INVITATION FOR BIDS

(IFB # 16-68)

LINCOLN PARK Renovation

Bid Opening: 11:00 AM, Wednesday, March 16, 2016

CITY OF SOMERVILLE, MASSACHUSETTS

Joseph A. Curtatone, Mayor

Purchasing Department
Angela M. Allen, Purchasing Director

Arn Franzen
Office Strategic Planning & Community Development.
City of Somerville
93 Highland Avenue
Somerville, MA 02143
PH: 617-625-6600 x2545
FX: 617-625-0722

LINCOLN PARK RENOVATION

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CITY OF SOMERVILLE MASSACHUSETTS
INVITATION FOR BID
LINCOLN PARK RENOVATION
Bid No. 16-68

Enclosed you will find an invitation for bid for:
LINCOLN PARK RENOVATION
290 Washington St., Somerville, MA

Plans and specifications will be available from 8:30 AM to 4:30 PM, Monday through Wednesday, 8:30 AM to 7:30 PM on Thursday, and 8:30 AM to 12:00 Noon, Fridays, at the Purchasing Department, 1st Floor, City Hall, 93 Highland Avenue, Somerville, MA 02143 starting **Wednesday, February 24, 2016.**

When submitting bid, please identify the bid name and number clearly. All bids must be sealed and delivered to Purchasing Department, City of Somerville, 93 Highland Ave., Somerville, MA 02143, **no later than 11:00AM, on Wednesday, March 16, 2016.**

Please mark the outside of all bid envelopes with the following:
"Bid #16-68, LINCOLN PARK" on the bid envelope.

BIDS SUBMITTED MUST BE AN ORIGINAL.
The completion of the following forms is necessary for consideration of a potential contract award. When submitting bid documents, please retain the order of documents as provided below:

1) **Form for General Bid**
2) **Unit Price Form**
3) **Somerville Living Wage Form**
4) **Acknowledgement of Notice to Bidders**
5) **Quality Requirements Form**
6) **Certificate of Non-Collusion & Tax Compliance**
7) **Certificate of Signature Authority**
8) **Signature Form complete when submitting your bid.**
9) **Reference Form**
10) **5% Bid Deposit**
11) **Prevailing Wages, Statement of Compliance Form**

NOTE: If Vendor is incorporated an updated "CERTIFICATE OF GOOD STANDING" from the Commonwealth of Massachusetts will be needed for the awarded vendor only.

CITY HALL HOURS HAVE BEEN CHANGED. WE ARE OPEN UNTIL 7:30 P.M. ON THURSDAYS AND CLOSE ON FRIDAYS AT 12:30 P.M.

Please review and return with your sealed bids as sent. Also, ensure that all forms are completed and that your bid response is submitted as requested.

Your cooperation is greatly appreciated.

PART 1, SECTION 2:

INSTRUCTIONS TO BIDDERS

(Chapter 30:39M or 30B:5 – Construction- Competitive Sealed Bids)

1. **NAME OF PROJECT**

LINCOLN PARK RENOVATION

2. **AWARDING AUTHORITY**
The City of Somerville (City), acting by and through the Purchasing Department, invites sealed bids for the LINCOLN PARK, in accordance with contract documents.

OSPCD Contact:
Arn Franzen
Office of Strategic Planning & Community Development
City of Somerville
93 Highland Avenue
Somerville, MA 02143
Phone (617) 625-6600 x2545
Fax: (617) 625-0722

3. LANDSCAPE ARCHITECT:

Weston & Sampson Engineers, Inc.
5 Centennial Drive
Peabody, MA 01960
978-532-1900

Contact: Cheri Ruane
ruanec@wseinc.com

4. **LOCATION OF PROJECT**
290 Washington St., Somerville, MA

5. **BRIEF DESCRIPTION OF WORK MORE PARTICULARLY DESCRIBED IN THE PLANS AND SPECIFICATIONS INCLUDED AS PART OF THIS BID PACKAGE.**

Construction documents for this project have been prepared by Weston & Sampson Engineers, Inc. who will act as the agent of the City, overseeing construction to ensure conformity to construction drawings, specifications, and standards. The City's Office of Strategic Planning and Community Development (OSPCD) is responsible for project management, and will also interact with the General Contractor during construction.

The City seeks a full range of construction services to renovate Lincoln Park. This 6+ acre restoration project is located in the densely populated Union Square neighborhood immediately adjacent to the Argenziano School. As such, the contractor will be required to exercise extreme care throughout the course of construction and abide by specific restrictions put in place by the City to protect students and neighbors within the immediate vicinity.

The project will include significant demolition and extensive earthwork to accommodate a 1.2m gallon capacity subsurface storm water management system and site regrading, new electrical service for pedestrian and sports lighting systems, natural grass rectangular playing field and softball diamond with appurtenances, expanded schoolyard featuring play equipment, an outdoor classroom, student gardens and multi-sport court, a new adventure playground with treehouse and net climbing features, resilient rubber and engineered wood surfacing, a new splash pad, new basketball court, specialized concrete work for a new parkour and skateboard area, extensive concrete walks for pedestrian circulation, community garden beds, site-wide fencing, significant tree and shrub plantings, irrigation, and signage.

Temporary facilities include but are not limited to robust construction fencing with scrims for dust; a trailer with power, reliable internet service, and temperature controls, and portable toilets.

Construction documents for this project have been prepared by SPURR, Weston and Sampson's Design Studio, which will act as the agent of the City, overseeing construction to ensure conformity to construction drawings, specifications, and standards. The City's Office of Strategic Planning and Community Development (OSPCD) is ultimately responsible for all project decisions, and a clerk of the woks representing the City will be on site throughout construction.

It is expected that the contractor will familiarize themselves with the site and shall proceed with extreme caution throughout the period of construction. Please consult all the plans and specifications for full scope of work, including important permitting requirements.

The contractor will maintain a set of construction drawings on site, documenting all changes.

At Final Completion, and prior to the payment of any retainage, the contractor will provide electronic and hard copies of as-built plans, a park maintenance manual, and a detailed site review of all systems with City staff.

A mandatory pre-construction meeting to be held on 3/2/16 at 3pm (meet at the project site at basketball court; address above) will be required of all potential contractors.

The contractor will be responsible for providing as-built drawings and a maintenance manual at final completion. The City will not assume maintenance of Lincoln Park until final completion and a park walk-through/review meeting with the Somerville Department of Public Works and OSPCD at which all systems and maintenance plans will be reviewed and approved by the Somerville Department of Public Works. After this approval, the contractor will submit the maintenance manual and as-built drawings to the City.

6. ESTIMATED CONSTRUCTION COST OF THE PROJECT

The estimated cost for the project is $ 7,200,000.00

7. PROJECT SCHEDULE:

Estimated Construction Start: June 22, 2016

Date of Substantial Completion
for the Argenziano Schoolyard: August 15, 2016

Date of Final Completion
for the Argenziano Schoolyard: August 29, 2016
100% completion of all work.

Date of Substantial Completion
for Lincoln Park: July 1, 2017

Date of Final Completion
for Lincoln Park: August 1, 2017
100% completion of all work.

Bidders are instructed to note the firmness of the dates of: Substantial Completion, and Final Completion. For the purpose of meeting these deadlines, the City may be prepared to authorize extended work hours beyond those prescribed by City ordinance, to include work on Sundays with the prior permission of the City.

Contractor submission of all paperwork required for the Construction Contract, including but not limited to insurance certificates, performance and payment bonds, a certificate of good standing from the Secretary of Corporations, and signature pages shall be submitted to the Purchasing Director no later than 5 working days from award of the contract.

The successful bidder shall be required to submit a preliminary construction schedule within 10 days of the established date of award of the Contract and a more detailed Gantt-type construction schedule within 15 days of the established award of the contract, which shows the dates of substantial and final completion.

8. GOVERNING LAW

Massachusetts General Laws, c. 30, §39M.

9. SALES TAX EXEMPTION

Materials, equipment, and supplies for this project are exempt from sales tax in accordance with M.G.L. Chapter 64H, Section 6 (d). The city will furnish the successful bidder with its sales tax exemption number.

10. PERMIT FEES (Contractor responsible obtaining permits/City of Somerville permit fees waived)

DPW permits to obstruct or excavate the public streets and/or sidewalks; ISD building code permits; and Traffic and Parking permits; are waived by the City of Somerville. However, license fees are not waived by the City of Somerville. The Contractor shall pay all license fees (e.g., drain layer's license fee). The City of Somerville Traffic and Parking Department must be contacted directly for all required permits. The vendor must also provide the City of Somerville Traffic and Parking Department with a traffic management plan, prior to the start of all work

If water usage is required in the commitment of this project, the Contractor needs to contact the DPW Water Dept., and make arrangements for a water meter. There will be a charge for the water meter and the water usage.

The Contractor is responsible for obtaining NSTAR work orders and for all costs and fees associated with NSTAR.

Permits to excavate the public way cannot be issued until the applicant has notified the appropriate utility companies, as required by Massachusetts General Laws, Chapter 370 of the Acts of 1963. The applicant must either: 1) obtain written receipts from the affected utilities, and provide copies of same to the owner; or 2) utilize the Dig-Safe System for the required notifications, and also submit written notifications for those utilities not participating in the Dig-Safe System. Written notifications must state that utility companies have been notified and the contractor cleared to begin work.

The following utility companies must be notified in writing:

M.B.T.A. Engineering and Maintenance Division **617-722-5454**
Attn: Mr. William Bregoli, Chief Engineer
500 Arborway
Jamaica Plain, MA 02130

M.W.R.A. Sewer Division **617-242-6000**
100 First Avenue
Charlestown Navy Yard
Boston, MA 02129

M.W.R.A. Water Division **617-242-6000**
100 First Avenue
Charlestown Navy Yard

Boston, MA 02129

The following utility companies must be notified in writing or through Dig-Safe;

Algonquin Gas Transmission Corp. **617-254-4050**
Attn: Mr. James Grasso
Manager of Land and Public Relations
1284 Soldiers Field Road
Brighton, MA 02135

Verizon **781-290-5154**
Attn: Mr. Jim Warren
460 Totten Pond Road
Waltham, MA 02154

Boston Edison **617-541-5730**
Attn: Mr. William Lemos
Right of Way
1165 Massachusetts Avenue
Dorchester, MA 02125

Boston Gas Company **617-323-9210**
Attn: Mr. Dennis Peri
201 Rivermoor Street
West Roxbury, MA 02132

N-Star Electric **617-497-1236, x4195**
Attn: Mr. Wendell Berthelson
46 Blackstone Street
Somerville, MA 02139

N-Star Steam **617-225-4568**
Attn: Mr. Thomas Connelly
Supervisor of Maintenance
265 First Street
Somerville, MA 02142

N-Star Gas **617-369-5591**
Attn: Mr. Steve Richmond
303 Third Street
Somerville, MA 02142

A T & T Broadband **981-658-0400, x2210**
Attn: Mr. Rich Ferrucci
760 Main Street
Malden, MA 01887

Somerville Public Works Department **617-625-6600, x5200**
One Franey Road
Somerville, MA 02145

Somerville Fire Department **617-625-6600, x8100**
266 Broadway
Somerville, MA 02143

Dig-Safe **1-800-322-4844**

The contractor shall have all utilities marked out along the course of this work by such means as the Engineer shall approve and shall preserve such marked locations until the work has progressed to the point where the encountered utility is fully exposed and protected as required. It shall be the contractor's responsibility to notify utilities at least 48 hours prior to the start of any excavation.

The contractor is responsible for contacting any other utilities that are not listed herein.

11. MINIMUM QUALIFICATION CRITERIA

- All bidders must have been conducting business, in this specified field, for a minimum of five (5) years.
- All bidders must have successfully constructed a minimum of three (3) municipal park projects similar in magnitude ($4,500,000 - $5,000,000) within the last six (6) years.

12. *MANDATORY* PRE-BID CONFERENCE, QUESTIONS, AND INFORMATION

A MANDATORY pre-bid Conference and site visit, will be held on Wednesday, March 2, 2016 at 3:00 PM. Please meet at the basketball court at LINCOLN PARK (290 Washington St, Somerville).

All questions regarding the project and this Invitation For Bid should be in writing, submitted to Purchasing Department, Somerville City Hall, First Floor, 93 Highland Avenue, Somerville, Massachusetts, 02143. Questions may be submitted either by mail or email to anosnik@somervillema.gov. Questions must be submitted in writing **by 12:00 pm, Friday, March 4, 2016;** they will be answered in writing (via addendum) to all registered bid holders. Bidders must submit an email address. If any bidders contact any other person or department outside of Purchasing with inquiries, they may be disqualified from the bidding process.

Key Dates

Mandatory Pre-Bid Meeting	3:00PM	Wednesday, March 2, 2016
Deadline for Questions	12:00 PM	Friday, March 4, 2016
Bids Due and Opened	11:00 AM	Wednesday, March 16, 2016
Evaluation of Bid Documentation Begins		Thursday, March 17, 2016
Anticipated Contract Award		March 25, 2016
Anticipated Notice to Proceed		March 30, 2016
Commencement of Work		June 22, 2016

13. BID SUBMISSION TIME AND PLACE OF BID OPENING

Sealed bids (clearly identified as a bid and endorsed with the name and address of the bidder) must be received at the Purchasing Department, First floor, City Hall, 93 Highland Avenue, Somerville, MA, 02143 on or before **11:00 AM, Wednesday, March 16, 2016**, at which time they will be publicly opened and read aloud. In the event City Hall is closed, the deadline shall be 11:00 am on the next day City Hall is open for business.

ADDITIONAL REQUIREMENTS: PLEASE READ CAREFULLY, FAILURE TO MEET THESE REQUIREMENTS COULD RESULT IN REJECTION OF A BID.

14. BID SUBMISSION REQUIREMENTS

Bid Signature

A bid must be signed as follows: 1) if the bidder is an individual, by her/him personally; 2) if the bidder is a partnership, by the name of the partnership, followed by the signature of each general partner; and 3) if the bidder is a corporation, by the authorized officer, whose signature must be a person named on the Corporate Secretary's Certificate of Authority.

Changes and Addenda

If any changes are made to this IFB, an addendum will be issued. Addenda will be emailed to all bidders on record as having picked up the IFB. No changes may be made to the bid documents, except as authorized in an addendum from the Purchasing Department.

Modification or Withdrawal of Bids, Mistakes, and Minor Informalities

A bidder may correct, modify, or withdraw a bid by written notice received by the City of Somerville prior to the time and date set for the bid opening. Bid modifications must be submitted in a sealed envelope clearly labeled "Modification No.__" to the address listed in part one of this section. Each modification must be numbered in sequence, and must reference the original IFB.

After the bid opening, a bidder may not change any provision of the bid in a manner prejudicial to the interests of the City or fair competition. Minor informalities will be waived or the bidder will be allowed to correct them. If a mistake and the intended correct bid are clearly evident on the face of the bid document, the mistake will be corrected to reflect the intended correct bid, and the bidder will be notified in writing; the bidder may not withdraw the bid. A bidder may withdraw a bid if a mistake is clearly evident on the face of the bid document, but the intended correct bid is not similarly evident.

Right to Cancel/Reject Bids

The City of Somerville may cancel this IFB, or reject any and all bids, if the City determines that cancellation serves the best interests of the City; or that such rejection of bids is in the public interest.

Bid Prices to Remain Firm
All bid prices submitted in response to this IFB must remain firm for 60 days following the bid opening.

Unbalanced Bids
The City reserves the right to reject unbalanced, front loaded, and conditional bids.

Documents to be Submitted as part of Bid
The following documents must be submitted with the complete signed bid package:

Form for General Bid (Section 00300)

Unit Price Form (Section 00315)

Somerville Living Wage Form (Section 00320)

Acknowledgement of Notice to Bidders (Section 00330)

Quality Requirements Form (Section 00335)

Certificate of Non-Collusion and Tax Compliance (Section 00340)

Certificate of Signature Authority (Section 00350)

Signature Form (Section 00360)

Reference Form (Section 00370)

Bid bond (Section 00380)

Wage Compliance Form (Section 00385)

OSHA Certification

Vendor's Health and Safety Plan

Project Schedule (please include a draft project schedule in your bid)

Schedule of Values. Bidders do NOT need to include a Schedule of Values with their bid package. The successful bidder will be required to submit a refined and detailed schedule of values for review and approval by the design professional prior to signing the construction contract.

5% Statutory Bid Guaranty. All bids shall be accompanied by a bid bond or bank certified check or bank treasurer's check in the amount of 5% of the bid price, which shall become

the property of the City of Somerville if the bid is accepted and the bidder neglects or refuses to comply with the terms of the bid.

For successful bidder: Certificate of Good Standing: If the bidder is a corporation, a Certificate of Good Standing should accompany the signed contract. Certificate available online at:http://corp.sec.state.ma.us/corp/Certificates/Certificate_Request.asp
or call Tel: (617) 727-9640 for more information.

15. PREVAILING WAGE RATE REQUIREMENTS

The contractor shall pay Mass. Prevailing Wage Rates. The applicable prevailing wage rates are attached as part of this bid package and will be included as Appendix J in the contract. A signed Compliance Form must be included with the bid package (form included).

(a) The Contractor shall pay Mass. Prevailing Wage Rates set forth in Appendix J. Notwithstanding anything to the contrary, the City may, in its sole discretion withhold payment unless the City has in its possession payroll records that are complete, accurate, and current as of the date of said application for payment.

(b) The Contractor shall:
- (1) Pay wages at least once a week;
- (2) Submit payroll information on a weekly basis in a format approved by the City, numbered in numerical sequence and signed by the Contractor (including forms for weeks when the Contractor is not on the Project Site, in which case there shall be a notation to the effect "no work this payroll period" and a date anticipated for resuming work).

(c) The Contractor shall submit to the City within the first week of construction:
- (1) A list of apprenticeship programs with which the Contractor is affiliated;
- (2) The number of apprentices that will be employed by the Contractor on the Project;
- (3) A list of the Contractor's employee fringe benefits;
- (4) A copy of each project schedule, including the anticipated commencement date for each Subcontractor; and
- (5) A list of each Subcontractor's suppliers and material men.

(d) The Contractor shall include language similar to the above in all subcontracts.

16. SAMPLE CONSTRUCTION CONTRACT

The successful bidder shall execute with the City of Somerville a Public Works Contract ("Contract") in substantially the same form as the sample contract included in this bid package. In addition to the items submitted with the bid, the contract includes certain other documents which may be executed by the Bidder selected as contractor and which are included as Appendices to the Sample Construction Contract (see Part 2) include:

Appendix F: Certificate of Authority (for corporations if the contract is signed by anyone other than the President, there must be a current Certificate of Vote signed by the

corporate clerk or secretary stating who is authorized to sign contracts on the Corporations behalf)

Appendix D: Insurance Certificates– evidencing minimum coverage as follows:
General Liability - $2,000,000 per occurrence, $2,000,000 aggregate
Automobile Liability: $1,000,000 per occurrence, $1,000,000 aggregate
Workman's Compensation: statutory coverage
Certificates must stipulate "City of Somerville" as a certificate holder and as an additional insured for general liability.

Appendix F: Certificate of Good Standing: Certificate available online at http://corp.sec.state.ma.us/corp/Certificates/Certificate_Request.asp
or call Tel: (617) 727-9640 for more information.

Appendix H: Statement of Management (for contracts over $100,000.00)

Appendix I: Performance and Payment Bonds for 100% of the contract sum

All paperwork required for the contract shall be completed and delivered to the Purchasing Department no later than five (5) working days after the Award of the Contract.

ITEMS OF SPECIAL CONSIDERATION
The Contractor's attention is specifically drawn to the following items of special consideration relative to this project, most of which are also addressed in the Technical Specifications.

a. The Contractor must provide police details at the Contractor's expense.
b. All new Handicapped Accessible ramps must meet the most current state ADA and City of Somerville standards.
c. The Contractor must obtain all street and sidewalk permits as necessary.

19. RESERVATION OF RIGHTS

The City reserves the right to extend the deadline for submission of bids, to waive minor informalities, and to reject any and all bids, if in its sole judgment, the best interests of the City of Somerville would be served by doing so.

20. RULE FOR AWARD

A contract will be awarded to the lowest responsible and eligible bidder. All required bid documents must be provided to be deemed responsible and eligible.

21. MAINTENANCE MANUAL AND AS-BUILT DRAWING REQUIREMENTS

Upon Final Completion of all park construction, the contractor shall submit: two complete copies of a park maintenance manual, and two copies of an as-built drawing set, with two compact disc (CD) copies of the as-built drawings.

The City will not issue the final check for park retainage until the submittal and approval of the maintenance manual and as-built drawings.

1) The Maintenance Manual shall be in the form of a three ring binder, organized and tabbed into appropriate sections, and shall include the following items:

    - A complete landscape maintenance plan with recommended maintenance schedules and procedures for all park systems including: watering, fertilization, spring start up procedures, fall clean-up, irrigation and water systems shut-down procedures, and park winterization procedures;
    - A letter from the contractor stating the period of warranty for all parts, materials, and workmanship, from the date of Final Completion;
    - A letter from the contractor stating the period of warranty for the irrigation system;
    - All product information, product directions, and warranties;
    - List of all plant material, and sizes of plant containers;
    - Copies of City permits with signatures of inspectors;
    - Contact information for all subcontractors including email addresses; and,
    - A record of all submittals and dates of approvals.

2) As-Built drawing shall be a complete and accurate record that incorporate any and all changes to the construction plan set issued at the time of contract initiation. As-built drawings shall be clearly marked and annotated and shall include but not be limited to: all field changes, change orders, and supplemental drawing provided by the landscape architect.

3) The Compact Discs shall include an electronic copy of all as-built drawings.

PART 1 SECTION 3

LINCOLN PARK
(IFB # 16-68)

BID SUBMISSION DOCUMENTS

BIDDERS NAME: _____

This Bid Submission includes the following:

_____ Form for General Bid

_____ Unit Price Form

_____ Project Schedule (please include a draft project schedule in your bid)

_____ Somerville Living Wage Form

_____ Acknowledgement of Notice to Bidders

_____ Quality Requirements

_____ Certificate of Non-Collusion and Tax Compliance

_____Certificate of Signature Authority

_____Signature Form

_____Reference Form

_____5% Statutory Bid Bond or Guaranty

_____Wage Rate Compliance Forms

_____OSHA Certification

_____Vendor's Health and Safety Plan

Part 1 Section 00300: FORM FOR GENERAL BID
FOR CONSTRUCTION CONTRACT

To the Awarding Authority:

A. The undersigned proposes to furnish all labor and materials required for:

LINCOLN PARK

in accordance with the accompanying plans and specifications prepared by

Weston & Sampson Engineers, Inc.
5 Centennial Drive
Peabody, MA 01960
978-532-1900

Contact: Cheri Ruane
ruanec@wseinc.com

specified below, subject to additions and deductions according to the terms of the specifications.

B. This bid includes addenda #1_____, #2 _____, #3 _____, #4 _____.

C. The proposed contract price is:

$_____.
(total bid in figures)

_____DOLLARS
(total bid in words)

D. While the proposed contract price does not include the items listed on the attached "Bid Form for Alternates," ***(NOT APPLICABLE)*** the bidder understands that the project construction cost estimate provided by the city is inclusive of all the work described in this form.

E. The Undersigned Bidder agrees that, if it is selected as general contractor, it will within five working days, Saturdays, Sundays and legal holidays excluded, after presentation thereof by the Awarding Authority, execute a contract in accordance with the terms of this bid, including furnishing a 100% performance bond and a 100% labor and materials or payment bond, each of a surety company qualified to do business under the laws of the Commonwealth of Massachusetts and

satisfactory to the Awarding Authority and each in the sum of the contract price, the premiums for which are to be paid by the general contractor and are included in the contract price; and, in addition, furnishing a certificate of good standing and insurance certificates as required by the bid documents.

F. The Undersigned Bidder hereby certifies that it is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the Project and that it will comply fully with all laws and regulations applicable to this Award, including applicable provisions of MGL Chapter 30, ss. 39M et seq.

G. The Undersigned Bidder further certifies under the penalties of perjury that this bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this certification, the word "person" shall mean any natural person, business, partnership, corporation, union, committee, club, or other organization, entity, or group of individuals.

H. The Undersigned Bidder certifies under the penalties of perjury that:

(1) Pursuant to M.G.L. c. 62C, §49A, to the best of the signatories knowledge and belief, that the Undersigned Bidder is in compliance with all laws of the Commonwealth relating to taxes, reporting of employees and contractors, and withholding and remitting child support, as well as paid all contributions and payments in lieu of contributions pursuant to MGL 151A, §19A(b), and

(2) the Federal Employer Identification Number (EIN) of the Bidder is # _____, and that it is in compliance with all federal, state, and local laws regarding taxation.

I. The Undersigned Bidder certifies under penalties of perjury that the Bidder is not presently debarred from doing federal or state public construction work, that the Bidder has not had its low bid rejected by any municipality in the previous two years, except _____
in which case the reasons for rejection were as follows:
_____

J. The Undersigned Bidder has submitted the information on the Reference Form:

- (00370-1), requesting three references for municipal park projects completed during the previous six (6) years. The Undersigned Bidder understands that the contractor and subcontractors will be required to pay prevailing wages to laborers and mechanics, and that if the Undersigned's bid is significantly below the average bid, the Awarding Authority may require the Bidder to substantiate that the bid is based on payment of wages at prevailing rates.

M. The Undersigned Bidder certifies that it can achieve ***substantial completion of*** ***Argenziano Schoolyard*** by: _____ and achieve ***Final Completion of*** ***Argenziano Schoolyard*** by: _____; and,

can achieve ***substantial completion of Lincoln Park*** by: _____ and achieve ***Final Completion of Lincoln Park*** by: _____.

N. Unit Price Form

1. Should certain additional work be required, or should the quantities of certain classes of work be increased or decreased from those required by the Contract Documents, by authorization of the City, unit prices listed on the attached "Unit Price Form" shall at the option of the City be the basis of payment to the Contractor or credit to the City, for such increase or decrease in the work. The unit prices shall represent the exact net amount per unit to be paid the Contractor (in the case of addition or increase) or to be refunded the City (in the case of decrease). Contractually noted adjustments will be allowed for overhead, profit, insurance or other direct or indirect expenses of the Contractor or Subcontractors.

2. The unit prices shall include cost of fuel, all labor, materials, equipment, overhead, profit, insurance, etc. to cover the finished work of the several kinds called for. Changes shall be processed in accordance with the provisions of the General Conditions governing changes in the work.

Executed this_____day of_____ , 2016.

On behalf of :

_____
(Undersigned Bidder Business Name)

_____

_____
(Business Address) and (Telephone)

By:

_____

(Name and Address of Person Signing Bid)

_____

(Title of Person Signing bid)

_____

(Signature)

Item No.	Brief Description (1), Unit or Lump Sum Price (In Both Words and Figures)	LINCOLN PARK		
		Unit	Total Add	Total Deduct
1	**MISCELLANEOUS EARTHWORK**			
1a	**R&D unsuitable material, per cubic yard**			
		CY	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
1b	**R&D rock ledge material, per cubic yard**			
		CY	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
1c	**Changes in earthwork, per cubic yard**			
		CY	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
1d	**Gravel borrow, per cubic yard**			
		CY	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
1e	**Loam borrow, per cubic yard**			
		CY	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
1f	**Sand loam borrow, per cubic yard**			
		CY	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
1g	**Planting medium per cubic yard**			
		CY	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			

(1) All items to be furnished in place per contract documents unless otherwise noted.

Item No.	Brief Description (1), Unit or Lump Sum Price (In Both Words and Figures)	LINCOLN PARK		
		Unit	Total Add	Total Deduct
2	**SITE WORK**			
2a	**Heavy duty bituminous concrete pavement, per square foot**			
		SF	$	$
	Unit price, Dollars and cents (words) $			
	Unit Price in Figures			
2b	**Bituminous concrete pavement, per square foot**			
		SF	$	$
	Unit price, Dollars and cents (words) $			
	Unit Price in Figures			
2c	**Concrete pavement, per square foot**			
		SF	$	$
	Unit price, Dollars and cents (words) $			
	Unit Price in Figures			
2d	**Integral colored concrete pavement, per square foot**			
		SF	$	$
	Unit price, Dollars and cents (words) $			
	Unit Price in Figures			
2e	**Cast-in-place concrete retaining wall- 8" wide, per linear foot**			
		LF	$	$
	Unit price, Dollars and cents (words) $			
	Unit Price in Figures			
2c	**Cast-in-place concrete retaining wall- 12" wide, per linear foot**			
		LF	$	$
	Unit price, Dollars and cents (words) $			
	Unit Price in Figures			
2d	**Cast-in-place concrete retaining wall- 18" wide, per linear foot**			
		LF	$	$
	Unit price, Dollars and cents (words) $			
	Unit Price in Figures			

(1) All items to be furnished in place per contract documents unless otherwise noted.

Item No.	Brief Description (1), Unit or Lump Sum Price (In Both Words and Figures)	LINCOLN PARK		
		Unit	Total Add	Total Deduct
2e	**Cast-in-place freestandng concrete wall & footing, per linear foot**			
		LF	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
2f	**Color sealcoating, per square yard**			
		SY	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
2g	**Granite curb with 6" reveal, per linear foot**			
		LF	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
2h	**Cast-in-place concrete mow curb- 6" width, per linear foot**			
		LF	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
2i	**Cast-in-place concrete mow curb- 12" width, per linear foot**			
		LF	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
2j	**Poured in place resilient surfacing, per square foot**			
		SF	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
2k	**Remove existing tree 6" DBH, grind stump, per each**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			

(1) All items to be furnished in place per contract documents unless otherwise noted.

Item No.	Brief Description (1), Unit or Lump Sum Price (In Both Words and Figures)	LINCOLN PARK Unit	Total Add	Total Deduct
2l	**Remove existing tree 12" DBH, grind stump, per each**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
2m	**Remove existing catch basin complete, per each**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
2m	**Remove existing drainline, per linear foot**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
2o	**Remove concrete retaining wall, per linear foot**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
2p	**Remove chain link fencing, per linear foot**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
3	**SITE FURNISHINGS**			
3a	**Metal picket fence 48" high, per linear foot**			
		LF	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
3b	**Metal picket fence 48" high single-leaf gate, per ea.**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			

(1) All items to be furnished in place per contract documents unless otherwise noted.

Item No.	Brief Description (1), Unit or Lump Sum Price (In Both Words and Figures)	LINCOLN PARK		
		Unit	Total Add	Total Deduct
3c	**Back vinyl coated chain link fence 8' high complete, per lf**			
		LF	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
3d	**Back vinyl coated chain link fence 30' high complete, per lf**			
		LF	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
3e	**Black vinyl coated chin link fabric only 8' high, per linear foot**			
		LF	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
3f	**Hand rails at stairs, per linear foot**			
		LF	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
3g	**Curved wooden bench with concrete footing, per each**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
3h	**Picnic table, per each**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	Unit Price in Figures			
3i	**Chaise lounge chairs, per each**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			

(1) All items to be furnished in place per contract documents unless otherwise noted.

Item No.	Brief Description (1), Unit or Lump Sum Price (In Both Words and Figures)	LINCOLN PARK		
		Unit	Total Add	Total Deduct
3j	**Park bench, per each**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
3k	**Hammock, per each**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
3l	**Park entry sign-type 1, per each**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
3m	**Park entry sign-type 2, per each**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
3n	**Pedestrian light pole with footing, per each**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
3o	**Bollard light with footing, per each**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
3p	**Electrical service to poles complete, per linear foot**			
		LF	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
3q	**Drinking fountain with bottle filling station installed, per each**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			

(1) All items to be furnished in place per contract documents unless otherwise noted.

Item No.	Brief Description (1), Unit or Lump Sum Price (In Both Words and Figures)	LINCOLN PARK		
		Unit	Total Add	Total Deduct
3r	**Drinking fountain with dog bowel station installed, per each**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
3s	**Big Belly' Trash and recycling receptacles on conrete pad complete, per each**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
3t	**City standard trash and recycling receptacles on conrete pad complete, per each**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
3u	**City standard bicycle rack on conrete pad complete, per each**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
4	**WATER SERVICE**			
4a	**1" PVC pipe, per linear foot**			
		LF	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
4b	**1.5" PVC pipe, per linear foot**			
		LF	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
4c	**4" water gate complete, per each**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			

(1) All items to be furnished in place per contract documents unless otherwise noted.

Item No.	Brief Description (1), Unit or Lump Sum Price (In Both Words and Figures)	LINCOLN PARK Unit	Total Add	Total Deduct
4d	**4" copper water service, per linear foot**			
		LF	$	$
	Unit price, Dollars and cents (words) $ *Unit Price in Figures*			
5	**DRAINAGE STRUCTURES**			
5a	**Area drain, per each**			
		EA	$	$
	Unit price, Dollars and cents (words) $ *Unit Price in Figures*			
5b	**Catch basin, per each**			
		EA	$	$
	Unit price, Dollars and cents (words) $ *Unit Price in Figures*			
5c	**Drain manhole, per each**			
		EA	$	$
	Unit price, Dollars and cents (words) $ *Unit Price in Figures*			
5d	**Drain inlet, per each**			
		EA	$	$
	Unit price, Dollars and cents (words) $ *Unit Price in Figures*			
5e	**ADS N-12 drainline 12", per linear foot**			
		LF	$	$
	Unit price, Dollars and cents (words) $ *Unit Price in Figures*			
5f	**HDPE perforated lateral drainline 4" complete, per linear foot**			
		LF	$	$
	Unit price, Dollars and cents (words) $ *Unit Price in Figures*			
5g	**HDPE perforated collector drainline 12" complete, per linear foot**			
		LF	$	$
	Unit price, Dollars and cents (words) $ *Unit Price in Figures*			

(1) All items to be furnished in place per contract documents unless otherwise noted.

Item No.	Brief Description (1), Unit or Lump Sum Price (In Both Words and Figures)	LINCOLN PARK		
		Unit	Total Add	Total Deduct
6	**PLANTING**			
6a	**Acer saccharaum, Sugar Maple 3-3.5" cal, per each**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
6b	**Betula utilis'Jacquemontii' Whitebark Himalayan Birch, 3-3.5" cal. per each**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
6c	**Cladrastis Kentuckea Yellowood, 3-3.5" cal. per each**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
6d	**Carya ovata Shagbark Hickory, 3-3.5" cal. per each**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
6e	**Gleditsia triacanthos 'Inermis' Honey Locust , 3-3.5" cal. per each**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
6f	**Liquidambar styraciflua 'Rotundiloba', 3-3.5" cal. per each**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
6g	**Leriodendron Tulipofera, Tulipo Tree, 3-3.5" cal. per tree**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
6h	**Malus domestica 'Crimson Crisp' dwarf, Early Crimson Apple, 3-3.5" cal. per tree**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
6i	**Platanus x Acerifolia, London Plane Tree, 3-3.5" cal. per tree**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			

(1) All items to be furnished in place per contract documents unless otherwise noted.

Item No.	Brief Description (1), Unit or Lump Sum Price (In Both Words and Figures)	LINCOLN PARK		
		Unit	Total Add	Total Deduct
6j	**Quercus rubrum, Red Oak, 3-3.5" cal. per tree**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
6k	**Picea pungens, Blue Spruce 3-3.5" cal. per tree**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
6l	**Abies concolor, White Fir 3-3.5" cal. per tree**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
6m	**Athletic field seed, per square yard**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
6n	**Lawn seed, per square yard**			
		EA	$	$
	Unit price, Dollars and cents (words)			
	$			
	Unit Price in Figures			
			Total Bid in Figures	*Total Bid in Figures*
			Total Bid, Dollars and Cents (words)	*Total Bid, Dollars and Cents (words)*

(1) All items to be furnished in place per contract documents unless otherwise noted.

SOMERVILLE LIVING WAGE ORDINANCE CERTIFICATION FORM

CITY OF SOMERVILLE CODE OF ORDINANCES SECTION 2-397 et seq[*].

Instructions: This form shall be included in all Invitations for Bids and Requests for Proposals which involve the furnishing of labor, time or effort (with no end product other than reports) by vendors contracting or subcontracting with the City of Somerville, where the contract price meets or exceeds the following dollar threshold: $10,000. If the undersigned is selected, this form will be attached to the contract or subcontract and the certifications made herein shall be incorporated as part of such contract or subcontract. **Complete this form and sign and date where indicated below on page 2.**

Purpose: The purpose of this form is to ensure that such vendors pay a "Living Wage" (defined below) to all covered employees (i.e., all employees except individuals in a city, state or federally funded youth program). In the case of bids, the City will award the contract to the lowest responsive and responsible bidder paying a Living Wage. In the case of RFP's, the City will select the most advantageous proposal from a responsive and responsible offeror paying a Living Wage. In neither case, however, shall the City be under any obligation to select a bid or proposal that exceeds the funds available for the contract.

Definition of "Living Wage": For this contract or subcontract, as of **7/1/2015** "Living Wage" shall be deemed to be an hourly wage of no less than **$12.24** per hour. From time to time, the Living Wage may be upwardly adjusted and amendments, if any, to the contract or subcontract may require the payment of a higher hourly rate if a higher rate is then in effect.

CERTIFICATIONS

1. The undersigned shall pay no less than the Living Wage to all covered employees who directly expend their time on the contract or subcontract with the City of Somerville.

2. The undersigned shall post a notice, (copy enclosed), to be furnished by the contracting City Department, informing covered employees of the protections and obligations provided for in the Somerville Living Wage Ordinance, and that for assistance and information, including copies of the Ordinance, employees should contact the contracting City Department. Such notice shall be posted in each location where services are performed by covered employees, in a conspicuous place where notices to employees are customarily posted.

3. The undersigned shall maintain payrolls for all covered employees and basic records relating hereto and shall preserve them for a period of three years. The records shall contain the name and address of each employee, the number of hours worked, the gross wages, a copy of the social

[*] Copies of the Ordinance are available upon request to the Purchasing Department.

security returns, and evidence of payment thereof and such other data as may be required by the contracting City Department from time to time.

4. The undersigned shall submit payroll records to the City upon request and, if the City receives information of possible noncompliance with the provisions the Somerville Living Wage Ordinance, the undersigned shall permit City representatives to observe work being performed at the work site, to interview employees, and to examine the books and records relating to the payrolls being investigated to determine payment of wages.

5. The undersigned shall not fund wage increases required by the Somerville Living Wage Ordinance by reducing the health insurance benefits of any of its employees.

6. The undersigned agrees that the penalties and relief set forth in the Somerville Living Wage Ordinance shall be in addition to the rights and remedies set forth in the contract and/or subcontract.

CERTIFIED BY:

Signature: _____
(Duly Authorized Representative of Vendor)

Title: _____

Name of Vendor:_____

Date: _____

INSTRUCTIONS: PLEASE POST

NOTICE TO ALL EMPLOYEES
REGARDING PAYMENT OF LIVING WAGE

Under the Somerville, Massachusetts' Living Wage Ordinance (Ordinance No. 1999-1), any person or entity who has entered into a contract with the City of Somerville is required to pay its employees who are involved in providing services to the City of Somerville no less than a "Living Wage".

The Living Wage as of **7/1/2015** is **$12.24** per hour. The only employees who are not covered by the Living Wage Ordinance are individuals in a Youth Program. "Youth Program" as defined in the Ordinance, "means any city, state or federally funded program which employs youth, as defined by city, state or federal guidelines, during the summer, or as part of a school to work program, or in any other related seasonal or part-time program."

For assistance and information regarding the protections and obligations provided for in the Living Wage Ordinance and/or a copy of the Living Wage Ordinance, all employees should contact the City of Somerville's Purchasing Department directly.

QUALITY REQUIREMENTS

Please respond to the following questions. A negative response to any of the first four questions will automatically disqualify the Bidder. A negative response to the fifth question about SOMWBA will not disqualify the Bidder.

	Yes	No
Has the contractor been established in this specified field for at least 5 years?		
Has the contractor successfully completed a minimum of three (3) similar sized Municipal Park projects ($4,500,000 - $5,000,000) within the past six (6) years?		
Has the Contractor included a Health and Safety Plan with their bid documents?		
Can the contractor certify that all employees have successfully completed at least 10 hours of OSHA approved training in Construction Safety and Health?		
Optional: Vendor: Are you a State Office for Minority and Women Owned Business Assistance (SOMWBA) certified minority- or woman-owned business?		

Non-Collusion Form and Tax Compliance Certification

Instructions: Complete each part of this two-part form and sign and date where indicated below.

A. NON-COLLUSION FORM

I, the undersigned, hereby certify under penalties of perjury that this bid or proposal has been made and submitted in good faith and without collusion or fraud with any other person.

As used in this certification, the word "person" shall mean any natural person, business, partnership, corporation, union, committee, club, or other organization, entity, or group of individuals.

Signature: _____
(Individual Submitted Bid or Proposal)
Duly Authorized

Name of Business or Entity:_____

Date: _____

B. TAX COMPLIANCE CERTIFICATION

Pursuant to M.G.L. c. 62C, §49A, I certify under the penalties of perjury that, to the best of my knowledge and belief, I am in compliance with all laws of the Commonwealth relating to taxes, reporting of employees and contractors, and withholding and remitting child support, as well as paid all contributions and payments in lieu of contributions pursuant to MGL 151A, §19A(b).

Signature: _____
(Duly Authorized Representative of Vendor)

Name of Business or Entity:_____

Social Security Number or Federal Tax ID#:_____

Date: _____

Print

Certificate of Authority
(Limited Liability Companies Only)

Instructions: Complete this form and sign and date where indicated below.

1. I, the undersigned, being a member or manager of

_____,
(Complete Name of Limited Liability Company)

a limited liability company (LLC) hereby certify as to the contents of this form for the purpose of contracting with the City of Somerville.

2. The LLC is organized under the laws of the state of: _____.

3. The LLC is managed by **(check one)** a ☐ Manager or by its ☐ Members.

4. I hereby certify that each of the following individual(s) is:
   - a member/manager of the LLC;
   - duly authorized to execute and deliver this contract, agreement, and/or other legally binding documents relating to any contract and/or agreement on behalf of the LLC;
   - duly authorized to do and perform all acts and things necessary or appropriate to carry out the terms of this contract or agreement on behalf of the LLC; and
   - that no resolution, vote, or other document or action is necessary to establish such authority.

Name	Title

5. **Signature**:_____

Printed Name: _____

Printed Title:_____

Date: _____

Print

Certificate of Authority
(Corporations Only)

Instructions: Complete this form and sign and date where indicated below.

1. I hereby certify that I, the undersigned, am the duly elected Clerk/Secretary of

_____.
(Insert Full Name of Corporation)

2. I hereby certify that the following individual _____
(Insert the Name of Officer who Signed the Contract and Bonds)

is the duly elected_____ of said Corporation.
(Insert the Title of the Officer in Line 2)

3. I hereby certify that on _____
(Insert Date: Must be *on or before* Date Officer Signed Contract/Bonds)

at a duly authorized meeting of the Board of Directors of said corporation, at which a quorum was present, it was voted that

_____ _____
(Insert Name of Officer from Line 2) (Insert Title of Officer from Line 2)

of this corporation be and hereby is authorized to make, enter into, execute, and deliver contracts and bonds in the name and on behalf of said corporation, and affix its Corporate Seal thereto, and such execution of any contract of obligation in this corporation's name and on its behalf, with or without the Corporate Seal, shall be valid and binding upon this corporation; and that the above vote has not been amended or rescinded and remains in full force and effect as of the date set forth below.

4. **ATTEST**:
Signature: _____ ***AFFIX CORPORATE SEAL HERE***
(**Clerk or Secretary)**
Printed Name: _____

Printed Title:_____

Date: _____
(Date Must Be *on or after* Date Officer Signed Contract/Bonds)

Print

NOTICE TO BIDDERS
BID #16-68

All bids must be in accordance with terms and conditions set forth herein as stated.

SECTION A. Sealed bids for: **LINCOLN PARK**. The bids will be received at the office of the Purchasing Director, Somerville City Hall, 93 Highland Avenue, Somerville, MA. 02143 no later than **Wednesday, March, 16, 2016 at 11:00 A.M.** at which time and place they will be publicly opened and read.

A *Mandatory* pre-bid conference and site visit, will be held on Wednesday, March 2, 2016 at 3:00 AM at the basketball courts at Lincoln Park (290 Washington St. Somerville, MA).

SECTION B. Forms of price bid, specifications and terms of contract can be obtained at the Purchasing Department office on or after **Wednesday, February 24, 2016.**

SECTION C. Bid envelopes shall be clearly marked as follows: **"Bid No: 16-68, Bid for LINCOLN PARK."**

SECTION D. If **awarded** vendor is a Corporation, vendor must comply with request for "Certificate of Good Standing". See attached instructions.

SECTION E. **INSURANCE: Awarded Vendor** must comply with insurance requirements as stated in the bid package.

SECTION F. Living Wage - see Somerville Living Wage Form (00320)
Higher of Davis Bacon / Prevailing Wage Rates – and Compliance Form

SECTION G. The requirements in Section **E or F** will be waived if the words "Non-Applicable" **(N/A)** are inserted in the space designated.

SECTION H. The copy of the bid deposited with the City will be accompanied by a bid guarantee in the amount of 5% of the proposed bid amount. A Bid bond, Certified Check, Treasurer's Check, or Cashier's Check made payable to the City must be submitted with each bid. Said bid guarantee will become the property of the City of Somerville if the proposal is accepted and the bidder either neglects or refuses to comply with the terms of the proposal. Bid guarantee will be returned within 30 days to all unsuccessful bidders.

SECTION I. A Performance Bond and a Payment Bond in the amount of 100% of the total contract price will be required by the City.

Part 1 Section 3: BID SUBMISSION DOCUMENTS

SECTION J. The Purchasing Director reserves the right to accept or reject any or all bids, to waive any minor informalities, if in her sole judgment, the best interest of the City of Somerville would be served by so doing.

SECTION K. The City reserves the right to cancel a contract, if awarded bidder does not respond to all necessary documents and required signature forms within ten (10) working days of receipt of contract.

SECTION L. The Vendor must certify that all employees to be provided have successfully completed at least ten (10) hours of OSHA approved training in Construction Safety and Health.

Signature: _____

Company: _____

By: _____ Title: _____

Date: Tel. No: _____ Fax: _____

Applicable to Corporations:

I hereby attest that the signatory to this bid has the authority to sign and submit bids for the Corporation.

ATTEST: _____
Secretary

CITY OF SOMERVILLE

SIGNATURE FORM

NAME OF COMPANY: _____

ADDRESS: _____

TELEPHONE #:_____FAX #: _____

DATE: _____ EMAIL: _____

SIGNATURE OF AUTHORIZED CONTRACTING OFFICIAL:

_____

TITLE: _____

RESIDENCE: _____

IF COMPANY IS A PARTNERSHIP:

FULL NAME AND RESIDENCE OF EACH PARTNER:

_____

_____

IF COMPANY IS A CORPORATION:

THE CORPORATE NAME IS: _____

THE CORPORATION IS ORGANIZED UNDER THE LAWS OF: _____

THE PRESIDENT IS: _____

THE TREASURER IS: _____

THE CLERK/SECRETARY OR ASSISTANT CLERK/SECRETARY WHO WILL EXECUTE THE CONTRACT AND SIGN THE CERTIFICATE OF AUTHORITY IS:

_____

NAME OF CORPORATION THAT WILL APPEAR ON A POTENTIAL CONTRACTUAL AGREEMENT IF DIFFERENT FROM ABOVE:_____.

NAME AND TITLE OF PERSON WHO WILL BE THE PRINCIPAL SIGNATORY ON THE CONTRACT IF OTHER THAN THE PRESIDENT:

NAME:___TITLE: _____

REFERENCE FORM

Bidder:_____

IFB Title: **IFB# 16-68 LINCOLN PARK**
Bidder must provide references from three municipalities for similar sized municipal park projects completed during the previous six (6) years.

1.)

Reference:_____ Contact:_____

Address:_____ Phone:_____

_____ Fax:_____

Names of all Key Personnel Assigned to the project (including the project manager):

_____

Description and date(s) of supplies or services provided:

_____

_____

2.)

Reference:_____ Contact:_____

Address:_____ Phone:_____

_____ Fax:_____

Names of all Key Personnel Assigned to the project (including the project manager):

_____

Description and date(s) of supplies or services provided:

_____

_____

3.)

Reference:_____ Contact:_____

Address:_____ Phone:_____

_____ Fax:_____

Names of all Key Personnel Assigned to the project (including the project manager):

_____

Description and date(s) of supplies or services provided:

_____

_____

4.)

Reference:_____ Contact:_____

Address:_____ Phone:_____

_____ Fax:_____

Names of all Key Personnel Assigned to the project (including the project manager):

_____

Description and date(s) of supplies or services provided:

_____

_____

5.)

Reference:_____ Contact:_____

Address:_____ Phone:_____

_____ Fax:_____

Names of all Key Personnel Assigned to the project (including the project manager):

_____

Description and date(s) of supplies or services provided:

_____

_____

WEEKLY PAYROLL RECORDS REPORT
& STATEMENT OF COMPLIANCE

In accordance with Massachusetts General Law c. 149, §27B, a true and accurate record must be kept of all persons employed on the public works project for which the enclosed rates have been provided. A Payroll Form has been printed on the reverse of this page and includes all the information required to be kept by law. Every contractor or subcontractor is required to keep these records and preserve them for a period of three years from the date of completion of the contract.

In addition, every contractor and subcontractor is required to submit a copy of their weekly payroll records to the awarding authority. For every week in which an apprentice is employed, a photocopy of the apprentice's identification card must be attached to the payroll report. Once collected, the awarding authority is also required to preserve those records for three years.

In addition, each such contractor, subcontractor, or public body shall furnish to the awarding authority directly, within fifteen days after completion of its portion of the work a statement, executed by the contractor, subcontractor or public body who supervises the payment of wages, in the following form:

STATEMENT OF COMPLIANCE

_____, 20_____

I,_____,_____
(Name of signatory party) (Title)

do hereby state:

That I pay or supervise the payment of the persons employed by

_____ on the _____
(Contractor, subcontractor or public body) (Building or project)

and that all mechanics and apprentices, teamsters, chauffeurs and laborers employed on said project have been paid in accordance with wages determined under the provisions of sections twenty-six and twenty-seven of chapter one hundred and forty nine of the General Laws.

Signature _____

Title _____

OSHA GENERAL CONTRACTOR CERTIFICATION FORM

Pursuant to Chapter 306 of the Acts of 2004
An Act Relative to the Health and Safety on Construction Projects

GENERAL CONTRACTOR'S CERTIFICATION – BID FORM

I, the undersigned, hereby certify under penalties of perjury that I, and all subcontractors who are not filed sub-bidders, shall:

> (1) that I am able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the work; (2) that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; and (3) that all employees to be employed in the work subject to this bid have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration.

As used in this certification, the word "person" shall mean any natural person, business, partnership, corporation, union, committee, club, or other organization, entity, or group of individuals.

Signature: _____
(Individual Submitting Bid)
Duly Authorized

Name of Business or Entity:_____

Date: _____

RETURN THIS FORM WITH YOUR BID

BID BOND OR GUARANTY

BIDDER TO INSERT HERE

Prevailing Wage Rates
Payroll Submission Forms

WEEKLY PAYROLL RECORDS REPORT
& STATEMENT OF COMPLIANCE

In accordance with Massachusetts General Law c. 149, §27B, a true and accurate record must be kept of all persons employed on the public works project for which the enclosed rates have been provided. A Payroll Form has been printed on the reverse of this page and includes all the information required to be kept by law. Every contractor or subcontractor is required to keep these records and preserve them for a period of three years from the date of completion of the contract.

In addition, every contractor and subcontractor is required to submit a copy of their weekly payroll records to the awarding authority. For every week in which an apprentice is employed, a photocopy of the apprentice's identification card must be attached to the payroll report. Once collected, the awarding authority is also required to preserve those records for three years.

In addition, each such contractor, subcontractor, or public body shall furnish to the awarding authority directly, within fifteen days after completion of its portion of the work a statement, executed by the contractor, subcontractor or public body who supervises the payment of wages, in the following form:

STATEMENT OF COMPLIANCE

_____, 20_____

I,_____,_____
(Name of signatory party) (Title)

do hereby state:

That I pay or supervise the payment of the persons employed by

_____ on the _____
(Contractor, subcontractor or public body) (Building or project)

and that all mechanics and apprentices, teamsters, chauffeurs and laborers employed on said project have been paid in accordance with wages determined under the provisions of sections twenty-six and twenty-seven of chapter one hundred and forty nine of the General Laws.

Signature _____

Title _____

MASSACHUSETTS WEEKLY CERTIFIED PAYROLL REPORT FORM

Company's Name:	Address:	Phone No.:	Payroll No.:

Employer's Signature:	Title:	Contract No:	Tax Payer ID No.	Work Week Ending:

Awarding Authority's Name:	Public Works Project Name:	Public Works Project Location:	Min. Wage Rate Sheet No.

General / Prime Contractor's Name:	Subcontractor's Name:

Employee Name & Complete Address	Employee is OSHA 10 Certified (?)	Work Classification:	Appr. Rate (%)	Hours Worked Su.	Mo.	Tu.	We.	Th.	Fr.	Sa.	Project Hours (A) All Other Hours	Hourly Base Wage (B)	"Employer" Hourly Fringe Benefit Contributions: Health & Welfare Insurance (C')	ERISA Pension Plan (D)	Supp. Unemp. (E)	Total Hourly Prev. Wage (B+C+D+E) (F)	Project Gross Wages (A x F) (G) Total Gross Wages	Check No. (H)
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	☐																	
	☐																	
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NOTE: Pursuant to MGL Ch. 149 s.27B, every contractor and subcontractor is required to submit a "true and accurate" copy of their weekly payroll records directly to the awarding authority. Failure to comply may result in the commencement of a criminal action or the issuance of a civil citation.

Date recieved by awarding authority
/ /

CHARLES D. BAKER
Governor

KARYN E. POLITO
Lt. Governor

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DEPARTMENT OF LABOR STANDARDS

Prevailing Wage Rates

As determined by the Director under the provisions of the Massachusetts General Laws, Chapter 149, Sections 26 to 27H

RONALD L. WALKER, II
Secretary

WILLIAM D MCKINNEY
Director

Awarding Authority: City of Somerville

Contract Number: IFB 16-68 **City/Town:** SOMERVILLE

Description of Work: Full scale renovation and restoration of Lincoln Park.

Job Location: 93 Highland Ave, Somerville, MA 02413

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

- This wage schedule applies only to the specific project referenced at the top of this page and uniquely identified by the "Wage Request Number" on all pages of this schedule.
- An Awarding Authority must request an updated wage schedule from the Department of Labor Standards ("DLS") if it has not opened bids or selected a contractor within 90 days of the date of issuance of the wage schedule. For CM AT RISK projects (bid pursuant to G.L. c.149A), the earlier of: (a) the execution date of the GMP Amendment, or (b) the bid for the first construction scope of work must be within 90-days of the wage schedule issuance date.
- The wage schedule shall be incorporated in any advertisement or call for bids for the project as required by M.G.L. c. 149, § 27. The wage schedule shall be made a part of the contract awarded for the project. The wage schedule must be posted in a conspicuous place at the work site for the life of the project in accordance with M.G.L. c. 149 § 27. The wages listed on the wage schedule must be paid to employees performing construction work on the project whether they are employed by the prime contractor, a filed sub-bidder, or any sub-contractor.
- All apprentices working on the project are required to be registered with the Massachusetts Division of Apprentice Standards (DAS). Apprentice must keep his/her apprentice identification card on his/her person during all work hours on the project. An apprentice registered with DAS may be paid the lower apprentice wage rate at the applicable step as provided on the prevailing wage schedule. **If an apprentice rate is not listed on the prevailing wage schedule for the trade in which an apprentice is registered with the DAS, the apprentice must be paid the journeyworker's rate for the trade.**
- The wage rates will remain in effect for the duration of the project, except in the case of multi-year public construction projects. For construction projects lasting longer than one year, awarding authorities must request an updated wage schedule. Awarding authorities are required to request these updates no later than two weeks before the anniversary of the date the contract was executed by the awarding authority and the general contractor. For multi-year CM AT RISK projects, awarding authority must request an annual update no later than two weeks before the anniversary date, determined as the earlier of: (a) the execution date of the GMP Amendment, or (b) the execution date of the first amendment to permit procurement of construction services. Contractors are required to obtain the wage schedules from awarding authorities, and to pay no less than these rates to covered workers. The annual update requirement is not applicable to 27F "rental of equipment" contracts.
- Every contractor or subcontractor which performs construction work on the project is required to submit weekly payroll reports and a Statement of Compliance directly to the awarding authority by mail or email and keep them on file for three years. Each weekly payroll report must contain: the employee's name, address, occupational classification, hours worked, and wages paid. Do not submit weekly payroll reports to DLS. A sample of a payroll reporting form may be obtained at http://www.mass.gov/dols/pw.
- Contractors with questions about the wage rates or classifications included on the wage schedule have an affirmative obligation to inquire with DLS at (617) 626-6953.
- Employees not receiving the prevailing wage rate set forth on the wage schedule may report the violation to the Fair Labor Division of the office of the Attorney General at (617) 727-3465.
- Failure of a contractor or subcontractor to pay the prevailing wage rates listed on the wage schedule to all employees who perform construction work on the project is a violation of the law and subjects the contractor or subcontractor to civil and criminal penalties.

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction						
(2 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	12/01/2015	$32.75	$10.41	$10.08	$0.00	$53.24
	06/01/2016	$33.25	$10.41	$10.08	$0.00	$53.74
	08/01/2016	$33.25	$10.91	$10.08	$0.00	$54.24
	12/01/2016	$33.25	$10.91	$10.89	$0.00	$55.05
(3 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	12/01/2015	$32.82	$10.41	$10.08	$0.00	$53.31
	06/01/2016	$33.32	$10.41	$10.08	$0.00	$53.81
	08/01/2016	$33.32	$10.91	$10.08	$0.00	$54.31
	12/01/2016	$33.32	$10.91	$10.89	$0.00	$55.12
(4 & 5 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	12/01/2015	$32.94	$10.41	$10.08	$0.00	$53.43
	06/01/2016	$33.44	$10.41	$10.08	$0.00	$53.93
	08/01/2016	$33.44	$10.91	$10.08	$0.00	$54.43
	12/01/2016	$33.44	$10.91	$10.89	$0.00	$55.24
ADS/SUBMERSIBLE PILOT *PILE DRIVER LOCAL 56 (ZONE 1)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2015	$88.29	$9.80	$19.23	$0.00	$117.32
AIR TRACK OPERATOR *LABORERS - ZONE 1*	12/01/2015	$36.10	$7.45	$13.55	$0.00	$57.10
	06/01/2016	$36.85	$7.45	$13.55	$0.00	$57.85
	12/01/2016	$37.85	$7.45	$13.55	$0.00	$58.85
For apprentice rates see "Apprentice- LABORER"						
ASBESTOS REMOVER - PIPE / MECH. EQUIPT. *HEAT & FROST INSULATORS LOCAL 6 (BOSTON)*	12/01/2015	$34.38	$10.40	$5.95	$0.00	$50.73
ASPHALT RAKER *LABORERS - ZONE 1*	12/01/2015	$35.60	$7.45	$13.55	$0.00	$56.60
	06/01/2016	$36.35	$7.45	$13.55	$0.00	$57.35
	12/01/2016	$37.35	$7.45	$13.55	$0.00	$58.35
For apprentice rates see "Apprentice- LABORER"						
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE *OPERATING ENGINEERS LOCAL 4*	12/01/2015	$43.73	$10.00	$14.90	$0.00	$68.63
	06/01/2016	$44.48	$10.00	$14.90	$0.00	$69.38
	12/01/2016	$45.73	$10.00	$14.90	$0.00	$70.63
	06/01/2017	$46.73	$10.00	$14.90	$0.00	$71.63
	12/01/2017	$47.73	$10.00	$14.90	$0.00	$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER *OPERATING ENGINEERS LOCAL 4*	12/01/2015	$43.73	$10.00	$14.90	$0.00	$68.63
	06/01/2016	$44.48	$10.00	$14.90	$0.00	$69.38
	12/01/2016	$45.73	$10.00	$14.90	$0.00	$70.63
	06/01/2017	$46.73	$10.00	$14.90	$0.00	$71.63
	12/01/2017	$47.73	$10.00	$14.90	$0.00	$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BARCO-TYPE JUMPING TAMPER *LABORERS - ZONE 1*	12/01/2015	$35.60	$7.45	$13.55	$0.00	$56.60
	06/01/2016	$36.35	$7.45	$13.55	$0.00	$57.35
	12/01/2016	$37.35	$7.45	$13.55	$0.00	$58.35
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER *LABORERS - ZONE 1*	12/01/2015	$36.10	$7.45	$13.55	$0.00	$57.10
	06/01/2016	$36.85	$7.45	$13.55	$0.00	$57.85
	12/01/2016	$37.85	$7.45	$13.55	$0.00	$58.85
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BOILER MAKER *BOILERMAKERS LOCAL 29*	01/01/2016	$41.62	$6.97	$16.21	$0.00	$64.80
	01/01/2017	$42.92	$6.97	$16.21	$0.00	$66.10

Apprentice - *BOILERMAKER - Local 29*

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	$27.05	$6.97	$10.54	$0.00	$44.56
2	65	$27.05	$6.97	$10.54	$0.00	$44.56
3	70	$29.13	$6.97	$11.35	$0.00	$47.45
4	75	$31.22	$6.97	$12.16	$0.00	$50.35
5	80	$33.30	$6.97	$12.97	$0.00	$53.24
6	85	$35.38	$6.97	$13.78	$0.00	$56.13
7	90	$37.46	$6.97	$14.59	$0.00	$59.02
8	95	$39.54	$6.97	$15.40	$0.00	$61.91

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	$27.90	$6.97	$10.54	$0.00	$45.41
2	65	$27.90	$6.97	$10.54	$0.00	$45.41
3	70	$30.04	$6.97	$11.35	$0.00	$48.36
4	75	$32.19	$6.97	$12.16	$0.00	$51.32
5	80	$34.34	$6.97	$12.97	$0.00	$54.28
6	85	$36.48	$6.97	$13.78	$0.00	$57.23
7	90	$38.63	$6.97	$14.59	$0.00	$60.19
8	95	$40.77	$6.97	$15.40	$0.00	$63.14

Notes:

Apprentice to Journeyworker Ratio:1:5

BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING) *BRICKLAYERS LOCAL 3 (BOSTON)*	02/01/2016	$49.86	$10.18	$19.14	$0.00	$79.18
	08/01/2016	$50.76	$10.18	$19.22	$0.00	$80.16
	02/01/2017	$51.33	$10.18	$19.22	$0.00	$80.73

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *BRICK/PLASTER/CEMENT MASON - Local 3 Boston*

Effective Date - 02/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.93	$10.18	$19.14	$0.00	$54.25
2	60	$29.92	$10.18	$19.14	$0.00	$59.24
3	70	$34.90	$10.18	$19.14	$0.00	$64.22
4	80	$39.89	$10.18	$19.14	$0.00	$69.21
5	90	$44.87	$10.18	$19.14	$0.00	$74.19

Effective Date - 08/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.38	$10.18	$19.22	$0.00	$54.78
2	60	$30.46	$10.18	$19.22	$0.00	$59.86
3	70	$35.53	$10.18	$19.22	$0.00	$64.93
4	80	$40.61	$10.18	$19.22	$0.00	$70.01
5	90	$45.68	$10.18	$19.22	$0.00	$75.08

Notes:

Apprentice to Journeyworker Ratio:1:5

BULLDOZER/GRADER/SCRAPER *OPERATING ENGINEERS LOCAL 4*	12/01/2015	$43.31	$10.00	$14.90	$0.00	$68.21
	06/01/2016	$44.06	$10.00	$14.90	$0.00	$68.96
	12/01/2016	$45.29	$10.00	$14.90	$0.00	$70.19
	06/01/2017	$46.28	$10.00	$14.90	$0.00	$71.18
	12/01/2017	$47.27	$10.00	$14.90	$0.00	$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
CAISSON & UNDERPINNING BOTTOM MAN *LABORERS - FOUNDATION AND MARINE*	12/01/2015	$36.45	$7.45	$13.75	$0.00	$57.65
	06/01/2016	$37.20	$7.45	$13.75	$0.00	$58.40
	12/01/2016	$38.20	$7.45	$13.75	$0.00	$59.40
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING LABORER *LABORERS - FOUNDATION AND MARINE*	12/01/2015	$35.30	$7.45	$13.75	$0.00	$56.50
	06/01/2016	$36.05	$7.45	$13.75	$0.00	$57.25
	12/01/2016	$37.05	$7.45	$13.75	$0.00	$58.25
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING TOP MAN *LABORERS - FOUNDATION AND MARINE*	12/01/2015	$35.30	$7.45	$13.75	$0.00	$56.50
	06/01/2016	$36.05	$7.45	$13.75	$0.00	$57.25
	12/01/2016	$37.05	$7.45	$13.75	$0.00	$58.25
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR *LABORERS - ZONE 1*	12/01/2015	$35.60	$7.45	$13.55	$0.00	$56.60
	06/01/2016	$36.35	$7.45	$13.55	$0.00	$57.35
	12/01/2016	$37.35	$7.45	$13.55	$0.00	$58.35
For apprentice rates see "Apprentice- LABORER"						
CARPENTER *CARPENTERS -ZONE 1 (Metro Boston)*	03/01/2015	$42.30	$9.80	$16.48	$0.00	$68.58

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *CARPENTER - Zone 1 Metro Boston*
Effective Date - 03/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.15	$9.80	$1.63	$0.00	$32.58
2	60	$25.38	$9.80	$1.63	$0.00	$36.81
3	70	$29.61	$9.80	$11.59	$0.00	$51.00
4	75	$31.73	$9.80	$11.59	$0.00	$53.12
5	80	$33.84	$9.80	$13.22	$0.00	$56.86
6	80	$33.84	$9.80	$13.22	$0.00	$56.86
7	90	$38.07	$9.80	$14.85	$0.00	$62.72
8	90	$38.07	$9.80	$14.85	$0.00	$62.72

Notes:

Apprentice to Journeyworker Ratio:1:5

CEMENT MASONRY/PLASTERING *BRICKLAYERS LOCAL 3 (BOSTON)*	01/01/2016	$46.44	$10.90	$18.71	$1.30	$77.35

Apprentice - *CEMENT MASONRY/PLASTERING - Eastern Mass (Boston)*
Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.22	$10.90	$12.21	$0.00	$46.33
2	60	$27.86	$10.90	$13.71	$1.30	$53.77
3	65	$30.19	$10.90	$14.71	$1.30	$57.10
4	70	$32.51	$10.90	$15.71	$1.30	$60.42
5	75	$34.83	$10.90	$16.71	$1.30	$63.74
6	80	$37.15	$10.90	$17.71	$1.30	$67.06
7	90	$41.80	$10.90	$18.71	$1.30	$72.71

Notes:
Steps 3,4 are 500 hrs. All other steps are 1,000 hrs.

Apprentice to Journeyworker Ratio:1:3

CHAIN SAW OPERATOR *LABORERS - ZONE 1*	12/01/2015	$35.60	$7.45	$13.55	$0.00	$56.60
	06/01/2016	$36.35	$7.45	$13.55	$0.00	$57.35
	12/01/2016	$37.35	$7.45	$13.55	$0.00	$58.35
For apprentice rates see "Apprentice- LABORER"						
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES *OPERATING ENGINEERS LOCAL 4*	12/01/2015	$44.73	$10.00	$14.90	$0.00	$69.63
	06/01/2016	$45.48	$10.00	$14.90	$0.00	$70.38
	12/01/2016	$46.73	$10.00	$14.90	$0.00	$71.63
	06/01/2017	$47.73	$10.00	$14.90	$0.00	$72.63
	12/01/2017	$48.73	$10.00	$14.90	$0.00	$73.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
COMPRESSOR OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2015	$30.13	$10.00	$14.90	$0.00	$55.03
	06/01/2016	$30.65	$10.00	$14.90	$0.00	$55.55
	12/01/2016	$31.52	$10.00	$14.90	$0.00	$56.42
	06/01/2017	$32.21	$10.00	$14.90	$0.00	$57.11
	12/01/2017	$32.90	$10.00	$14.90	$0.00	$57.80
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DELEADER (BRIDGE) *PAINTERS LOCAL 35 - ZONE 1*	01/01/2016	$49.51	$7.85	$16.10	$0.00	$73.46
	07/01/2016	$50.46	$7.85	$16.10	$0.00	$74.41
	01/01/2017	$51.41	$7.85	$16.10	$0.00	$75.36

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*
Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.76	$7.85	$0.00	$0.00	$32.61
2	55	$27.23	$7.85	$3.66	$0.00	$38.74
3	60	$29.71	$7.85	$3.99	$0.00	$41.55
4	65	$32.18	$7.85	$4.32	$0.00	$44.35
5	70	$34.66	$7.85	$14.11	$0.00	$56.62
6	75	$37.13	$7.85	$14.44	$0.00	$59.42
7	80	$39.61	$7.85	$14.77	$0.00	$62.23
8	90	$44.56	$7.85	$15.44	$0.00	$67.85

Effective Date - 07/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.23	$7.85	$0.00	$0.00	$33.08
2	55	$27.75	$7.85	$3.66	$0.00	$39.26
3	60	$30.28	$7.85	$3.99	$0.00	$42.12
4	65	$32.80	$7.85	$4.32	$0.00	$44.97
5	70	$35.32	$7.85	$14.11	$0.00	$57.28
6	75	$37.85	$7.85	$14.44	$0.00	$60.14
7	80	$40.37	$7.85	$14.77	$0.00	$62.99
8	90	$45.41	$7.85	$15.44	$0.00	$68.70

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

DEMO: ADZEMAN *LABORERS - ZONE 1*	12/01/2015	$35.50	$7.45	$13.55	$0.00	$56.50
For apprentice rates see "Apprentice- LABORER"						
DEMO: BACKHOE/LOADER/HAMMER OPERATOR *LABORERS - ZONE 1*	12/01/2015	$36.50	$7.45	$13.55	$0.00	$57.50
For apprentice rates see "Apprentice- LABORER"						
DEMO: BURNERS *LABORERS - ZONE 1*	12/01/2015	$36.25	$7.45	$13.55	$0.00	$57.25
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: CONCRETE CUTTER/SAWYER *LABORERS - ZONE 1*	12/01/2015	$36.50	$7.45	$13.55	$0.00	$57.50
For apprentice rates see "Apprentice- LABORER"						
DEMO: JACKHAMMER OPERATOR *LABORERS - ZONE 1*	12/01/2015	$36.25	$7.45	$13.55	$0.00	$57.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: WRECKING LABORER *LABORERS - ZONE 1*	12/01/2015	$35.50	$7.45	$13.55	$0.00	$56.50
For apprentice rates see "Apprentice- LABORER"						
DIRECTIONAL DRILL MACHINE OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2015	$43.31	$10.00	$14.90	$0.00	$68.21
	06/01/2016	$44.06	$10.00	$14.90	$0.00	$68.96
	12/01/2016	$45.29	$10.00	$14.90	$0.00	$70.19
	06/01/2017	$46.28	$10.00	$14.90	$0.00	$71.18
	12/01/2017	$47.27	$10.00	$14.90	$0.00	$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DIVER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2015	$58.86	$9.80	$19.23	$0.00	$87.89
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2015	$42.04	$9.80	$19.23	$0.00	$71.07
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2015	$63.06	$9.80	$19.23	$0.00	$92.09
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER/SLURRY (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2015	$88.23	$9.80	$19.23	$0.00	$117.26
For apprentice rates see "Apprentice- PILE DRIVER"						
DRAWBRIDGE OPERATOR (Construction) *ELECTRICIANS LOCAL 103*	09/01/2015	$45.67	$13.00	$15.89	$0.00	$74.56
	03/01/2016	$46.17	$13.00	$16.39	$0.00	$75.56
For apprentice rates see "Apprentice- ELECTRICIAN"						
ELECTRICIAN *ELECTRICIANS LOCAL 103*	09/01/2015	$45.67	$13.00	$15.89	$0.00	$74.56
	03/01/2016	$46.17	$13.00	$16.39	$0.00	$75.56

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ELECTRICIAN - Local 103*

Effective Date - 09/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$18.27	$13.00	$0.55	$0.00	$31.82
2	40	$18.27	$13.00	$0.55	$0.00	$31.82
3	45	$20.55	$13.00	$11.86	$0.00	$45.41
4	45	$20.55	$13.00	$11.86	$0.00	$45.41
5	50	$22.84	$13.00	$12.23	$0.00	$48.07
6	55	$25.12	$13.00	$12.58	$0.00	$50.70
7	60	$27.40	$13.00	$12.95	$0.00	$53.35
8	65	$29.69	$13.00	$13.32	$0.00	$56.01
9	70	$31.97	$13.00	$13.69	$0.00	$58.66
10	75	$34.25	$13.00	$14.06	$0.00	$61.31

Effective Date - 03/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$18.47	$13.00	$0.55	$0.00	$32.02
2	40	$18.47	$13.00	$0.55	$0.00	$32.02
3	45	$20.78	$13.00	$12.34	$0.00	$46.12
4	45	$20.78	$13.00	$12.34	$0.00	$46.12
5	50	$23.09	$13.00	$12.71	$0.00	$48.80
6	55	$25.39	$13.00	$13.07	$0.00	$51.46
7	60	$27.70	$13.00	$13.44	$0.00	$54.14
8	65	$30.01	$13.00	$13.81	$0.00	$56.82
9	70	$32.32	$13.00	$14.18	$0.00	$59.50
10	75	$34.63	$13.00	$14.55	$0.00	$62.18

Notes: :
App Prior 1/1/03; 30/35/40/45/50/55/65/70/75/80

Apprentice to Journeyworker Ratio:2:3***

ELEVATOR CONSTRUCTOR *ELEVATOR CONSTRUCTORS LOCAL 4*	01/01/2016	$54.53	$14.43	$14.96	$0.00	$83.92
	01/01/2017	$55.86	$15.28	$15.71	$0.00	$86.85

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ELEVATOR CONSTRUCTOR - Local 4*

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.27	$14.43	$0.00	$0.00	$41.70
2	55	$29.99	$14.43	$14.96	$0.00	$59.38
3	65	$35.44	$14.43	$14.96	$0.00	$64.83
4	70	$38.17	$14.43	$14.96	$0.00	$67.56
5	80	$43.62	$14.43	$14.96	$0.00	$73.01

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.93	$15.28	$0.00	$0.00	$43.21
2	55	$30.72	$15.28	$15.71	$0.00	$61.71
3	65	$36.31	$15.28	$15.71	$0.00	$67.30
4	70	$39.10	$15.28	$15.71	$0.00	$70.09
5	80	$44.69	$15.28	$15.71	$0.00	$75.68

Notes:
Steps 1-2 are 6 mos.; Steps 3-5 are 1 year

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ELEVATOR CONSTRUCTOR HELPER *ELEVATOR CONSTRUCTORS LOCAL 4*	01/01/2016	$38.17	$14.43	$14.96	$0.00	$67.56
	01/01/2017	$39.10	$15.28	$15.71	$0.00	$70.09
For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"						
FENCE & GUARD RAIL ERECTOR *LABORERS - ZONE 1*	12/01/2015	$35.60	$7.45	$13.55	$0.00	$56.60
	06/01/2016	$36.35	$7.45	$13.55	$0.00	$57.35
	12/01/2016	$37.35	$7.45	$13.55	$0.00	$58.35
For apprentice rates see "Apprentice- LABORER"						
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	11/01/2015	$40.49	$10.00	$14.55	$0.00	$65.04
	05/01/2016	$41.38	$10.00	$14.55	$0.00	$65.93
	11/01/2016	$41.97	$10.00	$14.55	$0.00	$66.52
	05/01/2017	$42.85	$10.00	$14.55	$0.00	$67.40
	11/01/2017	$43.58	$10.00	$14.55	$0.00	$68.13
	05/01/2018	$44.29	$10.00	$14.55	$0.00	$68.84
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	11/01/2015	$41.93	$10.00	$14.55	$0.00	$66.48
	05/01/2016	$42.82	$10.00	$14.55	$0.00	$67.37
	11/01/2016	$43.42	$10.00	$14.55	$0.00	$67.97
	05/01/2017	$44.31	$10.00	$14.55	$0.00	$68.86
	11/01/2017	$45.04	$10.00	$14.55	$0.00	$69.59
	05/01/2018	$45.76	$10.00	$14.55	$0.00	$70.31
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	11/01/2015	$21.71	$10.00	$14.55	$0.00	$46.26
	05/01/2016	$22.23	$10.00	$14.55	$0.00	$46.78
	11/01/2016	$22.58	$10.00	$14.55	$0.00	$47.13
	05/01/2017	$23.11	$10.00	$14.55	$0.00	$47.66
	11/01/2017	$23.53	$10.00	$14.55	$0.00	$48.08
	05/01/2018	$23.96	$10.00	$14.55	$0.00	$48.51
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIRE ALARM INSTALLER *ELECTRICIANS LOCAL 103*	09/01/2015	$45.67	$13.00	$15.89	$0.00	$74.56
	03/01/2016	$46.17	$13.00	$16.39	$0.00	$75.56
For apprentice rates see "Apprentice- ELECTRICIAN"						
FIRE ALARM REPAIR / MAINTENANCE / COMMISSIONING *ELECTRICIANS LOCAL 103*	09/01/2015	$34.25	$13.00	$14.06	$0.00	$61.31
	03/01/2016	$34.63	$13.00	$14.55	$0.00	$62.18
For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"						
FIREMAN (ASST. ENGINEER) *OPERATING ENGINEERS LOCAL 4*	12/01/2015	$36.34	$10.00	$14.90	$0.00	$61.24
	06/01/2016	$36.96	$10.00	$14.90	$0.00	$61.86
	12/01/2016	$38.00	$10.00	$14.90	$0.00	$62.90
	06/01/2017	$38.84	$10.00	$14.90	$0.00	$63.74
	12/01/2017	$39.67	$10.00	$14.90	$0.00	$64.57
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FLAGGER & SIGNALER *LABORERS - ZONE 1*	12/01/2015	$20.50	$7.45	$13.55	$0.00	$41.50
	06/01/2016	$20.50	$7.45	$13.55	$0.00	$41.50
	12/01/2016	$20.50	$7.45	$13.55	$0.00	$41.50
For apprentice rates see "Apprentice- LABORER"						
FLOORCOVERER *FLOORCOVERERS LOCAL 2168 ZONE I*	09/01/2015	$41.59	$9.80	$17.53	$0.00	$68.92

Apprentice - *FLOORCOVERER - Local 2168 Zone I*

Effective Date - 09/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.80	$9.80	$1.79	$0.00	$32.39
2	55	$22.87	$9.80	$1.79	$0.00	$34.46
3	60	$24.95	$9.80	$12.16	$0.00	$46.91
4	65	$27.03	$9.80	$12.16	$0.00	$48.99
5	70	$29.11	$9.80	$13.95	$0.00	$52.86
6	75	$31.19	$9.80	$13.95	$0.00	$54.94
7	80	$33.27	$9.80	$15.74	$0.00	$58.81
8	85	$35.35	$9.80	$15.74	$0.00	$60.89

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FORK LIFT/CHERRY PICKER *OPERATING ENGINEERS LOCAL 4*	12/01/2015	$43.73	$10.00	$14.90	$0.00	$68.63
	06/01/2016	$44.48	$10.00	$14.90	$0.00	$69.38
	12/01/2016	$45.73	$10.00	$14.90	$0.00	$70.63
	06/01/2017	$46.73	$10.00	$14.90	$0.00	$71.63
	12/01/2017	$47.73	$10.00	$14.90	$0.00	$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GENERATOR/LIGHTING PLANT/HEATERS *OPERATING ENGINEERS LOCAL 4*	12/01/2015	$30.13	$10.00	$14.90	$0.00	$55.03
	06/01/2016	$30.65	$10.00	$14.90	$0.00	$55.55
	12/01/2016	$31.52	$10.00	$14.90	$0.00	$56.42
	06/01/2017	$32.21	$10.00	$14.90	$0.00	$57.11
	12/01/2017	$32.90	$10.00	$14.90	$0.00	$57.80
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) *GLAZIERS LOCAL 35 (ZONE 1)*	01/01/2016	$44.80	$7.85	$16.10	$0.00	$68.75
	07/01/2016	$45.75	$7.85	$16.10	$0.00	$69.70
	01/01/2017	$46.70	$7.85	$16.10	$0.00	$70.65

Apprentice - *GLAZIER - Local 35 Zone 1*

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.40	$7.85	$0.00	$0.00	$30.25
2	55	$24.64	$7.85	$3.66	$0.00	$36.15
3	60	$26.88	$7.85	$3.99	$0.00	$38.72
4	65	$29.12	$7.85	$4.32	$0.00	$41.29
5	70	$31.36	$7.85	$14.11	$0.00	$53.32
6	75	$33.60	$7.85	$14.44	$0.00	$55.89
7	80	$35.84	$7.85	$14.77	$0.00	$58.46
8	90	$40.32	$7.85	$15.44	$0.00	$63.61

Effective Date - 07/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.88	$7.85	$0.00	$0.00	$30.73
2	55	$25.16	$7.85	$3.66	$0.00	$36.67
3	60	$27.45	$7.85	$3.99	$0.00	$39.29
4	65	$29.74	$7.85	$4.32	$0.00	$41.91
5	70	$32.03	$7.85	$14.11	$0.00	$53.99
6	75	$34.31	$7.85	$14.44	$0.00	$56.60
7	80	$36.60	$7.85	$14.77	$0.00	$59.22
8	90	$41.18	$7.85	$15.44	$0.00	$64.47

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HOISTING ENGINEER/CRANES/GRADALLS *OPERATING ENGINEERS LOCAL 4*	12/01/2015	$43.73	$10.00	$14.90	$0.00	$68.63
	06/01/2016	$44.48	$10.00	$14.90	$0.00	$69.38
	12/01/2016	$45.73	$10.00	$14.90	$0.00	$70.63
	06/01/2017	$46.73	$10.00	$14.90	$0.00	$71.63
	12/01/2017	$47.73	$10.00	$14.90	$0.00	$72.63

Apprentice - *OPERATING ENGINEERS - Local 4*

Effective Date - 12/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$24.05	$10.00	$0.00	$0.00	$34.05
2	60	$26.24	$10.00	$14.90	$0.00	$51.14
3	65	$28.42	$10.00	$14.90	$0.00	$53.32
4	70	$30.61	$10.00	$14.90	$0.00	$55.51
5	75	$32.80	$10.00	$14.90	$0.00	$57.70
6	80	$34.98	$10.00	$14.90	$0.00	$59.88
7	85	$37.17	$10.00	$14.90	$0.00	$62.07
8	90	$39.36	$10.00	$14.90	$0.00	$64.26

Effective Date - 06/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$24.46	$10.00	$0.00	$0.00	$34.46
2	60	$26.69	$10.00	$14.90	$0.00	$51.59
3	65	$28.91	$10.00	$14.90	$0.00	$53.81
4	70	$31.14	$10.00	$14.90	$0.00	$56.04
5	75	$33.36	$10.00	$14.90	$0.00	$58.26
6	80	$35.58	$10.00	$14.90	$0.00	$60.48
7	85	$37.81	$10.00	$14.90	$0.00	$62.71
8	90	$40.03	$10.00	$14.90	$0.00	$64.93

Notes:

Apprentice to Journeyworker Ratio:1:6

HVAC (DUCTWORK) *SHEETMETAL WORKERS LOCAL 17 - A*	02/01/2016	$43.31	$10.70	$21.95	$2.28	$78.24
	08/01/2016	$44.46	$10.70	$21.95	$2.28	$79.39
	02/01/2017	$45.56	$10.70	$21.95	$2.28	$80.49
	08/01/2017	$46.66	$10.70	$21.95	$2.28	$81.59
	02/01/2018	$47.81	$10.70	$21.95	$2.28	$82.74
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (ELECTRICAL CONTROLS) *ELECTRICIANS LOCAL 103*	09/01/2015	$45.67	$13.00	$15.89	$0.00	$74.56
	03/01/2016	$46.17	$13.00	$16.39	$0.00	$75.56
For apprentice rates see "Apprentice- ELECTRICIAN"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HVAC (TESTING AND BALANCING - AIR) *SHEETMETAL WORKERS LOCAL 17 - A*	02/01/2016	$43.31	$10.70	$21.95	$2.28	$78.24
	08/01/2016	$44.46	$10.70	$21.95	$2.28	$79.39
	02/01/2017	$45.56	$10.70	$21.95	$2.28	$80.49
	08/01/2017	$46.66	$10.70	$21.95	$2.28	$81.59
	02/01/2018	$47.81	$10.70	$21.95	$2.28	$82.74
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (TESTING AND BALANCING -WATER) *PIPEFITTERS LOCAL 537*	09/01/2015	$49.69	$9.70	$16.89	$0.00	$76.28
	03/01/2016	$50.69	$9.70	$16.89	$0.00	$77.28
	09/01/2016	$51.69	$9.70	$16.89	$0.00	$78.28
	03/01/2017	$52.69	$9.70	$16.89	$0.00	$79.28
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HVAC MECHANIC *PIPEFITTERS LOCAL 537*	09/01/2015	$49.69	$9.70	$16.89	$0.00	$76.28
	03/01/2016	$50.69	$9.70	$16.89	$0.00	$77.28
	09/01/2016	$51.69	$9.70	$16.89	$0.00	$78.28
	03/01/2017	$52.69	$9.70	$16.89	$0.00	$79.28
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HYDRAULIC DRILLS *LABORERS - ZONE 1*	12/01/2015	$36.10	$7.45	$13.55	$0.00	$57.10
	06/01/2016	$36.85	$7.45	$13.55	$0.00	$57.85
	12/01/2016	$37.85	$7.45	$13.55	$0.00	$58.85
For apprentice rates see "Apprentice- LABORER"						
INSULATOR (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (BOSTON)*	09/01/2015	$43.81	$11.50	$13.80	$0.00	$69.11
	09/01/2016	$45.81	$11.50	$13.80	$0.00	$71.11
	09/01/2017	$47.81	$11.50	$13.80	$0.00	$73.11
	09/01/2018	$50.06	$11.50	$13.80	$0.00	$75.36
	09/01/2019	$52.56	$11.50	$13.80	$0.00	$77.86

Apprentice - *ASBESTOS INSULATOR (Pipes & Tanks) - Local 6 Boston*

Effective Date - 09/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.91	$11.50	$10.05	$0.00	$43.46
2	60	$26.29	$11.50	$10.80	$0.00	$48.59
3	70	$30.67	$11.50	$11.55	$0.00	$53.72
4	80	$35.05	$11.50	$12.30	$0.00	$58.85

Effective Date - 09/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.91	$11.50	$10.05	$0.00	$44.46
2	60	$27.49	$11.50	$10.80	$0.00	$49.79
3	70	$32.07	$11.50	$11.55	$0.00	$55.12
4	80	$36.65	$11.50	$12.30	$0.00	$60.45

Notes:
Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
IRONWORKER/WELDER *IRONWORKERS LOCAL 7 (BOSTON AREA)*	09/16/2015	$42.40	$7.80	$20.85	$0.00	$71.05
	03/16/2016	$43.40	$7.80	$20.85	$0.00	$72.05
	09/16/2016	$44.05	$7.80	$20.85	$0.00	$72.70
	03/16/2017	$44.65	$7.80	$20.85	$0.00	$73.30

Apprentice - *IRONWORKER - Local 7 Boston*

Effective Date - 09/16/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$25.44	$7.80	$20.85	$0.00	$54.09
2	70	$29.68	$7.80	$20.85	$0.00	$58.33
3	75	$31.80	$7.80	$20.85	$0.00	$60.45
4	80	$33.92	$7.80	$20.85	$0.00	$62.57
5	85	$36.04	$7.80	$20.85	$0.00	$64.69
6	90	$38.16	$7.80	$20.85	$0.00	$66.81

Effective Date - 03/16/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$26.04	$7.80	$20.85	$0.00	$54.69
2	70	$30.38	$7.80	$20.85	$0.00	$59.03
3	75	$32.55	$7.80	$20.85	$0.00	$61.20
4	80	$34.72	$7.80	$20.85	$0.00	$63.37
5	85	$36.89	$7.80	$20.85	$0.00	$65.54
6	90	$39.06	$7.80	$20.85	$0.00	$67.71

Notes:
** Structural 1:6; Ornamental 1:4

Apprentice to Journeyworker Ratio:**

JACKHAMMER & PAVING BREAKER OPERATOR *LABORERS - ZONE 1*	12/01/2015	$35.60	$7.45	$13.55	$0.00	$56.60
	06/01/2016	$36.35	$7.45	$13.55	$0.00	$57.35
	12/01/2016	$37.35	$7.45	$13.55	$0.00	$58.35
For apprentice rates see "Apprentice- LABORER"						
LABORER *LABORERS - ZONE 1*	12/01/2015	$35.35	$7.45	$13.55	$0.00	$56.35
	06/01/2016	$36.10	$7.45	$13.55	$0.00	$57.10
	12/01/2016	$37.10	$7.45	$13.55	$0.00	$58.10

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *LABORER - Zone 1*

Effective Date - 12/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.21	$7.45	$13.55	$0.00	$42.21
2	70	$24.75	$7.45	$13.55	$0.00	$45.75
3	80	$28.28	$7.45	$13.55	$0.00	$49.28
4	90	$31.82	$7.45	$13.55	$0.00	$52.82

Effective Date - 06/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.66	$7.45	$13.55	$0.00	$42.66
2	70	$25.27	$7.45	$13.55	$0.00	$46.27
3	80	$28.88	$7.45	$13.55	$0.00	$49.88
4	90	$32.49	$7.45	$13.55	$0.00	$53.49

Notes:

Apprentice to Journeyworker Ratio:1:5

LABORER: CARPENTER TENDER *LABORERS - ZONE 1*	12/01/2015	$35.35	$7.45	$13.55	$0.00	$56.35
	06/01/2016	$36.10	$7.45	$13.55	$0.00	$57.10
	12/01/2016	$37.10	$7.45	$13.55	$0.00	$58.10
For apprentice rates see "Apprentice- LABORER"						
LABORER: CEMENT FINISHER TENDER *LABORERS - ZONE 1*	12/01/2015	$35.35	$7.45	$13.55	$0.00	$56.35
	06/01/2016	$36.10	$7.45	$13.55	$0.00	$57.10
	12/01/2016	$37.10	$7.45	$13.55	$0.00	$58.10
For apprentice rates see "Apprentice- LABORER"						
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER *LABORERS - ZONE 1*	12/01/2015	$35.50	$7.45	$13.55	$0.00	$56.50
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER *LABORERS - ZONE 1*	12/01/2015	$35.60	$7.45	$13.55	$0.00	$56.60
	06/01/2016	$36.35	$7.45	$13.55	$0.00	$57.35
	12/01/2016	$37.35	$7.45	$13.55	$0.00	$58.35
For apprentice rates see "Apprentice- LABORER"						
LABORER: MULTI-TRADE TENDER *LABORERS - ZONE 1*	12/01/2015	$35.35	$7.45	$13.55	$0.00	$56.35
	06/01/2016	$36.10	$7.45	$13.55	$0.00	$57.10
	12/01/2016	$37.10	$7.45	$13.55	$0.00	$58.10
For apprentice rates see "Apprentice- LABORER"						
LABORER: TREE REMOVER *LABORERS - ZONE 1*	12/01/2015	$35.35	$7.45	$13.55	$0.00	$56.35
	06/01/2016	$36.10	$7.45	$13.55	$0.00	$57.10
	12/01/2016	$37.10	$7.45	$13.55	$0.00	$58.10
This classification applies to all tree work associated with the removal of standing trees, and trimming and removal of branches and limbs when the work is not done for a utility company for the purpose of operation, maintenance or repair of utility company equipment. For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR *LABORERS - ZONE 1*	12/01/2015	$35.60	$7.45	$13.55	$0.00	$56.60
	06/01/2016	$36.35	$7.45	$13.55	$0.00	$57.35
	12/01/2016	$37.35	$7.45	$13.55	$0.00	$58.35
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MARBLE & TILE FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2016	$38.08	$10.18	$17.70	$0.00	$65.96
	08/01/2016	$38.78	$10.18	$17.78	$0.00	$66.74
	02/01/2017	$39.24	$10.18	$17.78	$0.00	$67.20

Apprentice - *MARBLE & TILE FINISHER - Local 3 Marble & Tile*

Effective Date - 02/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.04	$10.18	$17.70	$0.00	$46.92
2	60	$22.85	$10.18	$17.70	$0.00	$50.73
3	70	$26.66	$10.18	$17.70	$0.00	$54.54
4	80	$30.46	$10.18	$17.70	$0.00	$58.34
5	90	$34.27	$10.18	$17.70	$0.00	$62.15

Effective Date - 08/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.39	$10.18	$17.78	$0.00	$47.35
2	60	$23.27	$10.18	$17.78	$0.00	$51.23
3	70	$27.15	$10.18	$17.78	$0.00	$55.11
4	80	$31.02	$10.18	$17.78	$0.00	$58.98
5	90	$34.90	$10.18	$17.78	$0.00	$62.86

Notes:

Apprentice to Journeyworker Ratio:1:3

MARBLE MASONS,TILELAYERS & TERRAZZO MECH *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2016	$49.90	$10.18	$19.14	$0.00	$79.22
	08/01/2016	$50.80	$10.18	$19.22	$0.00	$80.20
	02/01/2017	$51.37	$10.18	$19.22	$0.00	$80.77

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *MARBLE-TILE-TERRAZZO MECHANIC - Local 3 Marble & Tile*

Effective Date - 02/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.95	$10.18	$19.14	$0.00	$54.27
2	60	$29.94	$10.18	$19.14	$0.00	$59.26
3	70	$34.93	$10.18	$19.14	$0.00	$64.25
4	80	$39.92	$10.18	$19.14	$0.00	$69.24
5	90	$44.91	$10.18	$19.14	$0.00	$74.23

Effective Date - 08/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.40	$10.18	$19.22	$0.00	$54.80
2	60	$30.48	$10.18	$19.22	$0.00	$59.88
3	70	$35.56	$10.18	$19.22	$0.00	$64.96
4	80	$40.64	$10.18	$19.22	$0.00	$70.04
5	90	$45.72	$10.18	$19.22	$0.00	$75.12

Notes:

Apprentice to Journeyworker Ratio:1:5

MECH. SWEEPER OPERATOR (ON CONST. SITES) *OPERATING ENGINEERS LOCAL 4*	12/01/2015	$43.31	$10.00	$14.90	$0.00	$68.21
	06/01/2016	$44.06	$10.00	$14.90	$0.00	$68.96
	12/01/2016	$45.29	$10.00	$14.90	$0.00	$70.19
	06/01/2017	$46.28	$10.00	$14.90	$0.00	$71.18
	12/01/2017	$47.27	$10.00	$14.90	$0.00	$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MECHANICS MAINTENANCE *OPERATING ENGINEERS LOCAL 4*	12/01/2015	$43.31	$10.00	$14.90	$0.00	$68.21
	06/01/2016	$44.06	$10.00	$14.90	$0.00	$68.96
	12/01/2016	$45.29	$10.00	$14.90	$0.00	$70.19
	06/01/2017	$46.28	$10.00	$14.90	$0.00	$71.18
	12/01/2017	$47.27	$10.00	$14.90	$0.00	$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MILLWRIGHT (Zone 1) *MILLWRIGHTS LOCAL 1121 - Zone 1*	04/01/2015	$37.64	$9.80	$16.21	$0.00	$63.65

Apprentice - *MILLWRIGHT - Local 1121 Zone 1*

Effective Date - 04/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$20.70	$9.80	$4.48	$0.00	$34.98
2	65	$24.47	$9.80	$13.36	$0.00	$47.63
3	75	$28.23	$9.80	$14.18	$0.00	$52.21
4	85	$31.99	$9.80	$14.99	$0.00	$56.78

Notes:

Steps are 2,000 hours

Apprentice to Journeyworker Ratio:1:5

MORTAR MIXER *LABORERS - ZONE 1*	12/01/2015	$35.60	$7.45	$13.55	$0.00	$56.60
	06/01/2016	$36.35	$7.45	$13.55	$0.00	$57.35
	12/01/2016	$37.35	$7.45	$13.55	$0.00	$58.35
For apprentice rates see "Apprentice- LABORER"						
OILER (OTHER THAN TRUCK CRANES,GRADALLS) *OPERATING ENGINEERS LOCAL 4*	12/01/2015	$22.27	$10.00	$14.90	$0.00	$47.17
	06/01/2016	$22.66	$10.00	$14.90	$0.00	$47.56
	12/01/2016	$23.31	$10.00	$14.90	$0.00	$48.21
	06/01/2017	$23.82	$10.00	$14.90	$0.00	$48.72
	12/01/2017	$24.34	$10.00	$14.90	$0.00	$49.24
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OILER (TRUCK CRANES, GRADALLS) *OPERATING ENGINEERS LOCAL 4*	12/01/2015	$26.08	$10.00	$14.90	$0.00	$50.98
	06/01/2016	$26.54	$10.00	$14.90	$0.00	$51.44
	12/01/2016	$27.29	$10.00	$14.90	$0.00	$52.19
	06/01/2017	$27.89	$10.00	$14.90	$0.00	$52.79
	12/01/2017	$28.50	$10.00	$14.90	$0.00	$53.40
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OTHER POWER DRIVEN EQUIPMENT - CLASS II *OPERATING ENGINEERS LOCAL 4*	12/01/2015	$43.31	$10.00	$14.90	$0.00	$68.21
	06/01/2016	$44.06	$10.00	$14.90	$0.00	$68.96
	12/01/2016	$45.29	$10.00	$14.90	$0.00	$70.19
	06/01/2017	$46.28	$10.00	$14.90	$0.00	$71.18
	12/01/2017	$47.27	$10.00	$14.90	$0.00	$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS) *PAINTERS LOCAL 35 - ZONE 1*	01/01/2016	$49.51	$7.85	$16.10	$0.00	$73.46
	07/01/2016	$50.46	$7.85	$16.10	$0.00	$74.41
	01/01/2017	$51.41	$7.85	$16.10	$0.00	$75.36

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.76	$7.85	$0.00	$0.00	$32.61
2	55	$27.23	$7.85	$3.66	$0.00	$38.74
3	60	$29.71	$7.85	$3.99	$0.00	$41.55
4	65	$32.18	$7.85	$4.32	$0.00	$44.35
5	70	$34.66	$7.85	$14.11	$0.00	$56.62
6	75	$37.13	$7.85	$14.44	$0.00	$59.42
7	80	$39.61	$7.85	$14.77	$0.00	$62.23
8	90	$44.56	$7.85	$15.44	$0.00	$67.85

Effective Date - 07/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.23	$7.85	$0.00	$0.00	$33.08
2	55	$27.75	$7.85	$3.66	$0.00	$39.26
3	60	$30.28	$7.85	$3.99	$0.00	$42.12
4	65	$32.80	$7.85	$4.32	$0.00	$44.97
5	70	$35.32	$7.85	$14.11	$0.00	$57.28
6	75	$37.85	$7.85	$14.44	$0.00	$60.14
7	80	$40.37	$7.85	$14.77	$0.00	$62.99
8	90	$45.41	$7.85	$15.44	$0.00	$68.70

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, NEW) *	01/01/2016	$46.20	$7.85	$16.10	$0.00	$70.15
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. *PAINTERS LOCAL 35 - ZONE 1*	07/01/2016	$47.15	$7.85	$16.10	$0.00	$71.10
	01/01/2017	$48.10	$7.85	$16.10	$0.00	$72.05

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 1 - Spray/Sandblast - New*

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.10	$7.85	$0.00	$0.00	$30.95
2	55	$25.41	$7.85	$3.66	$0.00	$36.92
3	60	$27.72	$7.85	$3.99	$0.00	$39.56
4	65	$30.03	$7.85	$4.32	$0.00	$42.20
5	70	$32.34	$7.85	$14.11	$0.00	$54.30
6	75	$34.65	$7.85	$14.44	$0.00	$56.94
7	80	$36.96	$7.85	$14.77	$0.00	$59.58
8	90	$41.58	$7.85	$15.44	$0.00	$64.87

Effective Date - 07/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.58	$7.85	$0.00	$0.00	$31.43
2	55	$25.93	$7.85	$3.66	$0.00	$37.44
3	60	$28.29	$7.85	$3.99	$0.00	$40.13
4	65	$30.65	$7.85	$4.32	$0.00	$42.82
5	70	$33.01	$7.85	$14.11	$0.00	$54.97
6	75	$35.36	$7.85	$14.44	$0.00	$57.65
7	80	$37.72	$7.85	$14.77	$0.00	$60.34
8	90	$42.44	$7.85	$15.44	$0.00	$65.73

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT) *PAINTERS LOCAL 35 - ZONE 1*	01/01/2016	$44.26	$7.85	$16.10	$0.00	$68.21
	07/01/2016	$45.21	$7.85	$16.10	$0.00	$69.16
	01/01/2017	$46.16	$7.85	$16.10	$0.00	$70.11

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 1 - Spray/Sandblast - Repaint*

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.13	$7.85	$0.00	$0.00	$29.98
2	55	$24.34	$7.85	$3.66	$0.00	$35.85
3	60	$26.56	$7.85	$3.99	$0.00	$38.40
4	65	$28.77	$7.85	$4.32	$0.00	$40.94
5	70	$30.98	$7.85	$14.11	$0.00	$52.94
6	75	$33.20	$7.85	$14.44	$0.00	$55.49
7	80	$35.41	$7.85	$14.77	$0.00	$58.03
8	90	$39.83	$7.85	$15.44	$0.00	$63.12

Effective Date - 07/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.61	$7.85	$0.00	$0.00	$30.46
2	55	$24.87	$7.85	$3.66	$0.00	$36.38
3	60	$27.13	$7.85	$3.99	$0.00	$38.97
4	65	$29.39	$7.85	$4.32	$0.00	$41.56
5	70	$31.65	$7.85	$14.11	$0.00	$53.61
6	75	$33.91	$7.85	$14.44	$0.00	$56.20
7	80	$36.17	$7.85	$14.77	$0.00	$58.79
8	90	$40.69	$7.85	$15.44	$0.00	$63.98

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (TRAFFIC MARKINGS) *LABORERS - ZONE 1*	12/01/2015	$35.35	$7.45	$13.55	$0.00	$56.35
	06/01/2016	$36.10	$7.45	$13.55	$0.00	$57.10
	12/01/2016	$37.10	$7.45	$13.55	$0.00	$58.10
For Apprentice rates see "Apprentice- LABORER"						
PAINTER / TAPER (BRUSH, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 1*	01/01/2016	$44.80	$7.85	$16.10	$0.00	$68.75
	07/01/2016	$45.75	$7.85	$16.10	$0.00	$69.70
	01/01/2017	$46.70	$7.85	$16.10	$0.00	$70.65

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER - Local 35 Zone 1 - BRUSH NEW*

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.40	$7.85	$0.00	$0.00	$30.25
2	55	$24.64	$7.85	$3.66	$0.00	$36.15
3	60	$26.88	$7.85	$3.99	$0.00	$38.72
4	65	$29.12	$7.85	$4.32	$0.00	$41.29
5	70	$31.36	$7.85	$14.11	$0.00	$53.32
6	75	$33.60	$7.85	$14.44	$0.00	$55.89
7	80	$35.84	$7.85	$14.77	$0.00	$58.46
8	90	$40.32	$7.85	$15.44	$0.00	$63.61

Effective Date - 07/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.88	$7.85	$0.00	$0.00	$30.73
2	55	$25.16	$7.85	$3.66	$0.00	$36.67
3	60	$27.45	$7.85	$3.99	$0.00	$39.29
4	65	$29.74	$7.85	$4.32	$0.00	$41.91
5	70	$32.03	$7.85	$14.11	$0.00	$53.99
6	75	$34.31	$7.85	$14.44	$0.00	$56.60
7	80	$36.60	$7.85	$14.77	$0.00	$59.22
8	90	$41.18	$7.85	$15.44	$0.00	$64.47

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, REPAINT) *PAINTERS LOCAL 35 - ZONE 1*	01/01/2016	$42.86	$7.85	$16.10	$0.00	$66.81
	07/01/2016	$43.81	$7.85	$16.10	$0.00	$67.76
	01/01/2017	$44.76	$7.85	$16.10	$0.00	$68.71

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 1 - BRUSH REPAINT*

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.43	$7.85	$0.00	$0.00	$29.28
2	55	$23.57	$7.85	$3.66	$0.00	$35.08
3	60	$25.72	$7.85	$3.99	$0.00	$37.56
4	65	$27.86	$7.85	$4.32	$0.00	$40.03
5	70	$30.00	$7.85	$14.11	$0.00	$51.96
6	75	$32.15	$7.85	$14.44	$0.00	$54.44
7	80	$34.29	$7.85	$14.77	$0.00	$56.91
8	90	$38.57	$7.85	$15.44	$0.00	$61.86

Effective Date - 07/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.91	$7.85	$0.00	$0.00	$29.76
2	55	$24.10	$7.85	$3.66	$0.00	$35.61
3	60	$26.29	$7.85	$3.99	$0.00	$38.13
4	65	$28.48	$7.85	$4.32	$0.00	$40.65
5	70	$30.67	$7.85	$14.11	$0.00	$52.63
6	75	$32.86	$7.85	$14.44	$0.00	$55.15
7	80	$35.05	$7.85	$14.77	$0.00	$57.67
8	90	$39.43	$7.85	$15.44	$0.00	$62.72

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PANEL & PICKUP TRUCKS DRIVER *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	12/01/2015	$32.58	$10.41	$10.08	$0.00	$53.07
	06/01/2016	$33.08	$10.41	$10.08	$0.00	$53.57
	08/01/2016	$33.08	$10.91	$10.08	$0.00	$54.07
	12/01/2016	$33.08	$10.91	$10.89	$0.00	$54.88
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) *PILE DRIVER LOCAL 56 (ZONE 1)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2015	$42.04	$9.80	$19.23	$0.00	$71.07
PILE DRIVER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2015	$42.04	$9.80	$19.23	$0.00	$71.07

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PILE DRIVER - Local 56 Zone 1*

Effective Date - 08/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.02	$9.80	$19.23	$0.00	$50.05
2	60	$25.22	$9.80	$19.23	$0.00	$54.25
3	70	$29.43	$9.80	$19.23	$0.00	$58.46
4	75	$31.53	$9.80	$19.23	$0.00	$60.56
5	80	$33.63	$9.80	$19.23	$0.00	$62.66
6	80	$33.63	$9.80	$19.23	$0.00	$62.66
7	90	$37.84	$9.80	$19.23	$0.00	$66.87
8	90	$37.84	$9.80	$19.23	$0.00	$66.87

Notes:

Apprentice to Journeyworker Ratio:1:3

PIPEFITTER & STEAMFITTER *PIPEFITTERS LOCAL 537*	09/01/2015	$49.69	$9.70	$16.89	$0.00	$76.28
	03/01/2016	$50.69	$9.70	$16.89	$0.00	$77.28
	09/01/2016	$51.69	$9.70	$16.89	$0.00	$78.28
	03/01/2017	$52.69	$9.70	$16.89	$0.00	$79.28

Apprentice - *PIPEFITTER - Local 537*

Effective Date - 09/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$19.88	$9.70	$7.50	$0.00	$37.08
2	45	$22.36	$9.70	$16.89	$0.00	$48.95
3	60	$29.81	$9.70	$16.89	$0.00	$56.40
4	70	$34.78	$9.70	$16.89	$0.00	$61.37
5	80	$39.75	$9.70	$16.89	$0.00	$66.34

Effective Date - 03/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$20.28	$9.70	$7.50	$0.00	$37.48
2	45	$22.81	$9.70	$16.89	$0.00	$49.40
3	60	$30.41	$9.70	$16.89	$0.00	$57.00
4	70	$35.48	$9.70	$16.89	$0.00	$62.07
5	80	$40.55	$9.70	$16.89	$0.00	$67.14

Notes:
** 1:3; 3:15; 1:10 thereafter / Steps are 1 yr.
Refrig/AC Mechanic **1:1;1:2;2:4;3:6;4:8;5:10;6:12;7:14;8:17;9:20;10:23(Max)

Apprentice to Journeyworker Ratio:**

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PIPELAYER	12/01/2015	$35.60	$7.45	$13.55	$0.00	$56.60
LABORERS - ZONE 1	06/01/2016	$36.35	$7.45	$13.55	$0.00	$57.35
	12/01/2016	$37.35	$7.45	$13.55	$0.00	$58.35
For apprentice rates see "Apprentice- LABORER"						
PLUMBERS & GASFITTERS	09/01/2015	$50.46	$10.82	$15.14	$0.00	$76.42
PLUMBERS & GASFITTERS LOCAL 12	03/01/2016	$51.61	$10.82	$15.14	$0.00	$77.57
	09/01/2016	$52.66	$10.82	$15.14	$0.00	$78.62
	03/01/2017	$53.66	$10.82	$15.14	$0.00	$79.62

Apprentice - *PLUMBER/GASFITTER - Local 12*

Effective Date - 09/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$17.66	$10.82	$5.63	$0.00	$34.11
2	40	$20.18	$10.82	$6.37	$0.00	$37.37
3	55	$27.75	$10.82	$8.56	$0.00	$47.13
4	65	$32.80	$10.82	$10.03	$0.00	$53.65
5	75	$37.85	$10.82	$11.48	$0.00	$60.15

Effective Date - 03/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$18.06	$10.82	$5.63	$0.00	$34.51
2	40	$20.64	$10.82	$6.37	$0.00	$37.83
3	55	$28.39	$10.82	$8.56	$0.00	$47.77
4	65	$33.55	$10.82	$10.03	$0.00	$54.40
5	75	$38.71	$10.82	$11.48	$0.00	$61.01

Notes:
** 1:2; 2:6; 3:10; 4:14; 5:19/Steps are 1 yr
Step4 with lic$56.90 Step5 with lic$63.40

Apprentice to Journeyworker Ratio:**

PNEUMATIC CONTROLS (TEMP.)	09/01/2015	$49.69	$9.70	$16.89	$0.00	$76.28
PIPEFITTERS LOCAL 537	03/01/2016	$50.69	$9.70	$16.89	$0.00	$77.28
	09/01/2016	$51.69	$9.70	$16.89	$0.00	$78.28
	03/01/2017	$52.69	$9.70	$16.89	$0.00	$79.28
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
PNEUMATIC DRILL/TOOL OPERATOR	12/01/2015	$35.60	$7.45	$13.55	$0.00	$56.60
LABORERS - ZONE 1	06/01/2016	$36.35	$7.45	$13.55	$0.00	$57.35
	12/01/2016	$37.35	$7.45	$13.55	$0.00	$58.35
For apprentice rates see "Apprentice- LABORER"						
POWDERMAN & BLASTER	12/01/2015	$36.35	$7.45	$13.55	$0.00	$57.35
LABORERS - ZONE 1	06/01/2016	$37.10	$7.45	$13.55	$0.00	$58.10
	12/01/2016	$38.10	$7.45	$13.55	$0.00	$59.10
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
POWER SHOVEL/DERRICK/TRENCHING MACHINE	12/01/2015	$43.73	$10.00	$14.90	$0.00	$68.63
OPERATING ENGINEERS LOCAL 4	06/01/2016	$44.48	$10.00	$14.90	$0.00	$69.38
	12/01/2016	$45.73	$10.00	$14.90	$0.00	$70.63
	06/01/2017	$46.73	$10.00	$14.90	$0.00	$71.63
	12/01/2017	$47.73	$10.00	$14.90	$0.00	$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (CONCRETE)	12/01/2015	$43.73	$10.00	$14.90	$0.00	$68.63
OPERATING ENGINEERS LOCAL 4	06/01/2016	$44.48	$10.00	$14.90	$0.00	$69.38
	12/01/2016	$45.73	$10.00	$14.90	$0.00	$70.63
	06/01/2017	$46.73	$10.00	$14.90	$0.00	$71.63
	12/01/2017	$47.73	$10.00	$14.90	$0.00	$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER)	12/01/2015	$30.13	$10.00	$14.90	$0.00	$55.03
OPERATING ENGINEERS LOCAL 4	06/01/2016	$30.65	$10.00	$14.90	$0.00	$55.55
	12/01/2016	$31.52	$10.00	$14.90	$0.00	$56.42
	06/01/2017	$32.21	$10.00	$14.90	$0.00	$57.11
	12/01/2017	$32.90	$10.00	$14.90	$0.00	$57.80
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
READY MIX CONCRETE DRIVERS after 4/30/10	07/01/2015	$27.88	$7.98	$8.92	$0.00	$44.78
(Drivers Hired After 4/30/2010)*TEAMSTERS LOCAL 25a*	05/01/2016	$28.03	$7.98	$9.31	$0.00	$45.32
	07/01/2016	$28.03	$8.23	$9.31	$0.00	$45.57
	05/01/2017	$28.18	$8.23	$9.72	$0.00	$46.13
	07/01/2017	$28.18	$8.48	$9.72	$0.00	$46.38
READY-MIX CONCRETE DRIVER	07/01/2015	$31.14	$7.98	$8.92	$0.00	$48.04
TEAMSTERS LOCAL 25a	05/01/2016	$31.29	$7.98	$9.31	$0.00	$48.58
	07/01/2016	$31.29	$8.23	$9.31	$0.00	$48.83
	05/01/2017	$31.44	$8.23	$9.72	$0.00	$49.39
	07/01/2017	$31.44	$8.48	$9.72	$0.00	$49.64
RECLAIMERS	12/01/2015	$43.31	$10.00	$14.90	$0.00	$68.21
OPERATING ENGINEERS LOCAL 4	06/01/2016	$44.06	$10.00	$14.90	$0.00	$68.96
	12/01/2016	$45.29	$10.00	$14.90	$0.00	$70.19
	06/01/2017	$46.28	$10.00	$14.90	$0.00	$71.18
	12/01/2017	$47.27	$10.00	$14.90	$0.00	$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
RESIDENTIAL WOOD FRAME (All Other Work)	04/01/2011	$37.25	$8.67	$15.51	$0.00	$61.43
CARPENTERS -ZONE 1 (Residential Wood)						
RESIDENTIAL WOOD FRAME CARPENTER **	05/01/2011	$27.49	$6.34	$6.23	$0.00	$40.06

** The Residential Wood Frame Carpenter classification applies only to the construction of new, wood frame residences that do not exceed four stories including the basement.*CARPENTERS -ZONE 1 (Residential Wood)*

As of 9/1/09 Carpentry work on wood-frame residential WEATHERIZATION projects shall be paid the RESIDENTIAL WOOD FRAME CARPENTER rate.

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *CARPENTER (Residential Wood Frame) - Zone 1*

Effective Date - 05/01/2011

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$16.49	$6.34	$0.00	$0.00	$22.83
2	60	$16.49	$6.34	$6.23	$0.00	$29.06
3	65	$17.87	$6.34	$6.23	$0.00	$30.44
4	70	$19.24	$6.34	$6.23	$0.00	$31.81
5	75	$20.62	$6.34	$6.23	$0.00	$33.19
6	80	$21.99	$6.34	$6.23	$0.00	$34.56
7	85	$23.37	$6.34	$6.23	$0.00	$35.94
8	90	$24.74	$6.34	$6.23	$0.00	$37.31

Notes:

Apprentice to Journeyworker Ratio:1:5

RIDE-ON MOTORIZED BUGGY OPERATOR *LABORERS - ZONE 1*	12/01/2015	$35.60	$7.45	$13.55	$0.00	$56.60
	06/01/2016	$36.35	$7.45	$13.55	$0.00	$57.35
	12/01/2016	$37.35	$7.45	$13.55	$0.00	$58.35
For apprentice rates see "Apprentice- LABORER"						
ROLLER/SPREADER/MULCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	12/01/2015	$43.31	$10.00	$14.90	$0.00	$68.21
	06/01/2016	$44.06	$10.00	$14.90	$0.00	$68.96
	12/01/2016	$45.29	$10.00	$14.90	$0.00	$70.19
	06/01/2017	$46.28	$10.00	$14.90	$0.00	$71.18
	12/01/2017	$47.27	$10.00	$14.90	$0.00	$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Inc.Roofer Waterproofng &Roofer Damproofg) *ROOFERS LOCAL 33*	02/01/2016	$40.11	$11.00	$12.90	$0.00	$64.01

Apprentice - *ROOFER - Local 33*

Effective Date - 02/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.06	$11.00	$3.39	$0.00	$34.45
2	60	$24.07	$11.00	$12.90	$0.00	$47.97
3	65	$26.07	$11.00	$12.90	$0.00	$49.97
4	75	$30.08	$11.00	$12.90	$0.00	$53.98
5	85	$34.09	$11.00	$12.90	$0.00	$57.99

Notes: ** 1:5, 2:6-10, the 1:10; Reroofing: 1:4, then 1:1
Step 1 is 2000 hrs.; Steps 2-5 are 1000 hrs.

Apprentice to Journeyworker Ratio:**

ROOFER SLATE / TILE / PRECAST CONCRETE *ROOFERS LOCAL 33*	02/01/2016	$40.36	$11.00	$12.90	$0.00	$64.26
For apprentice rates see "Apprentice- ROOFER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
SHEETMETAL WORKER *SHEETMETAL WORKERS LOCAL 17 - A*	02/01/2016	$43.31	$10.70	$21.95	$2.28	$78.24
	08/01/2016	$44.46	$10.70	$21.95	$2.28	$79.39
	02/01/2017	$45.56	$10.70	$21.95	$2.28	$80.49
	08/01/2017	$46.66	$10.70	$21.95	$2.28	$81.59
	02/01/2018	$47.81	$10.70	$21.95	$2.28	$82.74

Apprentice - *SHEET METAL WORKER - Local 17-A*

Effective Date - 02/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$17.32	$10.70	$4.90	$0.00	$32.92
2	40	$17.32	$10.70	$4.90	$0.00	$32.92
3	45	$19.49	$10.70	$9.79	$1.20	$41.18
4	45	$19.49	$10.70	$9.79	$1.20	$41.18
5	50	$21.66	$10.70	$10.65	$1.29	$44.30
6	50	$21.66	$10.70	$10.90	$1.30	$44.56
7	60	$25.99	$10.70	$12.37	$1.47	$50.53
8	65	$28.15	$10.70	$13.24	$1.56	$53.65
9	75	$32.48	$10.70	$14.97	$1.74	$59.89
10	85	$36.81	$10.70	$16.18	$1.91	$65.60

Effective Date - 08/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$17.78	$10.70	$4.90	$0.00	$33.38
2	40	$17.78	$10.70	$4.90	$0.00	$33.38
3	45	$20.01	$10.70	$9.79	$1.22	$41.72
4	45	$20.01	$10.70	$9.79	$1.22	$41.72
5	50	$22.23	$10.70	$10.65	$1.31	$44.89
6	50	$22.23	$10.70	$10.90	$1.31	$45.14
7	60	$26.68	$10.70	$12.37	$1.49	$51.24
8	65	$28.90	$10.70	$13.24	$1.59	$54.43
9	75	$33.35	$10.70	$14.97	$1.77	$60.79
10	85	$37.79	$10.70	$16.18	$1.94	$66.61

Notes:
Steps are 6 mos.

Apprentice to Journeyworker Ratio:1:4

SIGN ERECTOR *PAINTERS LOCAL 35 - ZONE 1*	06/01/2013	$25.81	$7.07	$7.05	$0.00	$39.93

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *SIGN ERECTOR - Local 35 Zone 1*

Effective Date - 06/01/2013

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$12.91	$7.07	$0.00	$0.00	$19.98
2	55	$14.20	$7.07	$2.45	$0.00	$23.72
3	60	$15.49	$7.07	$2.45	$0.00	$25.01
4	65	$16.78	$7.07	$2.45	$0.00	$26.30
5	70	$18.07	$7.07	$7.05	$0.00	$32.19
6	75	$19.36	$7.07	$7.05	$0.00	$33.48
7	80	$20.65	$7.07	$7.05	$0.00	$34.77
8	85	$21.94	$7.07	$7.05	$0.00	$36.06
9	90	$23.23	$7.07	$7.05	$0.00	$37.35

Notes:
Steps are 4 mos.

Apprentice to Journeyworker Ratio:1:1

SPECIALIZED EARTH MOVING EQUIP < 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	12/01/2015	$33.04	$10.41	$10.08	$0.00	$53.53
	06/01/2016	$33.54	$10.41	$10.08	$0.00	$54.03
	08/01/2016	$33.54	$10.91	$10.08	$0.00	$54.53
	12/01/2016	$33.54	$10.91	$10.89	$0.00	$55.34
SPECIALIZED EARTH MOVING EQUIP > 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	12/01/2015	$33.33	$10.41	$10.08	$0.00	$53.82
	06/01/2016	$33.83	$10.41	$10.08	$0.00	$54.32
	08/01/2016	$33.83	$10.91	$10.08	$0.00	$54.82
	12/01/2016	$33.83	$10.91	$10.89	$0.00	$55.63
SPRINKLER FITTER *SPRINKLER FITTERS LOCAL 550 - (Section A) Zone 1*	01/01/2016	$54.43	$8.67	$15.80	$0.00	$78.90
	03/01/2016	$55.43	$8.67	$15.80	$0.00	$79.90
	10/01/2016	$56.58	$8.67	$15.80	$0.00	$81.05
	03/01/2017	$57.58	$8.67	$15.80	$0.00	$82.05

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *SPRINKLER FITTER - Local 550 (Section A) Zone 1*

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$19.05	$8.67	$8.55	$0.00	$36.27
2	40	$21.77	$8.67	$8.55	$0.00	$38.99
3	45	$24.49	$8.67	$8.55	$0.00	$41.71
4	50	$27.22	$8.67	$8.55	$0.00	$44.44
5	55	$29.94	$8.67	$8.55	$0.00	$47.16
6	60	$32.66	$8.67	$8.55	$0.00	$49.88
7	65	$35.38	$8.67	$8.55	$0.00	$52.60
8	70	$38.10	$8.67	$8.55	$0.00	$55.32
9	75	$40.82	$8.67	$8.55	$0.00	$58.04
10	80	$43.54	$8.67	$8.55	$0.00	$60.76

Effective Date - 03/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$19.40	$8.67	$8.55	$0.00	$36.62
2	40	$22.17	$8.67	$8.55	$0.00	$39.39
3	45	$24.94	$8.67	$8.55	$0.00	$42.16
4	50	$27.72	$8.67	$8.55	$0.00	$44.94
5	55	$30.49	$8.67	$8.55	$0.00	$47.71
6	60	$33.26	$8.67	$8.55	$0.00	$50.48
7	65	$36.03	$8.67	$8.55	$0.00	$53.25
8	70	$38.80	$8.67	$8.55	$0.00	$56.02
9	75	$41.57	$8.67	$8.55	$0.00	$58.79
10	80	$44.34	$8.67	$8.55	$0.00	$61.56

Notes: Apprentice entered prior 9/30/10:
40/45/50/55/60/65/70/75/80/85
Steps are 850 hours

Apprentice to Journeyworker Ratio:1:3

STEAM BOILER OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2015	$43.31	$10.00	$14.90	$0.00	$68.21
	06/01/2016	$44.06	$10.00	$14.90	$0.00	$68.96
	12/01/2016	$45.29	$10.00	$14.90	$0.00	$70.19
	06/01/2017	$46.28	$10.00	$14.90	$0.00	$71.18
	12/01/2017	$47.27	$10.00	$14.90	$0.00	$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN *OPERATING ENGINEERS LOCAL 4*	12/01/2015	$43.31	$10.00	$14.90	$0.00	$68.21
	06/01/2016	$44.06	$10.00	$14.90	$0.00	$68.96
	12/01/2016	$45.29	$10.00	$14.90	$0.00	$70.19
	06/01/2017	$46.28	$10.00	$14.90	$0.00	$71.18
	12/01/2017	$47.27	$10.00	$14.90	$0.00	$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TELECOMMUNICATION TECHNICIAN *ELECTRICIANS LOCAL 103*	09/01/2015	$34.25	$13.00	$14.06	$0.00	$61.31
	03/01/2016	$34.63	$13.00	$14.55	$0.00	$62.18

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *TELECOMMUNICATION TECHNICIAN - Local 103*

Effective Date - 09/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$13.70	$13.00	$0.41	$0.00	$27.11
2	40	$13.70	$13.00	$0.41	$0.00	$27.11
3	45	$15.41	$13.00	$11.03	$0.00	$39.44
4	45	$15.41	$13.00	$11.03	$0.00	$39.44
5	50	$17.13	$13.00	$11.30	$0.00	$41.43
6	55	$18.84	$13.00	$11.58	$0.00	$43.42
7	60	$20.55	$13.00	$11.86	$0.00	$45.41
8	65	$22.26	$13.00	$12.13	$0.00	$47.39
9	70	$23.98	$13.00	$12.41	$0.00	$49.39
10	75	$25.69	$13.00	$12.68	$0.00	$51.37

Effective Date - 03/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$13.85	$13.00	$0.42	$0.00	$27.27
2	40	$13.85	$13.00	$0.42	$0.00	$27.27
3	45	$15.58	$13.00	$11.52	$0.00	$40.10
4	45	$15.58	$13.00	$11.52	$0.00	$40.10
5	50	$17.32	$13.00	$11.79	$0.00	$42.11
6	55	$19.05	$13.00	$12.06	$0.00	$44.11
7	60	$20.78	$13.00	$12.34	$0.00	$46.12
8	65	$22.51	$13.00	$12.62	$0.00	$48.13
9	70	$24.24	$13.00	$12.90	$0.00	$50.14
10	75	$25.97	$13.00	$13.17	$0.00	$52.14

Notes:

Apprentice to Journeyworker Ratio:1:1

TERRAZZO FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2016	$48.80	$10.18	$19.14	$0.00	$78.12
	08/01/2016	$49.70	$10.18	$19.22	$0.00	$79.10
	02/01/2017	$50.27	$10.18	$19.22	$0.00	$79.67

Apprentice - *TERRAZZO FINISHER - Local 3 Marble & Tile*

Effective Date - 02/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.40	$10.18	$19.14	$0.00	$53.72
2	60	$29.28	$10.18	$19.14	$0.00	$58.60
3	70	$34.16	$10.18	$19.14	$0.00	$63.48
4	80	$39.04	$10.18	$19.14	$0.00	$68.36
5	90	$43.92	$10.18	$19.14	$0.00	$73.24

Effective Date - 08/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.85	$10.18	$19.22	$0.00	$54.25
2	60	$29.82	$10.18	$19.22	$0.00	$59.22
3	70	$34.79	$10.18	$19.22	$0.00	$64.19
4	80	$39.76	$10.18	$19.22	$0.00	$69.16
5	90	$44.73	$10.18	$19.22	$0.00	$74.13

Notes:

Apprentice to Journeyworker Ratio:1:3

TEST BORING DRILLER *LABORERS - FOUNDATION AND MARINE*	12/01/2015	$36.70	$7.45	$13.75	$0.00	$57.90
	06/01/2016	$37.45	$7.45	$13.75	$0.00	$58.65
	12/01/2016	$38.45	$7.45	$13.75	$0.00	$59.65
For apprentice rates see "Apprentice- LABORER"						
TEST BORING DRILLER HELPER *LABORERS - FOUNDATION AND MARINE*	12/01/2015	$35.42	$7.45	$13.75	$0.00	$56.62
	06/01/2016	$36.17	$7.45	$13.75	$0.00	$57.37
	12/01/2016	$37.17	$7.45	$13.75	$0.00	$58.37
For apprentice rates see "Apprentice- LABORER"						
TEST BORING LABORER *LABORERS - FOUNDATION AND MARINE*	12/01/2015	$35.30	$7.45	$13.75	$0.00	$56.50
	06/01/2016	$36.05	$7.45	$13.75	$0.00	$57.25
	12/01/2016	$37.05	$7.45	$13.75	$0.00	$58.25
For apprentice rates see "Apprentice- LABORER"						
TRACTORS/PORTABLE STEAM GENERATORS *OPERATING ENGINEERS LOCAL 4*	12/01/2015	$43.31	$10.00	$14.90	$0.00	$68.21
	06/01/2016	$44.06	$10.00	$14.90	$0.00	$68.96
	12/01/2016	$45.29	$10.00	$14.90	$0.00	$70.19
	06/01/2017	$46.28	$10.00	$14.90	$0.00	$71.18
	12/01/2017	$47.27	$10.00	$14.90	$0.00	$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TRAILERS FOR EARTH MOVING EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	12/01/2015	$33.62	$10.41	$10.08	$0.00	$54.11
	06/01/2016	$34.12	$10.41	$10.08	$0.00	$54.61
	08/01/2016	$34.12	$10.91	$10.08	$0.00	$55.11
	12/01/2016	$34.12	$10.91	$10.89	$0.00	$55.92

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TUNNEL WORK - COMPRESSED AIR *LABORERS (COMPRESSED AIR)*	12/01/2015	$47.58	$7.45	$14.15	$0.00	$69.18
	06/01/2016	$48.33	$7.45	$14.15	$0.00	$69.93
	12/01/2016	$49.33	$7.45	$14.15	$0.00	$70.93
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) *LABORERS (COMPRESSED AIR)*	12/01/2015	$49.58	$7.45	$14.15	$0.00	$71.18
	06/01/2016	$50.33	$7.45	$14.15	$0.00	$71.93
	12/01/2016	$51.33	$7.45	$14.15	$0.00	$72.93
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR *LABORERS (FREE AIR TUNNEL)*	12/01/2015	$39.65	$7.45	$14.15	$0.00	$61.25
	06/01/2016	$40.40	$7.45	$14.15	$0.00	$62.00
	12/01/2016	$41.40	$7.45	$14.15	$0.00	$63.00
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR (HAZ. WASTE) *LABORERS (FREE AIR TUNNEL)*	12/01/2015	$41.65	$7.45	$14.15	$0.00	$63.25
	06/01/2016	$42.40	$7.45	$14.15	$0.00	$64.00
	12/01/2016	$43.40	$7.45	$14.15	$0.00	$65.00
For apprentice rates see "Apprentice- LABORER"						
VAC-HAUL *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	12/01/2015	$33.04	$10.41	$10.08	$0.00	$53.53
	06/01/2016	$33.54	$10.41	$10.08	$0.00	$54.03
	08/01/2016	$33.54	$10.91	$10.08	$0.00	$54.53
	12/01/2016	$33.54	$10.91	$10.89	$0.00	$55.34
WAGON DRILL OPERATOR *LABORERS - ZONE 1*	12/01/2015	$35.60	$7.45	$13.55	$0.00	$56.60
	06/01/2016	$36.35	$7.45	$13.55	$0.00	$57.35
	12/01/2016	$37.35	$7.45	$13.55	$0.00	$58.35
For apprentice rates see "Apprentice- LABORER"						
WASTE WATER PUMP OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2015	$43.73	$10.00	$14.90	$0.00	$68.63
	06/01/2016	$44.48	$10.00	$14.90	$0.00	$69.38
	12/01/2016	$45.73	$10.00	$14.90	$0.00	$70.63
	06/01/2017	$46.73	$10.00	$14.90	$0.00	$71.63
	12/01/2017	$47.73	$10.00	$14.90	$0.00	$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
WATER METER INSTALLER *PLUMBERS & GASFITTERS LOCAL 12*	09/01/2015	$50.46	$10.82	$15.14	$0.00	$76.42
	03/01/2016	$51.61	$10.82	$15.14	$0.00	$77.57
	09/01/2016	$52.66	$10.82	$15.14	$0.00	$78.62
	03/01/2017	$53.66	$10.82	$15.14	$0.00	$79.62
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						
Outside Electrical - East						
CABLE TECHNICIAN (Power Zone) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2015	$26.11	$7.25	$1.78	$0.00	$35.14
	08/28/2016	$26.61	$7.50	$1.80	$0.00	$35.91
	09/03/2017	$27.14	$7.75	$1.81	$0.00	$36.70
For apprentice rates see "Apprentice- LINEMAN"						
CABLEMAN (Underground Ducts & Cables) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2015	$36.98	$7.25	$8.12	$0.00	$52.35
	08/28/2016	$37.70	$7.50	$8.87	$0.00	$54.07
	09/03/2017	$38.45	$7.75	$9.53	$0.00	$55.73
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN CDL *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2015	$30.46	$7.25	$8.34	$0.00	$46.05
	08/28/2016	$31.05	$7.50	$8.89	$0.00	$47.44
	09/03/2017	$31.66	$7.75	$9.44	$0.00	$48.85
For apprentice rates see "Apprentice- LINEMAN"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DRIVER / GROUNDMAN -Inexperienced (<2000 Hrs) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2015	$23.93	$7.25	$1.72	$0.00	$32.90
	08/28/2016	$24.39	$7.50	$1.73	$0.00	$33.62
	09/03/2017	$24.88	$7.75	$1.75	$0.00	$34.38
For apprentice rates see "Apprentice- LINEMAN"						
EQUIPMENT OPERATOR (Class A CDL) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2015	$36.98	$7.25	$12.29	$0.00	$56.52
	08/28/2016	$37.70	$7.50	$12.95	$0.00	$58.15
	09/03/2017	$38.45	$7.75	$13.61	$0.00	$59.81
For apprentice rates see "Apprentice- LINEMAN"						
EQUIPMENT OPERATOR (Class B CDL) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2015	$32.63	$7.25	$9.05	$0.00	$48.93
	08/28/2016	$33.26	$7.50	$9.63	$0.00	$50.39
	09/03/2017	$33.92	$7.75	$10.21	$0.00	$51.88
For apprentice rates see "Apprentice- LINEMAN"						
GROUNDMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2015	$23.93	$7.25	$1.72	$0.00	$32.90
	08/28/2016	$24.39	$7.50	$1.73	$0.00	$33.62
	09/03/2017	$24.88	$7.75	$1.75	$0.00	$34.38
For apprentice rates see "Apprentice- LINEMAN"						
GROUNDMAN -Inexperienced (<2000 Hrs.) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2015	$19.58	$7.25	$1.59	$0.00	$28.42
	08/28/2016	$19.96	$7.50	$1.60	$0.00	$29.06
	09/03/2017	$20.35	$7.75	$1.61	$0.00	$29.71
For apprentice rates see "Apprentice- LINEMAN"						
JOURNEYMAN LINEMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2015	$43.51	$7.25	$15.06	$0.00	$65.82
	08/28/2016	$44.35	$7.50	$15.83	$0.00	$67.68
	09/03/2017	$45.23	$7.75	$16.61	$0.00	$69.59

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *LINEMAN (Outside Electrical) - East Local 104*

Effective Date - 08/30/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$26.11	$7.25	$3.28	$0.00	$36.64
2	65	$28.28	$7.25	$3.35	$0.00	$38.88
3	70	$30.46	$7.25	$3.41	$0.00	$41.12
4	75	$32.63	$7.25	$4.98	$0.00	$44.86
5	80	$34.81	$7.25	$5.04	$0.00	$47.10
6	85	$36.98	$7.25	$5.11	$0.00	$49.34
7	90	$39.16	$7.25	$7.17	$0.00	$53.58

Effective Date - 08/28/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$26.61	$7.50	$3.30	$0.00	$37.41
2	65	$28.83	$7.50	$3.36	$0.00	$39.69
3	70	$31.05	$7.50	$3.43	$0.00	$41.98
4	75	$33.26	$7.50	$5.00	$0.00	$45.76
5	80	$35.48	$7.50	$5.06	$0.00	$48.04
6	85	$37.70	$7.50	$5.13	$0.00	$50.33
7	90	$39.92	$7.50	$7.20	$0.00	$54.62

Notes:

Apprentice to Journeyworker Ratio:1:2

TELEDATA CABLE SPLICER *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	01/01/2016	$28.98	$4.25	$3.12	$0.00	$36.35
TELEDATA LINEMAN/EQUIPMENT OPERATOR *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	01/01/2016	$27.31	$4.25	$3.07	$0.00	$34.63
TELEDATA WIREMAN/INSTALLER/TECHNICIAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	01/01/2016	$27.31	$4.25	$3.07	$0.00	$34.63
TREE TRIMMER *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	01/31/2016	$18.51	$3.55	$0.00	$0.00	$22.06

This classification applies only to tree work done: (a) for a utility company, R.E.A. cooperative, or railroad or coal mining company, and (b) for the purpose of operating, maintaining, or repairing the utility company's equipment, and (c) by a person who is using hand or mechanical cutting methods and is not on the ground. This classification does not apply to wholesale tree removal.

TREE TRIMMER GROUNDMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	01/31/2016	$16.32	$3.55	$0.00	$0.00	$19.87

This classification applies only to tree work done: (a) for a utility company, R.E.A. cooperative, or railroad or coal mining company, and (b) for the purpose of operating, maintaining, or repairing the utility company's equipment, and (c) by a person who is using hand or mechanical cutting methods and is on the ground. This classification does not apply to wholesale tree removal.

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Additional Apprentice Information:

Minimum wage rates for apprentices employed on public works projects are listed above as a percentage of the pre-determined hourly wage rate established by the Commissioner under the provisions of the M.G.L. c. 149, ss. 26-27D. Apprentice ratios are established by the Division of Apprenticeship Training pursuant to M.G.L. c. 23, ss. 11E-11L.

All apprentices must be registered with the Division of Apprenticeship Training in accordance with M.G.L. c. 23, ss. 11E-11L.

All steps are six months (1000 hours.)
Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified.

** Multiple ratios are listed in the comment field.
*** APP to JM; 1:1, 2:2, 2:3, 3:4, 4:4, 4:5, 4:6, 5:7, 6:7, 6:8, 6:9, 7:10, 8:10, 8:11, 8:12, 9:13, 10:13, 10:14, etc.
**** APP to JM; 1:1, 1:2, 2:3, 2:4, 3:5, 4:6, 4:7, 5:8, 6:9, 6:10, 7:11, 8:12, 8:13, 9:14, 10:15, 10:16, etc.

Division of Labor and Industries Statement of Compliance

GENERAL TERMS & CONDITIONS

General Conditions

GENERAL TERMS AND CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, RECONSTRUCTION, ALTERATION, REMODELING, OR REPAIR OF ANY PUBLIC BUILDING OR PUBLIC WORK IN THE CITY OF SOMERVILLE

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GENERAL TERMS AND CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, RECONSTRUCTION, INSTALLATION,

DEMOLITION, MAINTENANCE, OR REPAIR OF ANY PUBLIC BUILDING OR PUBLIC WORK IN THE CITY OF SOMERVILLE

ARTICLE 1: DEFINITIONS

1.1. In General.

1.1.1. Well-known meanings. When words or phrases that have a well-known technical, or construction industry, or trade meaning are used in the Contract Documents, such words or phrases shall be interpreted in accordance with that meaning, unless otherwise stated.

1.1.2. Capitalization. The words and terms defined in this Article are capitalized in these General Terms and Conditions of the Contract. Other capitalized words may refer to a specific document found in the Contract Documents.

1.1.3. Persons. Whenever the word person or persons is used, it includes, unless otherwise stated, entity or entities, respectively, including, but not limited to, corporations, partnerships, and joint venturers.

1.1.4. Singular and Plural. The following terms have the meanings indicated which are applicable to both the singular and the plural thereof.

1.2. Definitions.

1.2.1. Agreement. The Agreement is the written document between the **City** and the **Contractor** which is titled: Agreement between the City of Somerville and the Contractor, which is the executed portion of the Contract, and which forms a part of the Contract. The Agreement also includes all documents required to be attached thereto, including, but not limited to, the performance bond, the labor and materials or payment bonds, certificates of insurance, and all Modifications of the Agreement.

1.2.2. Change Order. A Change Order is a document which is signed by the **Contractor**, the **Design Professional**, and the **City;** which is directed to the **Contractor;** which authorizes the **Contractor** to make an addition to, a deletion from or a revision in the Work, or an adjustment in the Contract Sum or in the Contract Time; and which is issued on or after the date of the Agreement between the **Contractor** and the **City.**

1.2.3. City. The **City** refers to the City of Somerville, which is the owner of the Project and is the public awarding authority with whom the **Contractor** has entered into the Contract and for whom the Work is to be provided.

1.2.4. Claim. A Claim is a dispute, demand, or assertion by one of the parties arising out of or relating to the Contract for which such party is seeking relief.

1.2.5. Contract. The Contract consists of all the Contract Documents. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations**,** representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification to the Contract signed by both parties.

1.2.6. Contract Documents. The Contract Documents consist of the Agreement; the notice of award of the Contract; the Notice to Proceed; the entire Project Manual; Change Orders; Construction Change Directives; the **Contractor's** Bid and all accompanying documents; and the **Design Professional's** written interpretations and clarifications issued on or after the issuance of the Notice to Proceed. Shop Drawing submittals and reports or drawings utilized by the **Design Professional** in preparing the Contract Documents are not Contract Documents.

1.2.7. Contractor. The **Contractor** is the person who is awarded the Contract for the Project herein pursuant to M.G.L. c. 149, §44A or M.G.L. c. 39, §39M; and is identified in the Agreement as such. The term "**Contractor**" is intended to include the **Contractor** as well as its authorized representative(s).

1.2.8. Contract Sum. The Contract Sum is the total amount stated in the Agreement payable by the **City** to the **Contractor** for the completion of the Work in accordance with the Contract Documents.

1.2.9. Contract Time. Unless otherwise provided, the Contract Time is the number of days allotted in the Contract Documents or the dates stated in the Agreement, including authorized adjustments, for Substantial Completion. We usually put a contract end date that is beyond the date of substantial completion.

1.2.10. Coordination Drawings. Coordination Drawings are those drawings, which are prepared by the **Contractor** or a Subcontractor that show the exact alignment, physical locations, and configuration of the mechanical, electrical, and fire protection installations.

1.2.11. Day. The term "day" shall mean calendar day unless otherwise stated.

1.2.12. Design Professional. The **Design Professional** is the person lawfully licensed to practice architecture, engineering, or landscape architecture and has been selected by the **City** to administer the Contract. The term "**Design Professional**," while referred to in the singular, means the **Design Professional** and/or the **Design Professional's** representative. For the purposes of this project, **Design Professional** shall mean the firm of Weston Sampson Engineers and appropriate consultants.

1.2.13. Field Order. A Field Order is a written order issued by the **Design Professional** which orders minor changes in the Work, but which does not involve a change in the Contract Sum or the Contract Time.

Part 1, Section 4: OTHER BID DOCUMENTS

1.2.14. Final Completion. Final Completion is the point in time when the Design Professional finds that the Work has been fully completed in accordance with the Contract Documents. Final Completion shall be no later than thirty (30) days after Substantial Completion.

1.2.15. General Requirements. General Requirements refer to Sections of Division 1 of the Specifications.

1.2.16. Modification. A Modification is a written instrument that amends the Contract after execution of the Agreement.

1.2.17. Notice to Proceed. A Notice to Proceed is a written notice given by the **City,** or the **Design Professional**, to the **Contractor** fixing the date on which the Contract Time will begin to run and on which the **Contractor** shall start to perform its obligations under the Contract Documents.

1.2.18. Plans. The Plans are the drawings which are the graphic and pictorial portions of the Contract Documents, wherever located and whenever issued, showing the design, location, dimensions, scope, extent, and character of the Work to be furnished and performed by the **Contractor** and which have been prepared or approved by the **Design Professional**.

1.2.19. Product Data. Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the **Contractor** to illustrate materials or equipment for some portion of the Work. Product Data are not considered part of the Contract Documents.

1.2.20. Project. The Project is the total Work to be provided under the Contract Documents and may be the whole or a part as indicated elsewhere in the Contract Documents and may include construction by the **City** or by separate contractors. The Project is the Work described in the invitation to bid (advertisement) and Specifications and illustrated by the Plans, including any Modifications.

1.2.21. Project Manual. The Project Manual is the entire set of bidding documents which includes, but is not limited to, the invitation to bid (advertisement), the instructions to bidders, all of the forms, the wage rates, all City and state requirements, the General Terms and Conditions of the Contract, any supplementary conditions thereto, the Plans, the Specifications, and all addenda.

1.2.22. Proposed Change Order. A Proposed Change Order is a Change Order that has been submitted by the **Contractor** to the **Design Professional,** is under review, and has not been approved by the **City**.

1.2.23. Samples. Samples are physical examples of materials, equipment, or

workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged. Samples are not considered part of the Contract Documents.

1.2.24. Shop Drawings. Shop Drawings are all drawings, diagrams, illustrations, schedules, and other information that are specifically prepared or assembled by or for the **Contractor** and submitted by the **Contractor** to illustrate some portion of the Work. Shop Drawings are not considered part of the Contract Documents.

1.2.25. Site. The Site is the location of the Project and of the Work.

1.2.26. Specifications. Specifications are those portions of the Contract Documents consisting of written technical descriptions of materials, equipment, construction systems, standards, and workmanship as applied to the Work and certain administrative details applicable thereto.

1.2.27. Subcontractor. A Subcontractor is a person who contracts directly with the **Contractor**, unless otherwise stated.

1.2.28. Submittals. Submittals are those Shop Drawings, Product Data, Samples, or any other required document that are provided to the Design Professional for review and approval.

1.2.29. Substantial Completion. Substantial Completion means that the Work has been completed and the Site or the facility is opened for full and intended public use, except for minor incomplete or unsatisfactory items that do not materially impair the usefulness of the Work. The **Design Professional** shall decide what constitutes "minor," "incomplete," "unsatisfactory," and "materially" and the **Design Professional's** decision shall be final.

1.2.30. Sub-subcontractor. A Sub-subcontractor is a person who has contracted directly with a Subcontractor.

1.2.31. Supplier. A Supplier is a manufacturer, fabricator, distributor, material person, or vendor having a direct contract with the Contractor or with any Subcontractor to furnish materials or equipment to be incorporated into the Work by the Contractor or any Subcontractor.

1.2.32. Work. Work refers to the services and the entire completed construction or the various separately identifiable parts thereof required by the Contract Documents, including all labor, materials, and equipment furnished, furnished and incorporated into the Project, or to be provided by the **Contractor** to fulfill the **Contractor's** obligations. The Work may constitute the whole or a part of the Project.

1.2.33. Construction Change Directive. A **Construction Change** Directive is a written directive to the **Contractor** ordering an addition to, a deletion from, or a revision to the Work issued on or after the date of the Agreement, signed by the **City**, and recommended by the **Design Professional**.

ARTICLE 2: ABOUT THE CONTRACT DOCUMENTS

2.1. Priority/Conflict.

2.1.1. Priority Among Contract Documents. In the event of conflict among the Contract Documents, the Contract Documents shall be construed according to the following priorities:

Highest Priority:	Modifications
Second Priority:	Agreement
Third Priority:	Addenda-later date to take precedence
Fourth Priority:	Supplementary General Conditions
Fifth Priority:	General Conditions
Sixth Priority:	Plans and Specifications

2.1.1.1. If there is a conflict between the Plans and Specifications, the figured dimensions shall govern over the scaled dimensions. Detailed Plans shall govern over the general Plans. Larger scale Plans shall take precedence over smaller scale Plans. Plans shall govern over Shop Drawings. Whenever notes, specifications, dimensions, details, or schedules in the Specifications or in the Plans, or between the Specifications and the Plans, or in all other instances not specifically noted above, the **Contractor** shall provide, unless otherwise directed by a Modification of the Contract, the better quality or greater quantity of Work at no increase in the Contract Sum or in the Contract Time.

2.1.1.2. Compliance with these priority conditions shall not justify any changes in the Work or any increase in the Contract Sum or Contract Time, unless any such compliance results in Work that may not be reasonably inferred from the Contract Documents as being required to produce the intended result as determined by the **Design Professional**.

2.1.2. Review of the Contract Documents and Field Conditions and Discovery of Conflict, Error, Ambiguity, or Discrepancy. Before starting the Work, and during the progress thereof, the **Contractor** shall carefully study and compare the Contract Documents with each other and with the information furnished by the **City** pursuant to Article 3 and shall at once report to the **Design Professional** any error, inconsistency, or omission the **Contractor** may discover. Any necessary change shall be ordered as provided in Article 11, subject to the requirements of any other provisions of the Contract Documents. The **Contractor** shall not proceed with the Work affected thereby (except in an emergency) until

a Modification has been issued. If the **Contractor** proceeds with the Work having discovered such errors, inconsistencies, or omissions contrary to the provisions contained herein, or if by reasonable study of the Contract Documents the **Contractor** could have discovered such, the **Contractor** shall bear all costs arising therefrom. The **Contractor** shall be liable to the **City** for failure to report any conflict, error, ambiguity, or discrepancy of which it knew or should have known.

2.1.3. Field Measurements. The **Contractor** shall take field measurements and verify field conditions and shall carefully compare such field measurements and conditions and other information known to the **Contractor** with the Contract Documents before commencing activities. Errors, inconsistencies, or omissions discovered shall be reported to the **Design Professional** at once.

2.1.4. Statutory Provisions. The **City** and the **Contractor** recognize that other rights duties and obligations with respect to public construction contracts are provided for by statute, notwithstanding the fact that they may not be provided for in the Contract Documents. In case of conflict between the statutory provisions and other provisions of the Contract Documents and the provisions of any applicable statute, the statutory provisions shall govern.

2.1.5. Voided or Unlawful Provisions. In the event any provision in the Contract is voided or deemed unlawful, such provision shall be deleted without affecting the remainder of the Contract.

2.2. Execution.

2.2.1. Execution of the Agreement by the **Contractor** is a representation that the **Contractor** has visited the Site, become familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

2.3. Intent.

2.3.1. Entire Agreement. The Contract Documents comprise the entire agreement between the **City** and the **Contractor** concerning the Work**.** The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the **Contractor**. The Contract Documents are complementary; what is required by one shall be as binding as if required by all. Performance by the **Contractor** shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the intended results. All Work mentioned or indicated in the Contract Documents shall be performed by the **Contractor** as part of this Contract unless it is specifically indicated in the Contract Documents that such Work is to be done by others.

2.3.2. Statutory Provisions. Each and every provision of law, code, and regulation, required by law to be inserted in these Contract Documents shall be deemed to be inserted

herein, and they shall be read and enforced as though it were included herein, and if through mistake or otherwise, any such provision is not inserted, or if not correctly inserted, then upon the application of either party, the Contract Documents shall forthwith be physically amended to make such insertion.

2.3.3. Functionally Complete Project. It is the intent of the Contract Documents to describe a functionally complete Project. The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the **Contractor**. Any Work, materials, or equipment that may be reasonably inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be furnished and performed by the **Contractor** whether or not specifically called for in the Contract Documents.

2.3.4. Indications or Notations. All indications or notations which apply to one of a number of similar situations, materials, or processes shall be deemed to apply to all such situations, materials, or processes wherever they appear in the Work, except where a contrary result is clearly indicated by the Contract Documents.

2.3.5. Standards or Quality of Materials or Workmanship. Where no explicit quality or standards for materials or workmanship are established for Work, such Work is to be of good quality for the intended use and consistent with the quality of the surrounding Work and of the construction of the Project generally.

2.3.6. Manufactured Products. All manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned in accordance with the manufacturer's written or printed directions and instructions unless otherwise indicated in the Contract Documents.

2.3.7. Mechanical, Electrical, and Fire Protection Plans. The mechanical, electrical, and fire protection Plans are diagrammatic only and are not intended to show the alignment, physical locations, or configurations of such Work. Such Work shall be installed without additional cost to the **City** to clear all obstructions, permit proper clearances for the Work of other trades, and present an orderly appearance where exposed. Prior to beginning such Work, the **Contractor** shall prepare Coordination Drawings and demonstrate to the **Design Professional's** satisfaction that the installations will comply with the preceding sentence. The **Contractor** shall be solely liable and responsible for any costs and/or delays resulting from the **Contractor's** failure to prepare such Coordination Drawings.

2.3.8. Locations of Fixtures and Outlets. Exact locations of fixtures and outlets shall be obtained from the **Design Professional** as provided in Article 5 before the Work is roughed in. Work installed without such information from the **Design Professional** shall be relocated at the **Contractor's** expense.

2.3.9. Tests. When test boring or soil test information are included with the Contract

Documents or otherwise made available to the **Contractor** and such test boring or soil test information was obtained by the **City** for use by the **Design Professional** in the design of the Project or Work, the **City** does not hold out such information to the **Contractor** as an accurate or approximate indication of subsurface conditions, and no claim for extra cost of extension of time resulting from a reliance by the **Contractor** on such information shall be allowed except as otherwise provided herein. Any such reports are not part of the Contract Documents.

2.3.10. Joining Work. Where the Work is to fit with existing conditions or work to be performed by others, the **Contractor** shall fully and completely join the Work with such conditions or work, unless otherwise specified.

2.4. Organization.

2.4.1. Except as provided in M.G.L. c. 149, §44F, the organization of the Specifications into divisions, sections, and articles, and the arrangement of Plans shall not control the **Contractor** in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

2.5. References.

2.5.1. Where codes, manuals, specifications, standards, requirements and publications of public and private bodies are referred to in the Contract Documents whether specifically or by implication, references shall be understood to be to the latest revision prior to the date of receiving bids, except where otherwise indicated. Where statutes are referred to in the Contract Documents whether specifically or by implication, references shall be understood to be to the latest revision.

2.5.2. References herein to particular paragraphs or Articles are solely to facilitate finding additional information with regard to the specific matters and are not to be construed in any way as limiting the possible paragraphs and Articles in which such matters may be found elsewhere in this document.

2.6. Reuse of Design Professional's Written Instruments.

2.6.1. Neither the **Contractor** nor any Subcontractor or Supplier shall have or acquire any title to or ownership rights in any of the Plans, Specifications, or other documents prepared by the **Design Professional** and shall not reuse any of such Plans, Specifications, or other documents without prior written consent of the **City** and the **Design Professional**.

2.7. Written Material of the Contractor.

2.7.1. All written material prepared or collected by the **Contractor** in the course of completing the Work shall be the exclusive property of the **City** and shall not be used by the **Contractor** for any purpose other than the purpose of this Contract.

2.8. Modifying Words.

Part 1, Section 4: OTHER BID DOCUMENTS

2.8.1. In the interest of simplicity, modifying words such as “all” and “any” may be omitted, but the fact that such words may be absent from one sentence and appear in another is not intended to affect the interpretation of either statement.

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2.9. Use of Certain Words and Terms.

2.9.1. Whenever in the Contract Documents the terms "as ordered," "as directed," "as required," "as allowed," "as approved," or terms of like effect or import are used, or the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe a requirement, direction, review, or judgment of the **City** or of the **Design Professional** as to the Work, it is intended that such requirement, direction, review, or judgment will be solely to evaluate, in general, the completed Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise).

2.9.2. The use of any such term or adjective shall not be effective to change the duties and responsibilities of the **City** or the **Design Professional** from those assigned in the Contract Documents or to assign any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of the Contract Documents.

2.9.3. When the words "Contractor," "Subcontractor," Sub-subcontractor," and "Supplier" are used, they are intended to include their employees and agents, unless otherwise specified.

2.10. Modification of the Contract Documents.

2.10.1. Major Modifications. Major Modifications may affect the Contract Sum or the Contract Time. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof in one or more of the following ways, all of which must contain a written endorsement by the **City**:

2.10.1.1. a formal written amendment;

2.10.1.2. a Change Order;

2.10.1.3. a **Construction Change** Directive; or

2.10.1.4. the **Design Professional's** written interpretation, clarification, or decision.

2.10.2. Minor Modifications. Minor modifications do not affect the Contract Sum or the Contract Time. The requirements of the Contract Documents may be supplemented and minor variations and deviations of the Work may be authorized in one or more of the following ways:

2.10.2.1. a Field Order; or

2.10.2.2. the **Design Professional's** approval of a Shop Drawing or Sample.

ARTICLE 3: THE CITY

3.1. Signatory.

3.1.1. All documents which require a signature or an endorsement by the **City** must be signed by the Mayor in order to be deemed ratified by the **City**.

3.2. Requirements to Provide Documents.

3.2.1. To the extent they are available, the **City** shall furnish surveys describing physical characteristics, legal limitations, and utility locations for the site of the Project, and a legal description of the Site.

3.2.2. The **City** shall obtain and pay for necessary approvals, easements, assessments, and charges that are customarily secured prior to the execution of the Contract.

3.2.3. The **City** shall furnish information or services required of the **City** hereunder with reasonable promptness after receipt from the **Contractor** of a written request for such information or services.

3.2.4. The **City** shall provide the **Contractor**, at no charge, such copies of the Project Manual as are reasonably necessary for the execution of the Work.

3.3. Clerk of the Works.

3.3.1. The **City** may engage a Clerk of the Works for this Project, in which case the **City** shall, upon request of the **Contractor**, provide the **Contractor** with a written statement of the duties, responsibilities, and limitations of authority of such Clerk of the Works. Except as expressly set forth in such written statement, the Clerk of the Works shall have no authority to approve Work, to approve Change Orders, or to exercise any of the power and authority of the **City** or the **Design Professional**. The Clerk of the Works shall observe the **Contractor's** operations and construction activities for compliance with the Plans and Specifications. The Clerk of the Works shall have access to all areas of the Project at all times. The **Contractor** shall fully cooperate with the Clerk of the Works in the performance of the Clerk's duties.

3.4. City's Right to Perform Construction and to Award Separate Contracts.

3.4.1. The **City** reserves the right to perform construction or operations at the Site with its own forces or others. If the **Contractor** claims that a delay or additional cost is involved because of such action by the **City**, the **Contractor** shall make such Claim as provided elsewhere in the Contract Documents.

3.4.2. When the separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "**Contractor**" in the Contract Documents in each case shall mean the **Contractor** who executes each separate City-Contractor Agreement.

3.4.3. The **City** shall provide for coordination of the activities of the **City's** own forces and of each separate contractor with the Work of the **Contractor**, who shall cooperate with them. The **Contractor** shall afford each other person access to the Site and shall properly coordinate its Work with that of the persons performing other work. The **Contractor** shall participate with other separate contractors and the **City** in reviewing their construction schedules when directed to do so. The **Contractor** shall make any revisions to the construction schedules deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the **Contractor**, separate contractors, and the **City** until subsequently revised.

3.5. Limitations on the City's Responsibilities.

3.5.1. The **City** shall not supervise, direct, or have control or authority over, nor be responsible for the **Contractor's** means, methods, techniques, sequences, or procedures of construction or the safety precautions and programs incident thereto, or for any failure of the **Contractor** to comply with laws, codes and regulations applicable to the furnishing or performance of the Work. The **City** will not be responsible for the **Contractor's** failure to perform or furnish the Work in accordance with the Contract Documents. The **City** is not responsible for the acts or omissions of the **Contractor**, any Subcontractor, Supplier, or anyone for whose acts the **Contractor**, any Subcontractor or Suppliers may be liable.

3.5.2. The **City's** authority to review any of the **Contractor's** progress schedules, or its decision to raise or not to raise any objections about such schedules shall not impose on the **City** any responsibility for the timing, planning, scheduling, or execution of the Work, nor in any way give rise to any duty or responsibility on the part of the **City** to exercise this authority for the benefit of the **Contractor**, any Subcontractor or Supplier or any other party.

3.5.3. The **City's** decision to raise or not to raise objections with regard to any aspects of the **Contractor's** insurance shall in no way give rise to any duty or responsibility on the part of the **City** to or for the benefit of the **Contractor**, any Subcontractor, any Supplier, or any other party.

3.6. Reservation of Rights.

3.6.1. The **City** reserves the right to correct at any time any error in any progress payment that may have been made.

3.6.2. Should defective Work be discovered subsequent to final payment, the **City** reserves the right to make a claim and recover all costs and professional fees associated therewith, including the cost of removing and/or replacing the defective Work.

3.7. Waivers.

3.7.1. All waivers by the **City** are valid only to the extent that they are signed by the **City**. Any such waivers pertain only to the specific matter contained in the waiver and not to any similar, subsequent matters.

ARTICLE 4: THE DESIGN PROFESSIONAL

4.1. City's Representative.

4.1.1. The **Design Professional** is the **City's** representative (1) during construction, (2) until final payment is due, and (3) with the **City's** concurrence, from time to time during the correction period described in Article 10. The **Design Professional** will advise and consult with the **City**. The **Design Professional** will have authority to act on behalf of the **City** only to the extent provided in the Contract Documents, unless otherwise modified by a written instrument in accordance with other provisions of the Contract.

4.1.2. The duties, responsibilities, and the limitations of authority of the **Design Professional** as the **City's** representative during construction are set forth in the Contract Documents and shall not be extended without the written consent of the **City** and the **Design Professional**.

4.2. Administration of the Contract.

4.2.1. The **Design Professional** will provide administration of the Contract as described in the Contract Documents, unless the **City** has engaged a construction manager.

4.3. Visits to the Site.

4.3.1. The **Design Professional** will visit the site at intervals appropriate to the stage of construction to become generally familiar with the progress and quality of the completed Work and to determine in general if the Work is being performed in a manner indicating that the Work, when completed, will be in accordance with the Contract Documents. However, the **Design Professional** will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. On the basis of on-site observations as an architect, engineer, or landscape architect, the **Design Professional** will keep the **City** informed of progress of the Work in writing and will endeavor to guard the **City** against defects and deficiencies in the Work.

4.4. Communications Facilitating Contract Administration.

4.4.1. Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the **City** and the **Contractor** shall endeavor to communicate through the **Design Professional**. Communications by and with the **Design Professional's** consultants shall be through the **Design Professional**. Communications by and with Subcontractors and Suppliers shall be through the **Contractor**. Communications by and with **City** employees and separate contractors shall be through the **City**.

4.4.2. When it deems it necessary or expedient, the **City** may communicate directly with the **Contractor**, any Subcontractors, Suppliers, or consultants.

4.5. Certification of Applications for Payment.

4.5.1. Based on the **Design Professional's** observations and evaluations of the

Contractor's applications for payment, the **Design Professional** will review and certify the amounts due the **Contractor** and will issue certificates for payment in such amounts.

4.6. Rejection of Work.

4.6.1. The **Design Professional** will have authority to reject or disapprove Work (1) that does not conform to the Contract Documents; (2) that the **Design Professional** believes to be defective; and (3) that the **Design Professional** believes will not produce a completed Project conforming to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Whenever the **Design Professional** considers it necessary or advisable for implementation of the intent of the Contract Documents, the **Design Professional** will have authority to require additional inspection or testing of the Work in accordance with Article 9, whether or not such Work is fabricated, installed, or completed. However, neither this authority of the **Design Professional** nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the **Design Professional** to the **Contractor**, Subcontractors, Suppliers, or other persons performing portions of the Work.

4.7. Review of Submittals.

4.7.1. The **Design Professional** will review or take other appropriate action upon the **Contractor's** submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents and only to the extent that the **Design Professional** believes desirable to protect the **City's** interest. The **Design Professional's** action will be taken with reasonable promptness, while allowing sufficient time in the **Design Professional's** professional judgment to permit adequate review, taking into account the time periods set forth in the latest schedule prepared by the **Contractor** and approved by the **Design Professional**. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the **Contractor** as required by the Contract Documents. The **Design Professional's** review of the **Contractor's** submittals shall not relieve the **Contractor** of the obligations under Article 5. The **Design Professional's** review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The **Design Professional's** approval of a specific item shall not indicate approval of an assembly of which the item is a component. After the rejection of the second resubmittal of any one Submittal, the **Contractor** shall bear the cost of the review of each subsequent resubmittal.

4.8. Preparation of Change Orders and Construction Change Directives.

4.8.1. The **Design Professional** will prepare Change Orders and **Construction Change** Directives and may authorize minor Modifications in the Work as provided in Article 11.

4.9. Inspections.

4.9.1. The **Design Professional** will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; will receive and forward to the **City** for the **City's** review and records written warranties and related documents required by the Contract and assembled by the **Contractor**; and will issue a final certificate for payment upon

the **Contractor's** compliance with all of the requirements of the Contract Documents.

4.10. Interpretations, Clarifications, and Decisions.

4.10.1. The **Design Professional** will interpret and decide matters concerning performance under and requirements of the Contract Documents on written request of either the **City** or the **Contractor**. The **Design Professional's** response to such requests will be made with reasonable promptness and within the time set forth in the Agreement between the **City** and the **Design Professional**. Any such written interpretations, clarifications, and decisions shall be binding on the **Contractor**.

4.10.2. Interpretations, clarifications, and decisions of the **Design Professional** will be consistent with the intent of and reasonably inferable from the Contract Documents and will be in writing or in the form of drawings. The **Design Professional** will not be liable to the **Contractor**, any Subcontractor, or Supplier for results of interpretations, clarifications, or decisions so rendered in good faith.

4.10.3. The **Design Professional** may, as the **Design Professional** judges desirable, issue additional drawings or instructions indicating in greater detail the construction or design of the various parts of the Work; such drawings or instructions may be effected by a Field Order or other notice to the **Contractor**, and provided such drawings or instructions are reasonably consistent with the previously existing Contract Documents, the Work shall be executed in accordance with such additional drawings or instructions without any additional cost or an extension of the Contract Time.

4.10.4. The **Design Professional's** decisions on matters relating to aesthetic effect must be consistent with the **City's** and will be final.

4.11. Limitation on the Design Professional's Responsibilities.

4.11.1. Neither the **Design Professional's** authority to act under the provisions of the Contract Documents nor any decision made by the **Design Professional** in good faith to exercise or not to exercise such authority shall give rise to any duty or responsibility of the **Design Professional** to the **Contractor**, any Subcontractor, any Supplier, any surety for any of them or any other person.

4.11.2. The **Design Professional** will not have control over or charge of and will not be responsible for construction means, methods, techniques, sequences, or procedures, or for safety precautions and programs in connection with the Work, since these are solely the **Contractor's** responsibility as provided in Article 5. The **Design Professional** will not be responsible for the **Contractor's** failure to carry out the Work in accordance with the Contract Documents. The **Design Professional** will not have control over or charge of and will not be responsible for acts or omissions of the **Contractor**, Subcontractors, Suppliers, or of any other persons performing portions of the Work.

ARTICLE 5: THE CONTRACTOR

5.1. Relationship with the City.

5.1.1. The **Contractor** is an independent contractor and not an employee of the **City.** The **Contractor** is engaged by virtue of the Contract to perform only those services contained therein. The **Contractor** is not authorized to contract on behalf of the **City** or to incur any liability on the part of the **City**.

5.2. Code of Conduct.

5.2.1. M.G.L. c. 268A establishes standards of conduct for officials and employees of the **City**. The **Contractor** shall familiarize itself with the statute and act accordingly.

5.3. Quality Assurance.

5.3.1. The **Contractor** shall be responsible for ensuring that it, all Subcontractors, Suppliers, and all persons employed to do the Work under the Contract Documents perform in a professional manner, provide a high quality of service and Work, and perform in accordance with the Contract Documents.

5.4. Supervision.

5.4.1. Competence and Efficiency. The **Contractor** shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills, attention and expertise as may be necessary to perform the Work in accordance with the Contract Documents.

5.4.2. Construction Means, Methods, Techniques, Etc. The **Contractor** shall be solely responsible for and have control over construction means, methods, techniques, sequences, and procedures and for coordinating all portions of the Work under the Contract. Where the Contract Documents refer to particular construction means, methods, techniques, sequences, or procedures or indicate or imply that such are to be used in the Work, such mention is intended only to indicate that the operations of the **Contractor** shall be such as to produce at least the quality of Work implied by the operations described. The actual determination of whether or not the described operations may be safely and suitably employed on the Work shall be the responsibility of the **Contractor**, who shall notify the **Design Professional** in writing, prior to implementation, of the actual means, methods, techniques, sequences, or procedures which will be employed on the Work, if these differ from those mentioned in the Contract Documents. All loss, damage, liability or cost of correcting defective work arising from the employment of any construction means, methods, techniques, sequences, or procedures shall be borne by the **Contractor**, notwithstanding that such construction means, methods, techniques, sequences, or procedures are referred to, indicated or implied by the Contract Documents, unless the **Contractor** has given timely notice to the **City** and the **Design Professional** in writing that such means, methods, techniques, sequences, or procedures are not safe or suitable, and the **City** has then instructed the **Contractor** in writing to proceed at the **City's** risk.

5.4.3. Variance between the Contract Documents and Statutes, Ordinances, Codes, Rules, and Regulations. The **Contractor** shall promptly notify the **Design Professional** and the **City** in writing of any variances between the Contract Documents and statutes, ordinances, codes, rules, and regulations. If the **Contractor,** without written notice to the **Design Professional** and the **City,** performs Work knowing that it is contrary to statutes, ordinances, codes, rules, and regulations, the **Contractor** shall assume full responsibility for such Work and shall bear the costs associated therewith, i.e., replacement, repairs, removal, and fines.

5.4.4. Acts and Omissions. The **Contractor** shall be responsible to the **City** for the acts and omissions of all persons performing or supplying the Work.

5.4.5. Inspections. The **Contractor** shall be responsible for inspection of portions of Work already performed under this Contract to determine whether such portions are in proper condition to receive subsequent Work.

5.5. Personnel.

5.5.1. Suitability. The **Contractor** shall provide competent, properly licensed and/or certified, suitably qualified, and reliable personnel to perform the Work required by the Contract Documents. The **Contractor** shall enforce strict discipline and maintain good order at the site at all times. The **Contractor** shall not employ any Subcontractor, Supplier, or other person, whether initially or as a substitute, against whom the **City** may have reasonable objection. Acceptance of any Subcontractor or other person by the **City** shall not constitute a waiver of any right of the **City** to reject defective Work.

5.5.2. Sexual Harassment. Sexual harassment is an unlawful practice under M.G.L. c. 151B. The **Contractor**, Subcontractors, and all other persons responsible for any portion of the Work shall refrain from engaging in sexual harassment. The **Contractor** shall be responsible for any acts of sexual harassment committed by any persons responsible for any portion of the Work. The **Contractor** shall take appropriate action against any such individuals.

5.5.3. Weapons and Illegal Drugs. No weapons or illegal drugs are permitted on the Site. It is the responsibility of the **Contractor** to ensure that no weapons or illegal drugs are brought to the Site.

5.5.4. Maximum Work Day and Work Week. (*Reference:* M.G.L. c. 149, §§30 and 34;). No laborer, worker, mechanic, foreperson or inspector working within this Commonwealth in the employ of the **Contractor**, Subcontractor or other person doing or contracting to do the whole or part of the work contemplated by the Contract, shall be required or permitted to work more than eight (8) hours in any one day or more than forty-eight (48) hours in any one week, or more than six (6) days in any one week, except in cases of emergency.

5.5.5. Lodging. (*Reference:* M.G.L. c. 149, §25;). Every employee under this Contract

shall lodge, board and trade where and with whom he or she elects, and neither the **Contractor** nor its agents or employees shall, either directly or indirectly, require as a condition of the employment of any person that the employee shall lodge, board or trade at a particular place or with a particular person.

5.5.6. Wage Rates. (*Reference:* M.G.L. c. 149, §27). Mechanics and apprentices, teamsters, chauffeurs and laborers performing Work shall be paid no less than the minimum rate of wages included in the bid documents and the Project Manual and which are made part of the Contract. They shall continue to be the minimum rate of wages for said employees during the life of the Contract. The **Contractor** shall keep a legible copy of the wage rates posted in a conspicuous place at the site during the life of the Contract. These rates of wages shall include payments by employers to health and welfare plans, pension plans and supplementary unemployment benefit plans as provided in M.G.L. c. 149, §26;, and such payments shall be considered as payments to persons under M.G.L. c. 149, §27 performing work as therein provided. If the **Contractor** does not make payments to a health and welfare plan, a pension plan and a supplementary unemployment benefit plan, where such payments are included in the rates of wages, the **Contractor** shall pay the amount of said payments directly to each employee engaged in the Work. If the **Contractor** pays less than the rate of wages, including payments to health and welfare funds and pension funds, or the equivalent payments in wages to any person performing Work within the classifications as determined by the Commissioner of Labor and Industries, and if the **Contractor** takes or receives for its own use or the use of any other person, as a rebate, refund or gratuity, or in any other guise, any part or portion of the wages, including payments to health and welfare funds and pension funds, or the equivalent payment in wages, paid to such person for Work done or service rendered on the Project, the **Contractor** will be subject to the penalties set forth in M.G.L. c. 149, §27. Notwithstanding the foregoing and the requirements of 5.5.7.1 and 5.5.7.2 below, if the Contract is federally funded, federal labor standards apply, including Davis Bacon minimum wage rates and payroll reporting requirements. See the "Federal Requirements" section at the end of these contract documents.

5.5.7. Payroll Records of Employees. (*Reference:* M.G.L. c. 149, §27B;). The **Contractor** and all Subcontractors who are subject to M.G.L. c. 149, §§27 and 27A shall keep a true and accurate record of all mechanics and apprentices, teamsters, chauffeurs, and laborers performing Work showing the name, address and occupational classification of each such employee, the hours worked by and the wages paid to all such employees. The **Contractor** and the Subcontractors shall submit a copy of said record to the **City** on a weekly basis.

5.5.7.1. (*Reference:* M.G.L. c. 149, §27B;). The **Contractor** and all Subcontractors who are subject to M.G.L. c. 149, §§27 and 27A shall preserve their payroll records for a period of three (3) years from the date of completion of the Contract.

5.5.7.2. (*Reference:* M.G.L. c. 149, §27B). The **Contractor** and all Subcontractors who are subject to M.G.L. c. 149, §§27 and 27A shall furnish to the Commissioner of Labor and Industries and the **City** within fifteen (15) days after completion of their portion of the Work a statement executed by the **Contractor** or

Subcontractor or by any authorized officer or employee of the **Contractor** or Subcontractor who supervises the payment of wages in the form found in M.G.L. c.149, §27B.

5.6. Superintendence.

5.6.1. Employment of a Superintendent. The **Contractor** shall employ a competent, properly licensed superintendent, reasonably acceptable to the **City**, and necessary assistants who shall be in attendance at the Site full time during the progress of the Work until the date of Substantial Completion and for such additional time thereafter as the **Design Professional** or the **City** may determine to be necessary for the expeditious completion of the Work, including final completion. If continually in the employ of the Contractor, the same Superintendent shall be assigned to this project.

5.6.2. Removal/Replacement of a Superintendent. The **Contractor** shall remove the superintendent if requested to do so in writing by the **City** and shall promptly replace such superintendent with a competent person reasonably acceptable to the **City**. The superintendent shall represent the **Contractor**, and communications given to the superintendent shall be as binding as if given to the **Contractor**. The **Contractor** shall not replace the superintendent without written notice to the **City** and the **Design Professional**.

5.6.3. Registered Professional Engineer or Registered Land Surveyor. The **Contractor** shall retain a competent Registered Professional Engineer or Registered Land Surveyor, acceptable to the **Engineer**, who shall establish the exterior lines and required elevations of all buildings and structures to be erected on the site and shall establish sufficient lines and grades for the construction of associated Work such as, but not limited to, roads, utilities, and site grading. The Engineer or Land Surveyor shall certify as to the actual location of the constructed facilities in relation to property lines, building lines, easements, and other restrictive boundaries.

5.6.4. Building Grades, Lines, Etc.; The **Contractor** shall establish the building grades; lines; levels; and column, wall and partition lines required by the various Subcontractors in laying out their Work.

5.6.5. Coordination and Supervision. The **Contractor** shall coordinate and supervise the Work performed by Subcontractors to the end that the Work is carried out without conflict between trades and so that no trade, at any time, causes delay to the general progress of the Work. The **Contractor** and all Subcontractors shall at all times afford each trade, any separate contractor, or the **City**, every reasonable opportunity for the installation of Work and the storage of materials.

5.6.6. Job Meetings. There shall be job meetings held on a weekly basis, or more often if required by the **City**. The **Contractor** shall arrange for and attend weekly job meetings with the **Design Professional** and such other persons as the **Design Professional** may from time to time wish to have present. The **Contractor** shall be represented by a principal, project manager, general superintendent or other authorized main office representative, as well as by the **Contractor's** own superintendent. An authorized representative of any Subcontractor or Sub-subcontractor shall attend such meetings if the representative's presence is requested by the

Design Professional. Such representatives shall be empowered to make binding commitments on all matters to be discussed at such meetings, including costs, payments, Change Orders, time schedules and workforce power. Any notices required under the Contract may be served on such representatives.

5.7. Materials, Labor, Equipment, Etc.

5.7.1. Provision of. Unless otherwise provided in the Contract Documents, the **Contractor** shall furnish and assume full responsibility for all materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the furnishing, performance, testing, start-up, and completion of the Work.

5.7.2. Quality and Use of. All materials and equipment shall be of good quality and new, except as otherwise provided in the Contract Documents. If required by the **Design Professional**, the **Contractor** shall furnish satisfactory evidence (including reports of required tests) as to the kind and quality of materials and equipment. All materials and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise provided in the Contract Documents.

5.7.3. Discrepancies or Defects. If the **Contractor** is unable to perform its Work because of discrepancies or defects in the work of the **City's** own forces or of a separate contractor, the **Contractor** shall immediately notify the **Design Professional** and the **City** in writing of the conditions that render unable to so perform. Failure to notify the **Design Professional** constitutes an acknowledgment and acceptance of the other work as being fit and proper for integration with the **Contractor's** Work except for latent or non-apparent defects and deficiencies in the other work.

5.8. Contractor's Management and Financial Statement Requirements. (*Reference:* M.G.L. c. 30, §39R)

5.8.1. The words defined herein shall have the meaning stated below whenever they appear in this Paragraph:

5.8.1.1. "Contractor" means any person, corporation, partnership, joint venture, sole proprietorship, or other entity awarded a contract pursuant to M.G.L. c.149, §44A-H or M.G.L. c. 30, §39M, inclusive.

5.8.1.2. "Contract" means any contract awarded or executed pursuant to M.G.L. c. 149, §44A-H or M.G.L. c. 30, §39M, which is for an amount or estimate amount that exceed the dollar amount set forth in M.G.L. c. 30, §39R.

5.8.1.3. "Records" means books of original entry, accounts, checks, bank statements and all other banking documents, correspondence, memoranda, invoices, computer printouts, tapes, discs, papers and other documents or transcribed information

of any type, whether expressed in ordinary or machine language.

5.8.1.4. "Independent Certified Public Accountant" means a person duly registered in good standing and entitled to practice as a certified public accountant under the laws of the place of his/her residence or principal office and who is in fact independent. In determining whether an accountant is independent with respect to a particular person, appropriate consideration should be given to all relationships between the accountant and that person or any affiliate thereof. Determination of an accountant's independence shall not be confined to the relationships existing in connection with the filing of reports with the **City**.

5.8.1.5. "Audit," when used in regard to financial statement, means an examination of records by an independent certified public accountant in accordance with generally accepted accounting principles and auditing standards for the purpose of expressing a certified opinion thereon, or, in the alternative, a qualified opinion or a declination to express an opinion for stated reasons.

5.8.1.6. "Accountant's Report," when used in regard to financial statements, means a document in which an independent certified accountant indicates the scope of the audit which s/he has made and sets forth his/her opinion regarding the financial statements taken as a whole with listing of noted exceptions and qualifications, or an assertion to the effect that an overall opinion cannot be expressed. When an overall opinion cannot be expressed the reason therefore shall be stated. An accountant's report shall include as part thereof a signed statement by the responsible corporate officer attesting that management has fully disclosed all material facts to the independent certified public accountant, and that the audited financial statement is a true and complete statement of the financial condition of the contractor.

5.8.1.7. "Management," when used herein, means the chief executive officers, partners, principals or other person or persons primarily responsible for the financial and operational policies and practices of the Contractor.

5.8.1.8. Accounting terms, unless otherwise defined herein shall have a meaning in accordance with generally accepted accounting principles and auditing standards.

5.8.2. The Contractor shall make, and keep for at least six (6) years after final payment, books, Records, and accounts that in reasonable detail accurately and fairly reflect the transactions and dispositions of the Contractor.

5.8.3. Until the expiration of six (6) years after final payment, the Office of the Inspector General, and the Deputy Commissioner of the Division of Capital Asset Management shall have the right to examine any books, documents, papers or Records of the Contractor or of its Subcontractors that directly pertain to, and involve transactions relating to, the Contractor or

its Subcontractors.

5.8.4. The Contractor shall describe any change in the method of maintaining Records or recording transactions which materially affect any statements filed with the **City**, including in its description the date of the change and reasons therefore, and shall accompany said description with a letter from the Contractor's Independent Certified Public Accountant approving or otherwise commenting on the changes.

5.8.5. The Contractor shall file a Statement of Management on internal accounting controls as set forth below prior to the execution of the Contract.

5.8.6. The Contractor shall file prior to the execution of the contract and shall continue to file annually, an Audited Financial Statement for the most recent completed fiscal year as set forth below.

5.8.7. The Contractor shall file with the **City** a Statement of Management as to whether the system of internal accounting controls of the Contractor and its subsidiaries reasonably assures that:

5.8.7.1. transactions are executed in accordance with Management's general and specific authorization;

5.8.7.2. transactions are recorded as necessary to permit preparation of financial statements in conformity with generally accepted accounting principles, and to maintain accountability for assets;

5.8.7.3. access to assets is permitted only in accordance with Management's general or specific authorization; and

5.8.7.4. the recorded accountability for assets is compared with the existing assets at reasonable intervals and appropriate action is taken with respect to any difference.

5.8.7.5. The Contractor shall also file with the **City** a statement prepared and signed by an Independent Certified Public Accountant stating that s/he has examined the Statement of Management on internal accounting controls, and expressing an opinion as to:

5.8.7.5.1. whether the representation of Management in response to this paragraph and paragraphs 5.8.2. through 5.8.6 above are consistent with the result of Management's evaluation of the system of internal accounting controls; and

5.8.7.5.2. whether such representations of Management are, in

addition, reasonable with respect to transactions and assets in amounts which would be material when measured in relation to the applicant's financial statements.

5.8.8. The Contractor shall annually file with the Commissioner of the Division of Capital Asset Management during the term of the contract a financial statement prepared by an Independent Certified Public Accountant on the basis of an Audit by such accountant. The final statement filed shall include the date of final payment. All statements shall be accompanied by an accountant's report. Such statements shall be made available to the **City** upon request.

5.9. Taxes.

5.9.1 The **Contractor** shall pay all sales, consumer, use, and other similar taxes for the Work or portions thereof which are provided by the **Contractor** which are legally enacted when bids are received, whether or not yet effective or merely scheduled to go into effect. However, the **Contractor** shall not pay, and the **City** shall not reimburse or pay the **Contractor** for, any sales taxes for building supplies or materials for which an exemption is provided in M.G.L. c. 64H, §6(f). The **City's** tax exemption number to be used by the **Contractor** in this regard is E04-600-1414.

5.10. Permits, Licenses, and Fees.

5.10.1 Unless otherwise provided, the **Contractor** shall obtain and pay the fees for all permits, licenses, and inspections that are necessary for the proper execution and completion of the Work and which are customarily secured after execution of the Contract and which are legally required. All fees for permits, and inspections required by any **City** department shall be waived. Fees for licenses (e.g. drainlayer's license) are not waived . In addition the contractor shall pay for water meters and water usage. The contractor is responsible for obtaining NSTAR work orders and paying all costs and fees associated with NSTAR work.

5.11. Notices Required By Statutes, Ordinances, Codes, Rules, Regulations, and Orders of the City.

5.11.1 The **Contractor** shall give notices required by statutes, ordinances, codes, rules, regulations, and orders of the **City** bearing on performance of the Work.

5.12. Additional Information from Design Professional.

5.12.1. The **Contractor** shall perform the Work in accordance with the Contract Documents and submittals approved pursuant to Article 4.

5.12.2. The **Contractor** shall give the **Design Professional** timely notice of any additional Plans, Specifications, or instructions required to define the Work in greater detail, or to permit the proper progress of the Work.

5.12.3. The **Contractor** shall not proceed with any Work not clearly and consistently defined in detail in the Contract Documents, but shall request additional drawings or instructions from the **Design Professional** as provided in the previous Paragraph. If the **Contractor** proceeds

with such Work without obtaining further drawings, Specifications, or instructions, the **Contractor** shall correct Work incorrectly done at the **Contractor's** own expense.

5.13. "Or equal."

5.13.1. Requirements for Substitutions. (*Reference:* M.G.L. c. 30, §39M(b).) Where products or materials are prescribed by manufacturer name, trade name, or catalog reference, the words "or approved equal" shall be understood to follow. An item shall be considered equal to the item so named or described if, in the opinion of the **Design Professional**:

5.13.1.1. it is at least equal in quality, durability, appearance, strength, and design;

5.13.1.2. it performs at least equally the function imposed by the general design for the Work;

5.13.1.3. it conforms substantially, even with deviations, to the detailed requirements for the items as indicated by the Specifications.

5.13.2. Net Savings. No proposed substitution will be permitted unless the **Contractor** certifies that the proposed substitution will yield a net savings to the **City** and will not extend the Contract Time.

5.13.3. Contractor's Expense. Any structural or mechanical changes made necessary to accommodate substituted equipment under this paragraph (including but not limited to engineering fees) shall be at the expense of the **Contractor** or **Subcontractor** responsible for the Work item.

5.13.3.1. Any additional cost, or any loss or damage arising from the substitution of any material or any method for those originally specified shall be borne by the **Contractor**, notwithstanding approval or acceptance of such substitution by the **City** or the **Design Professional**, unless such substitution was made at the written request or direction of the **City** or the **Design Professional**.

5.13.3.2. All data to be provided by the **Contractor** in support of any proposed "or equal" or substitute item will be at the **Contractor's** expense.

5.13.4. Meeting Requirements. The **Contractor** shall be responsible for determining that all materials furnished for the Work meet all requirements of the Contract Documents. The **Design Professional** may require the **Contractor** to produce reasonable evidence that a material meets such requirements, such as certified reports of past tests by qualified testing laboratories, reports of studies by qualified experts, or other evidence which, in the opinion of the **Design Professional,** would lead to a reasonable certainty that any material used, or proposed to be used, in the Work meets the requirements of the Contract Documents. All such data shall be furnished at the **Contractor's** expense. This provision shall not require the **Contractor** to pay for periodic testing of different batches of the same material, unless such testing is specifically required by the Contract Documents to be performed at the **Contractor's** expense.

5.13.5. Named Manufacturer's Product. In all cases in which a manufacturer's name, trade name, or other proprietary designation is used in connection with materials or articles to be furnished under this Contract, whether or not the phrase "or equal" is used after such name, the **Contractor** shall furnish the product of the name manufacturer(s) without substitution, unless a written request for a substitute has been submitted by the **Contractor** and approved in writing by the **Design Professional** as provided in the following paragraph.

5.13.6. Deviations. If the **Contractor** proposes to use a material which while suitable for the intended use, deviates in any way from the detailed requirements of the Contract Documents, the **Contractor** shall inform the **Design Professional** in writing of the nature of such deviations at the time the material is submitted for approval and shall request written approval of the deviation from the requirements of the Contract Documents.

5.13.7. Rejection of Deviations. In requesting approval of deviations or substitutions, the **Contractor** shall provide, upon request, evidence leading to a reasonable certainty that the proposed substitution or deviation will provide a quality of result at least equal to that otherwise attainable. If, in the opinion of the **Design Professional**, the evidence presented by the **Contractor** does not provide a sufficient basis for such reasonable certainty, the **Design Professional** may reject such substitution or deviation without further investigation.

5.13.8. Consistent Character and Quality of Design. The Contract Documents are intended to produce a building of consistent character and quality of design. All components of the building including visible items of mechanical and electrical equipment have been selected to have a coordinated design in relation to the overall appearance of the Project. The **Design Professional** shall judge the design and appearance of proposed substitutes on the basis of their suitability in relation to the overall design of the Project, as well as for their intrinsic merits. The **Design Professional** will not approve as equal to materials specified proposed substitutes that, in the **Design Professional's** opinion, would be out of character, obtrusive, or otherwise inconsistent with the character or quality of design of the Project. In order to permit coordinated design of color and finishes the **Contractor** shall, if required by the **Design Professional**, furnish the substituted material in any color, finish, texture, or pattern which would have been available from the manufacturer originally specified, at no additional cost to the **City**.

5.13.9. Warranty. The warranties provided herein shall be in addition to and not in limitation of any other warranty required by the Contract Documents or otherwise prescribed by law.

5.13.10. Design Professional's Approval. The **Design Professional** will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed, or utilized without the **Design Professional's** prior written acceptance which will be evidenced by either a Change Order or an approved Shop Drawing. The **City** may require the **Contractor** to furnish at the **Contractor's** expense a special performance guarantee or other surety with respect to any "or equal" or substitute. The **Design Professional** will record the time required by the **Design**

Professional and its consultants in evaluating substitutes proposed or submitted by the **Contractor** and in making changes in the Contract Documents (or in the provisions of any other direct contract with the **City** for work on the Project) occasioned thereby. Whether or not the **Design Professional** accepts a substitute item so proposed or submitted by the **Contractor**, the **Contractor** shall reimburse the **City** for the charges of the **Design Professional** and its consultants for evaluating each such proposed substitute item.

5.14. Substitute Construction Methods or Procedures.

5.14.1 If a specific means, method, technique, sequence, or procedure of construction is shown or indicated in and expressly required by the Contract Documents, the **Contractor** may furnish or utilize a substitute means, method, technique, sequence or procedure of construction acceptable to the **Design Professional**. The **Contractor** shall submit sufficient information to allow the **Design Professional**, in the **Design Professional's** sole discretion, to determine whether the substitute proposed is equivalent to that expressly called for by the Contract Documents.

5.15. Contractor's Progress Schedule.

5.15.1. Before Starting Construction. Within ten (10) days after the date of the Notice to Proceed, the **Contractor** shall submit to the **Design Professional** for review:

5.15.1.1. a preliminary progress schedule indicating the times (number of days or dates) for starting and completing the various stages of the Work;

5.15.1.2. a preliminary schedule of Shop Drawing and Sample submittals which will list each required submittal and the times for submitting, reviewing, and processing such submittal; and

5.15.1.3. a refined schedule of values for all of the Work which will include quantities and prices of items aggregating the Contract Sum and will subdivide the Work into component parts in sufficient detail to serve as the basis for progress payments during construction. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

5.15.2. Review of Progress Schedule. At least ten (10) days prior to the commencement of construction, the **Design Professional**, the **Contractor,** and any other appropriate persons will meet to review and discuss the acceptability to the **Design Professional** of the progress schedule. The **Contractor** will have an additional ten (10) days to make corrections and adjustments and to complete and resubmit the schedule. No progress payment shall be made to the **Contractor** until the schedule is submitted to and found acceptable by the **Design Professional** as provided below.

5.15.3. Acceptability of Progress Schedule. The progress schedule will be acceptable to the **Design Professional** if, according to the **Design Professional**, it provides an orderly

progression of the Work to completion within any specified time frame, but such acceptance will neither impose on the **Design Professional** responsibility for the sequencing, scheduling, or progress of the Work nor interfere with or relieve the **Contractor** from the **Contractor's** full responsibility therefore. The **Contractor's** schedule of Submittals must be acceptable to the **Design Professional** in providing a workable arrangement for reviewing and processing the required Submittals. The **Contractor's** schedule of values must be acceptable to the **Design Professional** as to form and substance.

5.15.4. Sepia and Copies. After the **Design Professional** has approved the schedule, the **Contractor** shall submit to the **Design Professional** one (1) sepia and four (4) copies bearing the **Contractor's** stamp of approval as a representation to the **City** that the **Contractor** has determined or verified all data on that progress schedule and that the **Contractor**, the Subcontractors and Suppliers have reviewed and coordinated the sequences in that progress schedule with the requirements of the Work.

5.15.5. Adjustment of Schedule. The **Contractor** shall adhere to the established progress schedule which may be adjusted from time to time as follows: the **Contractor** shall submit to the **Design Professional** for acceptance proposed adjustments in the progress schedule that will not change the Contract Time. Such adjustments will conform generally to the progress schedule then in effect and will comply with any provisions of the requirements applicable thereto.

5.15.6. During Construction. The **Contractor** shall submit monthly progress schedules to the **Design Professional**. The schedules shall stay current with the **Contractor's** approach to the Work remaining.

5.15.7. Schedule of Submittals. The **Contractor** shall prepare and keep current, for the **Design Professional's** approval, a schedule of Submittals that is coordinated with the **Contractor's** construction schedule and allows the **Design Professional** reasonable time to review Submittals.

5.16. Project Coordination.

5.16.1. In General. The **Contractor** shall be responsible for the proper coordination of the Work of all of the trades.

5.16.2. Coordination with Subcontractors. The **Contractor** shall coordinate the work of each Subcontractor with the Work of every other Subcontractor whose Work affects the other.

5.16.3. Coordination with the City's Own Forces or Separate Contractors. The **Contractor** shall coordinate its operations with those of the **City's** own forces or separate contractors. The **Contractor** shall provide the **City's** own forces and separate contractors a reasonable opportunity for the handling, unloading and storage of their materials and equipment and execution of their work. The **Contractor** shall connect and coordinate its Work with theirs.

5.16.4. Coordination with Utility Companies. The **Contractor** shall coordinate its operations with all the appropriate utility companies to assure that the utilities required on the Project are available and functioning properly pursuant to the requirements of the Contract Documents.

5.17. Project Photographs.

5.17.1. In General. The **Contractor** shall take, at its own expense, interior and exterior photographs at the site, from different vantages as directed by the **Design Professional** or the **City**, before beginning any Work and thereafter, at a minimum, on the first work day of each month until final completion of the Work, including final Site photos. Photos shall be taken of any Work that will be buried or concealed while the Work is still exposed. The photographs shall be taken by a skilled commercial photographer. The number of photographs required shall be at the discretion of the **City** or the **Design Professional**. One aerial photo shall be required a) prior to commencement of the work and b) at the completion of the work. See Section 01320 – Construction Progress Documentation.

5.17.2. Prints and Digital Media. Within fourteen (14) days after the photographs have been taken, the **Contractor** shall cause prints to be made and delivered to the **City** and the **Design Professional**. All photographs shall be 8” x 10”. Each print shall state the date of the photograph, the name of the Project, the description of the view and the name and address of the photographer. The **City** shall receive one glossy print of each photo as well as all prints in digital form on compact disc. The **Design Professional** shall receive one glossy print.

5.17.3. Failure to Comply. Should the **Contractor** fail to adhere to any requirement set forth in the previous two paragraphs, the **City** may have the photographs taken at the **Contractor's** expense or receive a set-off against the **Contractor's** next application for payment.

5.18. Record Documents and Samples at the Site.

5.18.1 The **Contractor** shall maintain in a safe place at the site one record copy of all Plans, Specifications, Modifications, Change Orders, **Construction Change** Directives, Field Orders and written interpretations and clarifications in good order and annotated to show all changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to the **Design Professional** for reference. Upon completion of the Work, these record documents, Samples and Shop Drawings will be delivered by the **Contractor** to the **Design Professional** for the **City**.

5.19. Submittals.

5.19.1. Purpose. The purpose of Submittals is to demonstrate for those portions of the Work for which Submittals are required the way the **Contractor** proposes to conform to the information given and the design concept expressed in the Contract Documents.

5.19.2. Submittal Procedure. Within ten (10) days from the Notice to Proceed, the **Contractor** shall submit to the **Design Professional** a completed Submittals schedule. The

Contractor shall review, approve, and submit to the **Design Professional** Submittals required by the Contract Documents with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the **City** or of separate contractors. Submittals made by the **Contractor** that are not required by the Contract Documents may be returned without action. The schedules shall be updated and resubmitted each month. All Submittals will be identified as the **Design Professional** may require and in the number specified in the General Requirements. The data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show the **Design Professional** the materials and equipment that the **Contractor** proposes to provide and to enable the **Design Professional** to review the information for the limited purposes stated below.

5.19.3. Samples. The **Contractor** shall also submit Samples to the **Design Professional** for review and approval in accordance with said accepted schedule of Submittals. Each Sample will be identified clearly as to material, Supplier, pertinent data such as catalog numbers and the use for which it is intended and otherwise as the **Design Professional** may require to enable the **Design Professional** to review the Submittal for the limited purposed stated below. The numbers of each Sample to be submitted will be as specified in the Specifications. Unless otherwise specified in the Specifications, three (3) specimens of each Sample shall be submitted.

5.19.3.1. The Samples shall be of sufficient size to permit proper evaluation of material. Where variations in color or other characteristics are to be expected, samples showing the minimum range of variation shall be submitted. Materials exceeding the range of variation of the approved Samples will not be approved on the Work.

5.19.3.2. All costs associated with delivery of Samples will be paid by the **Contractor**.

5.19.4. Contractor's Verifications. Before submitting each Submittal, the **Contractor** shall have determined and verified:

5.19.4.1. all field measurements, quantities, dimensions specified performance criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

5.19.4.2. all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and

5.19.4.3. all information relative to the **Contractor's** sole responsibilities in respect of means, methods, techniques, sequences, and procedures of construction and safety precautions and programs incident thereto.

5.19.5. Contractor's Representations. By approving and providing Submittals, the **Contractor** thereby represents that the **Contractor** has determined and verified all dimensions,

quantities, field dimensions, relations to existing Work, coordination with Work to be installed later, coordination with information on previously accepted Submittals and verification of compliance with all the requirements of the Contract Documents. The accuracy of all such information is the responsibility of the **Contractor**. In reviewing Submittals, the **Design Professional** shall be entitled to rely upon the **Contractor's** representation that such information is correct and accurate.

5.19.6. Coordination. The **Contractor** shall also have reviewed and coordinated each Submittal with other Submittals and with the requirements of the Work and the Contract Documents.

5.19.7. Stamp or Specific Written Indication. Each Submittal will bear a stamp or specific written indication that the **Contractor** has satisfied the **Contractor's** obligations under the Contract Documents with respect to the **Contractor's** review and approval of that Submittal.

5.19.8. Written Notice of Variations. At the time of each Submittal, the **Contractor** shall give the **Design Professional** specific written notice of such variations, if any, that the Submittal may have from the requirements of the Contract Documents. Such notice is to be in a written communication separate from the Submittal. Moreover, the **Contractor** shall make a specific notation on each Submittal to the **Design Professional** for review and approval of each such variation.

5.19.9. Review and Approval by the Design Professional. The **Contractor** shall perform no portion of the Work requiring a Submittal until the respective Submittal has been approved by the **Design Professional**. Such Work shall be in accordance with approved Submittals.

5.19.9.1. The **Design Professional** will review and approve Submittals in accordance with the schedule of Submittals accepted by the **Design Professional** as required above. The **Design Professional's** review and approval will be only to determine if the items covered by the Submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated in the Contract Documents. The **Design Professional's** review and approval will not extend to means, method, technique, sequences, or procedures of construction (except where a particular means, method, technique, sequences or procedures of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

5.19.10. Deviations. The **Contractor** shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the **Design Professional's** approval of Submittals unless the **Contractor** has specifically informed the **Design Professional** in writing of such deviation at the time of Submittal and the **Design Professional** has given written approval to the specific deviation. The **Contractor** shall not be relieved of responsibility for

errors or omissions in Submittals by the **Design Professional's** approval thereof.

5.19.11. Revisions. The **Contractor** shall make corrections required by the **Design Professional** and shall return the required number of corrected copies of Submittals and submit as required new Submittals for review and approval. The **Contractor** shall direct specific attention, in writing or on resubmitted Submittals, to revisions other than those requested by the **Design Professional** on previous Submittals. Unless such written notice has been given, the **Design Professional's** approval of a resubmitted Submittal shall not constitute approval of any changes not requested on the prior Submittal.

5.19.12. Related Work. Where a Submittal is required by the Contract Documents or the schedule of Submittals accepted by the **Design Professional**, any related Work performed prior to the **Design Professional's** review and approval of the pertinent Submittal will be at the sole expense and responsibility of the **Contractor**.

5.19.13. Informational Submittals. Informational Submittals upon which the **Design Professional** is not expected to take responsive action may be so identified in the Contract Documents.

5.19.14. Certification. When professional certification of performance criteria of materials, systems or equipment is required by the Contract Documents, the **City** shall be entitled to rely upon such certifications, and neither the **City** nor the **Design Professional** shall be expected to make any independent examination with respect thereto.

5.20. Continuing the Work.

5.20.1. The **Contractor** shall carry on the Work and adhere to the progress schedule during all disputes or disagreements with the **City**. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as otherwise provided herein or as the **City** and the **Contractor** may agree in writing.

5.21. Use of Site; **Access to Work.**

5.21.1. The right of possession of the premises and the improvements made thereon by the **Contractor** shall remain at all times in the **City**. The **Contractor's** right to entry and use thereof arises solely from the permission granted by the **City** under the Contract Documents. The **Contractor** shall confine the **Contractor's** apparatus, the storage of materials, and the operations of the **Contractor's** workers to limits indicated by law, ordinance, the Contract Documents and permits and/or directions of the **Design Professional** and shall not unreasonably encumber the premises with the **Contractor's** materials. The **City** shall not be liable to the **Contractor**, the Subcontractors, Suppliers, or anyone else with respect to the conditions of the premises, except for a condition caused directly and solely by the negligence of the **City**.

5.21.2. At all times, the **City** and the **Design Professional** shall have access to the Work.

5.22. Protection of Persons and Property.

5.22.1. In General. The **Contractor** shall be responsible for initiating, maintaining, and supervising all health and safety precautions and programs in connection with the performance of the Contract. The **Contractor** is responsible for the implementation of all Federal, State, and local health and safety requirements.

5.22.2. The **Contractor** shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to:

5.22.2.1. employees on the site and other persons who may be affected thereby;

5.22.2.2. the Work, materials, and equipment to be incorporated therein, whether in storage on or off the site, under the care, custody or control of the **Contractor**, Subcontractors, or Sub-subcontractors;

5.22.2.3. other property at the site or adjacent or in close proximity thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction; and

5.22.2.4. any other property of the **City**, whether or not forming part of the Work, located at the site or adjacent thereto in areas to which the **Contractor** has access.

5.22.3. Notices and Compliance. The **Contractor** shall give notices and comply in all other respects with applicable laws, ordinances, rules, regulations, codes, and lawful orders of public authorities bearing on the safety of persons or property or their protection from damage, injury, or loss. The **Contractor** shall notify owners of adjacent and nearby properties of underground facilities and utility owners when prosecution of the Work may affect them and shall cooperate with them in the protection, removal, relocation, and replacement of their property.

5.22.4. Erection and Maintenance of Safeguards. The **Contractor** shall erect and maintain, as required by existing conditions and the terms of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations, and notifying owners and users of adjacent and nearby sites and utilities.

5.22.5. Hazardous Materials and Equipment. When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the **Contractor** shall exercise utmost care and carry on such activities under the supervision of properly qualified personnel.

5.22.6. Damage to Property. The **Contractor** shall promptly remedy damage and loss to

property referred to above. If the damage or loss is due in whole or in part to the **Contractor's** failure to take the precautions required herein, the **Contractor** shall bear the cost, subject to any reimbursement to which the **Contractor** is entitled under property insurance required by the Contract Documents. The **Contractor** shall be fully and solely responsible for all Work and other operations carried out on adjacent properties. The insurance required under Article 8 shall cover such Work or operations, and the **Contractor** shall indemnify and defend the **City**, the **Design Professional**, and the owners of such adjacent or nearby properties from and against all claims, suits, losses, or costs arising out of such Work or operations.

5.22.7. Fire Protection Equipment and Services. The **Contractor** shall provide and maintain in good operating condition suitable and adequate fire protection equipment and services and shall comply with all reasonable recommendations regarding fire protection made by the representatives of the fire insurance company carrying insurance on the Work or by the local fire chief or fire marshal. The area within the site limits shall be kept orderly and clean and all combustible rubbish shall be promptly removed from the site.

5.22.8. Protection of Excavations, Trenches, etc. The **Contractor** shall at all times protect excavations, trenches, buildings and materials from rain water, ground water, backup or leakage of sewers, drains and other piping, and from water of any other origin and shall remove promptly any accumulation of water. The **Contractor** shall provide and operate all pumps, piping, and other equipment necessary to this end.

5.22.9. Snow and Ice Removal. The **Contractor** shall remove snow and ice that might result in damage or delay.

5.22.10. Safety Representative. The **Contractor** shall designate a qualified and experienced safety representative at the site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

5.22.11. Weather Protection. (*Reference:* M.G.L. c. 149, §44F(1).) The **Contractor** shall install weather protection and furnish adequate heat in the protected area from November 1 through March 31.

5.22.12. Security. The **Contractor** shall provide, within the Contract Sum, a sufficient number of security personnel at the Site at all times when the **Contractor's** personnel are not present, from commencement of the Work until Substantial Completion to assure that the Site, the facility, and the Work, and all materials and equipment stored at the Site are fully and completely protected against loss or damage due to vandalism, theft, or malicious mischief. If the **Contractor** elects, in addition, to use guard dogs for this purpose, each dog shall at all times be accompanied by an adult handler. If the **Contractor** fails to comply with the requirements of this paragraph, then the **City** may provide appropriate security and charge the cost thereof to the **Contractor**. The **City's** provision of such security, or failure to do so, shall not relieve the **Contractor** of its responsibility to pay for loss or damage due to vandalism, theft, or malicious mischief at the Site.

Part 1, Section 4: OTHER BID DOCUMENTS

5.22.13. Hazard Communication Programs. The **Contractor** shall be responsible for coordinating any exchange of material safety data sheets or other hazard communications information required to be made available to or exchanged between or among employers at the site in accordance with laws, codes and regulations.

5.22.14. Noise Pollution Control. The **Contractor** shall comply with all applicable provisions of Somerville Municipal Code §9-109.

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5.23. Cutting and Patching.

5.23.1. In General. Unless otherwise provided in the Contract Documents, the **Contractor** shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly, including the work of the City or of separate contractors.

5.23.2. Damage to Work of City or of Separate Contractor. The **Contractor** shall not damage or endanger a portion of the Work or fully or partially completed construction of the **City** or separate contractors by cutting, patching, or otherwise altering such construction, or by excavation. The **Contractor** shall not cut or otherwise alter such construction by the **City** or a separate contractor except with prior written consent of the **City** and of such separate contractor; such consent shall not be unreasonably withheld. The **Contractor** shall not unreasonably withhold from the **City** or a separate contractor the **Contractor's** consent to cutting or otherwise altering the Work.

5.23.3. Damage Caused by Contractor. Should the **Contractor** cause damage to the work or property of any separate contractor at the Site, or should any claim arising out of the **Contractor's** performance of Work at the Site be made by any separate contractor against the **Contractor**, the **City**, the **Design Professional**, or any of the **Design Professional's** consultants, the **Contractor** shall promptly attempt to settle with such other contractor by agreement, or to otherwise resolve the dispute by arbitration or at law. The **Contractor** shall, to the fullest extent permitted by laws and regulations, indemnify and hold harmless the **City**, the **Design Professional**, and the **Design Professional's** consultants from and against all claims, damages, losses and expenses (including, but not limited to, fees of the Design Professional, the Design Professional's consultants, attorneys, and other professionals, and court and arbitration or mediation costs) arising directly, indirectly or consequentially out of any action, legal or equitable, brought by any separate contractor against the **City**, the **Design Professional**, or any of the **Design Professional's** consultants, to the extent based on a claim arising out of the **Contractor's** performance of the Work. Should a separate contractor cause damage to the Work or property of the **Contractor** or should the performance of work by any separate contractor at the site give rise to any other claim, the **Contractor** shall not institute any action, legal or equitable, against the **City**, the **Design Professional**, or any of the **Design Professional's** consultants, or permit any action against any of them to be maintained and continued in its name or for its benefit in any court or before any arbiter which seeks to impose liability on or to recover damages from the **City**, the **Design Professional**, or any of the **Design Professional's** consultants, on account of any such damage or claim. If the **Contractor** delays at any time in performing or furnishing Work by any act or neglect of a separate contractor and the City and the Contractor are unable to agree as to the extent of any adjustment in the Contract Time attributable thereto, the **Contractor** may make a claim for an extension of time in accordance with Article 16. An extension of the Contract Time shall be the **Contractor's** exclusive remedy with respect to the **City**, the **Design Professional**, and the **Design Professional's** consultants, for any delay, disruption, interference, or hindrance caused by any separate contractor.

Part 1, Section 4: OTHER BID DOCUMENTS

5.24. Cleaning Up.

5.24.1. During the progress of the Work, the **Contractor** shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract or other debris. At the completion of the Work, the **Contractor** shall remove from and about the Project all waste materials, rubbish, and debris, and the **Contractor's** tools, construction equipment, machinery, and surplus materials. Surplus materials to be provided to the **City** by specifications shall be stored in a clean, safe and secure area as directed by the **City**. The **Contractor** shall leave the site clean and ready for occupancy by the **City** at Substantial Completion of the Work. Immediately prior to the **Design Professional's** inspection for Substantial Completion, the **Contractor** shall completely clean the premises. Concrete and ceramic surfaces shall be cleaned and washed. Resilient coverings shall be cleaned, waxed and buffed. Woodwork shall be dusted and cleaned. Sash, fixtures and equipment shall be thoroughly cleaned. Stains, spots, dust, marks and smears shall be removed from all surfaces. Hardware and all metal surfaces shall be cleaned and polished. Glass and plastic surfaces shall be thoroughly cleaned by professional window cleaners. All damaged, broken or scratched glass or plastic shall be replaced by the **Contractor** at the **Contractor's** expense. The **Contractor** shall restore to original condition all property not designated for alteration by the Contract Documents.

5.24.2. If the **Contractor** fails to clean up as provided herein, the **City** may do so and charge the cost thereof to the **Contractor**.

5.25. Royalties and Patents.

5.25.1 The **Contractor** shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. To the fullest extent permitted by law, the **Contractor** shall indemnify and hold harmless the **City** and the **Design Professional** from and against all claims, costs, losses, and damages arising out of or resulting from any infringement of patent rights or copyrights incident to the use in the performance of the work or resulting from the incorporation in the work of any invention, design, process, product, or device not specified in the Contract Documents.

5.26. Contractor's Obligation to Perform.

5.26.1. The **Contractor's** obligation to perform and complete the Work in accordance with the Contract Documents is absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of the **Contractor's** obligation to perform the Work in accordance with the Contract Documents:

5.26.1.1. observations by the **Design Professional**;

5.26.1.2. recommendation of any progress or final payment by the **Design Professional**;

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5.26.1.3. the issuance of a certificate of Substantial Completion or any payment by the **City** to the **Contractor** under the Contract Documents;

5.26.1.4. use or occupancy of the Work, Project, or Site, or any part thereof, by the **City**;

5.26.1.5. any acceptance by the **City** or any failure to do so;

5.26.1.6. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptance by the **Design Professional**;

5.26.1.7. any inspection, test, or approval by others; or

5.26.1.8. any correction of defective Work by the **City**.

5.27. Indemnification; **and Covenant Not To Sue.**

5.27.1. To the fullest extent permitted by law, the **Contractor** shall assume the defense of, indemnify and hold harmless the **City**, the **Design Professional**, the **Design Professional's** consultants, and agents and employees of any of them, from and against claims, damages, losses, and expenses, including, but not limited, to attorneys' fee, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself) including loss of use resulting there from, caused in whole or in part by alleged negligent acts or omissions of the **Contractor**, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this paragraph.

5.27.2. In claims against any person or entity indemnified under the foregoing paragraph by an employee of the **Contractor**, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under the foregoing paragraph shall not be limited by a limitation on the amount or type of damages, compensation or benefits payable by or for the **Contractor** or a Subcontractor under Workers' Compensation laws, disability benefit acts or other employee benefit acts.

5.27.3. The obligations of the **Contractor** in this Article shall not extend to the liability of the **Design Professional**, the **Design Professional's** consultants, and agents or employees of any of them arising out of (1) the preparation of maps, Plans, opinions, reports, surveys, Change Orders, designs, or Specifications, or (2) directions or instructions given by the **Design Professional**, the **Design Professional's** consultants and agents or employees of any of them, provided such instructions or directions are the primary cause of the injury or damage.

5.27.4. The **Contractor**, or any successor, assign, or subrogee of the **Contractor** agrees

not to bring any civil suit, action, or other proceeding in law, equity or arbitration against the **Design Professional**, or the officers, employees, agents, or consultants of the **Design Professional**, for the enforcement of any action which the **Contractor** may have arising out of or in any manner connected with the Work. The **Contractor** shall assure that this covenant not to sue is contained in all subcontracts and sub-subcontracts of every tier and shall assure its enforcement. The **Design Professional**, its officers, employees, agents, and consultants are intended third-party beneficiaries of this covenant not to sue, and are entitled to enforce this covenant in law or equity.

5.28. Survival of Obligations.

5.28.1 All representations, indemnifications, warranties, and guarantees made in, required by or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion and acceptance of the Work and termination or completion of the Contract.

ARTICLE 6: SUBCONTRACTORS

6.1 Use of Subcontractors.

6.1.1 The **Contractor** shall use the Subcontractors named in the **Contractor's** Bid.

6.2 Substitution of Subcontractors.

6.2.1 The **Contractor** shall not substitute another Subcontractor therefore without notice to the **City** and the **City's** prior written consent of such substitution.

6.3 Names of Subcontractors.

6.3.1 Upon execution of the Contract with the **City**, the **Contractor** shall provide in writing to the **City**, through the **Design Professional,** the names, addresses, telephone numbers, and fax numbers of all persons proposed for each principal portion of the Work.

6.4. Objections to Subcontractors.

6.4.1 The **Contractor** shall not use any Subcontractor against whom the **City** has a reasonable objection. The **Contractor** shall not be required to contract with any person or entity against whom it has a reasonable objection.

6.5. Form of the Subcontract.

6.5.1 All Work performed by a Subcontractor shall be through an appropriate subcontract. The form of subcontract shall be submitted to the **City's Law Department for its** approval, which shall not be unreasonably withheld or delayed.

6.6. Content of the Subcontract.

6.6.1. In addition to all statutorily mandated provisions and provisions required elsewhere in the Contract Documents, each subcontract shall expressly provide that:

6.6.1.1. Each subcontract agreement for a portion of the Work is assigned by the **Contractor** to the **City** provided that:

6.6.1.1.1. the assignment is effective only after termination of the Contract by the **City** or the **Contractor** and only for those subcontract agreements which the **City** accepts by notifying the Subcontractor in writing; and

6.6.1.1.2. the assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

6.6.1.2. Each Subcontractor is bound by the requirements of the Contract Documents for the express benefit of the **City.**

6.6.1.3. Each Subcontractor shall assume toward the **Contractor** all the obligations that the **Contractor** assumes toward the **City** and the **Design Professional**, unless otherwise provided by law.

ARTICLE 7: PERFORMANCE AND PAYMENT BONDS

7.1. Form of Bonds.

7.1.1 The performance and labor and material or payment bonds shall be in the form required by the **City**, copies of which are included in the Project Manual. The **City** reserves the right to reject any bond that does not conform to the **City's** requirements.

7.2. Furnished by the Contractor. (*Reference:* M.G.L. c. 30, §39M(c);, M.G.L. c. 149, §29).

7.2.1 The **Contractor** shall furnish a performance bond and a labor and materials or payment bond, each with a surety company qualified to do business under the laws of the Commonwealth and satisfactory to the **City** and each in the sum of the Contract Sum, the premiums for which are to be paid by the **Contractor** and are included in the Contract Sum. The bonds shall remain in effect until final payment is made. The sum of the performance bond shall increase each time the Contract Sum is increased as a result of a Change Order.

7.3. Submission to the City.

7.3.1 The **Contractor** must submit the performance and a labor and materials or payment bonds to the **City** upon the **Contractor's** execution of the Agreement.

ARTICLE 8: INSURANCE REQUIREMENTS

8.1 Insurance Certificates.

8.1.1 Prior to starting work on this project, the contractor shall deposit with the **City**, certificates from insurers clearly stating that the required insurance policies have been issued to the **Contractor** and will remain in effect during the time period required to complete this contract. ACCORD forms will not be accepted. The certificates must be in a form satisfactory to the **City**. The insurance shall include all major divisions of coverage, and shall be on a comprehensive general basis including: Premises and Operations (including X-C-U), Owners and Contractors Protective, Products and Completed Operations, Owned, Non-owned or Hired

and/or Leased Motor Vehicles. Such insurance shall be written for not less than any limits of liability, required by law or the following limits, whichever are greater.

8.2 Minimum Coverages. The **Contractor** shall possess and maintain throughout the contract period/project, insurance in the kinds and amounts as provided in Appendix D. The **Contractor** may purchase and maintain excess liability insurance in the in the umbrella form in order to satisfy the limits of liability required for the insurance to be purchased and maintained in accordance with the required requirements set forth above (in addition to the umbrella limits required). Evidence of such excess liability shall be delivered to the **City** in the form of a certificate and the certificate indicating the policy numbers and limits of liability of all underlying insurance.

8.3 Additional Insured. The **City** shall be named as an additional insured on each certificate, and the certificate must have the endorsement of the insurance agency.

8.4 Notice. Each certificate shall contain a notation that the insurer will give 30 days notice to the **City** prior to cancellation, change or non-renewal of policy.

8.5 Carrier Rating. Insurance carriers MUST have an A.M. Best rating of "A" or better.

8.6 Material Breach. Failure of the contractor to provide and continue in force such insurance shall be deemed a material breech of contract and shall operate as immediate termination thereof.

ARTICLE 9: TESTS AND INSPECTIONS

9.1. Access.

9.1.1 The **City**, the **Design Professional**, and all other persons designated by the **City** shall have access to the Work at reasonable times for observing, inspecting, and testing. The **Contractor** shall provide them with proper and safe conditions for such access and advise them of the **Contractor's** site safety procedures and programs so that they may comply therewith as applicable.

9.2. Tests and Inspections.

9.2.1. The **Contractor** shall give the **Design Professional** timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

9.2.2. Unless otherwise provided, the **Contractor** shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the **City**, or with the appropriate public authority and shall bear all related costs of tests, inspections, and approvals. If the laws or regulations of any public body having jurisdiction require any Work or part thereof specifically to be inspected, tested, or approved by an employee or other representative of such public body, the **Contractor** shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection

therewith and furnish the **Design Professional** with the required certificates of inspection, testing, or approval.

9.2.3. The **Contractor** shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for the **Design Professional's** acceptance of materials or equipment to be incorporated into the Work, or of materials, mix designs, or equipment submitted for approval prior to the **Contractor's** purchase thereof for incorporation into the Work.

9.2.4. If any Work that is to be inspected, tested, or approved is covered by the **Contractor**, Subcontractor, or Sub-subcontractor without the prior written consent of the **Design Professional**, it must be uncovered for observation, inspection, testing, or approval, if requested by the **Design Professional**. The **Contractor** must recover the Work at its own expense.

9.2.5. The **Contractor** shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the **Design Professional** in the **Design Professional's** administration of the Contract or by tests, inspections, or approvals required or performed by persons other than the **Contractor**.

ARTICLE 10
UNCOVERING AND CORRECTING WORK

10.1. Uncovering Work.

10.1.1. If a portion of the Work is covered contrary to the **Design Professional's** request or to requirements specifically expressed in the Contract Documents, it must, if required in writing by the **Design Professional**, be uncovered for the **Design Professional's** observation and be replaced, both at the **Contractor's** expense and without change in the Contract Time.

10.1.2. If a portion of the Work has been covered which the **Design Professional** has not specifically requested to observe prior to its being covered, the **Design Professional** may request to see such Work, and it shall be uncovered by the **Contractor**. If it is found that such Work is in accordance with the Contract Documents, costs of uncovering and replacing shall, by appropriate Change Order, be charged to the **City**. If it is found that such Work is defective or not in accordance with the Contract Documents, the **Contractor** shall pay all claims, costs, losses, and damages caused by, arising out of or resulting from such uncovering, exposure, observation, inspection, and testing and of satisfactory replacement of reconstruction (including, but not limited to, all costs of repair or replacement of work of others); and the **City** shall be entitled to an appropriate decrease in the Contract Sum. The **City** may take such decrease by reducing the then current application for payment accordingly or subsequent applications, if necessary, until the decrease is paid in full.

10.2. Correcting Work.

10.2.1. The **Contractor** shall promptly correct Work rejected by the **Design Professional**

or failing to conform to the requirements of the Contract Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed, or completed. The **Contractor** shall bear all costs of correcting such rejected Work including additional testing and inspections and compensation for the **Design Professional's** services and expenses made necessary thereby and any cost, loss, or damages to the **City** resulting from such failure or defect.

10.2.2. If, within one (1) year after the date of Substantial Completion of the Work or designated portion thereof, or after the date for commencement of warranties established in Article 15, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the **City** to do so, unless the **City** has previously given the **Contractor** a written acceptance of such condition. This period of one (1) year shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual performance of the Work. This obligation to correct under this paragraph shall survive acceptance of the Work under the Contract and termination of the Contract. The **City** shall give such notice promptly after discovery of the condition.

10.2.3. The **Contractor** shall correct, remove, or replace portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the **Contractor** nor accepted by the **City**.

10.2.4. If the **Contractor** fails within a reasonable time to correct nonconforming Work, or to remove and replace rejected Work, or fails to perform the Work in accordance with the Contract Documents, the **City** may correct it in accordance with the provisions herein. If the **Contractor** does not proceed with correction, removal, or replacement of such nonconforming Work within seven (7) days from the date of written notice from the **Design Professional**, the **City** may correct it and store any salvageable materials or equipment at the **Contractor's** expense. If the **Contractor** does not pay costs of any such removal and storage within ten (10) days after written notice, the **City** may upon ten (10) additional days' written notice sell such materials and equipment at auction or at private sale and shall account for the proceeds thereof, after deducting costs and damages that should have been borne by the **Contractor**, including compensation for the **Design Professional's** services and expenses made necessary thereby. If such proceeds of sale do not cover all the costs that the **Contractor** should have born, the Contract Sum shall be reduced by the deficiency. If payments then or thereafter due the **Contractor** are not sufficient to cover such amount, the **Contractor** shall pay the difference to the **City**.

10.2.5. The **Contractor** shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the **City** or separate contractors caused by the **Contractor's** correction or removal of Work which is not in accordance with the requirements of the Contract Documents.

10.2.6. Nothing contained in this paragraph shall be construed to establish a period of limitation with respect to other obligations that the **Contractor** might have under the Contract Documents. Establishment of the time period of one (1) year as described in the above paragraph related only to the specific obligation of the **Contractor** to correct the Work and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced nor to the time within which proceedings may be commenced to establish the **Contractor's** liability with respect to the **Contractor's** obligations other than specifically to correct the Work.

10.3. Acceptance of Nonconforming Work.

10.3.1 If, instead of requiring correction or removal and replacement of defective or nonconforming Work, the **City** prefers to accept Work which is not in accordance with the requirements of the Contract Documents, the **City** may do so instead of requiring its removal and correction, in which case the **Contractor** shall pay all claims, costs, losses, and damages attributable to the **City's** evaluation of and determination to accept such defective or non-conforming Work. The Contract Sum will be reduced as appropriate. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 11:CHANGES IN THE WORK

11.1. In General.

11.1.1. The Contract Sum constitutes the total compensation (subject to authorized adjustments) payable to the **Contractor** for performing the Work. All duties, responsibilities and obligations assigned to or undertaken by the **Contractor** shall be at the **Contractor's** expense without any change in the Contract Sum.

11.1.2. Without invalidating the Contract and without notice to any surety, the **City** may, at any time or from time to time, order additions to, deletions from, or revisions in the Work. Such additions, deletions, or revisions will be authorized by a Change Order, a Modification or a **Construction Change** Directive. Upon receipt of any such document, the **Contractor** shall promptly proceed with the Work involved that will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

11.1.3. The **Contractor** shall not be entitled to an increase in the Contract Sum or an extension of the Contract Time with respect to any Work performed that is not required by the Contract Documents as amended, modified, or supplemented, except as otherwise provided herein.

11.2. Change Orders.

11.2.1. (*Reference:* M.G.L. c. 30, §39I;). The **Contractor** shall perform all the Work required by this Contract in conformity with the Plans and Specifications contained herein. No willful and substantial deviation from said Plans and Specifications shall be made unless authorized in writing by the **City** and the **Design Professional** in charge of the Work who is duly authorized by the **City** to approve such deviations. In order to avoid delays in the prosecution of the Work required by such Contract, such deviation from the Plans or Specifications may be

authorized by a written order of the **City** or the **Design Professional** so authorized to approve such deviation. Within thirty (30) days thereafter, such written order shall be confirmed by a certificate of the **City** stating: (1) If such deviation involves any substitution or elimination of materials, fixtures or equipment, the reasons why such materials, fixtures, or equipment were included in the first instance and the reasons for substitution or elimination, and, if the deviation is of any other nature, the reasons for such deviation, giving justification therefore; (2) that the specified deviation does not materially injure the Project as a whole; (3) that either the work substituted for the Work specified is of the same cost and quality, or that an equitable adjustment has been agreed upon between the **City** and the **Contractor** and the amount in dollars of said adjustment; and (4) that the deviation is in the best interest of the **City**.

11.3. Construction Change Directive.

11.3.1. A **Construction Change** Directive shall be used in the absence of total agreement on the terms of a Change Order.

11.3.2. Upon request of the **City** or the **Design Professional**, the **Contractor** shall without cost to the **City** submit to the **Design Professional** in such form as the **Design Professional** may require, an accurate written estimate of the cost of any proposed extra work or change. The estimate shall indicate the quantity and unit cost of each item of materials, and the number of hours of work and hourly rate for each class of labor, as well as the description and amounts of all other costs chargeable under the terms of this Article. Unit labor costs for the installation of each item of materials shall be shown if required by the **Design Professional**. If required by the **Design Professional**, in order to establish the exact cost of new Work added or of previously required Work omitted, the **Contractor** shall obtain and furnish to the **Design Professional** bona fide proposals from recognized Suppliers for furnishing any material included in such Work. Such estimates shall be furnished promptly so as to occasion no delay in the Work, and shall be furnished at the **Contractor's** expense.

11.3.3. The **Contractor** shall state in the estimate any extension of time required for the completion of the Work if the change or extra Work is ordered. The **Contractor** shall document, through a critical path analysis, or some other clearly delineated explanation, how the proposed change affects other aspects of the Work, and why it would require an extension of time. The **Contractor** shall promptly revise and resubmit such estimate if the **Design Professional** determines that it is not in compliance with the requirements of this Article, or that it contains errors of fact or mathematical errors.

11.3.4. If the **Construction Change** Directive provides for an adjustment to the Contract Sum**,** the adjustment shall be based on one of the following methods, as selected by the **City**, selection of which does not require the consent of the **Contractor**:

11.3.4.1. by unit prices stated in the Contract Documents or otherwise mutually agreed upon; or

11.3.4.2. by Cost and Percentages estimated by the **Contractor** as provided

herein and accepted by the **City**, whereupon the **Contractor's** estimate shall become a fixed price which shall not be changed by any variation in the actual cost of executing the Work covered by the change; or

11.3.4.3. by actual Cost determined after the Work covered by the change is completed, plus Percentage; or

11.3.4.4. by submission to arbitration or a court, which shall determine the fair value of the Work covered by the change.

11.3.5. "Cost" shall mean the estimated or actual net increase or decrease in cost to the **Contractor**, Subcontractor, or Sub-subcontractor for performing the Work covered by the change, including actual payments for materials, equipment rentals, expendable items, wages, and associated benefits to the workers and to supervisors employed full time at the Site, insurance, bonds, and other provable direct costs, but not including any administrative, accounting or expediting costs, or other indirect or overhead costs, or any wages or benefits of supervisory personnel not assigned full time to the Site, or any amount for profit or fee to the **Contractor**, Subcontractor, or Sub-subcontractor.

11.3.6. "Percentage" shall mean an allowance to be added to or subtracted from the Cost in lieu of overhead and profit and of any other expense that is not included in the Cost of the Work covered by the change, as defined above. Percentage for a Sub-subcontractor shall be 8% of any net increase or decrease of Cost of any Work performed by the Sub-subcontractor's own forces plus 4% of any net increase or decrease in Cost of any Work performed for the Sub-subcontractor by lower tier Sub-subcontractors. Percentage for a Subcontractor shall be 12% of any net increase or decrease of Cost of any Work performed by the Subcontractor's own forces plus 4% of the Cost of Work performed by Sub-subcontractors. Percentage for the **Contractor** shall be 15% of any net increase or decrease of Cost of any Work performed by the **Contractor's** own forces plus 5% of any net increase or decrease in the Cost for all other Work covered by the change. When the **Contractor** is also performing Work as a Subcontractor or Sub-subcontractor, the **Contractor** shall only be entitled to a total of no more than 15% of any net increase or decrease of Cost of any Work.

11.3.7. When in the reasonable judgment of the **Design Professional** a series of **Construction Change** Directives or Change Orders effect a single change, Percentage shall be calculated on the cumulative net increase or decrease in Cost, if any.

11.3.8. If unit prices are stated in the Contract Documents or are subsequently agreed upon, and if quantities originally contemplated are so changed in a Proposed Change Order or **Construction Change** Directive that the application of such unit prices to quantities of Work proposed will cause substantial inequity to the **City** or the **Contractor**, the applicable unit prices shall be equitably adjusted.

11.3.9. If the **City** elects to determine the Cost of the Work as provided in method

(11.3.4.1) using unit prices stated in the Contract Documents or subsequently agreed upon, the unit prices shall be subject to the prior paragraph. Notwithstanding the inclusion of unit prices in the Contract Documents, it shall be the **City's** option to require the Cost of any given change to be determined by one of the other methods stated in 11.3.4. If the **City** elected to determine the Cost of the change by unit prices and the nature of the work is such that its extent cannot readily be measured after the completion of such work or any subsequent Work, the **Contractor** shall keep daily records, available at all times to the **Design Professional** for inspection, of the actual quantities of such Work put in place, and delivery receipts or other adequate evidence, acceptable to the **Design Professional**, indicating the quantities of materials delivered to the Site for use in such unit price Work, and distinguishing such from other similar material delivered for use in Work include in the base Contract Sum. If so required by the **Design Professional**, materials for use in unit price Work shall be stored apart from all other materials on the Project.

11.3.10. If the **City** elects to determine the Cost of the Work as provided in methods 11.3.4.3. or 11.3.4.4. or if the method of determining the Cost has not been established before the Work is begun, the **Contractor** shall keep detailed daily records of labor and material costs applicable to the Work.

11.3.11. Upon receipt of a **Construction Change** Directive, the **Contractor** shall promptly proceed with the change in the Work involved and advise the **Design Professional** in writing of the **Contractor's** agreement or disagreement with the method, if any, provided in the **Construction Change** Directive for determining the proposed adjustment in the Contract Time.

11.3.12. A **Construction Change** Directive signed by the **Contractor** indicates the agreement of the **Contractor** therewith, including adjustment in the Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

11.3.13. If the **Design Professional** and the **Contractor** do not agree with the adjustment in the Contract Time or the method for determining it, the adjustment or the method shall be referred to the **Design Professional** for determination.

11.4. Minor Changes in the Work.

11.4.1. The **Design Professional** has the authority to order minor changes in the Work. "Minor changes" as used in this paragraph mean changes which are so insignificant as to not affect the Contract Sum or the Contract Time and which are not inconsistent with the intent of the Contract Documents. Any minor change shall be committed to a written order which shall be binding on both the **City** and the **Contractor** and which shall be promptly carried out by the **Contractor**.

11.5. Certificate of Appropriations. (*Reference:* M.G.L. c. 44, §31C;). This Contract shall not be deemed to have been made until the **City's** auditor has certified thereon that an appropriation in the amount of this Contract is available therefor and that an officer or agent of the **City** has

been authorized to execute said Contract and approve all requisitions and change orders. No order to the **Contractor** for a change in or addition to the Work, whether in the form of a drawing, plan, detail or any other written instruction, unless it is an order which the **Contractor** is willing to perform without any increase to the Contract price, shall be deemed to be given until the auditor has certified thereon that an appropriation in the amount of such order is available therefore; but such certificate shall not be construed as an admission by the **City** of its liability to pay for such work. The certificate of the auditor that an appropriation in the amount of this Contract or in the amount of such order is available shall bar any defense by the **City** on the grounds of insufficient appropriation.

ARTICLE 12: CHANGE IN THE CONTRACT TIME

12.1. Date of Commencement.

12.1.1 The date of commencement of the Work is the date established in the Notice to Proceed. The date shall not be postponed by the failure to act of the **Contractor** or persons or entities for whom the **Contractor** is responsible.

12.2. Progress and Completion.

12.2.1. Time is of the essence; all time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the **Contractor** confirms that the Contract Time is a reasonable period for performing the Work.

12.2.2. The **Contractor** shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

12.2.3. Within five (5) working days of award of contract, the **Contractor** shall submit to the **Design Professional** a progress schedule showing for each class of Work included in the schedule of values, the percentage of completion to be obtained and the total dollar value of Work to be completed as of the first of each month until Substantial Completion. All calculations shall be on the basis of Work in place, but may include, at the **Design Professional's** discretion, the value of materials delivered but not in place.

12.2.4. The progress schedule shall be based on an orderly progression of the Work, allowing adequate time for each operation (including adequate time for submission and review of submittals), and leading to a reasonable certainty of Substantial Completion by the date established in the Agreement. The progress schedule will be reviewed by the **Design Professional** for compliance with the requirements of this Article and will be accepted by the **Design Professional** or returned to the **Contractor** for revision and resubmittal. Unless specifically required by law, no payment under this Contract shall be due until the progress schedule has been approved by the **Design Professional**. The **Design Professional's** review of the progress schedule shall not impose any duty on the **Design Professional** or the **City** with respect to the timing, planning, scheduling, or execution of the Work. In particular, if the **Contractor** proposes a progress schedule indicating a date of Substantial Completion which is earlier than the Contract Time, the **Contractor** shall not be entitled to additional payment or compensation of any kind if, for any reason, the full Contract Time is required to achieve

Substantial Completion of the Work.

12.2.5. If in any Application for Payment, the total value of the completed Work in place, as certified by the **Design Professional**, is less than 90% of the total value of the Work in place estimated in the progress schedule, the **City** may, at the **City's** option, require the **Contractor** to accelerate the progress of the Work without cost to the **City** by increasing the workforce or hours or Work or by other reasonable means approved by the **Design Professional**.

12.2.6. If each of three successive applications, as certified by the **Design Professional**, indicate that the actual Work completed is less than 90% of the values estimated in the progress schedule to be completed by the respective dates, the **City** may at the **City's** option, treat the **Contractor's** delinquency as a default justifying the action permitted under Article 18.

12.2.7. If the **Design Professional** has determined that the **Contractor** should be permitted to extend the time for completion as provided below, the calendar dates in the progress schedule shall be adjusted accordingly to retain their same relationship to the adjusted date of Substantial Completion, and the dollar value of the Work to be completed as of the first of each month shall be adjusted pro rata.

12.2.8. If the **Contractor** fails to submit any application for payment in any month, the **Design Professional** shall, for the purpose of this evaluation of progress, certify separately to the actual value of the Work in place completed as of the first of the month to the best of the **Design Professional's** knowledge.

12.2.9. Nothing herein shall limit the **City's** right to liquidated or other damages for delays by the **Contractor** or to any other remedy which the **City** may be entitled or may possess under other provisions of the Contract Documents or by law.

12.3. Delays and Extensions of Time.

12.3.1. If the **Contractor** is delayed at any time in the progress of the Work by an act or neglect of the **City** or the **Design Professional**, or of an employee of either, or of a separate contractor employed by the **City**, or by changes ordered in the Work, or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, or other causes (except weather) beyond the **Contractor's** control, or by delay authorized by the **City**, or by other causes which the **Design Professional** determines may justify delay, then the Contract Time shall be extended by Change Order or **Construction Change** Directive for such reasonable time as the **Design Professional** may determine.

12.3.2. Claims relating to time shall be made in accordance with applicable provisions of Article 16.

12.3.3. No claim for extension of time shall be allowed on account of failure of the **Design Professional** to furnish Plans, Specifications or instructions or to return Shop Drawings or Samples until fifteen (15) days after receipt by the **Design Professional** by registered or

certified mail of written demand for such instructions, Plans, Specifications, or Samples, and then not unless such claim is reasonable.

12.3.4. No extensions of time shall be granted because of seasonal or abnormal variations in temperature, humidity or precipitation, which conditions shall be wholly at the risk of the **Contractor**, whether occurring within the time originally scheduled for completion or within the period of any extension granted. There shall be no increase in the Contract Sum on account of any additional costs of operations or conditions resulting therefrom.

12.3.5. The **Contractor** hereby agrees that the **Contractor** shall have no claim for damages of any kind against the **City** or the **Design Professional** on account of any delay in the commencement of the Work and/or any hindrance, delay, or suspension of any portion of the Work, whether such delay is caused by the **City**, the **Design Professional**, or otherwise, except as and to the extent expressly provided under M.G.L. c. 30, §39O, in the case of written orders by the **City**. The **Contractor** acknowledges that the **Contractor's** sole remedy for any such delay and/or suspension will be an extension of time as provided in this Article.

12.3.6. (*Reference:* M.G.L. c. 30, §39O;). (a) The **City** may order the **Contractor** in writing to suspend, delay, or interrupt all or any part of the Work for such period of time as it may determine to be appropriate for the convenience of the **City**, provided however that if there is a suspension, delay, or interruption for fifteen (15) days or more due to a failure of the **City** to act within the time specified in this Contract, the **City** shall make an adjustment in the Contract prices for any increase in the cost of performance of this Contract under this provision for any suspension, delay, interruption, or failure to act to the extent that such is due to any cause for which this Contract provides for an equitable adjustment of the Contract price under any other Contract provisions.

(b) The **Contractor** must submit the amount of a claim under provision (a) to the **City** in writing as soon as practicable after the end of the suspension, delay, interruption, or failure to act and, in any event, not later than the date of final payment under this Contract and, except for costs due to a suspension order, the **City** shall not approve any costs in the claim incurred more than twenty (20) days before the **Contractor** notified the **City** in writing of the act or a failure to act involved in the Claim.

In the event a suspension, delay, interruption, or failure to act of the **City** increases the cost of performance to any Subcontractor, that Subcontractor shall have the same rights against the **Contractor** for payment for an increase in the cost of its performance as provisions (a) and (b) give the **Contractor** against the **City**, but nothing in provisions (a) and (b) shall in any way change, modify, or alter any other rights which the **Contractor** or the Subcontractor may have against each other.

12.4. Liquidated Damages.

12.4.1. If the **Contractor** shall fail to achieve Substantial Completion within the Contract

Time, it shall be liable to pay the **City** the daily amount specified in the Agreement, not as a penalty, but as a fixed and agreed upon damages for breach of contract. The said amount is fixed and agreed upon because of the difficulty of ascertaining the **City's** actual damages. It is mutually understood that the said amount is a reasonable approximation or estimate thereof as of the date of the Agreement. The **City** may elect to withhold said amount from periodic or final payments due to the **Contractor**, in addition to retainage and other back charges.

12.5. Changes in the Contract Time.

12.5.1. In Writing. The Contract Time may only be changed by a Change Order or a Modification. Any claim for an adjustment of the Contract Time shall be based on a written notice delivered to the party making the claim to the other party and to the **Design Professional** promptly (but in no event later that seven (7) days) after the occurrence of the event giving rise to the claim and stating the general nature of the claim. Notice of the extent of the claim with supporting data shall be delivered within thirty (30) days after such occurrence and shall be accompanied by the claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant has reason to believe it is entitled as a result of the occurrence of said event. All claims for adjustment in the Contract Time shall be determined by the **Design Professional** in accordance with Article 16. No claim for an adjustment in the Contract Time will be valid if not submitted in accordance with the requirements of this paragraph.

12.5.2. Early Completion. The Contract Time shall not be changed due to a delay in the **Contractor's** early completion date.

ARTICLE 13: PAYMENTS

13.1. Schedule of Values.

13.1.1. The **Contractor** shall submit to the **Design Professional** a schedule of values which shall subdivide the Work into its component parts and shall include quantities, direct craft labor worker hours, labor cost and material/equipment cost. Labor cost shall include an appropriate amount of construction equipment costs, supplemental costs, administrative expenses, contingencies, and profit. The **Contractor** shall prepare the schedule of values in such form and supported by such data to substantiate its accuracy as the **Design Professional** may require and shall be revised if later found by the **Design Professional** to be inaccurate. This schedule, unless objected to by the **Design Professional**, shall be used as a basis for reviewing the **Contractor's** applications for payment.

13.2. Content and Submission of Applications for Payment.

13.2.1. At least ten (10) days before the date established for each progress payment, the **Contractor** shall submit to the **Design Professional** six (6) copies of an itemized application for payment for Work completed in accordance with the schedule of values. Such application shall be in a form or format established or approved by the **Design Professional** and shall be supported by documentation substantiating the **Contractor's** right to payment.

13.2.2. When **Construction Change** Directives have set forth an adjustment to the

Contract Sum but have not yet been included in Change Orders, the value established by the **City** may be included in the application.

13.2.3. Applications covering Work of Subcontractors or Suppliers shall not include requests for payments of amounts the **Contractor** does not intend to pay to a Subcontractor or Supplier because of a dispute or other reason. The **Contractor** shall not be paid for any Work performed by a Subcontractor unless and until the **City** receives for that Subcontractor a certificate of insurance that conforms to the requirements of the Contract Documents .

13.2.4. Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the Site for subsequent incorporation in the Work. If approved in advance by the **City**, payment may similarly be made for materials and equipment suitably stored off the Site at a location agreed upon in writing. Payment for materials and equipment stored on or off the Site shall be conditioned upon the application for payment being accompanied by a bill of sale, an invoice, or other documentation warranting that the **City** has received the materials and equipment free and clear of all liens, claims, security interests, or encumbrances, hereinafter collectively referred to as "liens," and evidence that the materials and equipment are covered by appropriate insurance and other arrangements to protect the **City's** interest therein.

13.2.5. Each application for payment or periodic estimate requesting payment shall be accompanied by, at the **City's** option, a certificate from each Subcontractor stating that the Subcontractor has been paid all amounts due the Subcontractor on the basis of the previous periodic payment to the **Contractor**, or else stating the amount not so paid and the reason for the discrepancy. In the event of any such discrepancy, the **Contractor** shall furnish the **Contractor's** own written explanation to the **City** through the **Design Professional**. Such waiver or certificate shall be in a form acceptable to the **City**.

13.3. False Applications for Payment.

13.3.1. (*Reference:* M.G.L. c. 266, §§67B). Any person who makes or presents to any claim upon or against any employee or department of the **City**, knowing such claim to be false, fictitious, or fraudulent shall be punished by a fine or not ore than ten thousand dollars ($10,000) or by imprisonment in the state prison for not more than five (5) years, or in the house of correction for not more than two and one-half years, or both.

13.4. Review of Applications for Payment.

13.4.1. The **Design Professional** shall review each application for payment and will reject any application that (1) is not accompanied by the required documentation or (2) contains errors, mathematical or otherwise.

13.4.2. Within five (5) business days after receipt of an application for payment, the **Design Professional** will either (1) return the application to the **Contractor** with a written explanation as to why it was rejected or (2) issue to the **City** a certificate for payment, with a copy to the **Contractor**, for such amount as the **Design Professional** determines is properly due.

In the event an application is returned to the **Contractor**, the date of receipt of the application shall be the date of receipt of the corrected application.

13.4.3. The **Design Professional** or the **City** may make changes to any application submitted by the **Contractor**.

13.4.4. By recommending any payment, the **Design Professional** will not thereby be deemed to have represented that: (1) exhaustive or continuous on-site inspections have been made to check the quality or the quantity of the Work beyond the responsibilities specifically assigned to the **Design Professional** in the Contract Documents or (2) that there may not be other matters or issues between the parties that might entitle the **Contractor** to be paid additionally by the **City** or entitle the **City** to withhold payment to the **Contractor**. The **Design Professional's** approval of the application for payment and the accompanying documentation shall indicate that to the best of the **Design Professional's** knowledge, information, and belief, the Work has progressed to the point indicated by the **Contractor**, and that the quality of the Work is in accordance with the Contract Documents, subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests specified in the Contract Documents, final determination of quantities and classifications for unit price work and any other qualifications so stated.

13.4.5. The **Design Professional's** recommendation of any payment shall not mean that the **Design Professional** is responsible for the **Contractor's** means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of the **Contractor** to comply with laws and regulations applicable to the furnishing or performance of Work, of for any failure of the **Contractor** to perform or furnish Work in accordance with the Contract Documents.

13.4.6. No certificate given or payment made shall be evidence of the performance of this Contract, either wholly or in part and no payment, whether made upon the final certificate or otherwise, shall be construed as an acceptance of defective work or materials.

13.5. Decisions to Withhold Certification.

13.5.1. The **Design Professional** may refuse to recommend the whole or any part of any payment if, in the **Design Professional's** opinion, it would be incorrect to make the representations to the **City** referred to above.

13.5.2. If the **Contractor** and the **Design Professional** cannot agree on a revised amount, the **Design Professional** will promptly approve a certificate for payment for the amount for which the **Design Professional** is able to make such representations to the **City**. The **Design Professional** may also decide not to certify payment or, because of subsequently discovered evidence or subsequent observations, may nullify the whole or a part of a certificate for payment previously issued, to such extent as may be necessary in the **Design Professional's** opinion to protect the **City** from loss because of:

13.5.2.1. defective Work not remedied;

13.5.2.2. third party claims filed or reasonable evidence indicating probable filing of such claims;

13.5.2.3. failure of the **Contractor** to make payments properly to Subcontractors or for labor, materials or equipment;

13.5.2.4. reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;

13.5.2.5. damage to the **City** or another contractor;

13.5.2.6. reasonable evidence that the Work will not be completed within the Contract Time, and that retainage currently held by the **City** would not be adequate to cover actual or liquidated damage for the anticipated delay;

13.5.2.7. persistent failure to carry out the Work in accordance with the Contract Documents; or

13.5.2.8. failure of mechanical trade or electrical trade subcontractors to comply with mandatory requirements for maintaining record drawings. The **Contractor** shall check record drawings each month. Written confirmation that the record drawings are current will be required by the **Design Professional** before approval of the **Contractor's** monthly payment requisition.

13.5.3. When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

13.6. Progress Payments.

13.6.1. After the **Design Professional** has issued a certificate for payment, the **City** shall make payment in the manner and within the time provided in the Contract Documents.

13.6.2. (*Reference:* M.G.L. c. 30, §39G;). The **City** shall pay the amount due pursuant to any periodic, Substantial Completion or final estimate within thirty-five (35) days after receipt of written acceptance for such estimate from the **Contractor**. In the case of periodic payments, the **City** may deduct from its payment a retention based on its estimate of the fair value of its claims against the **Contractor**, a retention for direct payments to Subcontractors based on demands for same in accordance with M.G.L. c. 30, §39F; and a retention to secure satisfactory performance of the contractual work, not exceeding five percent (5%) of the approved amount of any periodic payment, and the same right to retention shall apply to bonded Subcontractors entitled to direct

payment under M.G.L. c. 30, §39F; provided, that a five percent (5%) value of all items that are planted in the ground shall be deducted from the periodic payments until final acceptance.

13.6.3. No periodic, Substantial Completion or final estimate or acceptance or payment thereof shall bar the **Contractor** from reserving all rights to dispute the quantity and amount of, or the failure of the **City** to approve a quantity and amount of, all or part of any Work item or extra Work item.

13.7. Final Payment.

13.7.1. After final inspection and after the **Contractor** has completed all the required corrections to the satisfaction of the **Design Professional** and the **City** and delivered in accordance with the Contract Documents all maintenance and operating instructions, schedules, guarantees, bonds, certificates, or other evidence of insurance, certificates of inspection, marked-up record documents, and all other documents called for in the Contract Documents, as well as any surplus materials requested by the **City,** the **Contractor** may make an application for final payment as provided below.

13.7.2. (*Reference:* M.G.L. c. 30, §39G;). Within thirty (30) days after receipt by the **City** of a notice from the **Contractor** stating that all of the Work required by the Contract has been completed, the **City** shall prepare and forthwith send to the **Contractor** for acceptance a final estimate for the quantity and price of the Work done and all retainage on the Work less all payments made to date, unless the **City's** inspection shows that Work required by the Contract remains incomplete or unsatisfactory, or that documentation required by the Contract has not been completed.

13.7.3. The making and acceptance of final payment will constitute a waiver of all claims by the **Contractor** against the **City** other than those previously made in writing and still unsettled.

13.8. Payments to Subcontractors.

13.8.1. Neither the **City** nor the **Design Professional** shall have an obligation to pay or see to the payment of money to a Subcontractor, Sub-subcontractor, or Supplier except as may otherwise be required by law.

13.8.2. (*Reference:* M.G.L. c. 30, §39F;) (1)(a) Forthwith after the **Contractor** receives payment on account of a periodic estimate, the **Contractor** shall pay to each Subcontractor the amount paid for the labor performed and the materials furnished by that Subcontractor, less any amount specified in any court proceedings barring such payment and also less any amount claimed due from the Subcontractor by the **Contractor**.

(b) Not later than the sixty-fifth day after each Subcontractor substantially completes its Work in accordance with the Plans and Specifications, the entire balance

due under the subcontract, less amounts retained by the **City** as the estimated cost of completing the incomplete and unsatisfactory items of Work, shall be due the Subcontractor; and the **City** shall pay that amount to the **Contractor**. The **Contractor** shall forthwith pay to the Subcontractor the full amount received from the **City** less any amount specified in any court proceeding barring such payment and also less any amount claimed due from the Subcontractor by the **Contractor**.

(c) Each payment made by the **City** to the **Contractor** pursuant to paragraphs (a) and (b) of M.G.L. c. 30, §39F(1);, for the labor performed and the materials furnished by a Subcontractor shall be made to the **Contractor** for the account of that Subcontractor; and the **City** shall take reasonable steps to compel the **Contractor** to make each such payment to each such Subcontractor. If the **City** has received a demand for direct payment from a Subcontractor for any amount which has already been included in a payment to the **Contractor** or which is to be include in a payment to the **Contractor** for payment to the Subcontractor as provided in paragraphs (a) and (b) of M.G.L. c. 30, §39F(1), the **City** shall act upon the demand as provided in M.G.L. c. 30, §39F.

(d) If, within seventy (70) days after the Subcontractor has substantially completed the subcontract Work, the Subcontractor has not received from the **Contractor** the balance due under the subcontract including any amount due for extra labor and materials furnished to the **Contractor**, less any amount retained by the **City** as the estimated cost of completing the incomplete and unsatisfactory items of Work, the Subcontractor may demand direct payment of that balance from the **City**. The demand shall be by a sworn statement delivered to or sent by certified mail to the **City**, and a copy shall be delivered to or sent by certified mail to the **Contractor** at the same time. The demand shall contain a detailed breakdown of the balance due under the subcontract and also a statement of the status of completion of the subcontract Work. [The demand letter shall indicate the certified mail number assigned by the postal service or the date of delivery to the **Contractor**.] Any demand made after substantial completion of the subcontract Work shall be valid even if delivered or mailed prior to the seventieth day after the Subcontractor has substantially completed the subcontract Work. Within ten (10) days after the Subcontractor has delivered or so mailed the demand to the **City** and delivered or so mailed a copy to the **Contractor**, the **Contractor** may reply to the demand. The reply shall be by a sworn statement delivered to or sent by certified mail to the **City**, and a copy shall be delivered to or sent by certified mail to the Subcontractor at the same time. The reply shall contain a detailed breakdown of the balance due under the subcontract, including any amount due for extra labor and materials furnished to the **Contractor** and of the amount due for each claim made by the **Contractor** against the Subcontractor.

(e) Within fifteen (15) days after receipt of the demand by the **City**, but in no event prior to the seventieth day after substantial completion of the subcontract Work, the **City** shall make direct payment to the Subcontractor of the balance due under the

subcontract, including any amount due for extra labor and materials furnished to the **Contractor**, less any amount (i) retained by the **City** as the estimated cost of completing the incomplete or unsatisfactory items of Work, (ii) specified in any court proceedings barring such payment, or (iii) disputed by the **Contractor** in the sworn reply; provided that the **City** shall not deduct from a direct payment any amount as provided in part (iii) if the reply is not sworn to or for which the sworn reply does not contain the detailed breakdown required by the previous paragraph. The **City** shall make further direct payments to the Subcontractor forthwith after the removal of the basis for deductions from direct payments made as provided in parts (i) and (ii) of this paragraph.

(f) The **City** shall forthwith deposit the amount deducted from a direct payment as provided in part (iii) of the previous paragraph in an interest-bearing joint account in the names of the **Contractor** and the Subcontractor in a bank in Massachusetts selected by the **City** or agreed upon by the **Contractor** and the Subcontractor and shall notify the **Contractor** and the Subcontractor of the date of the deposit and the bank receiving the deposit. The bank shall pay the amount in the account, including accrued interest, as provided in an agreement between the **Contractor** and the Subcontractor or as determined by decree of a court of competent jurisdiction.

(g) All direct payments and all deductions from demands for direct payments deposited in an interest-bearing account or accounts in a bank pursuant to the previous paragraph shall be made out of amounts payable to the **Contractor** at the time of receipt of a demand for direct payment from a Subcontractor and out of amounts which later become payable to the **Contractor** and in the order of receipt of such demands from Subcontractors. All direct payments shall discharge the obligation of the **City** to the **Contractor** to the extent of such payment.

(h) The **City** shall deduct from payments to a **Contractor** amounts that, together with the deposits in interest-bearing accounts pursuant to paragraph (f), are sufficient to satisfy all unpaid balances of demands for direct payment received from Subcontractors. All such amounts shall be earmarked for such direct payments, and the Subcontractors shall have a right in such deductions prior to any claims against such amounts by creditors of the **Contractor**.

(i) If the Subcontractor does not receive payment as provided in paragraph (a) or if the **Contractor** does not submit a periodic estimate for the value of the labor or materials performed or furnished by the Subcontractor and the Subcontractor does not receive payment for same when due less the deductions provided for in paragraph (a), the Subcontractor may demand direct payment by following the procedure in paragraph (d) and the **Contractor** may file a sworn reply as provided in that same paragraph. A demand made after the first day of the month following that for which the Subcontractor performed or furnished the labor and materials for which the Subcontractor seeks payment shall be valid even if delivered or mailed prior to the time payment was due on a periodic estimate from the **Contractor**. Thereafter the **City** shall proceed as provided in

paragraphs (e), (f), (g), and (h). "Subcontractor" as used in this paragraph (1)(i) shall mean a person approved by the **City** in writing as a person performing labor or both performing labor and furnishing materials pursuant to a contract with the **Contractor**.

(2) Any assignment by a Subcontractor of the rights under this section to a surety company furnishing a bond under the provisions of M.G.L. c. 149, §29; shall be invalid. The assignment and subrogation rights of the surety to amounts included in a demand for direct payment which are in the possession of the **City** or which are on deposit pursuant to paragraph (g) shall be subordinate to the rights of all Subcontractors who are entitled to be paid under this section and who have not been paid in full.

(3) A **Contractor** or a Subcontractor shall enforce a claim to any portion of the amount of a demand for direct payment deposited as provided in herein by a petition in equity in the superior court against the other and the bank shall not be a necessary party. A Subcontractor shall enforce a claim for direct payment or a right to require a deposit as provided in paragraph (f) by a petition in equity in the superior court against the **City** and the **Contractor** shall not be a necessary party. Upon motion of any party the court shall advance for speedy trial any petition filed as provided in this paragraph. M.G.L. c. 231, §§59 and 59B shall apply to such petitions. The court shall enter an interlocutory decree upon which execution shall issue for any part of a claim found due pursuant to §§59 and 59B and, upon motion of any party, shall advance for speedy trial the petition to collect the remainder of the claim. Any party aggrieved by such interlocutory decree shall have the right to appeal therefrom as from a final decree. The court shall not consolidate for trial the petition of any Subcontractor with the petition of one or more Subcontractors or the same general contract unless the court finds that a substantial portion of the evidence of the same events during the course of construction (other that the fact that the claims sought to be consolidated arise under the same general contract) is applicable to the petitions sought to be consolidated and that such consolidation will present unnecessary duplication of evidence. A decree in any such proceeding shall not include interest on the disputed amount deposited in excess of the interest earned for the period of any such deposit. No person except a Subcontractor filing a demand for direct payment for which no funds due the **Contractor** are available for direct payment shall have a right to file a petition in court of equity against the **City** claiming a demand for direct payment is premature, and such Subcontractor must file the petition before the **City** has made a direct payment to the Subcontractor and has made a deposit of the disputed portion as provided in part (iii) of paragraph (e) and in paragraph (f).

(4) In any petition to collect any claim for which a Subcontractor has filed a demand for direct payment the court shall, upon motion of the **Contractor**, reduce by the amount of any deposit of a disputed amount by the **City** as provided in part (iii) of paragraph (e) and in paragraph (f) any amount held under a trustee writ or pursuant to a restraining order or injunction.

ARTICLE 14: SUBSTANTIAL COMPLETION

14.1. Substantial Completion.

14.1.1. Upon Substantial Completion of the Work, the **Contractor** shall present in writing to the **City** its certification that the Work has been substantially completed and include in its certification (1) a list of items to be completed or corrected, (2) all special warranties required by the Contract Documents, endorsed by the **Contractor** and in a form reasonably acceptable to the **Design Professional** and (3) the permits and certificates referred to in 13.7.1., or elsewhere. The failure to include any item on the list mentioned in the preceding sentence does not alter the responsibility of the **Contractor** to complete all Work in accordance with the Contract Documents. When the **Design Professional** on the basis of an inspection determines that the Work or designed portion thereof is substantially complete and the other conditions have been met, the **Design Professional** will then prepare a certificate of Substantial Completion which shall establish the date of Substantial Completion, shall state the responsibilities of the **City** and the **Contractor** for security, maintenance, heat, utilities, damage to the Work, and insurance, and shall fix the time within which the **Contractor** shall complete the items listed therein. The certificate of Substantial Completion shall be submitted to the **City** and the **Contractor** for their written acceptance of the responsibilities assigned to them in such certificate.

14.1.2. Within twenty-one (21) days after receipt of the certification from the **Contractor**, the **City** shall present to the **Contractor** either a written declaration that the Work has been substantially completed or an itemized list of incomplete or unsatisfactory work items required by the Contract sufficient to demonstrate that the Work has not been substantially completed. The **City** may include with such list a notice setting forth a reasonable time within which the **Contractor** must achieve Substantial Completion of the Work. If the **City** fails to respond, by presentation of a written declaration or itemized list as aforesaid, to the **Contractor's** certification within the twenty-one (21) day period, the **Contractor's** certification shall take effect as the **City's** declaration that the Work has been substantially completed.

14.2. Partial Use or Occupancy of the Premises.

14.2.1. The **City** may occupy or use any completed or partially completed portion of the Work at any stage. Such partial occupancy or use may begin whether or not the portion is substantially complete, provided that the respective responsibilities of the **City** and the **Contractor** with respect to payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work, insurance, correction of the Work, and warranties shall be established by agreement of the **City** and the **Contractor** or, absent such agreement, shall be determined by the **Design Professional** subject to the right of either party to contest such determination as provided in Article 16.

14.2.2. Immediately prior to such partial occupancy or use, the **City**, the **Contractor** and the **Design Professional** shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

14.2.3. Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the

Contract Documents.

14.2.4. (*Reference:* M.G.L. c. 30, §39G;). Within sixty-five (65) days after the effective date of a declaration of Substantial Completion, the **City** shall prepare and send to the **Contractor** for acceptance a Substantial Completion estimate for the quantity and price of the Work done and all but one percent (1%) retainage on that Work, including the quantity, price and all but one percent (1%) retainage for the undisputed part of each item and extra work item in dispute, but excluding the disputed part thereof, less the estimated cost of completing all incomplete and unsatisfactory items and less the total periodic payments made to date for the Work. The **City** shall also deduct from the Substantial Completion estimate an amount equal to the sum of all demands for direct payment filed by Subcontractors and not yet paid to Subcontractors or deposited in joint accounts pursuant to M.G.L. c. 30, §39F.

14.2.5. (*Reference:* M.G.L. c. 30, §39G). If the **City** fails to prepare and send to the **Contractor** any Substantial Completion estimate required by the provisions herein on or before the date specified, the **City** shall pay to the **Contractor** interest on the amount which would have been due to the **Contractor** pursuant to such Substantial Completion estimate at the rate of three (3) percentage points above the rediscount rate then charged by the Federal Reserve Bank of Boston from such date to the date on which the **City** sends that Substantial Completion estimate to the **Contractor** for acceptance or to the date of payment therefor, whichever occurs first. The **City** shall include the amount of such interest in the Substantial Completion estimate.

14.2.6. (*Reference:* M.G.L. c. 30, §39G). Within fifteen (15) days after the effective date of the declaration of Substantial Completion, the **City** shall send to the **Contractor** by certified mail, return receipt requested, a complete list of all incomplete or unsatisfactory items, and unless delayed by causes beyond its control, the **Contractor** shall complete all such items within forty-five (45) days after the receipt of such list or before the date for final payment and acceptance, whichever is later. If the **Contractor** fails to complete such Work within such time, the **City** may, subsequent to seven (7) days' written notice to the **Contractor** by certified mail, return receipt requested, terminate the Contract and complete the incomplete or unsatisfactory items and charge the cost of same to the **Contractor**.

14.3. Final Inspection.

14.3.1. Upon written notice from the **Contractor** that the entire Work or an agreed portion thereof is complete, the **Design Professional** will make a final inspection with the **City** and the **Contractor** and will notify the **Contractor** in writing of all particulars which this inspection reveals that the Work is incomplete or defective. The **Contractor** shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

ARTICLE 15: GUARANTEES AND WARRANTIES

15.1. In General.

15.1.1. All guarantees and warranties specifically called for by the Specifications shall expressly run to the benefit of the **City**.

15.2. Warranties.

15.2.1. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof, unless otherwise provided in the certificate of Substantial Completion.

15.2.2. The **Contractor** warrants that the materials and equipment furnished under the Contract will be new and of recent manufacture unless otherwise specified, and that all Work will be of good quality, free from faults and defects, and in conformance with the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. The **Contractor's** warranty excludes remedy for damage or defect caused by abuse, Modifications not executed by the **Contractor**, improper or insufficient maintenance, improper operation, or normal wear and tear under normal usage. If required by the **Design Professional**, the **Contractor** shall furnish satisfactory evidence as to the kind and quality of material and equipment.

15.2.3. The **Contractor** warrants that title to all Work covered by an application for payment will pass to the **City** either by incorporation in the construction or upon the receipt of payment by the **Contractor**, whichever occurs first, free and clear of all liens. The **Contractor** further agrees that the submission of any application for payment shall conclusively be deemed to waive all liens with respect to said Work to which the **Contractor** may then be entitled, provided that such waiver of the lien rights shall not waive the **Contractor's** right to payment for such Work.

15.2.4. The **Contractor** warrants and guarantees that title to all Work, materials, and equipment covered by any application for payment, whether incorporated in the Project or not, will pass to the **City** no later than the time of payment free and clear of all liens.

15.2.5. No materials or supplies for the Work shall be purchased by the **Contractor** or Subcontractor subject to any chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller. The **Contractor** warrants that it has good title to all materials and supplies used by it in the Work, free from all liens.

15.2.6. The **Contractor** shall indemnify and hold the **City** harmless from all claims growing out of the lawful demands of Subcontractors, laborers, workers, mechanics, material persons, and furnishers of machinery and parts thereof, equipment, power tools, and all supplies, including commissary, incurred in the furtherance of the performance of this Contract. The **Contractor** shall at the **City's** request, furnish satisfactory evidence that all obligations of the nature hereinabove designated have been paid, discharged, or waived. If the **Contractor** fails to do so, then the **City** may, after having served written notice on the **Contractor** either pay unpaid bills, of which the **City** has written notice, direct, or withhold from the **Contractor's** unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to the **Contractor** shall be resumed, in accordance with the terms of this

Contract, but in no event shall the provisions of this sentence be construed to impose any obligations on the **City** to either the **Contractor** or its surety. In paying any unpaid bills of the **Contractor**, the **City** shall be deemed the agent of the **Contractor** and any payment so made by the **City** shall be considered as payment made under the Contract by the **City** to the **Contractor** and the **City** shall not be liable to the **Contractor** for any such payment made in good faith.

15.3. Extended Warranties and Guarantees.

15.3.1. Any defective Work that is either corrected or replaced will be warranted and guaranteed for a period of three (3) years from the date of such correction or replacement.

ARTICLE 16: CLAIMS

16.1. In General.

16.1.1. Written Notice. A Claim must be made by written notice to the other party.

16.1.2. Content of Notice. The notice must include all written supporting data.

16.1.3. Burden of Proof. The party making the Claim must substantiate the Claim.

16.2. Time Limits on Claims.

16.2.1. Unless otherwise provided, all Claims must be made within twenty-one (21) days after the occurrence of the event giving rise to such Claim or within twenty-one (21) days after the claimant first recognizes the condition giving rise to the Claim, whichever is later. Any change or addition to a previously made Claim shall be made by a written notice within the twenty-one-day period in order to be valid.

16.3. Continuing Contract Performance.

16.3.1. Pending final resolution of a Claim including arbitration, unless otherwise agreed in writing, the **Contractor** shall proceed diligently with performance of the Contract and the **City** shall continue to make payments in accordance with the Contract Documents.

16.4. Types of Claims.

16.4.1. Claims for Differing Subsurface or Latent Physical Conditions. (*Reference:* M.G.L. c. 30, §39N;). If, during the progress of the Work, the **Contractor** or the **City** discovers that the actual subsurface or latent physical conditions encountered at the Site differ substantially or materially from those shown on the Plans or indicated in the Contract Documents, either the **Contractor** or the **City** may request an equitable adjustment in the Contract Sum of the Contract applying to Work affected by the differing Site conditions. A request for such an adjustment shall be in writing and shall be delivered by the party making such claim to the other party as soon as possible after such conditions are discovered. Upon receipt of such a claim from a **Contractor**, or upon its own initiative, the **City** shall make an investigation of such physical conditions, and if they differ substantially or materially from those shown on the Plans or indicated in the Contract Documents or from those ordinarily encountered and generally recognized as inherent in Work of the character provided for in the Plans and Contract

Documents and are of such a nature as to cause an increase or decrease in the cost of performance of the Work or a change in the construction methods required for the performance of the Work which results in an increase or decrease in the cost of the Work, the **City** shall make an equitable adjustment in the Contract Sum and the Contract shall be modified in writing accordingly.

16.4.2. Claims for Additional Cost. If the **Contractor** claims that any acts or omissions of the **City** or the **Design Professional**, including any instructions or orders, whether oral, written, by drawings, or otherwise, involve extra cost or time, and the **Contractor** has not received a written acknowledgment by the **City** or the **Design Professional** that extra payment will be made or time extended on account thereof, the **Contractor** shall promptly so notify the **Design Professional** in writing of such Claim and shall proceed with the Work relating to such Claim and all rights of both parties with respect to such Claim shall be deemed to have been reserved. No Claim by the **Contractor** on account of such acts, omissions, instructions, or orders shall be valid unless the **Contractor** has so notified the **Design Professional** before proceeding.

16.4.2.1. Under no circumstances shall a Claim be made for additional cost where adverse weather conditions are the basis for the Claim.

16.4.3. Claims for Additional Time. If the **Contractor** wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The **Contractor** shall have the burden of demonstrating the effect of the claimed delay on the Contract Time and shall furnish the **Design Professional** with such documentation relating thereto as the **Design Professional** may reasonably require. Under no circumstances shall the **Contractor** make a Claim for an increase in the Contract Time due to a change in the **Contractor's** early completion date. If the increase in the Contract Time extends beyond the Contract Time established by the **City**, only the time that so extends beyond the Contract Time shall be reviewed and considered. In the case of a continuing delay, only one Claim is necessary.

16.4.3.1. Under no circumstances shall a Claim be made for additional time where adverse weather conditions are the basis for the Claim.

16.4.4. Claims for Injury to Person or Damage to Property. Should either party to the Contract suffer injury to person or damage to property because of any error, omission, or act of the other party or of any of the other party's employees or agents or others for whose acts the other party is legally liable, a Claim will be made in writing to the other party within twenty-one (21) days of the occurrence of the act giving rise to the injury or damage.

16.5. Review of Claims.

16.5.1. Initial Referral. All Claims, the bases of which arise prior to final payment or the earlier termination of the Contract, shall be referred initially to the **Design Professional** for action as provided herein.

16.5.2. Time Period and Action. The **Design Professional** shall review Claims and shall

do one of the following within fourteen (14) days of receipt of the Claim:

16.5.2.1. defer any action with respect to all or any part of a Claim for the purpose of requesting and receiving additional information from either party;

16.5.2.2. decline in writing to render a decision for any reason which it deems appropriate (including, but not limited to, the fact that the Claim involves allegations of fault on the part of the **Design Professional**); or

16.5.2.3. render a decision on all or a part of the Claim.

16.5.3. If the **Design Professional** requests additional information, the **Design Professional** shall take action with respect to the Claim no later than fourteen (14) days after receipt of the additional information. The **Design Professional** shall notify the parties in writing of its disposition of such Claim. If the **Design Professional** renders a decision or declines to render a decision, either party may proceed in accordance with paragraph 16.7.

16.6. Decisions.

16.6.1. Decisions by the City or the Design Professional. (*Reference:* M.G.L. c. 30, §39P;). In every case in which this Contract requires the **City**, any official, or its **Design Professional** to make a decision on interpretation of the Specifications, approval of equipment, material or any other approval, or progress of the Work, the decision shall be made promptly and, in any event, no later than fourteen (14) days after the written submission for decision; but if such decision requires extended investigation and study, the **City**, the official, or the **Design Professional** shall, within fourteen (14) days after the receipt of the submission, give the party making the submission written notice of the reasons why the decision cannot be made within the thirty-day period and the date by which the decision will be made.

16.6.2. When Decision of the Design Professional is Final and Binding. The decision of the **Design Professional** shall be final and binding on the parties, unless a party files suit or a demand for arbitration within thirty (30) days after the date of the decision.

16.6.3. When Decision of the Design Professional is Not Final and Binding. (*Reference:* M.G.L. c. 30, §39J). Notwithstanding any contrary provision of this Contract, no decision by the **City** or by the **Design Professional** on a dispute, whether of fact or of law, arising under said Contract shall be final or conclusive if such decision is made in bad faith, fraudulently, capriciously, arbitrarily, is unsupported by substantial evidence, or is based upon error of law.

16.6.4. Resolved Claims. If a Claim is resolved, the **Design Professional** shall obtain or prepare the appropriate documentation and provide the **City** and the **Contractor** with a copy of same.

Part 1, Section 4: OTHER BID DOCUMENTS

16.7. Arbitration.

16.7.1. Controversies and Claims Subject to Arbitration. Any controversy or Claim arising out of or related to the Contract, or the breach thereof, shall be settled by arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association, and judgment upon the award rendered by the arbitrator or arbitrators may be entered in any court having jurisdiction thereof, except controversies or Claims relating to aesthetic effect, subject to the provisions of paragraph 16.7.7. In any such arbitration in which the amount stated in the demand is $100,000 or less, the American Arbitration Association shall appoint a single arbitrator in accordance with such Rules, who shall be a lawyer. In any such arbitration in which the amount stated in the demand is in excess of $100,000, the demand shall include the name of an arbitrator appointed by the claimant. The respondent shall appoint a second arbitrator and shall notify the claimant in writing of such appointment within thirty (30) days of receipt of the demand, failing which the matter shall be decided by the arbitrator named in the claimant's demand. Within thirty (30) days after the claimant's receipt of notice of the appointment of the second arbitrator, the two arbitrators shall appoint a neutral arbitrator and shall notify the parties in writing of such appointment, failing which either party may apply to the American Arbitration Association to appoint such neutral arbitrator. If such neutral arbitrator is appointed by the American Arbitration Association, he or she shall be a lawyer.

16.7.2. Rules for Arbitration. If the neutral arbitrator is appointed by the American Arbitration Association, the said Association shall administer the arbitration and its Construction Industry Arbitration Rules shall govern all aspects of the proceeding including the enforcement of any award. If the neutral arbitrator is not appointed by the American Arbitration Association, then the panel of arbitrators shall act as the administrator of the arbitration but the Construction Industry Arbitration Rules of the Association shall nonetheless govern all aspects of the proceeding, including the enforcement of any award, provided however that the arbitration panel shall have all of the powers and duties conferred on the Association pursuant to said rules. In addition, the following rules shall govern the selection of arbitrators and the proceedings:

16.7.2.1. Neither party may appoint as arbitrator an employee or an owner of that party, nor the parent, spouse, or child of an employee or owner of that party.

16.7.2.2. After the neutral arbitrator has been appointed, neither party may engage in *ex parte* communication with any arbitrator.

16.7.3. When Arbitration May Be Demanded. Demand for arbitration of any Claim, the basis of which arises prior to final payment or the earlier termination of the Contract may not be made before the earlier of (1) the date on which the **Design Professional** has rendered a written decision on the Claim or has notified the parties in writing that such decision will not be rendered or (2) forty-five (45) days following receipt by the **Design Professional** of a written request for a decision sent by registered or certified mail to both the **Design Professional** and the other party to this Contract.

Lincoln Park
00430

16.7.3.1. In no event shall a demand for arbitration be made after the date when the institution of legal or equitable proceedings based on such Claim would be barred by the applicable statute of limitations.

16.7.4. Limitation on Consolidation or Joinder. No arbitration arising out of or relating to the Contract Documents shall include, by consolidation or joinder or in any other manner, the **Design Professional**, the **Design Professional's** employees or consultants, except by written consent containing specific reference to the Contract and signed by the **Design Professional**, the **City**, the **Contractor,** and any other person or entity sought to be joined. No arbitration shall include, by consolidation or joinder or in any other manner, parties other than the **City**, the **Contractor**, a separate contractor, and other persons substantially involved in a common question of fact or law whose presence is required if complete relief is to be accorded in arbitration. No person or entity other than the **City**, the **Contractor,** or a separate contractor shall be included as an original third party or additional third party to an arbitration whose interest or responsibility is insubstantial. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of a dispute not described therein or with a person or entity so named or described herein. The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Contract shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

16.7.5. Claims and Timely Assertion of Claims. A party who files a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded. When a party fails to include a Claim through oversight, inadvertence, or excusable neglect, or when a Claim has matured or been acquired subsequently, the arbitrator or arbitrators may permit amendment.

16.7.6. Award Final. The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

16.7.7. The City's Reservation of Rights. Notwithstanding any provision contained in this Article 16 or elsewhere in the Contract Documents, the **City** reserves the following rights in connection with Claims between the **City** and the **Contractor**, which rights may be exercised by the **City** unilaterally, in the **City's** sole discretion, and without the consent of the **Contractor**:

16.7.7.1. the right to institute legal action against the **Contractor** in any court of competent jurisdiction in lieu of demanding arbitration, in which case the dispute or disputes which are the subject of such action shall be decided by such court, and not by arbitration;

16.7.7.2. the right to obtain from any court of competent jurisdiction a stay of any arbitration instituted by the **Contractor**, provided that the application for such stay is made before the appointment of the neutral arbitrator in such arbitration, in which case the dispute or disputes which are the subject of such arbitration shall be decided by such

court and not by arbitration;

16.7.7.3. the right to require the **Contractor** to join as a party in any arbitration between the **City** and the **Design Professional** relating to the Project, in which case the **Contractor** agrees to be bound by the decision of the arbitrator or arbitrators in such arbitration.

16.7.8. In case the **City** elects to proceed in accordance with 16.7.7.1. or 16.7.7.2. above, the word “litigation” shall be deemed to replace the word “arbitration” wherever the latter word appears in the Contract Documents.

ARTICLE 17: EMERGENCIES

17.1. In an emergency affecting the health and safety of persons or property, the **Contractor** shall act to prevent threatened damage, injury, or loss.

17.2. In emergencies affecting the health, safety, or protection of persons, the Work or property at the Site or adjacent thereto, the **Contractor**, without special instruction or authorization from the **City** or the **Design Professional**, is obligated to act to prevent threatened damage, injury, or loss. The **Contractor** shall give the **Design Professional** prompt written notice if the **Contractor** believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby. If the **Design Professional** determines that a change in the Contract Documents is required because of the action taken by the **Contractor** in response to such an emergency, a **Construction Change** Directive or Change Order will be issued to document the consequences of such action.

ARTICLE 18: TERMINATION OR SUSPENSION OF THE CONTRACT

18.1. Suspension by the City.

18.1.1. At any time and without cause, the **City** may suspend the Work or any portion thereof for a period of not more than ninety (90) days by notice in writing to the **Contractor** and the **Design Professional** that will fix the date on which Work will be resumed. The **Contractor** shall resume Work on the date so fixed. The **Contractor** shall be allowed an adjustment in the Contract Sum or an extension of the Contract Time, or both, directly attributable to any such suspension if the **Contractor** makes an approved Claim therefor.

18.1.2. If the Work is defective, if the **Contractor** fails to provide a sufficient number of skilled workers or suitable materials or equipment, or if the **Contractor** defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a seven-day period after receipt of written notice from the **City** to begin and prosecute correction of such default or neglect with diligence and promptness, the **City** may correct such deficiencies, without prejudice to other remedies the **City** may have. In such case, an appropriate **Construction Change** Directive shall be issued deducting from payments then or thereafter due to the **Contractor** the cost of correcting such deficiencies including compensation for the **Design Professional's** additional services and expenses made necessary by such default, neglect, or

failure and any and all direct, indirect, or consequential costs associated with the order to stop the Work. If such payments then or thereafter due the **Contractor** are not sufficient to cover such amounts, the **Contractor** shall immediately pay the difference to the **City**. The **Contractor** shall remain responsible for maintaining progress and shall not be entitled to any increase in the Contract Time or the Contract Sum.

18.2. Termination by the Contractor.

18.2.1. If, through no act or fault of the **Contractor**, a Subcontractor, or a Sub-subcontractor, the Work is suspended for a period of more than ninety (90) days by the **City**, or under an order of court or other public authority, or the **Design Professional** fails to act on any application for payment within thirty (30) days after it is submitted in proper form and content or the **City** fails for thirty (30) days to pay the **Contractor** any sum finally determined to be due, then the **Contractor** may terminate the Contract upon seven (7) days' written notice to the **City**, provided that the **City** does not remedy such suspension or failure within that time.

18.3. Termination by the City.

18.3.1. If the **Contractor** is adjudged a bankrupt, or if the **Contractor** makes a general assignment for the benefit of the **Contractor's** creditors, or if a receiver is appointed on account of the **Contractor's** insolvency, or if the **Contractor** persistently or repeatedly refuses or fails, except in cases for which extension of time is provided, to supply enough properly skilled workers or proper materials, or if the **Contractor** fails to make prompt payment to Subcontractors or for materials or labor, or persistently disregards laws, ordinances, rules, regulations, or orders of any public authority having jurisdiction or disregards an instruction, order, or decision of the **Design Professional**, or otherwise is guilty of substantial violation of any provision of the Contract, then the **Contractor** shall be in default, and the **City** may, without prejudice to any other right or remedy and upon written notice to the **Contractor**, take possession of all materials, tools, appliances, equipment, construction equipment and machinery and vehicles, offices and other facilities on the Project Site, and all materials intended for the Work, wherever stored, and, seven (7) days after such notice, may terminate the employment of the **Contractor**, accept assignment of any or all subcontracts pursuant to Paragraph __, and finish the Work by whatever method the **City** may deem expedient. The **City** shall be entitled to collect from the **Contractor** all direct, indirect, and consequential damages suffered by the **City** on account of the **Contractor's** default, including without limitation additional services and expenses of the **Design Professional** made necessary thereby. The **City** shall be entitled to hold all amounts due to the **Contractor** at the date of termination until all of the **City's** damages have been established, and to apply such amounts to such damages.

18.3.2. (*Reference:* Somerville Municipal Code Chapter 2.117, Section 2.117.110C). In the event the **Contractor** or any of its agents or employees violates any provision of Somerville Municipal Code Chapter 2.117 that is applicable to **City** contractors in connection with the awarding, administration, or performance of the Contract, the **City** may terminate the Contract.

Part 1, Section 4: OTHER BID DOCUMENTS

ARTICLE 19: AMERICANS WITH DISABILITIES ACT; (42 U.S. 12131)

19.1. On July 26, 1994, the Americans with Disabilities Act ("the Act") became effective for employers of fifteen or more employees.

19.2. The Act protects against discrimination of the basis of "disability," which is defined as a physical or mental impairment that substantially limits at least one "major life activity;" or discrimination against an individual who has a record of such impairment; or discrimination against an individual being regarded - even if inaccurately - as having such impairment. The Act also expressly prohibits job discrimination that is based on any individual's relationship or association with a disabled person.

19.3. If the **Contractor** is subject to the Act, it must comply with its provisions.

ARTICLE 20: WRITTEN NOTICE TO THE PARTIES

20.1. In General.

20.1.1. All written communications from the **Design Professional** to the **Contractor** shall be copied to the **City**. All written communications from the **Contractor** to the **Design Professional** shall be copied to the **City**. All written communications from the **Contractor** to the **City** shall be copied to the **Design Professional**.

20.2. Addresses.

20.2.1. To the City. Written notice to the **City** shall be sent or hand-delivered to:

Purchasing Director
City of Somerville
93 Highland Avenue
Somerville, MA 02143

City Solicitor
Law Department
93 Highland Avenue
Somerville, MA 02143

Executive Director
Office of Strategic Planning & Community Development
93 Highland Avenue
Somerville, MA 02143

20.2.2. To the Contractor. Both the address given on the bid form upon which the Agreement is founded and the **Contractor's** office at or near the Site of the Work are hereby designated as places to either of which notices, letters, and other communications to the **Contractor** shall be certified, mailed, or delivered. Delivery of any notice, letter, or other communication to the **Contractor** at or depositing same in a postpaid wrapper directed to either

place shall be deemed sufficient service thereof upon the **Contractor**. Written notice shall be deemed to have been duly served on the **Contractor** if it is sent or hand-delivered to any member or officer of the **Contractor**. The date of said service shall be the date of such delivery or mailing. The address may be changed at any time by an instrument in writing, executed and acknowledged by the **Contractor** and delivered to the **City** and to the **Design Professional**. Nothing herein contained shall be deemed to preclude or render inoperative the service of any notice, letter. or other communication upon the **Contractor** personally. Moreover, any notice, letter, or other communication required under the Contract may be served on the **Contractor's** representative at job meetings. The **Contractor** shall provide the **City** with its change of address seven (7) days prior to its effective date.

20.2.3. To the Design Professional. Written notice to the **Design Professional** shall be sent or hand-delivered to the address appearing on the Project Manual. Written notice shall be deemed to have been duly served on the **Design Professional** if it is sent or hand-delivered to any member or officer of the **Design Professional**.

ARTICLE 21: MISCELLANEOUS PROVISIONS

21.1. Governing Law.

21.1.1. This Contract shall be governed by the laws of the Commonwealth of Massachusetts.

21.2. Venue.

21.2.1. Venue for any court action or proceeding shall be Middlesex County in the Commonwealth of Massachusetts only. The **Contractor**, all Subcontractors, and Suppliers waive any and all jurisdictional and venue defenses.

21.3. Successors and Assigns.

21.3.1. The **Contractor** shall not assign, in whole or in part, its rights and obligations under the Contract Documents without prior written consent of the **City**. An assignment without the prior written consent of the **City** shall not relieve the **Contractor** of its obligations thereunder.

21.3.2. The **City** and the **Contractor** respectively bind themselves, their partners, successors, assigns, and legal representatives to the other party hereto and to partners, successors, assigns, and legal representatives of such other party in respect to covenants, agreements, and obligations contained in the Contract Documents.

21.4. Statutory Limitation Period.

21.4.1. It is expressly agreed that the obligations of the **Contractor** hereunder arise out of contractual duties, and that the failure of the **Contractor** to comply with the requirements of the Contract Documents shall constitute a breach of contract, not a tort, for the purpose of applicable statutes of limitations and repose. Any cause of action which the **City** may have on account of

such failure shall be deemed to accrue only when the **City** has obtained actual knowledge of such failure, not before.

21.5. Rights and Remedies.

21.5.1. Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

21.5.2. No action or failure to act by the **City**, the **Design Professional,** or the **Contractor** shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed in writing.

PART 2 - SAMPLE CONSTRUCTION CONTRACT

IMPORTANT INFORMATION REGARDING CERTIFICATE OF GOOD STANDING

- Sample Contract
- Certificate of Authority
- Appendix A – Scope of Work (including Technical Specifications)
- Appendix B – Contractor's Bid Price; Form for General Bid (From Bid Book)
- Appendix C – General Terms and Conditions
- Appendix D – Insurance Requirements
- Appendix E – Wage Rates and Living Wage (From Bid Book)
- Appendix F – Certificate of Good Standing (for corporations; from Bid Book)
- Appendix G – Procurement documentation (Advertisements and Notice to Bidders)
- Appendix H – Statement of Management
- Appendix I – Performance Bond and Payment Bond, if contract over $2000

S A M P L E C O N T R A C T

CONTRACT NUMBER

PURCHASE ORDER # AND AMOUNT

BID NUMBER

OSPCD
ISSUING DEPARTMENT

FUNDING DEPARTMENT (Division)

CONTRACT PERIOD

CITY OF SOMERVILLE
MAYOR'S OFFICE OF STRATEGIC PLANNING AND COMMUNITY DEVELOPMENT

PUBLIC CONSTRUCTION CONTRACT

FOR: LINCOLN PARK

CONTRACTOR: Vendor
Address
Townname, Ma

ACCORDING TO SPECIFICATIONS CONTAINED HEREIN

SAMPLE CONTRACT

Part 1, Section 4: OTHER BID DOCUMENTS

CITY OF SOMERVILLE
OWNER-CONTRACTOR PUBLIC CONSTRUCTION AGREEMENT

AGREEMENT made this --- day of _____, by and between the City of Somerville, a Massachusetts municipal corporation, acting by and through its Purchasing Department, with a usual address of 93 Highland Ave., Somerville, MA 02143 ("City", "Owner" or "Awarding Authority") and the following General Contractor ("Contractor" or "General Contractor"):

GENERAL CONTRACTOR:
Name:
Address:
Telephone: Fax:
E-Mail:

PROJECT: ADA Ramps (12) at Four Locations

The work consists of the construction of twelve (12) Wheelchair Ramps to Massachusetts Architectural Access Board (AAB) standards (521 MR 21.00, effective January 27, 2006); hiring a design professional to verify that all AAB requirements have been fulfilled; and resetting crosswalk signs. Substantial completion of work shall be by September 1, 2009.

PROJECT MANAGER:
Name: Arn Franzen
Address: City Hall, 3rd floor, 93 Highland Avenue, Somerville, MA 02143
Telephone: 617-625-6600, x.2545 Fax: 617-625-0722
E-Mail: afranzen@somervillema.gov

DESIGN PROFESSIONAL:
Name: **Weston & Sampson Engineers, Inc.**
Address: **5 Centennial Drive**
Peabody, MA 01960

Contact: Cheri Ruane
Phone: 617-412-4480
ruanec@wseinc.com

Profession: Architect [ ] Landscape Architect [X] Engineer [ ]

FUNDING SOURCE: Federal [ ] State [ ] City [X]

THIS CONTRACT IS A:

SAMPLE CONTRACT

X Public Works Contract estimated to cost more than $10,000 subject to the bidding requirements of G.L. c. 30, § 39M

_ Public Building Contract estimated to cost under $10,000, subject to the price quote requirements of G.L. c. 149 §44A (2)(A)

_ Public Building Contract estimated to cost more than $10,000 but less than $25,000, subject to the written response requirements of G.L. c. 149, §44A(2)(B) of the General Laws

_ Public Building Contract estimated to cost more than $25,000 but less than $100,000, subject to the bidding requirements of G.L. c. 149, §44A(2)(C) and G.L. c. 30, § 39M

_ Public Building Contract estimated to cost more than $100,000, subject to the bidding requirements of G.L. c. 149, §44A(D).

Section 1: CONTRACT DOCUMENTS/APPENDICES

The Contract Documents consist of this Agreement; the notice of award of the Contract; the Notice to Proceed; the entire Project Manual; Change Orders; Construction Change Directives; the Contractor's Bid and all accompanying documents; and the Design Professional's written interpretations and clarifications issued on or after the issuance of the Notice to Proceed. Shop Drawing submittals and reports or drawings utilized by the Design Professional in preparing the Contract Documents are not Contract Documents.

The following Appendices are hereby incorporated by reference as part of this Agreement.

X Certificate of Authority

* Appendix A - Scope of Services - Misc. Bid Documents: includes a brief description of the Project, the Plans and Technical Specifications (Plans on File) and Addenda issued during the bid process

X Appendix B - Contractor's Bid Price; Form for General Bid

X** Appendix C - General Conditions

X** Appendix D - Insurance Requirements with Contractor's Insurance Certificate(s)

X Appendix E - Wage Rates; Living Wage

X Appendix F - Certificate of Good Standing (for corporations)

X Appendix G - Procurement Documentation (includes Advertisement; Notice to Bidders)

X Appendix H - Statement of Management (over $100,000)

X Appendix I - Performance Bond and Payment Bond, if contract is over $2,000

_X_ Appendix J - Section 3 Requirements

_X_ Appendix K – Laws Applicable to Federally Funded Contracts

X = Attached
* = Included in the Project Manual and incorporated herein by reference
** = Attached and also duplicated in the Project Manual

Section 2: THE CONTRACTOR'S WORK.

The Contractor's "Work" refers to the services and the entire completed construction or the various separately identifiable parts thereof required by the Contract Documents, including all labor, materials, and equipment furnished, furnished and incorporated into the Project, or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

Section 3: PROJECT DATES.

(a) Contract Period: The Contract shall begin on _____and end on _____.

(b) Date of Commencement of Work: The Date of Commencement of the Work shall be stipulated by a written Notice to Proceed given by the City to the Contractor.

(c) Date of Substantial Completion: The Contractor shall achieve Substantial Completion of the Work on or before _____ or --- calendar days after the Date of Commencement of the Work, time being of the essence. Substantial Completion means that the Work has been completed and the Site or the facility is opened for full and intended public use, except for minor incomplete or unsatisfactory items that do not materially impair the usefulness of the Work. The Design Professional shall decide what constitutes "minor," "incomplete," "unsatisfactory," and "materially" and the Design Professional's decision shall be final.

(d) Date of Final Completion:
The Date of Final Completion shall be _____.

Section 4. CONTRACT SUM/LIQUIDATED DAMAGES

(a) Contract Sum: The Contract Sum shall be $_____ .

(b) Liquidated Damages: The Contractor and the City agree to a Liquidated Damages sum of $250.00 per calendar day.

SIGNATURE PAGE FOLLOWS

IN WITNESS WHEREOF, the City and the Contractor have executed this Contract as a sealed instrument as of the date first written above.

CITY OF SOMERVILLE

I hereby certify that an unencumbered balance of $_____ is available for this Contract and I further certify that the sum of $_____ is hereby encumbered against the appropriate account for the purposes of this contract.

_____
Edward Bean, City Auditor

_____
Joseph A. Curtatone
Mayor

_____
Michael F. Glavin, OSPCD
Executive Director

_____
Angela M. Allen, Purchasing Director

Approved as to form:

_____
Francis X. Wright, Jr., City Solicitor

VENDOR:

_____
Signature of Authorized Agent of Vendor

Printed Name: _____
Title: _____

Vendor Address:_____
_____

Federal Tax ID: #_____

FOR CORPORATIONS ONLY:

_____
Clerk's Signature

_____
Clerk's Name

SAMPLE CONTRACT

SAMPLE CERTIFICATE OF AUTHORITY

__, 2014.
(Contract Date)

At a meeting of the directors of _____ duly
(Name of Corporation)

called and held at ____on _, 2010.
(Address) (Date)

which a quorum was present and acting, it was voted that _____
(Name)

the __ of this corporation is hereby authorized and empowered to
(Office)

make, enter into, sign, seal and deliver on behalf of this corporation a contract for

_____with the City of Somerville, Mayor's (Describe Service)

Office of Strategic Planning and Community Development. I do hereby certify that the above

is a true and correct copy of the record that said vote has not been amended or repealed and is in

full force and in effect at of this date, and that __ is duly elected
(Name)

___of this corporation.
(Office)

_____
(Clerk) (Secretary) of the Corporation

Attest:

(Affix Corporation Seal Here)

SAMPLE CONTRACT

Part 1, Section 4: OTHER BID DOCUMENTS

APPENDIX A
Scope of Services – Miscellaneous Bid Documents

Includes a brief description of the project
The Plans and Technical Specifications (Plans on File)
And all addenda issued during the bid process.

Sample Contract

APPENDIX B
Contractor's Bid Price - Form for General Bid
(From Bid Book)

Part 1, Section 4: OTHER BID DOCUMENTS

APPENDIX C
General Conditions
(From Bid Book)

SAMPLE CONTRACT

SAMPLE CONTRACT

APPENDIX D
INSURANCE REQUIREMENTS

APPENDIX D - INSURANCE REQUIREMENTS
INSURANCE SPECIFICATIONS

INSURANCE REQUIREMENTS FOR AWARDED VENDOR ONLY:

Prior to commencing performance of any work or supplying materials or equipment covered by these specifications, the contractor shall furnish to the Office of the Purchasing Director a Certificate of Insurance evidencing the following:

A. GENERAL LIABILITY - Comprehensive Form

Bodily Injury Liability.....….....$ Two Million
Property Damage Liability.....$ Two Million

B. COVERAGE FOR PAYMENT OF WORKER'S COMPENSATION BENEFIT PURSUANT TO CHAPTER 152 OF THE MASSACHUSETTS GENERAL LAWS IN THE AMOUNT AS LISTED BELOW:

WORKER'S COMPENSATION.….....$Statutory
EMPLOYERS' LIABILITY.…....…….$ Statutory

C. AUTOMOBILE LIABILITY INSURANCE AS LISTED BELOW:

AGGREGATE…….....$ One Million

l. A contract will not be executed unless a certificate (s) of insurance evidencing above-described coverage is attached.
2. Failure to have the above-described coverage in effect during the entire period of the contract shall be deemed to be a breach of the contract.
3. All applicable insurance policies shall read:
"CITY OF SOMERVILLE" as a certificate holder and as an additional insured for general liability only along with a description of operation in the space provided on the certificate.

Certificate Should Be Made Out To:
City Of Somerville
Purchasing Department
93 Highland Avenue
Somerville, Ma. 02143

Note: If your insurance expires during the life of this contract, you shall be responsible to submit a new certificate(s) covering the period of the contract. No payment will be made on a contract with an expired insurance certificate.

APPENDIX E
PREVAILING WAGE RATES AND LIVING WAGE FORM

Part 1, Section 4: OTHER BID DOCUMENTS

DAVIS BACON AND PREVAILING WAGE RATES

INSERT MANUALLY

Sample Contract

SAMPLE CONTRACT

SAMPLE CONTRACT

SOMERVILLE LIVING WAGE ORDINANCE CERTIFICATION FORM

CITY OF SOMERVILLE CODE OF ORDINANCES SECTION 2-397 et seq[2].

Instructions: This form shall be included in all Invitations for Bids and Requests for Proposals which involve the furnishing of labor, time or effort (with no end product other than reports) by vendors contracting or subcontracting with the City of Somerville, where the contract price meets or exceeds the following dollar threshold: $10,000. If the undersigned is selected, this form will be attached to the contract or subcontract and the certifications made herein shall be incorporated as part of such contract or subcontract. **Complete this form and sign and date where indicated below on page 2.**

Purpose: The purpose of this form is to ensure that such vendors pay a "Living Wage" (defined below) to all covered employees (i.e., all employees except individuals in a city, state or federally funded youth program). In the case of bids, the City will award the contract to the lowest responsive and responsible bidder paying a Living Wage. In the case of RFP's, the City will select the most advantageous proposal from a responsive and responsible offeror paying a Living Wage. In neither case, however, shall the City be under any obligation to select a bid or proposal that exceeds the funds available for the contract.

Definition of "Living Wage": For this contract or subcontract, as of **7/1/2013** "Living Wage" shall be deemed to be an hourly wage of no less than **$11.89** per hour. From time to time, the Living Wage may be upwardly adjusted and amendments, if any, to the contract or subcontract may require the payment of a higher hourly rate if a higher rate is then in effect.

CERTIFICATIONS

1. The undersigned shall pay no less than the Living Wage to all covered employees who directly expend their time on the contract or subcontract with the City of Somerville.

2. The undersigned shall post a notice, (copy enclosed), to be furnished by the contracting City Department, informing covered employees of the protections and obligations provided for in the Somerville Living Wage Ordinance, and that for assistance and information, including copies of the Ordinance, employees should contact the contracting City Department. Such notice shall be posted in each location where services are performed by covered employees, in a conspicuous place where notices to employees are customarily posted.

[2]Copies of the Ordinance are available upon request to the Purchasing Department.

3. The undersigned shall maintain payrolls for all covered employees and basic records relating hereto and shall preserve them for a period of three years. The records shall contain the name and address of each employee, the number of hours worked, the gross wages, a copy of the social security returns, and evidence of payment thereof and such other data as may be required by the contracting City Department from time to time.

4. The undersigned shall submit payroll records to the City upon request and, if the City receives information of possible noncompliance with the provisions the Somerville Living Wage Ordinance, the undersigned shall permit City representatives to observe work being performed at the work site, to interview employees, and to examine the books and records relating to the payrolls being investigated to determine payment of wages.

5. The undersigned shall not fund wage increases required by the Somerville Living Wage Ordinance by reducing the health insurance benefits of any of its employees.

6. The undersigned agrees that the penalties and relief set forth in the Somerville Living Wage Ordinance shall be in addition to the rights and remedies set forth in the contract and/or subcontract.

CERTIFIED BY:

Signature: _____
(Duly Authorized Representative of Vendor)

Title: _____

Name of Vendor:_____

Date: _____

SAMPLE CONTRACT

INSTRUCTIONS: PLEASE POST

NOTICE TO ALL EMPLOYEES REGARDING PAYMENT OF LIVING WAGE

Under the Somerville, Massachusetts' Living Wage Ordinance (Ordinance No. 1999-1), any person or entity who has entered into a contract with the City of Somerville is required to pay its employees who are involved in providing services to the City of Somerville no less than a "Living Wage".

The Living Wage as of **7/1/2013** is **$11.89** per hour. The only employees who are not covered by the Living Wage Ordinance are individuals in a Youth Program. "Youth Program" as defined in the Ordinance, "means any city, state or federally funded program which employs youth, as defined by city, state or federal guidelines, during the summer, or as part of a school to work program, or in any other related seasonal or part-time program."

For assistance and information regarding the protections and obligations provided for in the Living Wage Ordinance and/or a copy of the Living Wage Ordinance, all employees should contact the City of Somerville's Purchasing Department directly.

APPENDIX F
CERTIFICATE OF GOOD STANDING
(FOR CORPORATIONS)

INSERT DOCUMENT FROM BID BOOK HERE

Certificate of Good Standing: If the bidder is a corporation, a Certificate of Good Standing should accompany the bid. Certificate of Good Standing available online at:
http://corp.sec.state.ma.us/corp/Certificates/Certificate_Request.asp
or call Tel: (617) 727-9640 for more information.

CERTIFICATE OF GOOD STANDING

TO: Vendor

FROM: Purchasing Department

RE: **CERTIFICATE OF GOOD STANDING**

The **Awarded Vendor** must comply with our request for a **CURRENT "Certificate of Good Standing".**

If you require information on how to obtain the "Certificate of Good Standing" or Certificate of Registration (Foreign Corporations) from the Commonwealth of Massachusetts, please call the Secretary of State's Office at (617) 727-2850 (Press #1) located at One (1) Ashburton Place, 17th Floor, Boston, MA 02133 or you may access their web site at: www.MA.GOV/SEC/COR

If your company is incorporated outside of Massachusetts and therefore is a "foreign corporation", but is registered to do business in Massachusetts, please comply with our request for the Certificate of Registration from the Commonwealth of Massachusetts. If your company is a foreign corporation, but is not registered to do business in Massachusetts, please provide the Certificate of Good Standing from your state of incorporation.

Please note that without the above certificate (s), the City of Somerville cannot execute your contract.

IMPORTANT NOTICE

Requests for Certificates of Good Standing by mail may take a substantial amount of time. A certificate may be obtained immediately in person at the Secretary's Office at the address above. Also, at this time, the Secretary of State's Office may not have your current annual report recorded. If this is the case, and you are therefore unable to obtain the Certificate of Good Standing, please forward a copy of your annual report filing fee check with your signed contracts. Please forward your original Certificate of Good Standing to the Purchasing Department upon receipt.

Thank You,

Purchasing Director

SAMPLE CONTRACT

Part 1, Section 4: OTHER BID DOCUMENTS

APPENDIX G
PROCUREMENT DOCUMENTATION

ADVERTISEMENTS, NOTICE TO BIDDERS, ETC.

Sample Contract

APPENDIX H
STATEMENT OF MANAGEMENT
FOR CONTRACTS OVER $100,000

STATEMENT OF MANAGEMENT

In accordance with M.G.L. Chapter 30, Section 39R, the undersigned successful bidder states that its system of internal accounting controls and that of its subsidiaries reasonably assure (1) that transactions are executed in accordance with management's general and specific authorization; (2) that transactions are recorded as necessary to permit preparation of financial statements in conformity with generally accepted accounting principles, and to maintain accountability for assets; (3) that access to assets is permitted only in accordance with management's general or specific authorization, and (4) that the recorded accountability for assets is compared with the existing assets at reasonable intervals and appropriate action was taken with respect to any difference.

Executed this _____day of _____2014__

On behalf of _____
(Successful bidder name)

_____
(Address and telephone of successful bidder)

_____
(Name and title of person signing statement)

By:_____
(Signature)

CERTIFIED PUBLIC ACCOUNTANT STATEMENT

In accordance with M.G.L. 30, Section 39R I, _____
a certified public accountant, state that I have examined the above Statement of Management on internal accounting controls, and that in my opinion (1) the representations of management are consistent with the result of management's evaluation of the system of internal accounting controls; and (2) that such representations of management are, in addition, reasonable with respect to transactions and assets in amounts which would be material when measured in relation to the above referenced successful bidder's financial statements.

_____
(Signature)

_____

Part 1, Section 4: OTHER BID DOCUMENTS

(Business name, address and telephone number)

SAMPLE CONTRACT

SAMPLE CONTRACT

APPENDIX I
PERFORMANCE BOND AND PAYMENT BOND

FOR CONTRACTS OVER $2000

PERFORMANCE BOND

We, the undersigned,

_____,
(Name of Contractor)

_____,
(Address of Contractor)

___, hereinafter called Principal, and
(Corporation, Partnership, or Individual)

_____,
(Name of Surety)

_____, (Address of Surety)

hereinafter called Surety, are held and firmly bound unto CITY OF SOMERVILLE, 93 Highland Avenue Avenue, Somerville, MA 02139, hereinafter called Owner, in the penal sum of __ Dollars ($__) in lawful money of the United States, for the payment of which sum well and truly to be made. We hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors, and assigns.

The condition of this obligation is such that the Principal entered into a certain contract with the Owner, dated the _day of _, 20_, a copy of which is attached hereto and made a part hereof, for the project known as Zero New Washington Street Community Park and Off-Leash Recreation Area and the Principal and Surety bind themselves to the Owner for the performance of the contract.

Now, therefore, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the

original term thereof, and any extensions thereof which may be granted by the Owner, with or without notice to the Surety and during the guaranty period set forth in the contract, and if it shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the Owner from all costs and damages which it may suffer by a reason of failure to do so, and shall reimburse and repay the Owner all outlay and expenses which the Owner may incur in making good any default, then this obligation shall be void; otherwise, this bond shall remain in full force and effect; provided, further, that the said Surety for value received hereby agrees that no change, extension of time, alteration or addition to the terms of the contract or to the work to be performed thereunder of the specifications accompanying the same shall in any wise affect its obligation on this Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the work or to the specifications. Provided, further, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed on this day of ,2014.

CONTRACTOR AS PRINCIPAL	SURETY
_____	_____
(Signature)	(Signature)
Name and Title:	Name and Title:
SEAL	SEAL

SAMPLE CONTRACT

Part 1, Section 4: OTHER BID DOCUMENTS

Payment Bond

We, the undersigned,

_____,
(Name of Contractor)

_____,
(Address of Contractor)

___, hereinafter called Principal, and
(Corporation, Partnership, or Individual)

_____,
(Name of Surety)

_____, (Address of Surety)

hereinafter called Surety, are held and firmly bound unto CITY OF SOMERVILLE, 93 Highland Avenue, Somerville, MA 02139, hereinafter called Owner, in the penal sum of Dollars

($__) in lawful money of the United States, for the payment of which sum well and truly to be made. We hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors, and assigns.

The condition of this obligation is such that the Principal entered into a certain contract with the Owner, dated the _day of _, 20_, a copy of which is attached hereto and made a part hereof, for the project known as Zero New Washington Street Community Park and Off-Leash Recreation Area.

Now, therefore, if the Principal shall promptly make payment to all persons, firms, subcontractors, and corporations furnishing materials for or performing labor in the prosecution of the work provided for in such contract, and any authorized extension or

modification thereof, including all amounts due for materials used in connection with the work, and all insurance premiums on said work, and for all labor, performed in such work whether by subcontractor or otherwise, then this obligation shall be void; otherwise this bond is remain in full force and effect. Provided, further, that the said Surety for value received hereby agrees that no change, extension of time, alteration or addition to the terms of the contract or to the work to be performed thereunder of the Specifications accompanying the same shall in any wise affect its obligation on this Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the work or to the specifications.

Provided, further, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed on this day of , 2014.

CONTRACTOR AS PRINCIPAL	SURETY
----------	----------
(Signature)	(Signature)
Name and Title:	Name and Title:
SEAL	SEAL

MEETING OF THE BOARD OF DIRECTORS

CERTIFICATE OF AUTHORITY

20

At a meeting of the Directors of the

duly called and held at on the day of 20, at which a quorum was present and acting, it was

VOTED THAT

the of this corporation is hereby authorized and empowered to make, enter into, sign, seal and deliver, in behalf of this corporation, a Contract for Site Improvements at Perry Park and Stone Place Park with the City of Somerville, and performance and payment bonds (each in the full amount of the Contract) in connection with such Contract.

I DO HEREBY CERTIFY that the above is a true and correct copy of the record, that said vote has not been amended or repealed and is in full force and effect on this date, and that is duly elected of this corporation.

ATTEST:

_____

Clerk or Secretary of the Corporation

(Affix Corporate Seal Here)

SAMPLE CONTRACT

SAMPLE CONTRACT

LINCOLN PARK RENOVATION
TABLE OF CONTENTS

Invitation for Bid Documents

PART 1: BID INVITATION

Section 1: Pages:
- 00020 Invitation to Bid

Section 2:
- 00200 Instructions to Bidders

Section 3: Bid Submission Documents:
(See Enclosed Submission Packet)
- 00300 Form for General Bid
- 00315 Unit Price Form
- 00320 Somerville Living Wage Form
- 00330 Acknowledgement of Notice to Bidders
- 00335 Quality Requirements Form
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- 00350 Certificate of Signature Authority
- 00360 Signature Form
- 00370 Reference Form
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Section 4: Other Bid Documents
- 00410 Division of Labor and Industries Prevailing Wage Rates
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PART 2: SAMPLE CONSTRUCTION CONTRACT

a. Sample Contract
- Appendix A - Scope of Work (including Technical Specifications)*
- Appendix B – Contractor's Bid Price; Form for General Bid (From Bid Book)
- Appendix C – General Terms and Conditions*
- Appendix D – Insurance Requirements
- Appendix E – Wage Rates and Living Wage (From Bid Book)
- Appendix F – Certificate of Good Standing (for corporations) and Certificate of Authority
- Appendix G – Procurement documentation (Advertisements and Notice to Bidders)
- Appendix H – Statement of Management
- Appendix I – Performance Bond and Payment Bond, if contract over $2000

*Appendix to be included in contract by reference

END OF SECTION

SECTION 01110

CONTROL OF WORK AND MATERIALS

PART 1 – GENERAL

Not Used.

PART 2 – PRODUCTS

Not Used

PART 3 - EXECUTION

3.01 HAULING, HANDLING AND STORAGE OF MATERIALS:

A. The Contractor shall, at his own expense, handle and haul all materials furnished by him and shall remove any of his surplus materials at the completion of the work.

B. The Contractor shall provide suitable and adequate storage for equipment and materials furnished by him that are liable to injury and shall be responsible for any loss of or damage to any equipment or materials by theft, breakage, or otherwise.

C. All excavated materials and equipment to be incorporated in the Work shall be placed so as not to injure any part of the Work or existing facilities and so that free access can be had at all times to all parts of the Work and to all public utility installations in the vicinity of the work. Materials and equipment shall be kept neatly piled and compactly stored in such location as will cause a minimum of inconvenience to public travel and adjoining owners, tenants and occupants.

D. The Contractor shall be responsible for all damages to the work under construction during its progress and until final completion and acceptance even though partial payments have been made under the Contract.

E. The Contractor shall schedule deliveries to the site as not to interfere with school operations. From September 1st, 2016 through July 1, 2017 (excluding days where school is not in session or the school is not otherwise being used for civic purposes like voting, etc.) the Contractor shall ensure that deliveries arrive after 8:20am, Before 2pm or after 3pm on weekdays. School drop off is from 7:30 to 8:15 am and pick up is 2:30 to 3pm each day.

F. Construction entrance shall be as marked on Plan L2.00 off of Perry Street and **will require a tracking pad / truck wash station** to ensure no debris leaves the site. Contractor is responsible for cleaning the streets should debris be tracked off site. A detail will be furnished within the conformed plan set.

3.02 OPEN EXCAVATIONS:

A. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons, and damage to property. The Contractor shall, at his own expense, provide suitable and safe means for completely covering all open excavations and for accommodating travel when work is not in progress.

B. Bridges provided for access to private property during construction shall be removed when no longer required.

C. The length of open trench will be controlled by the particular surrounding conditions but shall always be confined to the limits prescribed by the Engineer.

D. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, then special construction procedures shall be taken, such as limiting the length of trench and prohibiting stocking excavated material in the street.

E. All street excavations shall be completely closed at the end of each work day. Backfilling or use of steel plates of adequate strength to carry traffic shall be used.

3.03 MAINTENANCE OF TRAFFIC:

A. Unless permission to close the street is received in writing from the proper authority, all excavated materials and equipment shall be placed so that vehicular and pedestrian traffic may be safely maintained at all times.

B. The contractor is required by the Director of Traffic and Parking to have workforce carpool to the site in order to reduce traffic at the beginning and end of the work day. Director of Traffic and Parking deem it necessary, uniformed officers will be assigned to direct traffic. The Contractor shall make all arrangements in obtaining uniformed officers required.

C. The Contractor shall at his own expense, as directed by the Police Traffic Control/Safety Officer, provide and erect acceptable barricades, barrier fences, traffic signs, and all other traffic devices not specifically covered in a bid item, to protect the work from traffic, pedestrians, and animals. He shall provide sufficient temporary lighting such as lanterns/flashers (electric battery operated) or other approved illuminated traffic signs and devices to afford adequate protection to the traveling public, at no additional cost to the Owner.

D. The Contractor shall furnish all construction signs that are deemed necessary by and in accordance with Part VI of the Manual on Uniform Traffic Control Devices as published by the U.S. Department of Transportation. In addition, the Contractor may be required to furnish up to 128 square feet of additional special construction warning

signs. Size and exact wording of signs shall be determined by the Engineer during construction.

E. The intent of policing is to ensure public safety by direction of traffic. Police officers are not to serve as watchmen to protect the Contractor's equipment and materials.

F. Nothing contained herein shall be construed as relieving the Contractor of any of his responsibilities for protection of persons and property under the terms of the Contract.

3.05 CARE AND PROTECTION OF PROPERTY:

The Contractor shall be responsible for the preservation of all public and private property, and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work on the part of the Contractor, such property shall be promptly restored by the Contractor, at his expense, to a condition similar or equal to that existing before the damage was done, to the satisfaction of the Engineer.

3.06 PROTECTION AND RELOCATION OF EXISTING STRUCTURES AND UTILITIES:

A. All existing buildings, utilities, pipes, poles, wires fences, curbings, property line markers and other structures which the Engineer decides must be preserved in place without being temporarily or permanently relocated, shall be carefully supported and protected from damage by the contractor. Should such property be damaged, it shall be restored by the Contractor, at no additional cost to the Owner.

B. The Contractor shall determine the location of all underground structures and utilities (including existing water services, drain lines, electrical lines, and sewers). Services to buildings shall be maintained, and all costs or charges resulting from damage thereto shall be paid by Contractor.

C. When fences interfere with the Contractor's operations, he shall remove and (unless otherwise specified) promptly restore them in accordance with Section 01564 EXISTING FENCES.

D. On paved surfaces the Contractor shall not use or operate tractors, bulldozers, or other power-operated equipment with treads or wheels which are shaped so as to cut or otherwise damage such surfaces.

E. All property damaged by the Contractor's operations shall be restored to a condition at least equal to that in which it was found immediately before work was begun. Suitable materials and methods shall be used for such restoration.

F. Restoration of existing property and structures shall be carried out as promptly as practicable and shall not be left until the end of the construction period.

3.07 MAINTENANCE OF FLOW:

A. The Contractor shall at his own cost, provide for the flow of sewers and drains interrupted during the progress of the work, and shall immediately cart away and dispose of all offensive matter. The entire procedure of maintaining existing flow shall be fully discussed with the Engineer well in advance of the interruption of any flow.

B. All existing drainage facilities including, but not limited to; brooks, streams, canals, channels, ditches, culverts, catch basins and drainage piping shall be adequately safeguarded so as not to impede drainage or to cause siltation of downstream areas in any manner whatsoever. If the Contractor damages or impairs any of the aforesaid drainage facilities, he shall repair the same within the same day.

C. At the conclusion of the work, the Contractor shall remove all silt in drainage structures caused by his operations as described in Section 01740, CLEANING UP.

3.08 REJECTED MATERIALS AND DEFECTIVE WORK:

A. Materials furnished by the Contractor and condemned by the Engineer as unsuitable or not in conformity with the specifications shall forthwith be removed from the work by the Contractor, and shall not be made use of elsewhere in the work.

B. Any errors, defects or omissions in the execution of the work or in the materials furnished by the Contractor, even though they may have been passed or overlooked or have appeared after the completion of the work, discovered at any time before the final payment is made hereunder, shall be forthwith rectified and made good by and at the expense of the Contractor and in a manner satisfactory to the Engineer.

C. The Contractor shall reimburse the Owner for any expense, losses or damages incurred in consequence of any defect, error, omission or act of the Contractor or his employees, as determined by the Engineer, occurring previous to the final payment.

3.09 SANITARY REGULATIONS:

Sanitary conveniences for the use of all persons employed on the work, properly screened from public observation, shall be provided in sufficient numbers in such manner and at such locations as may be approved. The contents shall be removed and disposed of in a satisfactory manner as the occasion requires. The Contractor shall rigorously prohibit the committing of nuisances within, on or about the work. Any employees found violating these provisions shall be discharged and not again employed on the work without the written consent of the Engineer. The sanitary conveniences specified above shall be the obligation and responsibility of the Contractor.

3.10 SAFETY AND HEALTH REGULATIONS:

This project is subject to the Safety and Health regulations of the U.S. Department of Labor set forth in 29 CFR, Part 1926, and to the Massachusetts Department of Labor and Industries, Division of Industrial Safety "Rules and Regulations for the Prevention of Accidents in Construction Operations (454 CMR 10.0 et. seq.)." Contractors shall be familiar with the requirements of these regulations.

3.11 SITE INVESTIGATION:

The Contractor acknowledges that he has satisfied himself as to the conditions existing at the site of the work, the type of equipment required to perform this work, the quality and quantity of the materials furnished insofar as this information is reasonably ascertainable from an inspection of the site, as well as from information presented by the drawings and specifications made a part of this contract. Any failure of the Contractor to acquaint himself with available information will not relieve him from the responsibility for estimating properly the difficulty or cost of successfully performing the work. The Owner assumes no responsibility for any conclusion or interpretation made by the Contractor on the basis of the information made available by the Owner.

3.12 HANGERS, PADS, AND SUPPORTS:

A. Unless otherwise indicated, hangers and supports shall be by the trade providing the supported item.

B. Except where detailed or specified, design of hangers and supports shall be the responsibility of the Contractor. All parts of such hangers or supports shall be designed in accordance with accepted engineering practice, using a factor of safety of at least 2½.

C. When proprietary hangers, etc., are supplied, satisfactory evidence of the strength of such items shall be furnished.

D. Hangers for items hung from steel and concrete shall be centered on the vertical center of gravity of the beam.

E. Locations and sizes of openings, sleeves, concrete pads, steel frames, and other equipment supports are indicated on the drawings for bidding purposes only. Final sizes and locations of such items shall be obtained from the shop drawings.

3.13 SLEEVES, HOLES, HANGERS, INSERTS, ETC.:

A. Except where holes and openings are dimensioned, and hangers, inserts, and supports are fully called for on the architectural and structural drawings (or reference is made thereon to drawings containing such information) to accommodate mechanical or electrical items, they shall be by the mechanical or electrical trade concerned.

B. Sleeves, inserts, anchors, etc., supplied under the mechanical and electrical contracts in sufficient time to so permit, shall be set in concrete, masonry, etc., or fastened to steel deck, etc., by the respective architectural or structural trade. Where not supplied in sufficient time, installation of such items shall be the responsibility of the mechanical or electrical trade involved.

C. Nothing shall be suspended from the steel roof deck and no fastenings made to it, except with the prior permission of the Engineer. Request for permission shall be accompanied by full details of the hanger or fastener, including the weight of the item to be suspended.

D. Nailers and other wood members attached to steel or masonry, for which fasteners are not indicated on the design drawings or in the specification, shall be fastened with the equivalent of ½-inch diameter bolts at 3 feet o.c.

E. Openings for mechanical and electrical items in finished areas of the building shall be closed off with near escutcheon plates or similar closures. These closures shall be by the mechanical or electrical trade involved.

3.14 WORK PROTECTION:

Where work must be performed over completed work, the pavement shall be protected by 2 layers of ½-inch thick plywood, laid with joints in the second layer offset 1/2 sheet width and length from joints in the first layer. No material shall be stored or work performed on areas of completed site which are not so protected.

3.15 WEATHER PROTECTION:

In conformance with Sections 44F and 44G of Chapter 149 of the General Laws of Massachusetts, the General Contractor shall install weather protection and shall furnish adequate heat in the area so protected during the months of November through March. Standards for such specifications shall be established by the Director of Building Construction in the Executive Office for Administration and Finance.

3.16 ELECTRIC SERVICE:

A. The Contractor shall make all necessary applications and arrangements and pay for all fees and charges for electrical energy for power and light necessary for the proper completion of this contract during its entire progress. The Contractor shall provide and pay for all temporary wiring, switches, connections, and meters.

B. There shall be sufficient electric lighting so that all work may be done in a workmanlike manner where there is not sufficient daylight.

END OF SECTION

SECTION 01330

SUBMITTALS

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. The Contractor shall provide the Engineer with submittals as required by the contract documents.

1.02 RELATED WORK:

A. Divisions 1 – 16 of these specifications that require submittals.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 GENERAL:

A. As required by the General Conditions, Contractor shall submit a schedule of shop and working drawing submittals.

B. The Contractor shall submit the shop and working drawing submittals either electronically or hard copy.

3.02 ELECTRONIC SUBMITTALS:

A. In accordance with the accepted schedule, the Contractor shall submit promptly to the Engineer by email (rileyb@wseinc.com) or on Compact Disc (mail to Weston & Sampson, 85 Devonshire Street, Third Floor, Boston, MA 02109, attention: Brandon Riley), one electronic copy in Portable Document Format (PDF) of shop or working drawings required as noted in the specifications, of equipment, structural details and materials fabricated especially for this Contract.

B. Each electronic copy of the shop or working drawing shall be accompanied by the Engineer's standard shop drawing transmittal form, included as Exhibit 1 of this section (use only for electronic submittals), on which is a list of the drawings, descriptions and numbers and the names of the Owner, Project, Contractor and building, equipment or structure.

C. The Contractor shall receive a shop drawing memorandum with the Engineer's approval or comments via email.

3.03 HARD COPY SUBMITTALS:

A. In accordance with the accepted schedule, the Contractor shall submit promptly to the Engineer, by hand at a meeting or via mail to the Boston office one (1) copy each of shop or working drawings required as noted in the specifications, of equipment, structural details and materials fabricated especially for this Contract.

B. Each shipment of drawings shall be accompanied by the Engineer's (if applicable) standard shop drawing transmittal form on which is a list of the drawings, descriptions and numbers and the names of the Owner, Project, Contractor and building, equipment or structure.

3.04 SHOP AND WORKING DRAWINGS:

A. Shop and working drawings shall show the principal dimensions, weight, structural and operating features, space required, clearances, type and/or brand of finish of shop coat, grease fittings, etc., depending on the subject of the drawings. When it is customary to do so, when the dimensions are of particular importance, or when so specified, the drawings shall be certified by the manufacturer or fabricator as correct for this Contract.

B. All shop and working drawings shall be submitted to the Engineer by and/or through the Contractor, who shall be responsible for obtaining shop and working drawings from his subcontractors and returning reviewed drawings to them. All shop and working drawings shall be prepared on standard size, 24-inch by 36-inch sheets, except those, which are made by changing existing standard shop or working drawings. All drawings shall be clearly marked with the names of the Owner, Project, Contractor and building, equipment or structure to which the drawing applies, and shall be suitably numbered. Each shipment of drawings shall be accompanied by the Engineer's (if applicable) standard shop drawing transmittal form on which is a list of the drawings, descriptions and numbers and the names mentioned above.

C. Only drawings that have been prepared, checked and corrected by the fabricator should be submitted to the Contractor by his subcontractors and vendors. Prior to submitting drawings to the Engineer, the Contractor shall check thoroughly all such drawings to satisfy himself that the subject matter thereof conforms to the Contract Documents in all respects. Shop drawings shall be reviewed and marked with the date, checker's name and indication of the Contractor's approval, and only then shall be submitted to the Engineer. Shop drawings unsatisfactory to the Contractor shall be returned directly to their source for correction, without submittal to the Engineer. Shop drawings submitted to the Engineer without the Contractor's approval stamp and signature will be rejected. Any deviation from the Contract Documents indicated on the shop drawings must be identified on the drawings and in a separate submittal to

the Engineer, as required under subsection 6.17 Shop Drawings and Samples; D. Submittal Procedures, Paragraph 3 of the 1996 General Conditions.

D. The Contractor shall be responsible for the prompt submittal and resubmittal, as necessary, of all shop and working drawings so that there will be no delay in the work due to the absence of such drawings.

E. The Engineer will review the shop and working drawings as to their general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Corrections of comments made on the drawings during the review do not relieve the Contractor from compliance with requirements of the Contract Documents. The Contractor is responsible for: confirming and correlating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner. The review of the shop drawings is general and shall not relieve the Contractor of the responsibility for details of design, dimensions, code compliance, etc., necessary for interfacing with other components, proper fitting and construction of the work required by the Contract and for achieving the specified performance. The Engineer will review submittals two times: once upon original submission and a second time if the Engineer requires a revision or corrections. The Contractor shall reimburse the Owner amounts charged to the Owner by the Engineer for performing any review of a submittal for the third time or greater.

F. With few exceptions, shop drawings will be reviewed and returned to the Contractor within 30 days of submittal.

G. No material or equipment shall be purchased or fabricated especially for this Contract nor shall the Contractor proceed with any portion of the work, the design and details of which are dependent upon the design and details of equipment or other features for which review is required, until the required shop and working drawings have been submitted and reviewed by the Engineer as to their general conformance and compliance with the project and its Contract Documents. All materials and work involved in the construction shall then be as represented by said drawings.

H. Two copies of the shop and working drawings and/or catalog cuts will be returned to the Contractor. The Contractor shall furnish additional copies of such drawings or catalog cuts when he needs more than two copies or when so requested.

3.05 SAMPLES:

A. Samples specified in individual Sections include, but are not necessarily limited to, physical examples of the work such as sections of manufactured or fabricated work, small cuts or containers of materials, complete units of repetitively-used products, color/texture/pattern swatches and range sets, specimens for coordination of visual

effect, graphic symbols, and units of work to be used by the Engineer or Owner for independent inspection and testing, as applicable to the work.

B. The number of samples submitted shall be as specified. Submittal and processing of samples shall follow the procedures outlined for shop and working drawings unless the specifications call for a field submittal or mock-up.

C. Acceptance of samples will be acknowledged via a copy of the transmittal noting status. When samples are not acceptable, prompt resubmittal will be required.

3.06 OPERATING AND MAINTENANCE MANUALS AND SPARE PARTS LISTS:

A. Where reference is made in technical specification sections to operating and maintenance manuals and/or spare parts lists, the Contractor shall submit four copies to the Engineer for review in accordance with the instructions furnished under "Shop and Working Drawings." If the submittal is complete and does not require any changes, an acknowledgement (copy of transmittal) will be returned noting status. If the submittal is incomplete or does require changes, corrections, additions, etc., two copies of the submittal will be returned with a copy of transmittal noting status. Four copies of the final operating and maintenance manuals and/or spare parts list shall be delivered to the Engineer prior to or with the equipment when it is delivered to the job site. For systems requiring field adjustment and balancing, such as heating and ventilating, the Contractor shall submit separate test results and adjustment data on completion of the work, to be incorporated into the system manual.

B. The information included in the manual shall be as described in the specification sections, but as a minimum shall contain clear and concise instructions for operating, adjusting, lubricating and maintaining the equipment, an exploded assembly drawing identifying each part by number and a listing of all parts of the equipment, with part numbers and descriptions required for ordering spare parts. Spare parts lists shall include recommended quantity and price.

C. Operating and maintenance manuals shall be in durable loose-leaf binders, on 8½-inch by 11-inch paper, with diagrams and illustrations either on 8½-inch by 11 inch or multiple foldouts. The instructions shall be annotated to indicate only the specific equipment furnished. Reference to other sizes or models of similar requirement shall be deleted or neatly lined out.

END OF SECTION

EXHIBIT 1 TO SECTION 01330 SUBMITTALS

SHOP DRAWING TRANSMITTAL FORM

Shop Drawing Transmittal

Weston&Sampson
ENGINEERS, INC.

Instructions for Preparing Transmittal

No action will be taken on any item unless accompanied by this form.
Type or print all entries.

TRANSMITTAL NOS. to be consecutive (1, 2, 3, etc.).
Each resubmittal of same item shall use same number with suffix letter (A, B, etc.).

SPEC. SECT. NO: Only one spec. section no. to each transmittal.

DESCRIPTION: Complete identification of document or group of documents.

SOURCE: Originator of document(s) being submitted.

DRAWING NO: Identification of document(s).

NO. of COPIES: Usually 6 or as directed/specified.

CONTRACT DRAWING REFERENCE: Contract drawing number(s) showing details of document(s) being submitted.

SPECIAL INSTRUCTIONS: Special cases and emergencies, changes in distribution and special handling requests, etc. should be entered here.

SIGNATURE OF CONTRACTOR: Signature of individual who reviews and approves material prior to submittal to engineer.

Contractor to retain last copy. Submit original with two pink and two yellow copies.

THIS SECTION TO BE COMPLETED BY CONTRACTOR

TRANSM. NO.	SPEC. SECT. NO.	DATE / /	CONTRACTOR'S JOB NO.	W&S JOB NO.
PROJECT NAME & CONTRACT NO.			LOCATION	
TO	Attention: CSD Weston & Sampson Engineers, Inc. 5 Centennial Drive Peabody, MA 01960-7985		FROM (CONTRACTOR)	

ITEM NO.	DESCRIPTION	SOURCE	DRAWING NO. CATALOG NO. BROCHURE, ETC.	NO. OF COPIES	CONTRACT DRAWING REF.	BY W&S ACTION CODE	BY W&S REVIEWED BY
1							
2							
3							
4							

THIS CERTIFIES THAT ALL ITEMS SUBMITTED HEREWITH HAVE BEEN CHECKED BY THE CONTRACTOR, ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS, EXCEPT AS NOTED, AND ARE APPROVED BY THE CONTRACTOR FOR THIS PROJECT.

SPECIAL INSTRUCTIONS:

(FOR CONTRACTOR)
SIGNATURE & TITLE:

THIS SECTION TO BE COMPLETED BY W&S

ACTION CODE
1. NO EXCEPTIONS TAKEN
2. MAKE CORRECTIONS NOTED
3. AMEND AND RESUBMIT
4. REJECTED - SEE REMARKS
5. ACKNOWLEDGMENT

a. INSTALLATION SHALL PROCEED ONLY WHEN ACTION CODE IS 1 or 2.
b. ACTION CODED 3 SHALL BE RESUBMITTED WITHIN TIME LIMIT SET IN CONTRACT.
c. REVIEW DOES NOT RELIEVE CONTRACTOR FROM RESPONSIBILITY OF COMPLIANCE WITH ALL REQUIREMENTS OF THE CONTRACT DOCUMENTS.

FIELD OFFICE
REC'D BY
DATE / /

Weston&Sampson
ENGINEERS, INC.
BY
DATE / /

Please! **BEAR DOWN WHEN HANDWRITING — THIS IS A 6 COPY FORM & THE LAST COPY IS YOURS!**

SECTION 01350

PERMITS

PART I - GENERAL

1.01 SCOPE OF WORK

a. The Contractor shall be responsible for obtaining all permits required to complete the work of this contract, to provide all coordination and furnish all bonds, assurances and required warranties. As applicable, the Contractor shall be responsible for any/all fees associated with the securing of permits necessary for the execution of the work of this contract. Should any street work be required, an approved City contractor shall perform it.

1.02 GENERAL REQUIREMENTS

A.

Permits by Contractor

Backflow Preventers

Trench Permit (520 CMR 14.00)(eff. date 3/1/09)

Electrical Permit
Plumbing Permit

(Contractor shall prepare permit application and obtain the permit after contract is awarded, bearing all expenses.)

B. The Contractor shall perform the work in accordance with the Contract Documents, including the attached permits/order of conditions, and any applicable municipal requirements.

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1.03 DIGSAFE

a. Contact Digsafe seventy-two (72) hours prior to initiating work at telephone # 1-888-344-7233.

PART II - MATERIALS

a. All materials and equipment shall conform to permit requirements and the City's standards for utilities, excavation, backfill, patching, and surveying or other work unless otherwise stated in these specifications. Coordinate as necessary with the appropriate City official and/or private utility.

3.01 EXECUTION

a. Execute all work per permit requirements. All plumbing and electric work to be approved by City Inspectors, sidewalk ramps to be approved by City Engineer.

4.01 GUARANTEE

a. Guarantee all work per permit requirements.

- - - END OF SECTION - - -

SECTION 01450

SAMPLING & TESTING

PART I - GENERAL

1.01 SCOPE OF WORK

a. The work under this Section shall consist of performing or ordering the work of collecting samples for testing, having tests performed by a Certified Testing Laboratory satisfactory to the Engineer, having all test results forwarded to the Engineer for approval, and paying all costs associated with the collection and sampling, transportation, shipping, postage, and testing, and the coordination of test results and approvals.

1.02 SUBMITTALS

a. In accordance with Section 01330 of these Specifications, submit the names, addresses and certification of laboratories to be utilized for approval by the Engineer.

PART II - MATERIALS

2.01 CONTAINERS AND TOOLS

a. Utilize tools recommended by the laboratory to obtain samples, packaging or containers suitable to, or furnished by, the laboratory, and collect all samples in the proper number and quantity to permit tests to be conducted.

2.02 TESTS

a. Refer to Section specifications for test requirements and criteria for results; coordinate with the Owner’s Representative.

b. All irrigation systems, splash pad elements, play equipment, locking gates, lighting systems, well systems and any other components from the scope of work as requested by the Owner’s Representative shall be tested to ensure complete compliance with manufacturer’s installation instructions and warrantee requirements.

PART III - EXECUTION

3.01 METHODOLOGY

a. Unless otherwise directed by the Section specifications, perform sampling and

testing will be ordered by the Contractor and approved by the Owner's Representative. Locations, number and quantity of samples shall be submitted for approval as directed in accordance with the Specifications.

b. Sampling and Testing results must be provided to the Owner's Representative and Approved prior to the installation of any work potentially impacted by unacceptable test results.

- - - END OF SECTION - - -

SECTION 01450

STRUCTURAL TESTS AND INSPECTIONS

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. Provide labor, materials, and equipment necessary to complete the work of this Section, including but not limited to the following:

1. Obtaining, coordinating, and providing notifications to the Owner and Engineer.
2. Provide safe access to the work of this Contract to accommodate the indicated tests and inspections.
3. Implementing corrective action and providing additional tests and/or inspections for work identified as non-conforming by the Independent Testing Agency.

1.02 GENERAL REQUIREMENTS:

A. The Massachusetts State Building Code, Latest Edition, 780 CMR, requires the Structural Engineer of Record (SER) to provide a program of structural tests and inspections for this project.

B. Attachment A, Program of Structural Tests and Inspections, shall not relieve the Contractor or its subcontractors of their responsibilities and obligations for quality control of the Work; their other obligations for supervising the Work; for any design work which is included in their scope of services; for full compliance with the requirements of the Contract Documents; the detection of, or failure to detect, deficiencies or defects, whether detected or undetected, in all parts of the Work, and to otherwise comply with all requirements of the Contract Documents.

C. The Program of Structural Tests and Inspection does not apply to the Contractor's equipment, temporary structures used by the Contractor to construct the project, the Contractor's means, methods, procedures, and job site safety.

1.03 CONTRACTOR RESPONSIBILITIES:

A. The Contractor shall provide free and safe access to the Work for the SER and all other individuals who are observing the Work or performing structural tests or inspections. The Contractor shall provide all ladders, scaffolding, staging, and up-to-date safety equipment, all in good and safe working order, and qualified personnel to handle and erect them, as may be required for safe access.

B. The Contractor shall give reasonable notice to the Owner and the Engineer of when the various parts of the Work will be ready for testing and/or inspection. The Contractor shall notify the Owner and the Engineer a minimum of 48 hours before such tests and/or inspections are to take place.

PART 2 - PRODUCTS

NOT USED.

PART 3 - EXECUTION

NOT USED.

ATTACHMENT A

PROGRAM OF STRUCTURAL TESTS AND INSPECTIONS

The following is a summary of Work subject to Tests and Inspections under the Program.

1. In-situ Bearing Strata for Footings
2. Controlled Structural Fill
3. Cast-In-Place Concrete
4. Masonry
5. Structural Steel

Abbreviation	Agent
SER	Structural Engineer of Record
ITA	Contractor – Independent Testing Agency

In-Situ Bearing Strata for Footings

Item	Agent	Scope
1. Bearing Strata QC Review	ITA	Review Contractor's field quality control procedures.
2. General Excavation	ITA	Inspect strata for conformance to the structural drawings, specifications, and/or geotechnical report.
3. General Excavation	ITA	Ensure that excavation is to proper depth or material.
4. General Excavation	ITA	Ensure that excavation is controlled and contains no unsuitable materials.
5. Bearing surfaces for footings	ITA	Inspect bearing surfaces for conformance to the requirements of the structural drawings, specifications, and/or geotechnical report.

Controlled Structural Fill

Item	Agent	Scope
1. Controlled Structural Fill QC Review	SER	Review Contractor's field quality control procedures
2. Fill Material	ITA	Test material for conformance to specifications or geotechnical report. Perform laboratory compaction tests in accordance with the specifications to determine optimum water content and maximum dry density.
3. Installation of controlled structural fill	ITA	Provide full-time inspection of the installation, in accordance with the specifications.
4. Density of Fill	ITA	Perform field density tests of the in-place fill in accordance with the specifications.

Cast-In-Place Concrete Construction

Item	Agent	Scope
1. Cast-In-Place Concrete Construction QC Review	SER	Review Contractor's field quality control procedures. Review frequency and scope of field testing and inspections.
2. Mix Design	SER	Review Mix Designs
3. Materials	SER	Review material certifications for conformance to Specifications
4. Batching Plant	ITA	Review Plant quality control procedures and batching and mixing methods
5. Reinforcement Installation	ITA	Inspect reinforcing for size, quantity, condition and placement
6. Anchor Rods	ITA	Inspect anchor rods prior to and during placement of concrete.
6. Formwork	ITA	Inspect form sizes for proper sizes of concrete members.
7. Concrete Placement and Sampling fresh Concrete	ITA	Observe concrete placement operations. Verify conformance to specifications including cold-weather and hot-weather placement procedures. Perform slump, density and air content tests at point of discharge.
8. Evaluation of Concrete	ITA	Test and evaluate in accordance with the specifications.
9. Curing and Protection	ITA	Observe procedures for conformance to the specifications.

END OF SECTION

SECTION 01562

DUST CONTROL

PART 1 - GENERAL

1.01 DESCRIPTION:

This section of the specification covers the control of dust via calcium chloride and water, complete. Please note that site security fence with scrims is also considered a dust control measure and shall be employed as required where site limits abut residential property.

PART 2 - PRODUCTS

2.01 CALCIUM CHLORIDE:

A. Calcium chloride shall conform to the requirements of AASHTO-M 144, Type I or Type II and Specification for Calcium Chloride, ASTM D98. The calcium chloride shall be packaged in moisture proof bags or in airtight drums with the manufacturer, name of product, net weight, and percentage of calcium chloride guaranteed by the manufacturer legibly marked on each container.

B. Calcium chloride failing to meet the requirements of the aforementioned specifications or that which has become caked or sticky in shipment may be rejected by the Engineer.

2.02 WATER:

A. Water shall not be brackish and shall be free from oil, acid, and injurious alkali or vegetable matter.

PART 3 - EXECUTION

3.01 APPLICATION:

A. Calcium chloride shall be applied when ordered by the Engineer and only in areas which will not be adversely affected by the application. See Section 01570, ENVIRONMENTAL PROTECTION.

B. Calcium chloride shall be uniformly applied at the rate of 1-1/2 pounds per square yard or at any other rate as required by the Engineer. Application shall be by means of a mechanical spreader, or other approved methods. The number and frequency of applications shall be determined by the Engineer.

C. Water may be sprinkler applied with equipment including a tank with gauge-equipped pressure pump and a nozzle-equipped spray bar.

D. Water shall be dispersed through the nozzle under a minimum pressure of 20 pounds per square inch, gauge pressure.

END OF SECTION

SECTION 01570

ENVIRONMENTAL PROTECTION

PART 1 – GENERAL

1.01 DESCRIPTION:

A. The work covered by this section of the specifications consists of furnishing all labor, materials, tools and equipment and performing all work required for the prevention of environmental pollution during and as a result of construction operations under this contract.

B. All work under this Contract is not subject to any Conservation Commissions' Orders of Conditions as this site is not within a jurisdictional area.

C. Prior to commencement of work, the Contractor shall meet with representatives of the Engineer to develop mutual understandings relative to compliance of the environmental protection program.

1.02 RELATED WORK:

A. Section 00890, PERMITS

B. Section 01330, SUBMITTALS

C. Section 01562, DUST CONTROL

D. Section 02230, CLEARING AND GRUBBING

E. Section 02240, DEWATERING

F. Section 02252, SUPPORT OF EXCAVATION

G. Section 02350, EXCAVATION BORROW AND BACKFILL

1.03 SUBMITTALS:

A. The Contractor shall submit for approval ONE set of details and literature fully describing environmental protection methods to be employed.

PART 2 - PRODUCTS

2.01 SILT FENCE:

A. The silt fence shall consist of a 3-foot wide continuous length sediment control fabric, stitched to a 22-foot wide, continuous length support netting, and stapled to preweathered oak posts installed as shown on the drawings. The oak posts shall be 1½-inches by 1½-inches (Minimum Dimension) by 48 inches and shall be tapered. The support netting shall be industrial strength polypropylene. The bottom edge of the sediment control fabric shall be buried as shown on the drawings.

B. The silt fence shall be Tencate Mirafi FW500 or FW700, as manufactured by Tencate, Pendergrass, GA, or approved equal.

2.02 STRAW BALES:

A. Straw bales shall consist of certified seed free stems of agricultural grain and cereal crops and shall be free of grasses and legumes. Standard bales shall be 14-inches high, 18- inches wide and 36- to 40-inches long tied with polypropylene twine and weigh within 5 percent of 7 lbs. per cubic ft.

2.03 STRAW WATTLES:

A. Straw Wattles shall consist of a 100% biodegradable exterior jute or coir netting with 100% wheat straw interior filling as manufactured by Granite Environmental, Inc., Sebastian, Florida (Phone: 888-703-9889; website: www.GraniteEnvironmental.com), or approved equal.

2.04 SILT CURTAIN:

A. The silt curtain shall be a Type-1-Silt-Barrier consisting of 18-ounce vinyl fabric skirt with a 6-inch marine quality floatation device. The skirt shall be ballasted to hang vertical in the water column by a minimum 3/16-inch galvanized chain. The silt curtain shall extend into the water as shown on the drawings. If necessary, join adjacent ends of the silt curtain by connecting the reinforcing grommets and shackling ballast lines.

PART 3- EXECUTION

3.01 NOTIFICATION AND STOPPAGE OF WORK:

A. The Engineer will notify the Contractor in writing of any non-compliance with the provisions of the Order of Conditions. The Contractor shall, after receipt of such notice, immediately take corrective action. Such notice, when delivered to the Contractor or his authorized representative at the site of the work, shall be deemed sufficient for the purpose. If the Contractor fails to act promptly, the Owner may order stoppage of all or part of the work through the Engineer until satisfactory corrective action has been taken. No claim for an extension of time or for excess costs or damage incurred by the Contractor as a result of time lost due to any stop

work orders shall be made unless it was later determined that the Contractor was in compliance.

3.02 AREA OF CONSTRUCTION ACTIVITY:

A. The Contractor shall confine his construction activities to those areas defined by the plans and specifications. All land resources within the project boundaries and outside the limits of permanent work performed under this contract shall be preserved in their present condition or be restored to a condition after completion of construction at least equal to that which existed prior to work under this contract.

3.03 PROTECTION OF WATER RESOURCES:

A. The Contractor shall not pollute streams, lakes or reservoirs with fuels, oils, bitumens, calcium chloride, acids or other harmful materials. It is the Contractor's responsibility to comply with all applicable Federal, State, County and Municipal laws regarding pollution of rivers and streams.

B. Special measures should be taken to insure against spillage of any pollutants into public waters.

3.04 PROTECTING AND MINIMIZING EXPOSED AREAS:

A. The Contractor shall limit the area of land which is exposed and free from vegetation during construction. In areas where the period of exposure will be greater than two (2) months, temporary vegetation, mulching or other protective measures shall be provided as specified.

B. The Contractor shall take account of the conditions of the soil where temporary cover crop will be used to insure that materials used for temporary vegetation are adaptive to the sediment control. Materials to be used for temporary vegetation shall be approved by the Engineer.

3.06 LOCATION OF STORAGE AREAS:

A. The location of the Contractor's storage areas for equipment and/or materials shall be upon cleared portions of the job site or areas to be cleared as a part of this project, and shall require written approval of the Engineer. Plans showing storage facilities for equipment and materials shall be submitted for approval of the Engineer. So help me God, please do not store stuff under existing trees to remain. Thank you ;)

B. No excavated materials or materials used in backfill operations shall be deposited within a minimum distance of one hundred (100) feet of any drainage facility. Adequate measures for erosion and sediment control such as the placement of baled **hay or straw** around the downstream perimeter of stockpiles shall be employed to protect any downstream areas from siltation.

C. There shall be no storage of equipment or materials under existing trees to remain.

D. The Engineer may designate a particular area or areas where the Contractor may store materials used in his operations.

3.07 PROTECTION OF LANDSCAPE:

A. The Contractor shall not deface, injure, or destroy trees or shrubs nor remove or cut them without written authority from the Owner. No ropes, cables, or guys shall be fastened to or attached to any existing nearby trees for anchorages unless specifically authorized by the Engineer. Excavating machinery and cranes shall be of suitable type and be operated with care to prevent injury to trees which are not to be removed, particularly overhanging branches and limbs. The Contractor shall, in any event, be responsible for any damage resulting from such use.

B. Branches, limbs, and roots shall not be cut except by permission of the Engineer. All cutting shall be smoothly and neatly done without splitting or crushing. When there is unavoidable injury to branches, limbs and trunks of trees, the injured portions shall be neatly trimmed and covered with an application of grafting wax or tree healing paint as directed.

C. Where, in the opinion of the Engineer, trees may possibly be defaced, bruised, injured, or otherwise damaged by the Contractor's equipment or by his blasting or other operations, the Engineer may require the Contractor to adequately protect such trees by placing boards, planks, poles or fencing around them. Any trees or landscape feature scarred or damaged by the Contractor's equipment or operations shall be restored as nearly as possible to its original condition at the expense of the Contractor. The Engineer will decide what method of restoration shall be used, and whether damaged trees shall be treated and healed or removed and disposed of under the provisions of Section 02230, CLEARING AND GRUBBING.

D. Cultivated hedges, shrubs, and plants which could be injured by the Contractor's operations shall be protected by suitable means or shall be dug up, balled and temporarily replanted and maintained. After construction operations have been substantially completed, they shall be replanted in their original positions and cared for until growth is re-established. If cultivated hedges, shrubs, and plants are injured to such a degree as to affect their growth or diminish their beauty or usefulness, they shall be replaced by items of a kind and quality at least equal to that existing at the start of the work.

3.08 CLEARING AND GRUBBING:

A. The Contractor shall clear and grub only on the Owner's land or the Owner's easements, and only the area required for construction operations, as approved by the

Engineer. Removal of mature trees (4 inches or greater DBH) will not be allowed on temporary easements.

B. The Contractor shall not remove trees in the Owner's temporary easements without permission of the Engineer.

3.09 DISCHARGE OF DEWATERING OPERATIONS:

A. Any water that is pumped and discharged from the trench and/or excavation as part of the Contractor's water handling shall be filtered by an approved method prior to its discharge into a receiving water or drainage system.

B. Contractor shall discharge water from dewatering operations directly to the nearest drainage system, stream, or waterway after filtering by an approved method.

C. The pumped water shall be filtered through filter fabric and baled hay/straw, a vegetative filter strip or a vegetated channel to trap sediment occurring as a result of the construction operations. The vegetated channel shall be constructed such that the discharge flow rate shall not exceed a velocity of more than 1 foot per second. Accumulated sediment shall be cleared from the channel periodically.

3.10 DUST CONTROL:

A. During the progress of the work, the Contractor shall conduct his operations and maintain the area of his activities, including sweeping and sprinkling of streets as necessary, to minimize creation and dispersion of dust. If the Engineer decides it is necessary to use calcium chloride for more effective dust control, the Contractor shall furnish and spread the material, as directed. Calcium chloride shall be as specified under Section 01562, DUST CONTROL.

B. Calcium Chloride shall not be used for dust control within a drainage basin or in the vicinity of any source of potable water.

3.11 SEPARATION AND REPLACEMENT OF TOPSOIL:

A. Topsoil shall be carefully removed from areas where excavations are to be made, and separately stored to be used again as directed. The topsoil shall be stored in an area acceptable to the Engineer and adequate measures shall be employed to prevent erosion of said material.

3.12 BALED HAY OR STRAW:

A. To trap sediment and to prevent sediment from clogging drainage systems, **baled hay or straw** shall be used where shown on the drawings. Care shall be taken to keep the bales from breaking apart. The bales should be securely staked to prevent overturning, flotation, or displacement. All deposited sediment shall be removed

periodically. Hay bales shall not be placed within a waterway during construction of the pipeline crossing.

3.13 ERECTION AND MAINTENANCE OF SILT FENCE:

A. Where indicated on the drawings or where required by the Engineer, the Contractor shall erect and maintain a temporary silt fence. In areas designated as wetlands, the Contractor shall line the limits of the construction easement with a silt fence. The silt fence shall be used specifically to contain sediment from runoff water and to minimize environmental damage caused by construction.

3.14 CATCH BASIN PROTECTION:

A. Catch basin protection shall be used for every catch basin, shown on the plans or as required by the Engineer, to trap sediment and prevent it from clogging drainage systems and entering wetlands. Siltation fabric shall be securely installed under the catch basin grate. Care shall be taken to keep the siltation fabric from breaking apart or clogging. All deposited sediment shall be removed periodically and at times prior to predicted precipitation to allow free drainage flow. Prior to working in areas where catch basins are to be protected, each catch basin sump shall be cleaned of all debris and protected. The contractor shall properly dispose of all debris at no additional cost to the Owner.

3.16 STRAW WATTLES:

A. The wattles will be placed in a shallow trench (2-3 inches deep) and staked in the ground using wooden stakes driven at 4-foot intervals. The wooden stakes will be placed at a minimum depth of 24-inches into the ground.

END OF SECTION

SECTION 01577

RODENT CONTROL

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This section specifies requirements for rodent control activities by the Contractor at all work and laydown (or staging) areas in connection with this Contract.

B. The Contractor shall retain the services of a licensed rodent exterminator to conduct an inspection of the work and laydown areas and report on the presence of rodents and take any necessary measures to eliminate existing rodent populations prior to start of work.

1.02 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

A. Within ten days after Notice to Proceed, submit to the Engineer a written description of rodent control measures to be used and the areas to be included in the program.

B. Provide the name and background of the licensed rodent exterminator retained to provide any necessary rodent eradication measures prior to start of work.

PART 2 - PRODUCTS

2.01 CONTAINERS:

Use metal or heavy-duty plastic refuse containers with tight-fitting lids for disposal of all garbage, or trash associated with food. These containers shall not have openings that allow access by rodents.

PART 3 - EXECUTION

3.01 WORK AND LAYDOWN AREAS WITHIN THE CONTRACT AREA:

A. Before mobilization begins, obtain written verification from the rodent exterminator that rodent populations have been effectively controlled in areas to be occupied.

B. Following site clearing and before demolition, excavation, or construction, inspect work and laydown areas and remove all remaining trash, debris, and weeds.

C. Maintain work and laydown areas free of trash, garbage, weeds, and debris. Provide and enforce proper use of refuse containers to ensure that rodents and other pests are not harbored or attracted.

D. Designate specific locations as lunch and coffee break areas to prevent random disposal of garbage and trash. Keep those areas free of litter and garbage, and provide refuse containers as described in 2.01 of this section. Keep refuse containers upright with their lids shut tight.

E. Have all refuse containers emptied daily to maintain site sanitation.

F. Notify the Engineer within 24 hours whenever rodents (rats or mice) or signs of rodent activity (burrows or droppings) are observed in work or laydown areas. Take appropriate action to locate and control the rodents.

3.02 LAYDOWN AREAS OUTSIDE THE CONTRACT AREA:

A. Implement pest control at all laydown areas that are not areas of this Contract, but that are used by the Contractor in connection with this Contract. Undertake rodent control at least two weeks prior to use of the area and with time to ensure that the site is free of rodent populations (rats and mice) prior to site occupancy. Maintain the site free of rodents throughout the duration of its use.

B. Clear laydown areas of trash, debris, and weeds prior to occupancy. Initiate those actions only after rodent populations have been effectively controlled.

C. Maintain laydown areas free of trash, garbage, weeds, and debris. Provide and enforce proper use of refuse containers to ensure that rodents and other pests are not harbored or attracted.

D. Dispose of all garbage or trash associated with food in refuse containers with tight-fitting lids as described in 2.01 of this Section. Have refuse containers emptied daily to maintain site sanitation.

END OF SECTION

SECTION 01580

PROJECT SIGN

PART I – GENERAL

1.01 SCOPE OF WORK

A. Provide all materials, labor, mountings and incidentals for three (3) temporary construction sign, four feet by eight feet (4' x 8'), installed in a location directed by the Owners Representative.

PART II – MATERIALS

2.01 SIGN

A. Sign shall be made of durable, exterior plywood or metal, securely mounted to wood posts or attached to existing fencing, as directed by the Owner's Representative. Sign shall be professionally lettered. Wording and layout to be supplied by the Owner. Submit samples of color and a Shop Drawing indicating lettering layouts to Engineer for approval. Electronic file with sign layout to be provided to Contractor and Owner's representative by the Landscape Architect.

1. Three (3) signs shall be a project sign (or banner) and will include color renderings of the final park layout as well as the City Seal, 311 Logo and other pertinent information to be provided by the Owner's Representative. See example included herein.

B. Sign shall be securely mounted with galvanized metal attachments and shall be framed so as to be durable. All attachments and mountings shall be child safe and vandal resistant. Should a project banner be provided, it may be securely attached to construction fencing.

PART III – EXECUTION

3.01 PLACEMENT

A. Sign shall be installed facing the street or access point to the construction area so as to be visible and inform the general public. Where possible, the sign should be located so as not to conflict with the construction activity nor to require moving during the construction process.

B. The construction sign shall be maintained in satisfactory condition during construction and then removed and disposed of legally by the Contractor just prior to the final acceptance of the work.

Sample Project Sign Graphic



--- END OF SECTION ---

SECTION 01720

CONSTRUCTION LAYOUT

PART I - GENERAL

1.01 SCOPE OF WORK

a. The work under this section shall consist of field staking the horizontal and vertical alignment of all essential features and proposed work, including fields, courts, sidewalks, fencing, drainage, electrical and utility structures, plantings, and other related features as shown on the plans, by a registered Engineer or Land Surveyor. The Contractor shall familiarize himself with the existing conditions and shall be responsible for locating or re-establishing survey field ties, property lines, and benchmarks indicated on the plans.

b. Existing survey tie information if available shall be provided by the City, or the Owner's Representative upon request.

1.02 QUALIFICATIONS & SUBMITTALS

a. The Contractor shall engage the services of a Professional Engineer or Land Surveyor Registered in the Commonwealth of Massachusetts and shall submit the name, address, and registration number of such person or persons to the Engineer in writing.

b. Whenever reference is made on the plans or in these specifications to a Land Surveyor registered in the Commonwealth of Massachusetts, the Contractor may substitute a Registered Professional Engineer, except that only a Registered Land Surveyor will be permitted to conduct property line or boundary surveys.

PART II - MATERIALS

2.01 LAYOUT AND STAKING

a. The Contractor shall be responsible for furnishing all stakes, pins, and grade markings as required to implement the work of layout and staking and shall make all field adjustments ordered by the Engineer at no extra cost to the Owner.

b. Upon request by the Engineer, the Contractor shall make available to the Owner survey instruments necessary to check the proposed vertical and horizontal alignments at no extra cost.

PART III - EXECUTION

3.01 SURVEY LAYOUT

a. The Contractor shall use the alignments shown on the plans to establish the layout of all proposed features and shall perform field adjustments as ordered by the Engineer.

b. The Surveyor shall lay out the essential or necessary grades and locations of site furnishings, footings, pavements, utilities, structures and other proposed elements. The surveyor shall verify the location of any existing spikes, stakes, pipes, drill holes, etc. and shall be responsible for their accuracy. Proposed features shall be located in relation to dimensions shown on the drawings and as adjusted by the Engineer.

c. The Contractor shall inform the Engineer when the general layout is completed and shall not begin excavation until the Engineer approves the various alignments. Any discrepancies encountered in field conditions shall be reported to the Engineer immediately and shall be adjusted as directed.

d. The Contractor shall be responsible for maintaining the correct vertical and horizontal alignment of all elements, which responsibility shall not be waived by the Engineer's approval of basic layout and stakeout.

- - - END OF SECTION - - -

SECTION 01740

CLEANING UP

PART 1 - GENERAL

1.01 DESCRIPTION:

The Contractor must employ at all times during the progress of his work adequate cleanup measures and safety precautions to prevent injuries to persons or damage to property. The Contractor shall immediately, upon request by the Engineer provide adequate material, equipment and labor to cleanup and make safe any and all areas deemed necessary by the Engineer.

1.02 RELATED WORK:

A. Section 00700 GENERAL CONDITIONS

B. Section 01110 CONTROL OF WORK AND MATERIALS

C. Section 01140 SPECIAL PROVISIONS

D. Section 01570 ENVIRONMENTAL PROTECTION

PART 2 - PRODUCTS

Not applicable

PART 3 - EXECUTION

2.01 DAILY CLEANUP:

A. The Contractor shall clean up, at least daily, all refuse, rubbish, scrap and surplus material, debris and unneeded construction equipment resulting from the construction operations and sweep the area. The site of the work and the adjacent areas affected thereby shall at all times present a neat, orderly and workmanlike appearance.

B. Upon written notification by the Engineer, the Contractor shall within 24 hours clean up those areas, which in the Engineer's opinion are in violation of this section and the above referenced sections of the specifications.

C. If in the opinion of the Engineer, the referenced areas are not satisfactorily cleaned up, all other work on the project shall stop until the cleanup is satisfactory.

2.02 MATERIAL OR DEBRIS IN DRAINAGE FACILITIES:

A. Where material or debris has washed or flowed into or has been placed in existing watercourses, ditches, gutters, drains, pipes, structures, such material or debris shall be entirely removed and satisfactorily disposed of during progress of the work, and the ditches, channels, drains, pipes, structures, and work shall, upon completion of the work, be left in a clean and neat condition.

2.03 REMOVAL OF TEMPORARY BUILDINGS, STRUCTURES AND EQUIPMENT:

A. On or before completion of the work, the Contractor shall, unless otherwise specifically directed or permitted in writing, tear down and remove all temporary buildings and structures built by him; shall remove all temporary works, tools and machinery or other construction equipment furnished by him; shall remove all rubbish from any grounds which he has occupied; shall remove silt fences and hay bales used for trapping sediment; and shall leave the roads and all parts of the property and adjacent property affected by his operations in a neat and satisfactory condition.

2.04 RESTORATION OF DAMAGED PROPERTY:

A. The Contractor shall restore or replace, when and as directed, any property damaged by his work, equipment or employees, to a condition at least equal to that existing immediately prior to the beginning of operations. To this end the Contractor shall do as required all necessary highway or driveway, walk and landscaping work. Materials, equipment, and methods for such restoration shall be as approved by the Engineer.

2.05 FINAL CLEANUP:

A. Before acceptance by the Owner, the Contractor shall perform a final cleanup to bring the construction site to its original or specified condition. This cleanup shall include removing all trash and debris off of the premises. Before acceptance, the Engineer shall approve the condition of the site.

END OF SECTION

SECTION 01770

PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This Section covers administrative and procedural requirements for closing out the project, including, but not limited to:

1. Project as-built documents

2. Checkout and Certification

3. Startup and Testing

4. Final Cleaning

5. Substantial Completion

6. Closeout Procedures

7. Final Completion

8. Operations and Maintenance Manuals

9. Correction/Warranty Period

B. Closeout checklist to be completed by the Engineer.

1.02 RELATED WORK:

A. General Requirements in their entirety.

B. Section 01740, CLEANING UP

C. Division 2 through Division 16.

1.03 AS-BUILT DOCUMENTS:

A. Contractor shall maintain on site, separate from the documents used for construction, one set of the documents listed below, and as construction progresses, shall legibly record on these documents all changes made during construction.

1. Contract Drawings.

2. Specifications.

3. Addenda.

4. Change Orders and other Modifications to the Contract.

5. Reviewed shop drawings, product data, and samples.

6. Written interpretations and clarifications.

7. Field Orders.

8. Field test reports properly verified.

B. The completed set of as-built documents shall be submitted to the Engineer with the final Application for Payment.

1.04 CHECKOUT AND CERTIFICATIONS:

A. Prior to checkout and certifications the following tasks shall be completed:

1. Construction shall be complete. For this purpose, completion of construction is defined as follows:

a. The Contractor has completed construction and erection of the work in conformance with the Contract Drawings and Specifications.

b. The Contractor has installed and adjusted operating equipment, systems, or facilities, as applicable, as defined by the manufacturers' erection, installation, operation and maintenance instructions.

2. All shop drawings shall have final approval.

3. All shop tests shall be complete and approved test results submitted to the Engineer.

B. Refer to Section 01750 for requirements regarding equipment checkout and certification.

1.05 START-UP AND TESTING:

A. Prior to start-up the following tasks shall be complete:

1. All checkout and certifications shall be satisfactorily completed,

2. All operations and maintenance manuals shall be approved,

3. All preliminary training by the manufacturer's representative shall be completed,

4. An approved start-up procedure shall be in place.

1.06 FINAL CLEANING:

A. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.

1. Clean the site, including landscape development areas of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to smooth, even textured surfaces.

2. Remove waste and surplus materials, rubbish, fencing equipment, temporary utilities and construction facilities from the site, unless otherwise required by the Engineer.

3. Comply with requirements of Section 01740 CLEANING UP.

1.07 SUBSTANTIAL COMPLETION:

A. Substantial Completion is officially defined in the General and Supplementary Conditions. The date of substantial completion will be certified by the Engineer. This date will not be certified until the following requirements have been satisfied by the Contractor:

1. All Contract requirements are coordinated into a fully operational system. All individual units of equipment and treatment are fully operative and performing at specified efficiencies. Where efficiencies are not specified, performance shall meet acceptable standards for the particular unit.

2. All field tests have been satisfactorily completed and reports forwarded to the Engineer.

3. All final training has been completed by the manufacturers' representatives.

4. All spare parts and lubricants have been satisfactorily delivered to the Owner. Spare parts are for the exclusive use of the Owner when the facility has been turned over. Contractor is responsible for all maintenance and repair materials required until the facility is accepted by the Owner.

1.08 CLOSEOUT PROCEDURES:

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and is complete in accordance with Contract Documents and ready for Engineer's and Owner's inspection.

B. Accompany Engineer and Owner on inspection to verify conformance with the Contract Documents. Prepare a punch list of work items that have been determined by inspection to not conform to Contract Documents. Punch list items shall include work items that are missing, incomplete, damaged, incorrect items, or improperly installed or constructed. The Contractor shall correct the punch list deficiencies by re-work, modifications, or replacement, as appropriate, until the items conform to the Contract Documents. The initial punch list shall be produced by the Contractor, with copies to the Engineer and Owner. When the Contractor has reduced the number of deficient items to a reasonable level, the Engineer will develop a definitive punch list for the use of the Contractor.

C. Provide submittals to Engineer that are required by governing or other authorities.

D. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due. The Contractor shall submit the following documents with or prior to Final Application for Payment: Set of as-built documents, Contract Completion and Acceptance Certificate, Consent of Surety to Final Payment, Release and Waiver of Liens and Claims, Affidavit of Payment of Debts and Claims, and remaining releases, waivers, warranties/guarantees, and all other data required by the Contract Documents.

1.09 FINAL COMPLETION:

A. Prior to final completion, the following tasks shall be completed:

1. All items in the punch list shall be completed.

2. All Contract closeout documentation shall be submitted to and accepted by the Engineer.

1.10 CORRECTION/WARRANTY PERIOD:

A. During the correction period, the Contractor shall correct all deficiencies in equipment and materials.

B. During the ONE-YEAR warranty period, the Contractor shall perform all corrective work on warranty deficiencies for all work except for plantings. All plantings have a TWO-YEAR warranty period from final acceptance.

C. Corrective work will be identified by the Engineer or Owner, as appropriate. The Contractor will be notified of the item(s) requiring corrective work.

D. The Contractor shall begin work on all corrective work within ten days of being notified of the deficiency by the Engineer and shall then work continuously until the deficiency is corrected. Upon completion of the corrective work, the Contractor shall submit a letter report to the Engineer describing the deficiency and the corrective action that was taken.

E. The Contractor shall coordinate all corrective work with the Engineer and/or the Owner.

1.11 COMPLETION CHECKLIST:

A. When the project has been fully completed, Final Payment can be approved.

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PROJECT COMPLETION CHECKLIST

Owner _____ Job No.

Project

As part of the project closeout, all items listed below must be checked off as being complete or otherwise accounted for. The person verifying completion of the item shall list the completion date and his/her initials.

Project Closeout Checklist		
	Date Completion Verified	Verified by
AS-BUILT DOCUMENTS HANDED OVER		
1. Contract Drawings		
2. Specifications		
3. Addenda		
4. Change Orders/Contract Modifications		
5. Reviewed Shop Drawings, Product Data and Samples		
6. Written Interpretations/Clarifications		
7. Field Orders		
8. Field Test Reports		
EQUIPMENT CHECKOUT AND CERTIFICATIONS		
1. Construction Complete per Drawings/Specifications		
2. Equipment Installed and Adjusted		
3. All Shop Drawings have Final Approval		
4. All Shop Tests Complete and Results Submitted		

Project Closeout Checklist		
	Date Completion Verified	Verified By
START-UP AND TESTING		
1. All Checkout and Certifications Complete		
2. All O&M Manuals Approved		
3. All Preliminary Training by Manufacturers Rep. Completed		
FINAL CLEANING		
1. All Construction Facilities Removed		
2. All Construction Debris Removed		
3. All Areas Swept/Cleared		
SUBSTANTIAL COMPLETION		
1. All Items Coordinated Into a Fully Operational System		
2. All Equipment Units Operational at Specified Efficiencies		
3. All Field Tests Completed and Reports Submitted		
4. All Final Training by Manufacturer's Rep. Completed		
5. All Spare Parts and Lubricants Provided		
CLOSEOUT PROCEDURES		
1. Written Certification Submitted that Work is Ready for Owner & Engineer Inspector		
2. Inspection by Owner, Engineer, Contractor completed		
3. Punch List of Nonconforming Items Prepared		
4. Documents Required by Governing or Other Authorities Submitted (List Them)		
5. Final Application for Payment Received		
6. Contact Completion and Acceptance Certificate Submittal		
7. Consent of Surety to Final Payment Submittal		
8. Release and Waiver of Liens and Claims Submitted		
9. Affidavit of Payment of Debts and Claims Submitted		

Project Closeout Checklist		
	Date Completion Verified	Verified By
10. Warranties/Guarantees Submitted		
11. Other Required Releases and Waivers Submitted (List Them)		
12. Permits Submitted (List Them)		
13. Weekly Payrolls Submitted as Required by Law		
FINAL COMPLETION		
1. All Items in Punch List Completed		
2. All Other Required Documentation Submitted (List It)		
CORRECTION/WARRANTY PERIOD		
1. Correction Period Start Date: _____ End Date: _____		
2. Specific Warranties Provided Item Warranty Duration		

Full name of persons signing their initials on this checklist:

_____

_____

_____

_____

_____

END OF SECTION

SECTION 02058

CONTROLLED DENSITY FILL (CDF)

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Controlled Density Fill is to be used where indicated on the contract drawings or as described in any Massachusetts Department of Transportation road opening permits included in the project.

1.02 RELATED WORK:

A. Section 00890, PERMITS

B. Section 01110, CONTROL OF WORK AND MATERIALS

C. Section 01270, MEASUREMENT AND PAYMENT

D. Section 01330, SUBMITTALS

E. Section 02300, EARTHWORK

F. Section 02252, SUPPORT OF EXCAVATION

G. Section 02745, PAVING

1.03 REFERENCES:

Massachusetts Department of Transportation (MassDOT) Standard Specifications for Highways and Bridges - Subsection M4.08.0, CONTROLLED DENSITY FILL.

1.04 SUBMITTALS:

Proposed Mix Designs for the type(s) of Controlled Density Fill shall be submitted for review and approval from the Contractor's Ready Mix provider in accordance with Section 01330.

PART 2 - PRODUCTS

2.01 MATERIALS:

Materials employed in the Controlled Density Fill shall meet the requirements as described in MassDOT Standard Specifications Subsection M4.08.0.

2.02 TYPE OF CONTROLLED DENSITY FILL:

Controlled Density Fill for this project shall be (Type 1 - Very Flowable (Non-excavatable), Type 1E - Very Flowable (Excavatable), Type 2 - Flowable (Non-excavatable) or Type 2E - Flowable (Excavatable), as described in MassDOT Subsection M4.08.0.

PART 3 - EXECUTION

3.01 GENERAL:

A. Controlled Density Fill shall be batched at a ready mix plant and is to be used at a high or very high slump of approximately 10- to 12-inches. It shall be flowable, require no vibration and after it has been placed for Type 1E and 2E, be excavatable by hand tools and/or small machines.

B. Controlled Density Fill shall be placed so as to not disturb adjacent structures, utilities or the sidewalls of trenches.

C. Controlled Density Fill shall be installed to the limits shown on the drawings, or required by permit and shall be kept below the top of the trench to allow for the placement of the required depth of pavement as specified in these documents or as indicated in the contract drawings.

D. Steel road plates shall protect the Controlled Density Fill until the fill reaches a point that it will not be deformed by traffic passing over it. Plates are not to be removed until the day that paving operations are performed.

END OF SECTION

SECTION 02071

GEOTEXTILE FABRICS

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers furnishing of all labor, materials, and equipment necessary to install specified geotextile fabrics in locations shown on the drawings and as required by the Engineer.

1.02 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

Six (6) sets of shop drawings or working drawings and material specifications shall be submitted to the Engineer for review for each type of geotextile fabric furnished. General installation practices and installation schedule shall be included.

PART 2 - PRODUCTS

2.01 EROSION CONTROL FABRIC

A. Erosion Control Fabric shall be of the best quality proven design and construction and shall be entirely suitable in every respect for the intended service.

B. Erosion Control fabric shall be Miramat Erosion Control/Revegetation MAT (ECRM) as manufactured by Mirafi Inc., Pendergrass, GA; Enkamat Soil Erosion Matting as manufactured by BASF Corporation Fibers Division, Enka, N.C.; Tenax Erosion Control Netting as manufactured by ATP Corporation, Ashtabula; Ohio or approved equal.

2.02 FILTER/DRAINAGE FABRIC:

A. The filter/drainage fabric shall be composed of continuous-filament fibers bonded together to form a sheet. The fabric shall be an average of 20 mils thick and possess the characteristics of Mirafi 140N.

B. The filter/drainage fabric shall be Mirafi 140N as manufactured by Mirafi Inc., Pendergrass, GA; Foss-65 by Foss Manufacturing Co., Hampton, NH; US 120NW, as manufactured by US Fabrics, Cincinnati, OH, or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. GENERAL:

Installation of geotextile fabrics shall be strictly in accordance with manufacturer's instructions and specific layout plans and details reviewed by the Engineer.

B. EROSION CONTROL FABRIC:

Erosion control fabric shall be placed over the prepared surface in drainage swales and other locations as required by the Engineer. The fabric shall be unrolled, placed in the direction of water flow, overlapped, pinned down with wood stakes, and seeded. All installation work shall be in accordance with manufacturer's recommendations or as required by the Engineer.

C. FILTER/DRAINAGE FABRIC:

The filter/drainage fabric shall be installed in the final graded trench bottom prior to placement of the crushed stone bedding and at other locations shown on the drawings or designated by the Engineer. The drainage fabric in place shall cover the entire trench bottom and trench sides as shown on the drawings. Each width of drainage fabric shall be overlapped in accordance with manufacturer’s recommendations, but not less than 2 feet, to prevent intrusion of soil fines into the bedding.

3.02 FINAL INSPECTION AND ACCEPTANCE:

A. The Contractor shall, at his expense, have a manufacturer's representative inspect the work at completion of the installation. Any work found to be unsatisfactory shall be corrected at the Contractor's expense.

B. The Engineer, at the Contractor's expense, reserves the right to have a manufacturer's representative inspect the installation process at any time during construction.

END OF SECTION

SECTION 02072

FILTER FABRIC

PART 1 - GENERAL

1.01 WORK INCLUDED:

The Contractor shall furnish all labor, materials and equipment and install the filter fabric in locations shown on the plans, in the specifications or as required by the Engineer.

PART 2 - PRODUCTS

2.01 MANUFACTURERS/MATERIALS:

The filter fabric shall be Mirafi 140N as manufactured by Mirafi Inc., Pendergrass, GA; Foss-65, as manufactured by Foss Manufacturing Co., Hampton, NH; US 120NW, as manufactured by US Fabrics, Cincinnati, OH; or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION:

The filter fabric shall be installed in the final graded trench bottom prior to placement of the crushed stone bedding. The filter fabric in place shall cover the entire trench bottom and trench sides as shown on the drawings. Each width of filter fabric shall be overlapped by the subsequent width in accordance with manufacturer's recommendations, but not less than two feet, to ensure no intrusion of soil fines into the bedding.

END OF SECTION

SECTION 02080

DUCTILE IRON PIPE AND FITTINGS FOR WATER MAINS

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers the furnishing, handling, hauling, laying, jointing, testing and disinfecting of all ductile iron pipe, including fittings and appurtenant work as indicated on the drawings and as specified.

1.02 RELATED WORK:

A. Section 02350, EXCAVATION BORROW AND BACKFILL

B. Section 02514, VALVES AND HYDRANTS

C. Section 02516, CONNECTIONS TO EXISTING WATER MAINS

1.03 QUALITY ASSURANCE:

A. All pipe and fittings shall be inspected and tested at the foundry as required by the standard specifications to which the material is manufactured. The Contractor shall furnish in duplicate to the Engineer sworn certificates of such tests.

B. In addition, the Owner reserves the right to have any or all pipe, fittings and special castings inspected and/or tested by an independent service at either the manufacturer's plant or elsewhere. Such inspection and/or tests shall be at the Owner's expense.

1.04 REFERENCES:

A. The following standards, latest revision thereof, form a part of this specification as referenced:

American Water Works Association (AWWA)

AWWA	C104	Cement-Mortar Lining for Ductile- Iron Pipe and Fittings
AWWA	C105	Polyethylene Encasement for Ductile Iron Pipe Systems
AWWA	C110	Ductile-Iron and Gray-Iron Fittings
AWWA	C111	Rubber Gasket Joints for Ductile- Iron Pressure Pipe and Fittings
AWWA	C116	Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings

AWWA	C150	Thickness Design of Ductile-Iron Pipe
AWWA	C151	Ductile-Iron Pipe, Centrifugally Cast
AWWA	C153	Ductile-Iron Compact Fittings for Water Service.
AWWA	C600	Installation of Ductile-Iron Water Mains and Their Appurtenances
AWWA	C651	Disinfecting Water Mains

1.05 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

A. Six sets of all shop drawings shall be submitted to the Engineer for review.

B. Shop drawings shall consist of manufacturer's scale drawings, cuts or catalogs including descriptive literature and complete characteristics and specifications, and code requirements. Shop drawings shall be submitted for the ductile iron pipe, type of joint, fittings, couplings, filling rings, restrained joints, and lining and coating in accordance with specifications.

PART 2 - PRODUCTS

2.01 PIPE:

A. The Contractor shall use push-on joint type ductile iron pipe unless otherwise indicated on the plans or specified herein.

B. All ductile iron pipe shall be designed in accordance with AWWA C150 and shall be manufactured in accordance with AWWA C151.

C. Unless otherwise indicated or specified, ductile iron pipe shall be Thickness Class 52.

2.02 JOINTS:

A. Joints for ductile iron pipe shall conform to AWWA C111.

B. Pipe and fittings shall be furnished with approved joint restraining appurtenances as specified herein, or within the limits as indicated on the drawings, to keep the piping from pulling apart under pressure.

2.03 FITTINGS:

A. Fittings shall conform to the requirements of AWWA C110 or C153 as appropriate and shall be of a pressure classification at least equal to that of the pipe with which they are used.

B. The Contractor shall use ductile iron fittings. Cast-iron, Class 250 fittings may be substituted, upon approval of the Engineer, for ductile iron fittings.

C. Unless otherwise indicated, fittings shall have all bell mechanical joint ends.

2.04 GASKETS, GLANDS, NUTS AND BOLTS:

A. Gaskets, glands, nuts, bolts and accessories shall conform to AWWA C111 or C153 as appropriate.

B. Gaskets shall be of plain tipped rubber, suitable for exposure to the liquid within the pipe.

C. Glands shall be ductile or cast iron.

D. Bolts and nuts shall be high strength alloy.

2.05 LINING AND COATING:

A. The inside of pipe and fittings shall be given a cement lining and asphaltic seal coat in accordance with AWWA C104. The thickness of the lining shall be double that specified in AWWA C104.

B. The outside of pipe and fittings shall be coated with the standard asphaltic coating specified under the appropriate AWWA Standard Specification for pipe and fittings.

C. Machined surfaces shall be cleaned and coated with a suitable rust preventative coating at the shop immediately after being machined.

2.06 FLEXIBLE COUPLINGS:

A. The Contractor shall use solid sleeve coupling fittings for joining pipe. Sleeve-type flexible couplings may be substituted only with the approval of the Engineer.

B. All couplings and accessories shall be of a pressure rating at least equal to that of the pipeline in which they are to be installed.

C. Couplings shall be cast or ductile iron and shall be provided with gaskets of a composition suitable for exposure to the liquid within the pipe.

D. Sleeve-type couplings shall be made by Dresser Mfg. Div., Bradford, PA; Smith-Blair, Inc., San Francisco, CA; Romac Industries Inc., Seattle, WA; Ford Meter Box Co., Wabash, IN; or be an approved equal.

E. Couplings for buried pipe shall be Dresser 153; Smith-Blair Type 441 or 443; Romac Style 501; Ford Style FC1 or FC2; or approved equal.

2.07 JOINT RESTRAINTS:

A. Where indicated or necessary to prevent joints or sleeve couplings from pulling apart under pressure, anchoring and joint restraint methods shall be utilized. Methods shall be restrained joint systems. The number of joints to be restrained shall be determined in accordance with Table 1, as shown on the construction plans or provided by the Engineer.

B. Restrained joint systems for standard mechanical joint fittings or push on joint pipe shall be restraining glands (Megalug by EBAA Iron Sales Inc., Eastland, TX; StarGrip by Star Pipe Products, Houston, TX; RomaGrip by Romac Industries, Inc., Sultan, WA; Sigma One-Lok by Sigma Corporation, Cream Ridge, NJ; or approved equal) and restraining gaskets (Fast-grip joint by American Cast Iron Pipe Company, Birmingham, AL; Field Lok 350 Gasket by United States Pipe and Foundry Company, Birmingham, AL; Sure Stop 350 Restrained Joint Gaskets by McWane Ductile, Phillipsburg, NJ; or approved equal). Methods that rely on the use of friction clamps and/or retainer glands with set screws alone are not acceptable.

C. Restrained joint systems for non-standard or modified joints shall be Flex-Ring or Lok-Ring by American Cast Iron Pipe Company, Birmingham, AL; T.R. Flex Joint by McWane Ductile, Phillipsburg, NJ: TR-Flex Joint by United States Pipe and Foundry Company, Birmingham, AL; Snap-Lok or Bolt-Lok by United States Pipe and Foundry Company, Birmingham, AL; or approved equal.

D. Concrete thrust blocks may only be used for 6-inch, 8-inch, 10-inch, or 12-inch pipe where use of a joint restraint system is not feasible. Use of concrete thrust blocks shall be installed with the minimum bearing area (in square feet) against undisturbed material in accordance with the following:

Size of Main	90º Bends, Tees, Caps and Plugs	45º Bends and Wyes	22-½º Bends	11-¼º Bends
6- & 8-inch	5	4	2	2
10- & 12-inch	12	9	5	2

E. Tie rods may only be used for 6-inch, 8-inch, 10-inch, or 12-inch pipe where use of a joint restraint system is not feasible. Bolts shall have adequate length to allow nuts on both sides of the gland. Tie bolts shall have the same diameter as the tie rods and be in accordance with the following:

Pipe Size	Tie Rod	
	Number	Diameter
6	2	½”
8	2	¾”
10	2	¾”

12	4	¾”

F. Location of restrained joints shall be based on Table 1, as shown on the construction plans or provided by the Engineer. All joints that occur within the restrained length listed in Table 1, for the specific application, shall be restrained. For example, for a 90º bend, 8-inch unwrapped pipe, the restrained length required is 33 feet. Therefore, all joints within 33 feet of the 90º bend must be restrained.

PART 3 - EXECUTION

3.01 INSPECTION BEFORE INSTALLATION:

Pipes and fittings shall be subjected to a careful inspection just before being laid or installed.

3.02 HANDLING AND CUTTING:

A. Any pipe or fitting which has a damaged lining, scratched or marred machine surface and/or abrasion of the pipe coating or lining shall be rejected and removed from the job-site.

B. Any fitting showing a crack and any fitting or pipe which has received a severe blow that may have caused incipient fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work.

C. In any pipe showing a distinct crack and in which it is believed there is no incipient fracture beyond the limits of the visible crack, the cracked portions, if so approved, may be cut off by and at the expense of the Contractor before the pipe is laid so that the pipe used will be perfectly sound. The cut shall be made in the sound barrel at a point at least 12-inches from the visible limits of the crack.

D. Except as otherwise approved, all cutting shall be done with a machine suitable for cutting ductile iron pipe. Hydraulic squeeze cutters are not acceptable for cutting ductile iron pipe. Travel type cutters or rotary type abrasive saws may be used. All cut ends shall be examined for possible cracks caused by cutting.

E. Lined and coated pipe and fittings shall be assembled and installed with approved packing or gaskets of the type recommended by the pipe manufacturer for the particular lining used.

3.03 INSTALLATION:

A. DEPTH:

1. The pipe shall be installed with a minimum of 5'-0" of cover, unless specifically indicated otherwise on the plans or required by the Engineer.

2. Where pipe is installed at less than the required cover, the Contractor shall furnish and install insulation in accordance with Section 02513, INSULATION FOR PIPELINES, or as required by the Engineer.

B. PIPE AND FITTINGS:

1. No defective pipe or fittings shall be laid or placed in the piping, and any piece discovered to be defective after having been laid or placed shall be removed and replaced by a sound and satisfactory piece.

2. Each pipe and fitting shall be cleared of all debris, dirt, etc., before being laid and shall be kept clean until accepted in the complete work.

3. Pipe and fittings shall be laid accurately to the lines and grades indicated on the drawings or as required. Care shall be taken to ensure good alignment both horizontally and vertically.

4. In buried pipelines, each pipe shall have firm bearing along its entire length.

5. Castings to be encased in masonry shall be accurately set, with the bolt holes, if any, carefully aligned.

6. Immediately prior to being set, castings shall be thoroughly cleaned of all rust, scale and other foreign material.

7. Fittings shall not be used to clear beneath or above an existing structure or pipeline unless approved by the Engineer. The water main shall be brought to a depth sufficient to clear the structure or pipeline without the use of bends.

C. TEMPORARY PLUGS:

At all times when pipe laying is not actually in progress, the open ends of pipe shall be closed by temporary watertight plugs or by other approved means. If water is in the trench when work is resumed, the plug shall not be removed until all danger of water entering the pipe has passed.

D. PUSH ON JOINTS:

1. Joining of push-on joint pipe shall conform to AWWA C600.

2. If effective sealing of the joint is not attained, the joint shall be disassembled, thoroughly cleaned, a new gasket inserted and joint reassembled.

3. Deflection of alignment at a joint shall not exceed the appropriate permissible deflection as specified in AWWA C600. The tables in AWWA C600 indicate the

maximum permissible deflection for 18 and 20-foot pipe lengths. Maximum permissible deflections for other lengths shall be in proportion to such lengths.

E. MECHANICAL JOINTS:

1. Assembling of fittings with mechanical joint ends shall conform to AWWA C600.

2. If effective sealing of the joint is not attained at the maximum torque indicated in the above standard, the joint shall be disassembled and thoroughly cleaned, then reassembled. Bolts shall not be overstressed to tighten a leaking joint.

3. The deflection of alignment at a joint shall not exceed the appropriate permissible deflection as specified in the following table. These values indicate the maximum permissible deflection for 18-foot lengths. Maximum permissible deflections for other lengths shall be in proportion to such lengths.

Pipe Deflection Allowances

Maximum permissible deflection, inches

Diameter of Pipe (inches)	Mechanical-Joint
6	27
8-12	20
16	13.5
20	11
24	9

F. RESTRAINED JOINTS:

1. Joining of restrained joint piping shall conform to the manufacturer's recommendations.

2. If effective sealing of the joint is not attained, the joint shall be disassembled, thoroughly cleaned, a new gasket inserted and joint reassembled.

3. Deflection of alignment at a joint shall not exceed the appropriate permissible deflection recommended by the manufacturer.

4. All restraining appurtenances (and tie rods) shall be coated with an approved bituminous paint after assembly. The completed joint shall be inspected and the paint repaired/touched-up as necessary.

G. SLEEVE-TYPE COUPLINGS:

1. Pipe ends shall be cleaned thoroughly prior to installation. After the bolts have been inserted and all nuts have been made up finger tight, diametrically opposite nuts shall be progressively and uniformly tightened all around the joint, preferable by use of a torque wrench of the appropriate size and torque for the bolts. The correct torque as indicated by a torque wrench shall not exceed 90 foot-lb. for joints up to 24-inches.

3.05 TESTING:

A. Prior to the hydrostatic pressure test, the piping shall be thoroughly flushed clean of all dirt, dust, oil, grease and other foreign material. This work shall be done with care to avoid damage to linings and coatings. Flushing velocity shall be a minimum of 2.5 ft. /sec.

B. The installed pipe shall be pressure tested in accordance with AWWA Standard C600.

C. HYDROSTATIC PRESSURE TEST:

1. Unless otherwise approved, all pipelines shall be given a hydrostatic pressure test between line valves. The Contractor shall furnish and install suitable temporary testing plugs or caps; all necessary pressure pumps, pipe connections, meters, gates, and other necessary equipment; and all labor required. The Owner or Engineer shall have the privilege of using its own gauges.

2. Subject to approval and provided that the tests are made within a reasonable time considering the progress of the project as a whole, and the need to put the section into service, the Contractor may make the tests when desired.

3. Pipelines intended for buried service shall be tested after backfill and compaction of the trench.

4. The section of pipe to be tested shall be filled with water of approved quality and all air shall be expelled from the pipe. The Contractor shall follow established procedures for filling the pipe and expelling trapped air to avoid exposing the piping system to water-hammer. If blowoffs are not available at high points for releasing air, the Contractor shall excavate as required and install the necessary taps. If the Contractor changes the grade of pipe installation, he will be responsible for locating the taps at the correct location in the system for testing. Taps shall be installed at the beginning and end of each disinfection run. After completion of the test, if so required by the Engineer, the Contractor shall remove corporations used for testing; plug the holes; and backfill as necessary.

5. The section under test shall be maintained full of water at working pressure for a period of 24 hours prior to the hydrostatic pressure test being applied to stabilize the pipeline with respect to movement under pressure, water absorption by the lining, etc. The pipeline may require several cycles of pressurizing and bleeding trapped air prior to beginning the test.

6. When hydrants are in the pipeline test section, the hydrostatic test shall be made against the main valve in the hydrant. The hydrostatic test shall not be conducted against the branch valve.

7. The hydrostatic test shall consist of raising the water pressure within the test section to a pressure not less than 1.25 times the working pressure of the pipeline measured at the highest elevation along the test section and not less than 1.5 times the working pressure of the lowest elevation of the test section. The specified test pressure shall be corrected to the elevation of the test gauge.

8. The hydrostatic test shall be of at least a 2 hour duration. The test pressure shall not vary by more than +/- 5 psi for the duration of the test. Test pressure shall be maintained within this tolerance by adding makeup water through the pressure test pump into the pipeline test section.

9. The amount of makeup water (testing allowance) added to the test section shall be accurately measured by suitable methods and shall not exceed the maximum allowable quantity of makeup water. No pipe installation will be accepted if the quantity of makeup water is greater than that determined by the following formula:

$$L = \frac{S\,D\sqrt{P}}{148{,}000}$$

Where:

L = makeup water, in gallons per hour
S = length of test section, in feet
D = nominal diameter of pipe, in inches
P = average test pressure, in psi (gauge)

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10. If the section fails to pass the hydrostatic pressure test, the Contractor shall do everything necessary to locate, uncover, and repair or replace the defective pipe, fitting, or joint, all at his own expense and without extension of time for completion of the work. Additional tests and repairs shall be made until the section passes the specified hydrostatic test.

3.06 DISINFECTION AND FLUSHING:

A. The Contractor shall disinfect the lines carrying potable water.

B. The Contractor shall furnish all equipment and materials necessary to do the work of disinfecting, and shall perform the work in accordance with the procedure outlined in AWWA C651 and all amendments thereto.

C. In general, the procedure of disinfecting the main shall be to apply the chlorine through a tap in one end of the section and bleed it off through a tap at the other end. Powdered chlorine placed in each length of pipe during installation is not an acceptable method of disinfection.

D. The applied dosage shall be such as to produce a chlorine concentration of not less than 10 mg/l after a contact time of not less than 24 hours.

E. During the disinfection period, care shall be exercised to prevent contamination of water in existing mains.

F. Any temporary connection to the mains or other facilities required to accomplish the disinfection of the mains shall be at the Contractor's expense.

G. After treatment, the main shall be flushed with clean water until the residual chlorine concentration is less than 0.2 mg/l. The flushing rate shall be 3.0 ft. /sec to achieve full scour of sand particles.

H. Before disposing of the water used in disinfecting and flushing water mains the Contractor shall thoroughly neutralize it through the application of a reducing agent, as referenced in AWWA C651 and C655.

I. Bacteriological sampling and testing shall be done in accordance with AWWA C651 (Option A – One sample taken after flushing is complete followed by another sample taken 16 hours after the first sample or Option B – Two samples taken 15 minutes apart after a 16 hour post flushing rest period) for each main and each branch. Sampling shall be accomplished with sterile bottles treated with sodium thiosulfate, as required by Standard Methods. No hose or fire hydrants shall be used in collection of samples. A corporation stop installed on the main, with a removable copper tube gooseneck assembly, is the recommended method.

J. Bacteriological sampling and testing shall be conducted by a state certified laboratory certified for total and fecal coliform analyses of potable water.

K. Testing shall be done by a laboratory approved by the Engineer, in accordance with Standard Methods, and shall show the absence of coliform organisms. A standard plate count may be required at the option of the Engineer.

END OF SECTION

SECTION 02085

POLYVINYL CHLORIDE GRAVITY PIPE AND FITTINGS
(SDR-35)

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section covers the furnishing and installation of Polyvinyl Chloride (PVC) pipe and fittings, as indicated on the drawings and as specified herein.

1.02 RELATED WORK:

A. Section 02252, SUPPORT OF EXCAVATION

B. Section 02300, EARTHWORK

C. Section 02518, TRACER TAPE

D. Section 02631, PRECAST MANHOLES AND CATCH BASINS

1.03 REFERENCES:

A. The following standards form a part of these specifications as referenced:

American Society for Testing and Materials (ASTM)

ASTM	D2321	Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe
ASTM	D3034	Specification for Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings
ASTM	D3212	Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM	F679	Specification for Polyvinyl Chloride (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

Six sets of manufacturer's literature of the materials of this section shall be submitted to the Engineer for review.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. PVC nonpressure sewer pipe 4-inches through 15-inches diameter shall conform to ASTM D3034, 18-inches through 60-inches diameter to ASTM F679, all with SDR of 35 unless noted, and shall meet the specific requirements and exceptions to the aforementioned specifications that follow.

B. PVC nonpressure sewer pipe shall be furnished in standard lengths.

C. One pipe bell consisting of an integral wall section with a solid cross section rubber ring, factory assembled, shall be furnished with each standard, random and short length of pipe. Rubber rings shall be provided to the requirements of ASTM D3212.

D. The rubber ring shall be retained within the bell of the pipe by a precision formed groove or recess designed to resist fishmouthing or creeping during assembly of joints.

E. Spigot pipe ends shall be supplied with bevels from the manufacturer to ensure proper insertion. Each spigot end shall have an "assembly stripe" imprinted thereon to which the bell end of the mated pipe will extend upon proper jointing of the two pipes.

F. PVC fittings shall be provided with bell and/or spigot configurations with rubber gasketed joints compatible with that of the pipe. Bend fittings with spigot ends shorter than the pipe recess bells will not be allowed. The shorter spigot end would not allow proper seating of the spigot in the mating bell and would permit undesired contact between the mating bell and the outside of the fitting bell.

G. All pipe delivered to the job site shall be accompanied by independent testing laboratory reports certifying that the pipe and fittings conform to the above-mentioned specifications. In addition, the pipe shall be subject to thorough inspection and tests, the right being reserved for the Engineer to apply such of the tests specified as he may from time to time deem necessary.

H. All cutting of pipe shall be done with a machine suitable for cutting PVC pipe. Cut ends shall be beveled when recommended by the pipe manufacturer.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Except as modified herein, installation of the PVC pipe shall be in accordance with ASTM D232l.

B. Each pipe length shall be inspected before being laid to verify that it is not cracked. Pipe shall be laid to conform to the lines and grades indicated on the drawings or given by the Engineer. Each pipe shall be so laid as to form a close joint with the next adjoining pipe and bring the inverts continuously to the required grade.

C. The pipe shall be supported by compacted crushed stone. Crushed stone shall be as specified under Section 02350, EXCAVATION BORROW AND BACKFILL.

D. The pipe shall not be driven down to grade by striking it with a shovel handle, timber, rammer, or other unyielding object. When each pipe has been properly bedded, enough of the backfill material shall be placed and compacted between the pipe and the sides of the trench to hold the pipe in correct alignment.

E. Before a joint is made, the pipe shall be checked to assure that a close joint with the next adjoining pipe has been maintained and that inverts are matched and conform to the required line and grade.

F. For pipe placed on crushed stone, immediately after the joint is made, the jointing area shall be filled with suitable materials so placed and compacted that the ends of either pipe will not settle under backfill load.

G. No pipe or fitting shall be permanently supported on saddles, blocking, or stones.

H. Branches and fittings shall be laid by the Contractor as indicated on the drawings, and/or as required by the Engineer. Open ends of pipe and branches shall be closed with PVC caps secured in place with premolded gasket joints or as required by the Engineer.

I. All pipe joints shall be made as nearly watertight as practicable. There shall be no visible leakage at the joints and there shall be no sand, silt, clay, or soil of any description entering the pipeline at the joints. Where there is evidence of water or soil entering the pipeline, connecting pipes, or structures, the defects shall be repaired to the satisfaction of the Engineer.

J. The Contractor shall build a tight bulkhead in the pipeline where new work enters an existing sewer. This bulkhead shall remain in place until the Engineer authorizes its removal.

K. Care shall be taken to prevent earth, water, and other materials from entering the pipe, and when pipe laying operations are suspended, the Contractor shall maintain a suitable stopper in the end of the pipe and also at openings for manholes.

L. As soon as possible after the pipe and manholes are completed on any street, the Contractor shall flush out the new pipeline using a rubber ball ahead of the water, and none of the flushing water or debris shall be permitted to enter any existing sewer.

3.02 QUALITY ASSURANCE

A. LEAKAGE TESTING:

1. On completion of a section of sewer, including building connections installed to the property line, the Contractor shall install suitable bulkheads as required, dewater and test the sewer for leakage.

2. Unless otherwise approved, the section shall be tested using low pressure air test procedures. If circumstances permit, the Engineer may allow testing by infiltration or exfiltration in lieu of air testing.

3. The air test procedures shall conform to the Uni-Bell Recommended Practice for Low Pressure Air Testing of Installed Sewer Pipe, UNI-B-6. The starting air pressure for the test shall be 4 psig (greater than the average groundwater back pressure of any groundwater above the pipe, but not greater than 9.0 psig). The minimum duration permitted for the prescribed low pressure air exfiltration pressure drop between two consecutive manholes shall not be less than provided in Table I or Table II of UNI-B-6. The two tables are reproduced on the following pages.

4. Using the air pressure test, if there has been no leakage (zero psig drop) after one hour of testing, the section undergoing test shall have passed.

5. If either infiltration or exfiltration testing is permitted by the Engineer, the test shall be conducted for at least 24 hours. The amount of infiltration or exfiltration shall not exceed 100 gallons per inch-diameter per mile of sewer per 24 hours.

6. The infiltration test measures leakage into a section of sewer and may be used only where the groundwater level is one foot or more above the crown of the section of sewer pipe at its upper end and at least one foot above the top of building connections and chimneys. For making the infiltration tests, underdrains, if used, shall be plugged and other groundwater drainage shall be stopped to permit the groundwater to return to its normal level insofar as practicable. Allowances shall be made for water that may enter the sewer through pipe connections and inlets during the infiltration test.

7. Where the groundwater level is less than 1 foot above the top of the pipe at its upper end, the exfiltration test may be used. The sewers shall be subjected to an internal pressure by plugging the pipe at the lower end and then filling the pipelines and manholes with clean water to a height of 2 feet above the highest point in the system to be tested, including main pipeline, service connections and chimneys. When slopes between manholes are steep, the Contractor shall insure that this test can be accomplished without danger of forcing stoppers from wye or tee branches.

8. The rate of exfiltration from the sewers shall be determined by measuring the amount of water required to maintain the water level at the elevation established at the beginning of the test.

9. The Contractor shall construct such weirs or other means of measurements as may be required, shall furnish water and shall do all necessary pumping to enable the test to be properly made.

10. The Contractor shall be responsible for the satisfactory watertightness of the entire section of sewer. Should the sections under test fail to meet the requirements, the Contractor shall do all work of locating and repairing leaks and retesting as the Engineer may require without additional compensation. A plan of the method of repairing any leaks that are found shall be submitted to the Engineer for review.

B. PIPE DEFLECTION MEASUREMENT:

1. In accordance with ASTM D3034, no less than 30 days after completion of the PVC sewer pipe installation, the Contractor shall test the pipeline for deflection using a "go/no-go" deflection mandrel having a minimum of nine evenly spaced arms or prongs. The "go/no-go" gauge shall be hand pulled through all sections of the pipeline by the Contractor. The Contractor shall submit drawings of the "go/no-go" gauge to the Engineer for approval prior to testing. Complete dimensions of the gauge for each diameter of pipe to be tested shall be in accordance with ASTM D3034.

2. Any section of pipe found to exceed 7.5 percent deflection shall be deemed a failed pipe and shall be excavated and replaced by the Contractor at his own expense.

TABLE I

MINIMUM SPECIFIED TIME REQUIRED FOR A 1.0 PSIG PRESSURE DROP
FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q=0.0015

Pipe Diameter (in)	Minimum Time (min:sec)	Length for Min. Time (ft)	Time for Longer Length (sec)	Specification Time for Length (L) shown (min:sec)							
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft
4	3:46	597	0.380 L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	0.854 L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.52 L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48
12	11:20	199	3.418 L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38
15	14:10	159	5.342 L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41
21	19:50	114	10.470 L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31
24	22:40	99	13.674 L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33
27	25:30	88	17.306 L	28:51	43:16	57:41	72:07	86:32	100:57	115:22	129:48
30	28:20	80	21.366 L	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:15
33	31:10	72	25.852 L	43:05	64:38	86:10	107:43	129:16	150:43	172:21	193:53
36	34:00	66	30.768 L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:46
42	39:48	57	41.883 L	69:48	104:42	139:37	174:30	209:24	244:19	279:13	314:07
48	45:34	50	54.705 L	91:10	136:45	182:21	227:55	273:31	319:06	364:42	410:17
54	51:02	44	69.236 L	115:24	173:05	230:47	288:29	346:11	403:53	461:34	519:16
60	56:40	40	85.476 L	142:28	213:41	284:55	356:09	427.23	498:37	569:50	641:04

TABLE II

MINIMUM SPECIFIED TIME REQUIRED FOR A 0.5 PSIG PRESSURE DROP
FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q=0.0015

Pipe Diameter (in)	Minimum Time (min:sec)	Length for Min. Time (ft)	Time for Longer Length (sec)	Specification Time for Length (L) shown (min:sec)							
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft
4	1:53	597	0.190 L	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	0.427 L	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12
8	3:47	298	0.760 L	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42
10	4:43	239	1.187 L	4:43	4:43	4:43	4:57	5:56	6:55	7:54	8:54
12	5:40	199	1.709 L	5:40	5:40	5:42	7:08	8:33	9:58	11:24	12:50
15	7:05	159	2.671 L	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02
18	8:30	133	3.846 L	8:30	9:37	12:49	16:01	19:14	22:26	25:38	28:51
21	9:55	114	5.235 L	9:55	13:05	17:27	21:49	26:11	30:32	34:54	39:16
24	11:20	99	6.837 L	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17
27	12:45	88	8.653 L	14:25	21:38	28:51	36:04	43:16	50:30	57:42	64:54
30	14:10	80	10:683 L	17:48	26:43	35:37	44:31	53:25	62:19	71:13	80:07
33	15:35	72	12:926 L	21:33	32:19	43:56	53:52	64:38	75:24	86:10	96:57
36	17:00	66	15:384 L	25:39	38:28	51:17	64:06	76:55	89:44	102:34	115:23
42	19:54	57	20.942 L	34:54	52:21	69:49	87:15	104:42	122:10	139:37	157:04
48	22:47	50	27.352 L	45:35	68:23	91:11	113:58	136:46	159:33	182:21	205:09
54	25:31	44	34.618 L	57:42	86:33	115:24	144:15	173:05	201:56	230:47	259:38
60	28:20	40	42.738 L	71:14	106:51	142:28	178:05	213:41	249:18	284:55	320:32

END OF SECTION

SECTION 02220

DEMOLITION

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. Complete demolition of two structures, an equipment trailer and a brick and CMU building used as a concession stand with associated restrooms, and existing site features as stipulated throughout the Contract Documents, to generally include the following:

1. Complete demolition and complete removal and disposal of existing utility vault including floors, slabs, walls, ceilings and roof structures, utilities and related appurtenances.

2. Complete demolition and complete removal of all basketball court pavements, fencing, and associated equipment.

3. Complete demolition and complete removal of softball backstop, fencing, and infield mix.

4. Complete demolition and complete removal of play equipment, fencing, and play surfacing.

5. Complete demolition and complete removal of sports and pedestrian lighting, controls, and associated conduit. Salvaging pedestrian light poles and furnishing to the Owner.

6. Complete demolition and complete removal of irrigation heads and laterals.

7. Complete demolition and complete removal of all asphalt and concrete pavements.

8. Complete demolition and removal of all concrete and masonry walls and associated footings.

9. Complete demolition and complete removal of splash pad pavements, spray features, and associated piping and appurtenances.

10. Stripping and stockpiling of existing soils.

11. Complete demolition and complete removal of all other site items as indicated on the plans.

12. Salvaging of limited site features if designated on the Contract Documents.

13. Identifying, cutting, capping and abandonment of all utility systems as detailed and specified throughout the Contract Documents.

14. Installation of environmental controls including silt fencing / erosion controls prior to commencing work of any kind on premises.

15. Protection of the adjacent properties, coordination with the City of Somerville and Argenziano School representatives as needed and required, conducting of demolition and restoration operations in a manner that does not disrupt or inconvenience normal activities and/or special events at the property.

B. Restoration of all project areas upon the successful and satisfactory execution of all demolition efforts as specified throughout the Contract Documents.

1.02 REGULATORY REQUIREMENTS:

A. Conform to applicable codes and requirements for demolition of structure, safety of adjacent structure, dust control, service utilities, and discovered hazards.

B. Dispose or recycle all demolition debris in accordance with all applicable regulations.

1. Contractor is solely responsible for obtaining permits or approvals which may be required to perform the work of this Section, including all costs, fees and taxes required or levied. All legally imposed charges made by local authorities for the work of this Section involving the connection, inspection and approval services of all bureaus administering all applicable codes and regulations shall be provided hereunder at no additional expense to the Owner.

2. Notify and obtain such permits or approvals from all agencies having jurisdiction over demolition prior to starting work including, but not limited to Health, Building, and Fire Departments of the municipality and local, State and Federal agencies. The Contractor shall give the proper authorities all required notices or information relating to work in his charge, pay all fees necessary to obtain all official licenses, permits and certificates, and comply with the rules of the Massachusetts Department of Public Safety.

3. Comply with all applicable Federal, State, and local environmental, safety and health requirements and regulations regarding the demolition of structures and other site features and recycling or disposal of demolition debris, as applicable.

4. Conform to applicable codes and requirements for demolition of structures, safety of adjacent structures, dust control, service utilities, and discovered hazards.

1.03 PROTECTION:

A. The Contractor shall assume complete responsibility and liability for the safety and structural integrity of all work and utilities to remain during demolition. The contractor shall take special care when working within or near the drainage culvert easement. Refer to plans for location.

B. Provide safeguards including, but not limited to, warning signs, barricades, temporary fences, warning lights and other items required for protection of personnel and the general public during performance of all work.

C. All features related to protection shall be maintained until that work has been completed to the point when such safeguards are no longer required.

D. Install erosion controls to protect adjacent areas from eroded materials likely to enter adjacent properties, resource areas, or drainage ways/systems, downstream of areas disturbed by work activities.

E. Where items to be demolished are located within or adjacent to pavements to remain, the Contractor shall make provisions to protect that pavement to remain. Cut concrete pavement back to the nearest score line and cut bituminous concrete pavement back far enough to prevent disturbance to base course materials. Pavements damaged as a result of Contractor activities shall be replaced to the extent determined by the Engineer at no additional cost to the Owner.

1.04 RELATED WORK:

A. Section 01570- ENVIRONMENTAL PROTECTION
B. Section 01562- DUST CONTROL

1.05 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

A. Submit six (6) copies of a demolition plan and schedule, for each site, to the Engineer for review at least two weeks prior to the start of work, describing the proposed sequence, methods, and equipment required for the demolition and disposal. Identifying recycling and disposal facilities, with applicable permits, for each waste stream. Also, indicate measures to be taken to protect adjacent properties and all adjacent facilities to remain.

B. Do not proceed with the demolition until the Engineer has given written acceptance of the demolition plan.

C. Evidence of lawful disposal or recycling of all wastes generated, including waste shipment manifests, shipping records, and weight slips shall be submitted and up to

date with each request for payment. Requests for payment will be returned, in the event that this requirement is not met.

PART 2 - PRODUCTS

2.01 TEMPORARY FENCE:

A. The work under these Items shall conform to the relevant provisions of section 644 of the MassDOT standard specifications.

B. The work shall include temporary installation of chain link fence around the perimeter of the work limits where shown on the plans, and as required by the Engineer, and as Contractor sees fit to protect work.

C. Temporary fence shall consist of 6 foot high chain link fence anchored into a base that is both stable and movable to allow access and adjustment as needed. Reclaimed existing fence fabric and materials may be used with the approval of the Engineer. The Contractor shall submit a shop drawing to the Engineer for approval prior to installation.

2.02 BACKFILL:

A. The Contractor shall provide suitable backfill as specified under Section 02300 of these Specifications, to fill voids left by removal or abandonment of site features, and shall provide all pipe cap ends, mortar, brick and other material needed to cap off or plug pipes of various sizes and kinds.

B. Suitable materials shall be used as base course fill and topsoil to the depth as specified herein. Restore disturbed areas with similar materials blended to match the line and grades of adjacent surfaces.

PART 3 - EXECUTION

3.01 PREPARATION:

A. Provide, erect, and maintain temporary barriers and security devices. Temporary fence shall be erected and existing chain link fences may be maintained in place throughout the demolition process. Erect temporary chain link construction fencing at as voids are created in the perimeter of the work area (formed by buildings to be demolished.)

B. Notify City of Somerville of procedures and operations that may affect the property or adjacent properties, of potential noise, utility outages, or other potential disruptions. Coordinate with City of Somerville and Engineer.

C. Protect all existing site features and elements that are to remain or that are to be removed and transported as stipulated elsewhere in the Contract Documents.

D. Arrange with, pay for all required fees, and perform work required by utility companies and municipal departments for discontinuance or interruptions of utility services due to demolition work.

E. Arrange with, pay for all required fees, and perform work required by municipal departments for interruptions of road/sidewalk access due to demolition work. Fees associated with any required police details shall also be the responsibility of the contractor.

3.02 DEMOLITION REQUIREMENTS:

A. The demolition of the vaults, walls, site features, utilities and related appurtenances shall be accomplished by methods that will not cause damage to surrounding structures, underground and overhead utilities, or other existing items and structures that are to remain in place.

B. Under no circumstances shall explosives be used.

C. Conduct operations with minimum interference to public or private properties and access routes. Gain access to the premises at designated locations only.

D. Maintain protected access and egress at all times. Do not close or obstruct roadways without permits.

E. Cease operations immediately if adjacent properties or facilities appear to be in danger. Notify the City of Somerville for direction prior to commencing with work.

F. Restore all disturbed areas outside the demolition areas to original conditions, remove and replace all elements that are intended to remain, but have been damaged to the satisfaction of the City of Somerville.

3.03 EROSION AND DUST CONTROL:

A. Erosion and dust control measures will be required during the project to prevent the potential migration of impacted soil/sediment off-site. As part of the general site work, the Contractor shall include environmental protection (straw wattles, etc.), as required, to prevent sediment laden water from leaving the site. The Contractor shall also install and maintain catch basin protection (sediment control fabric) at the surrounding catch basins. Vehicles leaving the site shall have no mud and dirt on the vehicle body or wheels. Any foreign matter on the vehicle body or wheels shall be physically removed prior to the vehicle's entering a public roadway. Contractor shall not permit any truck to leave the site with exterior mud or dirt that has the potential to be deposited on public roadways.

B. The Contractor is responsible for implementing engineering controls to minimize or eliminate fugitive dust emissions at the site. These engineering controls shall be implemented during all demolition and earthwork activities (demolition, stockpiling, excavating, loading, backfilling, grading, and removal of material). If dust exceeds action levels (150 micrograms per cubic meter (µg/m3)), or determined to be a nuisance by the Engineer, the Contractor shall implement additional engineering controls (e.g., additional dust suppression agents, wind screens, wind barriers), as required by the Engineer, at no additional cost to the Owner.

3.04 EXCAVATIONS AND SITE SECURITY:

A. Upon completion of daily work, the Contractor will secure open excavations with steel plates and/or temporary chain link fencing, as appropriate, for public safety. The Contractor shall be responsible for public safety and security within their work zone for the duration of this Project.

3.05 SALVAGEABLE MATERIAL:

A. Frames, grates and other salvageable material shall be carefully removed to minimize damage and stored for later reuse, transport, or removal from site.

3.06 ABANDONED STRUCTURES:

A. All inlets and outlets shall be plugged with at least eight (8) inches of brick and mortar masonry. Upper portions of masonry structures shall be removed to a depth of three feet. The bottoms of all structures shall be broken to allow drainage, and the structure shall be filled with suitable backfill material placed in six (6) inch layers and thoroughly compacted at each level.

B. The Engineer shall review work related to abandoned structures before backfilling. Those items not reviewed before backfilling shall be uncovered and backfill procedures observed, at no expense to the Owner.

3.07 ABANDONED PIPES OR CONDUITS:

A. Plug previously abandoned drainpipes encountered with masonry brick at least eight (8) inches in thickness.

B. Abandon discontinued water supplies that are encountered during the execution of this contract in accordance with Owner requirements.

F. Electrical conduits encountered and previously abandoned shall be capped or plugged.

3.08 CLEAN UP:

A. Remove demolished materials from sites as work progresses. Provide evidence of satisfactory disposal or recycling accommodations for all demolished materials.

B. Leave areas of work in safe and clean condition at the end of each work day.

C. Restore all project areas and adjacent project areas in conformance with the Contract Documents.

END OF SECTION

SECTION 02220

SELECTIVE STRUCTURE DEMOLITION

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. Demolish designated vault structure, disconnect utilities; remove building utility control wall panels complete.

B. Remove all utility equipment and fixtures; crush and compact walls and slab for burial.

B. Crush foundations and substructures, fill and compact as required for full burial without impact on proposed improvements or existing tree roots.

1.02 REGULATORY REQUIREMENTS:

A. Conform to applicable codes and requirements for demolition of structure, safety of adjacent structure, dust control, service utilities, and discovered hazards.

B. Dispose or recycle all demolition debris in accordance with all applicable regulations.

1.03 RELATED WORK:

A. Section 01110, CONTROL OF WORK MATERIALS

B. Section 01562, DUST CONTROL

C. Section 02300, EARTHWORK

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

A. Submit a demolition plan to the Engineer for review at least two weeks prior to the start of work, describing the proposed sequence, methods, and equipment required for the demolition and disposal. Also, indicate measures to be taken to protect new work, and structures and facilities to remain.

B. Do not proceed with the demolition until the Engineer has given written acceptance of the demolition plan. Also, no demolition work shall proceed until the new facility is complete, fully operational, and beneficial occupancy has been obtained by the Owner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 PREPARATION:

A. Provide, erect, and maintain temporary barriers and security devices.

B. Notify Owner of procedures which may affect property, of potential noise, utility outage, or disruption. Coordinate with Owner.

C. Erect and maintain temporary partitions to prevent spread of dust, odors and noise to permit continued Owner occupancy.

D. Protect existing items (ie: mature shade trees) which are not indicated to be removed.

E. Arrange with, pay for all required fees, and perform work required by utility companies and municipal departments for discontinuance or interruptions of utility services due to demolition work.

3.02 DEMOLITION REQUIREMENTS:

A. Conduct demolition in accordance with approved plan, so as to minimize interference with adjacent building areas.

B. Under no circumstances shall explosives be used.

C. Conduct operations with minimum interference to public or private accesses.

D. Maintain protected access and egress at all times. Do not close or obstruct roadways without permits.

3.03 UTILITY VAULT DEMOLITION:

A. Disconnect, cap, identify and remove designated utilities.

B. Demolish components indicated, in an orderly and careful manner.

C. Crush and compact concrete slabs-on-grade as clean fill.

D. Remaining concrete materials shall be crushed, compacted and buried to a minimum of 2 feet below finished grade.

E. Backfill foundations and substructure excavations with Class B or Select Backfill. Compact backfill in accordance with Section 02300, EARTHWORK.

F. Rough grade and compact areas affected by demolition to maintain grades and contours per Drawings.

3.04 SELECTIVE DEMOLITION:

A. Demolish and remove components in an orderly and careful manner, in sequence as indicated on Drawings.

B. Protect existing supporting structural members and equipment.

3.05 CLEAN UP:

A. Remove demolished materials from site as work progresses.

B. Leave areas of work in clean condition.

END OF SECTION

SECTION 02222

ABANDONMENT OF SEWERS AND DRAINS

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This Section covers the abandonment of sewers and drains through various means including furnishing, handling and installation of all concrete and masonry plugs; removal and disposal of manholes, and filling existing pipes with controlled density fill, as shown on the Drawings and specified herein.

B. The Contractor shall furnish all materials, tools, labor, and equipment to abandon existing sewers, combined sewers, and drains.

1.02 RELATED WORK:

A. Section 02058, CONTROLLED DENSITY FILL

B. Section 03302, FIELD CONRETE

1.03 REFERENCES:

The following standards form a part of this specification, as referenced:

American Society for Testing and Materials (ASTM)

ASTM C32 Specifications for Sewer and Manhole Brick (Made from Clay or shale).

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

The Contractor shall submit six sets of its plan for abandoning existing pipe, showing equipment, methods and materials. The plan shall be submitted to and reviewed by the Engineer before construction.

PART 2 - PRODUCTS

2.01 PLUGS:

A. Plugs installed at the open ends of the pipe to be abandoned shall be 12-inch thick 3,000-psi cement concrete, or 8-inch thick brick masonry as directed. The pipes to be

abandoned include all sewer, combined sewer, and drains as specified herein and as shown on the Drawings.

B. Precast cement concrete plugs that are used shall meet the requirements for 3,000 psi concrete and shall be free of cracks and spalls. Brick masonry plugs shall be made of brick meeting the requirements of ASTM C32, for grade SS, hard brick.

C. Mortar shall be composed of portland cement, hydrated lime, and sand, and the volume of sand shall not exceed three times the sum of the volumes of cement and lime. The proportions of cement and lime shall be as directed and may vary from 1:1/4 for dense hard-burned brick to 1:3/4 for softer brick. In general, mortar for grade SS brick shall be mixed in the volume proportions of 1:1/2:4-1/2; portland cement to hydrated lime to sand. The cement concrete plug shall be covered with non-shrink grout to prevent leakage at the plug.

2.02 PIPE FILL:

A. Fill used for the abandonment of sewers, combined sewers, and drains as shown on the drawings shall consist of clean fill, or controlled density fill meeting the requirements included in Section 02058 Controlled Density Fill.

B. Any variance from the specified material shown on the plans or as specified herein for the abandonment of the pipeline shall be subject to the written approval of the Engineer.

PART 3 - EXECUTION

3.01 INSTALLATION

A. PLUGS:

1. Existing sewers or drains shall be plugged with 3,000 psi concrete or with brick masonry, as required by the Engineer. For non-circular pipes, the largest interior cross sectional dimension shall govern in determining size of abandonment.

2. Plugs shall be of adequate strength to withstand the full soil and groundwater pressure but not less than 5 psi.

3. Open ends of sewer and drain services less than 12 inches in diameter shall be plugged with the appropriate VC plugs or concrete plug as required by the Engineer. Such plug shall be made watertight with an application around the plug of an approved watertight compound.

4. Masonry plugs shall be at least 8-inches thick and concrete plugs shall be at least 12-inches thick. Pipes entering a manhole or catch basin that are to be abandoned shall have a plug installed that is flush with the interior wall of the structure.

B. PIPE FILL:

1. Existing sewers or drains 12-inches and larger shall be abandoned and filled with clean fill, or controlled density fill, and plugged, as shown on the Drawings.

2. Existing sewers or drains smaller than 12-inches shall be plugged and abandoned but need not be filled with clean fill or any other material unless otherwise specified by the Engineer.

3. The method of filling the abandoned pipeline shall fill a minimum of 95 percent of the total annular volume of the pipe.

3.02 REMOVAL AND DISPOSAL OF MANHOLES

A. REMOVAL OF MANHOLES

1. Frames and covers will be removed and delivered to the place designated by the Owner.

2. After filling the pipes to be abandoned that are entering the manhole as specified above, the Contractor shall remove the cone section of a precast manhole or the top four feet of brick in a brick manhole.

3. The Contractor shall place and compact clean fill in the void left by the removal of the manhole.

4. The ground or paved surface shall be restored in accordance with the drawings.

B. DISPOSAL OF MANHOLES

1. The Contractor shall dispose of all manhole materials that are to be removed. Unless the Owner designates a site for receiving the removed materials, the Contractor shall dispose of the materials at a site of his own choosing.

END OF SECTION

SECTION 02223

SELECTIVE SITE DEMOLITION

PART 1 - GENERAL

1.01 SCOPE OF WORK:

A. Work under this Section shall consist of the careful removal, storage for reuse, transportation off-site, or demolition, of all structures and site features encountered or noted to be removed or abandoned to a minimum of three feet below finished grade, and the removal and disposal of all materials not called for to be reused or salvaged, in accordance with the contract drawings, these specifications, and Engineer's requirements. Provide all labor, equipment, materials and transportation necessary to complete the work.

B. Items plan referenced to be removed and stored shall be carefully removed and stored on site in a manner and location designated by the Engineer for reinstallation later as shown on the plans or as indicated by the Engineer.

C. Items plan referenced, or as indicated by the Engineer to be removed and disposed of shall be removed from the site and properly and legally disposed of by the Contractor.

D. Items indicated on the contract drawings or in the specifications to be removed and salvaged, or other items required to be removed by the Engineer, shall be transported to a municipal storage facility, located within the City confines, and unloaded and stacked as required by the Engineer.

E. Items indicated on the contract drawings or in the specification to be removed and reset shall be carefully removed and reset in the same location as existing according to the specification and details.

F. The following scope describes the general work/demolition requirements of this Section.

1. Cement concrete and bituminous concrete pavements.

2. Curbing

3. Fencing around play area.

4. Chain link fencing and footings complete.

5. Sports and pedestrian lighting.
6. Concrete retaining walls, stairs and masonry rip rap

7. Other features as indicated on the drawings.

1.02 PROTECTION:

A. The Contractor shall assume complete responsibility and liability for the safety and structural integrity of all work and utilities to remain during demolition.

B. Provide safeguards including, but not limited to, warning signs, barricades, temporary fences with scrims for dust control 6' height minimum, warning lights and other items required for protection of personnel and the general public during performance of all work.

C. All features related to protection shall be maintained until that work has been completed to the point when such safeguards are no longer required.

1.03 SPECIAL REQUIREMENTS:

A. Install erosion controls to protect adjacent areas from eroded materials likely to enter drainage ways/systems, downstream of areas disturbed by work activities.

B. Where items to be demolished are located within or adjacent to pavements to remain, the Contractor shall make provisions to protect that pavement to remain. Cut concrete pavement back to score line and cut bituminous concrete pavement back far enough so as not to allow disturbance to base course materials. Pavements damaged as a result of Contractor activities shall be replaced to the extent determined by the Engineer at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 BACKFILL:

A. The Contractor shall provide suitable backfill as specified under Section 02300 of these Specifications, to fill voids left by removal or abandonment of site features, and shall provide all pipe cap ends, mortar, brick and other material needed to cap off or plug pipes of various sizes and kinds.

B. Suitable materials shall be used as base course fill and topsoil to the depth as specified herein. Restore disturbed areas with similar materials blended to match the line and grades of adjacent surfaces.

2.02 TEMPORARY FENCE:

A. The work under these Items shall conform to the relevant provisions of section 644 of the MassDOT standard specifications.

B. The work shall include temporary installation of chain link fence around the perimeter of the work limits where shown on the plans, and as required by the Engineer, and as Contractor sees fit to protect work.

C. Temporary fence shall consist of 6 foot high chain link fence anchored into a base that is both stable and movable to allow access and adjustment as needed. Reclaimed existing fence fabric and materials may be used with the approval of the Engineer. Dust control scrims shall be required where property limits are shared with residential abutters. The Contractor shall submit a shop drawing to the Engineer for approval prior to installation.

PART 3 - EXECUTION

3.01 SALVAGEABLE MATERIAL:

A. Frames, grates and other salvageable material shall be carefully removed to minimize damage and stored for later reuse, transport, or removal from site.

3.02 ABANDONED STRUCTURES:

A. All inlets and outlets shall be plugged with at least eight (8) inches of brick and mortar masonry. Upper portions of masonry structures shall be removed to a depth of three feet. The bottoms of all structures shall be broken to allow drainage, and the structure shall be filled with suitable backfill material placed in six (6) inch layers and thoroughly compacted at each level.

B. The Engineer shall review work related to abandoned structures before backfilling. Those items not reviewed before backfilling shall be uncovered and backfill procedures observed, at no expense to the Owner.

3.03 ABANDONED PIPES OR CONDUITS:

A. Plug previously abandoned drainpipes encountered with masonry brick at least eight (8) inches in thickness.

B. Abandon discontinued water supplies that are encountered during the execution of this contract in accordance with Owner requirements.

C. Electrical conduits encountered and previously abandoned shall be capped or plugged.

END OF SECTION

SECTION 02230

CLEARING AND GRUBBING

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. The Contractor shall do all required clearing and grubbing as indicated on the drawings or herein specified in the area required for construction operations on the Owner's land or in the Owner's permanent or temporary easements and shall remove all debris resulting therefrom.

B. Unless otherwise noted, all areas to be cleared shall also be grubbed.

C. The Contractor shall not clear and grub outside of the area required for construction operations.

1.02 RELATED WORK:

Any trees and shrubs specifically designated by the Owner not to be cut, removed, destroyed, or trimmed shall be saved from harm and injury in accordance with Section 01570, ENVIRONMENTAL PROTECTION.

PART 2 - PRODUCTS: NOT APPLICABLE

PART 3 - EXECUTION

3.01 RIGHT TO WOOD AND LOGS:

The Owner shall have the right to cut and remove logs and other wood of value in advance of the Contractor's operations. All remaining logs and other wood to be removed in the course of clearing shall become the property of the Contractor.

3.02 CLEARING:

A. Unless otherwise indicated, the Contractor shall cut or otherwise remove all trees, saplings, brush and vines, windfalls, logs and trees lying on the ground, dead trees and stubs more than 1-foot high above the ground surface (but not their stumps), trees which have been partially uprooted by natural or other causes (including their stumps), and other vegetated matter such as shags, sawdust, bark, refuse, and similar materials.

B. Except where clearing is done by uprooting with machinery or where stumps are left longer to facilitate subsequent grubbing operations, trees, stumps, and stubs to be cleared shall be cut as close to the ground as practicable but not more than 6-inches above the ground surface in the case of small trees, and 12-inches in the case of large

trees. Saplings, brush and vines shall be manually pulled from the ground along with as much of the root mass as possible to prevent resprouting.

3.03 GRUBBING:

A. Unless otherwise indicated, the Contractor shall completely remove or grind all stumps and roots to a depth of 18-inches.

B. Any depression remaining from the removal of a stump and not filled in by backfilling shall be filled with gravel borrow and/or loam, whichever is appropriate to the proposed ground surface.

3.04 DISPOSAL:

All material collected in the course of the clearing and grubbing, which is not to remain, shall be disposed of in a satisfactory manner away from the site or as otherwise approved. Such disposal shall be carried on as promptly as possible and shall not be left until the final clean-up period.

END OF SECTION

SECTION 02235

TREE PRUNING AND TREE AND STUMP REMOVALS

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. The work of this Section includes the following:

1. Pruning – all trees to remain shall have crown cleaning performed including the removal of dead and crossing limbs as well as all limbs necessary to execute the scope of work required under this contract.

2. Removal of trees and stumps.

B. Refer to the Contract Drawings for general location of trees to be removed. In general, unless otherwise noted on the drawings most trees are to remain and be pruned in conformance with this Specification. Tree removals shall be limited to the locations denoted on the plans and shall include the removal of individual trees that would impede the construction of proposed facilities AS APPROVED BY OWNERS REPRESENTATIVE.

1.02 QUALIFICATIONS OF CONTRACTOR:

A. This work shall be limited to individuals, partnerships and corporations who are actively engaged in the field of Arboriculture, and who demonstrate competence, experience and financial capability to carry out the terms of this project. The Owner may require proof of these qualifications.

B. All work shall be conducted by qualified and trained personnel under the direct supervision of a Massachusetts Certified Arborist (MCA) in the Contractor's employ.

1.03 PERSONNEL:

A. The Contractor shall submit each employee's name and title prior to the commencement of work. The Contractor shall advise the Owner of any changes in personnel assigned to this Contract.

B. The crew foreman shall have a minimum of five (5) years climbing/pruning experience. At least one (1) crew person shall be an MCA and shall be certified in CPR.

C. Each trimmer shall be experienced and highly qualified with the necessary tree

worker skills to successfully complete the work of this Section, including the ability and training to perform aerial rescue. Said skill shall also include worker safety and ability in compliance with current OSHA and ANSI Z-133.1 Standards.

1.04 SPECIAL REQUIREMENTS:

A. Dutch Elm diseased wood shall be disposed of in accordance with provisions of General Laws, Chapter 87, Section 5, and Chapter 132, Sections 8 and 11 as amended; and in accordance with any additional local regulations. All wood shall be removed from the site and be properly disposed of in accordance with state and local regulations.

B. No burning shall be permitted on the project site.

C. Prior to commencing work, the Contractor shall submit a plan to the Owner for legal disposal of removed materials, in conformance with State and Federal regulations.

1.05 STANDARDS AND DEFINITIONS:

A. All pruning work shall be performed in accordance with the following:

1. The ANSI A300 'Standard Practices for Trees, Shrubs, and Other Wood Plant Materials' of the Secretariat: National Arborist Association, Post Office Box 1094, Amherst, New Hampshire 03031.

2. American National Standards Institute (ANSI) Standard Z-133.1.

3. The standards and practices of the International Society of Arborists.

4. The standards and practices of the Massachusetts Arborist Association.

5. The standards and practices of the American Association of Nurserymen.

B. The term 'Owner' shall mean the Owner's designated representative charged with carrying out the requirements of this Project, Architect, Engineer, Planner, or Tree Warden as referenced herein, rendering approvals for the Owner.

1.06 EXAMINATION OF SITE AND DOCUMENTS:

A. The Contractor shall be responsible for having a clear understanding of the existing site conditions and shall be responsible for fully carrying out the work of this Section, regardless of actual site conditions encountered.

1.07 ORDER OF WORK:

A. Based on the site conference, the Contractor shall submit a schedule of work for the Owner's review and approval prior to beginning work. Unless otherwise authorized by the Owner, failure of the Contractor to comply with the approved removal schedule shall be sufficient cause to give notice that the Contractor is in default of the contract.

1.08 PROTECTION OF THE VEGETATION TO BE PRESERVED:

A. The Contractor shall protect all existing trees, shrubs, lawns and other site features designated to remain. The placement of protection devices, such as snow fence enclosures, shall, however, be at the Contractor's discretion.

B. Damage no plant to remain by burning, pumping water, cutting of live roots or branches, or any other means. Neither vehicles nor equipment shall be parked within the dripline of trees to remain, or where ever damage may result to trees to be saved. Construction material shall not be stored beneath trees to be saved.

C. The Contractor shall be liable for any damage to any trees, shrub, lawn or other site features to remain, and shall immediately report to the Owner. Damaged shrubs or lawns shall be restored or replaced to match existing to remain to the satisfaction of the Owner.

D. The Contractor shall compensate the Owner for damages by installing replacement tree(s) of the size and species approved by the Owner and of sufficient quantity such that the sum of the Diameter at Breast Height (DBH) inches for replacement trees equals the total DBH inches of the damaged tree(s). Damaged shrubs shall be replaced with shrubs(s) of the same size, species, and quantity, unless determined otherwise by the Owner.

1.09 USE AND CARE OF THE SITE:

A. The Contractor shall leave the work site at the end of each working period in a condition satisfactory to the Owner.

B. Pavements shall be swept and lawns or other surfaces raked and/or otherwise cleaned of all material related to the work operation. Degree of clean-up required will be described by the Owner and will be based upon the character of the work area.

C. All trimmings or any other form of debris (except diseased materials or trimmings from Elms) shall be collected and chipped. The Contractor shall remove all materials and shall dispose of such materials off site in a legal manner.

D. No vehicles are to be stored on site. The Contractor shall be fully and solely responsible for any damage to equipment or vehicles left at the site of the work.

All necessary permits shall be obtained by the Contractor.

PART 2 - PRODUCTS

2.01 EQUIPMENT:

A. Equipment necessary for this Contract shall be properly maintained and in good operating condition to the City's satisfaction. The Contractor shall promptly remove and replace any equipment which the Owner deems to be in unsatisfactory condition or otherwise unsuitable.

B. Cutting tools shall be kept well sharpened to provide clean smooth cuts. Any tools utilized on any tree suspected to have cankers or other fungal, bacterial or viral diseases shall be sterilized or not used on any other specimen.

C. A disc chipper shall be used which will process material up to twelve (12) inches in diameter.

PART 3 - EXECUTION

3.01 PRUNING:

A. Under this Section, the Contractor shall furnish all labor, materials, equipment and transportation required to complete all aspects of the work in accordance with all local, state and federal regulations in force at the same time of this Contract and in accordance with tree pruning as specified herein.

B. The work of this Section consists of all pruning work and related items as specified herein and includes, but is not limited to:

1. Pruning – Crown cleaning on all trees to remain as well as limb removal required to allow for the proper installation of scope of work, as approved by Owner's Representative prior to any pruning operations.

Crown cleaning is defined as medium pruning and shall consist of the removal of dead, dying, diseased, crossing, interfering, objectionable and weak branches on the main trunks as well as those within the leaf area. An occasional branch one (1) inch or less in diameter may remain within the main leaf area where it is not practical to remove it.

3.02 DESCRIPTION OF PRUNING WORK:

A. Pruning and trimming are generally described as the removal and disposal of limbs, branches and stubs which are either dead, potentially detrimental to the health of the tree or dangerous to pedestrians, visually deficient, interfering or otherwise objectionable as determined by the Owner.

B. The limits of all trees to be pruned have been identified on the plans or referenced elsewhere in this specification section.

C. Vehicle access shall be controlled and approved by the Owner.

D. If the Contractor discovers tree(s) which have not been marked for pruning, but whose condition is such that removal is warranted, whether due to death, disease, decay, or structural weakness, such tree(s) shall not be pruned and the Contractor shall immediately report these findings in writing to the Owner and await the Owner's direction before proceeding with work on the particular tree(s) in question.

E. All pruning shall be performed in a manner that maintains the natural aesthetic characteristics of the species and variety of trees. No topping or dehorning of trees or stubbing back of branches shall be permitted. All cuts shall be made to a lateral branch that is a minimum of one third (1/3) the size of the branch being removed, unless otherwise instructed by the Owner.

F. The use of climbing spurs or spiked shoes shall not be permitted and their use will result in the immediate cancellation of the contract.

G. All cuts shall be made sufficiently close to the parent stem so that wound closure can be readily started under normal conditions. Cuts shall, however, never be made through the branch collar. Slab cuts and rip cuts will result in cancellation of the contract.

H. All limbs over two (2) inches in diameter to be removed shall be precut to prevent splitting. Any branches that by falling would injure existing trees to remain or other objects shall be lowered to the ground by proper ropes.

I. On trees known to be diseased and where there is known to be danger of transmitting the disease on tools, tools shall be disinfected with alcohol or bleach after each cut between trees.

J. Lateral branches as well as occasional branch suckers ("water sprouts") may be retained. Complete removal of secondary laterals and branch suckers resulting in the stripping of major limbs, ("lion tailing") will not be permitted.

K. Tree paint to seal pruning cuts shall not be used.

L. All branches and limbs shall be manually lowered to the ground via rope and pulley. This practice must be consistent with the National Arborist Association Standards for Pruning. All grade-level artifacts and landscaping must be protected from damage.

3.03 REMOVALS:

A. The Contractor shall furnish all labor, materials, equipment and transportation required to complete all aspects of the removals work in accordance with all local, state, and federal regulations in force at the time of this contract and in accordance with tree and stump removals as specified herein and with approval by owner's representative.

3.04 DESCRIPTION OF REMOVAL WORK:

A. Removal is generally described as the removal of groups and individual trees and shrubs which interfere with the growth of more desirable types of trees; the clearing away of lesser growth that may obscure outstanding trees; and thinning out to provide space for healthy growth by the elimination of thinner, weaker trees.

B. The Contractor shall adhere to the specifications and provide suitable facilities for inspecting the work. Failure of the Owner to immediately reject unsatisfactory work or to notify the Contractor of deviations from the specification shall not relieve the Contractor of responsibility to correct or remedy unsatisfactory work.

C. The Contractor shall only work on trees designated by the Owner. No compensation will be made for work performed on any other tree or trees.

D. Trees designated to be removed shall be taken down and all leaves, branches and trunks of trees properly disposed of by chipping and removal from the premises.

E. Fell trees in a manner that allows all site features and those trees to be saved undamaged.

F. Removal of all the parts of each tree shall be completed on the same day that the tree is cut.

G. Stumps shall be ground to eighteen (18) inches below grade by grinding or other means acceptable to the Owner. The void from the stump removal operations shall be filled with ordinary borrow soil to within six (6) inches of finished grade. The top six (6) inches shall be filled with screened loam, moderately tamped to prevent future settling. In grass areas the disturbed area shall be sown with grass seed of a mix appropriate to the location, as directed by the Owner.

H. Excavation or grading within the branch spread of trees to be saved shall be performed only under the direction of the Owner unless otherwise directed. Removal of pavement such as bituminous concrete in these zones shall be by hand tools and/or air spade to ensure root health for trees to remain.

I. All equipment to be used and all work to be performed must be in full compliance

with all standards as promulgated by OSHA at the time of bidding, including but not limited to those regulations concerning noise levels, protective devices and operator safety.

J. The Contractor shall be solely responsible for pedestrian and vehicular safety and control within the work site and shall protect the public and its property from injury or damage that could be caused by the progress of the work. To this end the Contractor shall provide, erect, and maintain protective devices acceptable to the Owner, including but not limited to barricades, lights and warning signs.

K. Any practice employed by the Contractor that is obviously hazardous as determined by the Owner shall be immediately discontinued by the Contractor upon receipt of either written or oral notice from the Owner to discontinue such practice.

END OF SECTION

SECTION 02240

DEWATERING

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section specifies designing, furnishing, installing, maintaining, operating and removing temporary dewatering systems as required to lower and control water levels and hydrostatic pressures during construction; disposing of pumped water; constructing, maintaining, observing and, except where indicated or required to remain in place, removing of equipment and instrumentation for control of the system.

1.02 RELATED WORK:

A. Section 00890, PERMITS

B. Section 01570, ENVIRONMENTAL PROTECTION

C. Section 02252, SUPPORT OF EXCAVATION

D. Section 02350, EXCAVATION BORROW AND BACKFILL

1.03 SYSTEM DESCRIPTION:

A. Dewatering includes lowering the water table and intercepting seepage which would otherwise emerge from the slopes or bottom of the excavation; increasing the stability of excavated slopes; preventing loss of material from beneath the slopes or bottom of the excavation; reducing lateral loads on sheeting and bracing; improving the excavation and hauling characteristics of sandy soil; preventing rupture or heaving of the bottom of any excavation; and disposing of pumped water.

B. Normal dewatering is defined as using conventional pumps installed in open excavations, ditches or sumps.

1.04 QUALITY ASSURANCE:

A. The Contractor is responsible for the adequacy of the dewatering systems.

B. The dewatering systems shall be capable of effectively reducing the hydrostatic pressure and lowering the groundwater levels to a minimum of 2 feet below excavation bottom, unless otherwise required by the Engineer, so that all excavation bottoms are firm and dry.

C. The dewatering system shall be capable of maintaining a dry and stable subgrade until the structures, pipes and appurtenances to be built therein have been completed to the extent that they will not be floated or otherwise damaged.

D. The dewatering system and excavation support (see Section 02252, SUPPORT OF EXCAVATION) shall be designed so that lowering of the groundwater level outside the excavation does not adversely affect adjacent structures, utilities or wells.

1.05 SUBMITTALS

A. Contractor shall submit a plan indicating how they intend to control the discharge from any dewatering operations on the project, whether it is discharge of groundwater from excavations or stormwater runoff during the life of the project.

PART 2 - PRODUCTS: NOT APPLICABLE

PART 3 - EXECUTION

3.01 DEWATERING OPERATIONS:

A. All water pumped or drained from the work shall be disposed of in a manner that will not result in undue interference with other work or damage to adjacent properties, pavements and other surfaces, buildings, structures and utilities. Suitable temporary pipes, flumes or channels shall be provided for water that may flow along or across the site of the work. All disposal of pumped water shall conform to the provisions of Section 01570 ENVIRONMENTAL PROTECTION and Section 00890 PERMITS.

B. Dewatering facilities shall be located where they will not interfere with utilities and construction work to be done by others.

C. Dewatering procedures to be used shall be as described below:

1. Crushed stone shall encapsulate the suction end of the pump to aid in minimizing the amount of silt discharged.

2. For dewatering operations with relatively minor flows, pump discharges shall be directed into hay bale sedimentation traps lined with filter fabric. Water is to be filtered through the hay bales and filter fabric prior to being allowed to seep out into its natural watercourse.

3. For dewatering operations with larger flows, pump discharges shall be into a steel dewatering basin. Steel baffle plates shall be used to slow water velocities to increase the contact time and allow adequate settlement of sediment prior to discharge into waterways.

4. Where indicated on the contract drawings or in conditions of excess silt suspended in the discharge water, silt control bags shall be utilized in catch basins.

D. The Contractor shall be responsible for repair of any damage caused by his dewatering operations, at no cost to the Owner.

END OF SECTION

SECTION 02252

SUPPORT OF EXCAVATION

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This section of the specification covers wood sheeting and bracing for support of excavations. The requirements of this section shall also apply, as appropriate, to other methods of excavation support and underpinning which the Contractor elects to use to complete the work.

B. The Contractor shall furnish and place timber sheeting of the kinds and dimensions required, complying with these specifications, where indicated on the drawings or required by the Engineer.

1.02 RELATED WORK:

A. Section 02240, DEWATERING.

B. Section 02300, EARTHWORK.

1.03 QUALITY ASSURANCE:

A. This project is subject to the Safety and Health regulations of the U.S. Department of Labor set forth in 29 CFR, Part 1926, and to the Massachusetts Department of Safety and Department of Labor, Division of Occupational Safety "Excavation & Trench Safety Regulation (520 CMR 14.00)" and "Rules and Regulations for the Prevention of Accidents in Construction Operations (454 CMR 10.0 et seq.)." Contractors shall be familiar with the requirements of these regulations.

B. The excavation support system shall be of sufficient strength and be provided with adequate bracing to support all loads to which it will be subjected. The excavation support system shall be designed to prevent any movement of earth that would diminish the width of the excavation or damage or endanger adjacent structures.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Timber sheeting shall be sound spruce, pine, or hemlock, planed on one side and either tongue and grooved or splined. Timber sheeting shall not be less than nominal 2-inches thick.

B. Timber and steel used for bracing shall be of such size and strength as required in the excavation support design. Timber or steel used for bracing shall be new or undamaged used material which does not contain splices, cutouts, patches, or other alterations which would impair its integrity or strength.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Work shall not be started until all materials and equipment necessary for their construction are either on the site of the work or satisfactorily available for immediate use as required.

B. The sheeting shall be securely and satisfactorily braced to withstand all pressures to which it may be subjected and be sufficiently tight to minimize lowering of the groundwater level outside the excavation, as required in Section 02240, DEWATERING.

C. The sheeting shall be driven by approved means to the design elevation. No sheeting may be left so as to create a possible hazard to safety of the public or a hindrance to traffic of any kind.

D. If boulders or very dense soils are encountered, making it impractical to drive a section to the desired depth, the section shall, as required, be cut off.

E. The sheeting shall be left in place where indicated on the drawings or required by the Engineer in writing. At all other locations, the sheeting may be left in place or salvaged at the option of the Contractor. Steel or wood sheeting permanently left in place shall be cut off at a depth of not less than two feet below finish grade unless otherwise required.

F. All cut-off will become the property of the Contractor and shall be removed by him from the site.

G. Responsibility for the satisfactory construction and maintenance of the excavation support system, complete in place, shall rest with the Contractor. Any work done, including incidental construction, which is not acceptable for the intended purpose shall be either repaired or removed and reconstructed by the Contractor at his expense.

H. The Contractor shall be solely responsible for repairing all damage associated with installation, performance, and removal of the excavation support system.

END OF SECTION

SECTION 02290

TYPICAL SEEDING

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This Section includes furnishing all labor, materials, equipment, seed and incidental materials necessary to accomplish all grass seeding and related work, complete in place, maintained, and accepted, in accordance with the Contact Drawings and Specifications. All grassed areas disturbed by the Contractor's operations shall be repaired as herein specified.

B. The Contractor shall bear the responsibility and cost of furnishing and applying water or any other substances, as necessary to ensure the sustainability of grass seeded areas, as part of the work of this contract.

1.02 RELATED WORK:

A. Section 02910, SCREENED LOAM BORROW AND TOPSOIL REUSED.

1.03 SUBMITTALS:

In accordance with requirements of general specifications, the Contractor shall submit the following to the Engineer for review and approval:

A. Six copies of information for seed mixes including the following:

1. Name and address of the seed supplier.

2. Source of origin and dates of harvest for each of the various types of seed

3. Certification of seed mix composition and proportion, indicating named seed varieties by percent, percent germination, purity, and percent crop seed, percent inert matter, and percent weed seed content.

4. Estimated number of seeds per pound of each type of seed in the mix

5. Ingredients that comprise the hydroseed mix

B. Six copies of information detailing proposed limestone, fertilizers, herbicide, mulch materials, hydroseeding materials (as required), and slope protection material (as required) to be applied to seeded areas.

C. Six copies of watering, fertilizing and maintenance schedule.

D. Six copies of marked up prints indicating the square footage of all proposed seeded areas with quantities of various soil additives and amendments, and quantities of seed for each area prior to beginning work.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. LOAM BORROW;

1. Loam Borrow shall be as specified in Section 02910, SCREENED LOAM BORROW AND TOPSOIL RE-USED.

B. LIMESTONE:

1. Lime shall be an approved agricultural limestone containing at least 50 percent total oxides (calcium oxide and magnesium oxide). The material will be ground such that 50 percent of the material will pass through a No. 100 mesh sieve and 98 percent will pass a No. 2 mesh sieve. Lime shall be uniform in composition, dry and free-flowing and shall be delivered to the site in the original sealed containers, each bearing the manufacturer's guaranteed analysis.

C. FERTILIZER:

1. Fertilizer shall be a complete, standard commercial fertilizer, homogenous and uniform in composition, dry and free-flowing, and shall be delivered to the site in the manufacturer's original sealed containers, each bearing the manufacturer's guaranteed analysis and marketed in compliance with State and Federal Laws. All fertilizer shall be used in accordance with the manufacturer's recommendations.

2. The analysis for supplemental maintenance fertilizer shall have a ratio of Nitrogen (N) – Phosphorous (P) – Potassium (K) of approximately 4 – 1 – 2 and shall be applied to deliver 1 pound of Nitrogen per 1000 square feet, or as approved by the Engineer. At least 50 percent of nitrogenous elements shall be Urea-form or derived from organic sources and contain no less than 3 percent water soluble Nitrogen.

D. SEED:

1. Seed shall be of an approved perennial variety mixture, the previous year's crop, clean, and high in germinating value. Weed seed content shall be less than 0.5 percent and include no noxious weeds. Seed shall be obtained from a reliable seed company and shall be accompanied by certificates of compliance relative to mixture purity and germinating value. Seed shall be furnished and delivered in new, clean, sealed and properly labeled containers. All seed shall comply with applicable State and Federal laws. Seed that has become wet, moldy or otherwise damaged shall not be accepted.

2. Grass seed for lawn areas shall conform to the following requirements:

Botanical and Common Names	Proportion by Weight	Germination Rate	Purity Minimum
Chewing's Fescue (Festuca rubra commutata)	30%	70%	97%
'Kentucky 31' Tall Fescue (Festuca arundinacea 'Kentucky 31')	30%	90%	98%
Kentucky Bluegrass (Poa pratensis)	20%	80%	85%
Perennial Ryegrass (Lolium perenne)	20%	90%	98%

E. TEMPORARY COVER CROP:

1. Temporary cover crop shall conform to the following requirements:

Botanical and Common Names	Proportion by Weight	Germination Rate	Purity Minimum
Annual Ryegrass (Lolium multiflorum)	80% min.	85%	%
Creeping Red Fescue (Festuca rubra)	4% min.	85%	95%
Perennial Ryegrass (Lolium perenne)	3% min.	90%	98%
Red Clover (Trifolium pratense)	3% min.	90%	%
Other Crop Grass	0.5% max.		
Noxious Weed Seed	0.5% max.		
Inert Matter	1.0% max.		

G. MULCH

1. Materials to be used in mulching seeded areas shall be free of weed seed and shall conform to the following requirements:

a. Hay Mulch shall consist of mowed and properly cured grass, clover or other acceptable plants. No salt hay shall be used.

b. Straw Mulch shall consist of stalks or stems of grain after threshing.

H. HYDROSEED MULCH, TACKIFIERS AND WATER RETENTION AGENTS:

1. Wood fiber mulch for Hydroseed application shall be a manufactured product of natural wood cellulose fibers with a non-toxic green marking dye incorporated to ensure uniform distribution. Mulch shall be packed in sealed original containers, clearly labeled with brand name and manufacturer. It shall have delivered moisture content less than 12 percent.

2. Hydroseed tackifier shall be a powdered starch-based product approved by the Engineer. Hydroseed tackifier shall be applied in conjunction with the hydroseed slurry in accordance with the manufacturer's recommendations.

2. Moisture retention agent shall be a powdered starch-based product, approved by the Engineer, and shall be capable of retaining up to 400 times their weight in water. Moisture retaining agents shall be added to the hydroseed slurry in accordance with the manufacturer's recommendations. Moisture retention agent shall be 'Hydro-Gel', as manufactured by Finn Corporation, Fairfield, OH.

3. Contractor to submit mix ingredients prior to installation of hydroseed.

I. SLOPE EROSION PROTECTION:

1. Erosion control blanket shall be 100 percent biodegradable mesh with 100 percent biodegradable straw or straw/coconut fill. Fill shall be held together by biodegradable fastening. Weight shall be 0.50 pounds per square yard. Erosion control blankets shall be applied parallel to direction of water flow. The erosion control blankets shall be by North American Green, Evansville, IN or approved equal. For slopes 4:1 or greater, erosion control blanket shall be composed of 70 percent straw 30 percent coconut fiber, Model SC150. For slopes less than 4:1, erosion control blanket shall be high velocity straw matting, Model S150.

2. Six-inch wire staples shall be placed in accordance with the manufacturer's recommendations to anchor the mesh material. Staples shall be biodegradable.

J. WATER:

1. Water shall be furnished by the Contractor, unless otherwise specified, and shall be suitable for irrigation and free from ingredients harmful to plant growth and viability. The delivery and distribution equipment required for the application of water shall be the furnished by the Contractor, at no additional cost to the Owner.

PART 3 - EXECUTION

3.01 GENERAL:

A. All work shall be performed by skilled workers with a minimum of 2 years of seeded lawn construction and establishment experience and under the full-time supervision of a qualified foreman.

B. Seeding operations shall not begin less than 4 days after the application of lime and fertilizer and the seedbed areas are reviewed and approved by the Engineer.

C. Seeding shall be done when soil and weather conditions permit in early spring, until June 15, or from September 10 to October l5, unless otherwise approved. If it becomes necessary for seed to be sown after June 15, provisions shall be made for supplementary water and using mulch cover over lawn areas.

D. If there is a delay in seeding, during which weeds grow, or soil is washed out, the Contractor shall eliminate the weeds by physical means, or replace the soil before sowing the seed, without additional compensation. Immediately before seeding is begun, the soil shall be lightly raked.

E. Seed shall be sown at the approved rate, on a non-windy day by machine, or as approved by the Engineer.

F. The surface shall be kept moist by a fine spray until the seed shows uniform germination over the entire area. Wherever poor germination occurs in areas larger than 3 square feet, the Contractor shall reseed, roll, straw and water as necessary to obtain proper germination.

G. If there is insufficient time in the planting season to complete soil preparations, fertilizing, and seeding, permanent seeding may be left until the following planting season, at the option of the Contractor, or on order of the Engineer. In that event, a temporary cover crop shall be sown. This cover crop shall be cut and watered as necessary until the beginning of the following planting season, at which time it shall be plowed or harrowed into the soil, the area shall be fertilized and the permanent seed crop shall be sown as specified.

H. Protection of all newly loamed and graded areas is required and shall be accomplished by whatever means necessary such as mulch applied with a tackifier, or by other means approved by the Engineer. The Contractor shall be responsible for the prevention of siltation in areas beyond the limit of work and for all means of protection throughout the maintenance period at no additional cost to the Owner.

3.02 LOAM TESTING REQUIREMENTS

A. Loam (vegetative support layer) samples shall be collected from in-place loam at a minimum of every 1000 cubic yards and analyzed for grain size (ASTM D422), pH (Astm D6276) and organic content (ignition test).

3.03 BROADCAST SEEDING, PLACING MULCH AND SLOPE EROSION PROTECTION:

A. The seed mix shall be broadcast at 6 pounds per 1000 square feet, as recommended by the seed supplier, or as directed by the Engineer. Seed shall be divided into 2 equal amounts and uniformly distributed in 2 applications at right angles to each other. Seed shall then be raked lightly into the soil to a depth of l/4 inch.

B. If mulch is not necessary the seed shall be directly firmed into the soil with a roller that will apply pressure between 75 and 100 pounds per linear foot of width.

C. Hay or Straw Mulch shall be used based on time of seeding as previously specified over all seeded areas, as designated on the plans, or as otherwise directed. If mulch is to be used, it shall be loosely spread to a uniform depth at a rate of 4-1/2 tons per acre to provide ¼ inch of cover, or as otherwise directed. The seed and mulch shall then be firmed into the soil with a roller that will apply a pressure between 75 and 100 pounds per foot of width.

D. Hay or Straw Mulch may be applied by mechanical apparatus, if in the judgment of the Engineer, the apparatus spreads the mulch uniformly and forms a suitable mat to control slope erosion. The apparatus shall be capable of spreading at least 80 percent of the hay or straw in lengths of 6-inches or more, otherwise it shall be spread by hand without additional compensation.

E. Slope erosion control blankets shall be placed as indicated on the plans or as directed by the Engineer.

3.04 HYDROSEEDING:

A. The application of lime, fertilizer, grass seed and mulch may be accomplished in a single operation with the use of approved hydroseeding equipment. The materials shall be mixed with water in the machine and kept in an agitated state in order that the materials may be uniformly suspended in the water. The slurry shall be of such consistency that it can be sprayed from a hydroseed gun or through at least 200 feet of 1 ½ inch diameter hose. The spraying equipment shall be so designed that when the solution is sprayed over an area, the resulting deposits of lime, fertilizer, grass seed, and mulch shall be equal to the specified quantities.

B. Prior to the start of hydroseeding, the Contractor shall furnish to the Engineer, in writing, the weights of limestone, fertilizer, grass seed, mulch, tackifier (as required) and moisture retention agent (as required) per 100 gallons of water to be used. This statement should also specify the number of square yards of seeding that can be covered with the solution specified above. If the results of hydroseeding operations are unsatisfactory, the Contractor will be required to abandon this method and to apply the lime, fertilizer, grass seed and mulch by other means.

C. Seed shall be incorporated with the mulching material to obtain a minimum hydroseeded sown coverage of 200 pounds of the specified seed mix per acre, as recommended by the seed suppliers, or as directed by the Engineer.

D. Wood fiber mulch shall be uniformly spread over certain selected seeded areas at the minimum rate of 1,400 pounds per acre unless otherwise directed. Mulch shall be placed

by spraying from an approved spraying machine with pressure sufficient to cover the entire area in a single operation.

E. The Contractor shall immediately cleanup hydroseed oversprays from plant materials, pavements, furnishings, etc., to the satisfaction of the Engineer.

3.05 MAINTENANCE:

A. The Contractor shall maintain and protect the entire seeded area, as necessary to ensure dense healthy growth, until completion of the guarantee period and final acceptance of the project, or for 60 days, whichever is longer. If lawns are planted in late summer or during the fall, maintenance shall continue through the following spring for at least 30 days. Maintenance shall include watering as specified, liming, fertilizing, removal of stones, control of weeds, insect pests and fungal pathogens, and regular mowing. Defective work shall be corrected as soon as possible after it becomes apparent and weather and season permit.

B. The first cutting of lawn areas shall be done when the grass is between 2 ½ - 3 inches in height. The lawn shall be cut no shorter than 2 inches in height and shall be regularly mowed as necessary to maintain the above-prescribed conditions. All cuttings shall be removed from the lawn during the maintenance period and disposed of off-site.

C. The Contractor shall be responsible to regularly water seeded areas with the equivalent of 1-inch minimum of rainfall per week, or as necessary to develop and sustain dense, green growth.

D. Six weeks after turf has established, and only during the months of April, May, or September, the Contractor shall apply fertilizer as specified above, at one half the rate recommended by the initial soils laboratory tests, or as directed by the Engineer.

E. The Contractor shall be responsible for securing all seeded areas from physical damage as necessary, including warning signs, barriers, temporary fencing, or other means of protection, through the guarantee period until final acceptance. All damaged areas shall be repaired to reestablish healthy vigorous growth of turf to the satisfaction of the Engineer, at no additional cost to the Owner. All temporary barriers shall remain the property of the Contractor and shall be removed by the Contractor upon final acceptance by the Engineer.

F. Pavement shall be kept clean and clear of cuttings and debris at all times during the maintenance period to the satisfaction of the Engineer.

3.06 INSPECTION AND PRELIMINARY ACCEPTANCE:

A. At the beginning of the planting season following that in which the permanent grass crop is sown, seeded areas will be inspected. Any section not showing dense, vigorous growth shall be promptly reseeded by the Contractor at no additional cost to the Owner. The seeded areas shall be watered, weeded, cut and otherwise maintained by the Contractor, as many times as necessary, in accordance with these specifications, until they are accepted.

B. The Contractor shall provide written notice to the Engineer not less than 10 days before the anticipated date of inspection for preliminary acceptance. The Engineer shall recommend preliminary acceptance of the work of this Section only after completion and re-inspection of all necessary repairs, renewals, or replacements.

C. Inspection and acceptance of seeded areas may be requested and granted in part, provided the areas for which acceptance is requested are relatively substantial in size, and with clearly definable boundaries. Acceptance and use of these areas by the Owner shall not waive any other provisions of this Contract.

3.07 GUARANTEE:

A. Seeded areas shall be guaranteed until final acceptance of the project, or, in the case of late summer or fall planting, the guarantee period shall extend through the following spring.

B. When the work is accepted in part, the guarantee period shall extend from each partial acceptance to the terminal date of the last guarantee period. All guarantee periods terminate at one time.

C. Guarantee shall not apply to the replacement of seeded lawns resulting from the removal, loss, or damage due to occupancy of the project in any part; vandalism or acts of neglect on the part of others; physical damage by animals, vehicles, etc.; and Acts of God, including but not limited to, catastrophic fire, hurricanes, riots, war, etc.

D. In the instance of curtailment of water by local water authorities (when supply was to be furnished by the Owner), the Contractor shall furnish all necessary water by water tanker, the cost of which will be approved and paid for by the Owner.

3.08 FINAL INSPECTION AND FINAL ACCEPTANCE:

A. At the end of the guarantee period, the Contractor shall provide written notice to the Engineer not less than 10 days before the anticipated date of final inspection for final acceptance.

B. The Engineer shall recommend final acceptance of the work of this Section only after completion and re-inspection of all necessary repairs, renewals or replacements.

END OF SECTION

SECTION 02291

ATHLETIC FIELD SEEDING

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This Section includes furnishing all labor, materials, equipment, seed and incidental materials necessary to accomplish all grass seeding and related work, complete in place, maintained, and accepted, in accordance with the Contact Drawings and Specifications. All grassed areas disturbed by the Contractor's operations shall be repaired as herein specified.

B. The Contractor shall bear the responsibility and cost of furnishing and applying water or any other substances, as necessary to ensure the sustainability of grass seeded areas, as part of the work of this contract.

1.02 RELATED WORK:

A. Section 02910, SCREENED LOAM BORROW AND TOPSOIL REUSED.

B. Section 02911, ROOT ZONE MIX

1.03 SUBMITTALS:

In accordance with requirements of general specifications, the Contractor shall submit the following to the Engineer for review and approval:

A. Six copies of information for seed mixes including the following:

1. Name and address of the seed supplier.

2. Source of origin and dates of harvest for each of the various types of seed

3. Certification of seed mix composition and proportion, indicating named seed varieties by percent, percent germination, purity, and percent crop seed, percent inert matter, and percent weed seed content.

4. Estimated number of seeds per pound of each type of seed in the mix

5. Ingredients that comprise the hydroseed mix

6. Soil amendments and fertilizers and indicated in Appendix E – Sand and Soil Amendments

B. Six copies of information detailing proposed limestone, fertilizers, mulch materials, hydroseeding materials (as required), and slope protection material (as required) to be applied to seeded areas.

C. Six copies of watering, fertilizing and maintenance schedule.

D. Six copies of marked up prints indicating the square footage of all proposed seeded areas with quantities of various soil additives and amendments, and quantities of seed for each area prior to beginning work.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. LOAM BORROW:

1. Loam Borrow shall be as specified in Section 02910, SCREENED LOAM BORROW AND TOPSOIL RE-USED.

B. LIMESTONE:

1. Lime shall be an approved agricultural limestone containing at least 50 percent total oxides (calcium oxide and magnesium oxide). The material will be ground such that 50 percent of the material will pass through a No. 100 mesh sieve and 98 percent will pass a No. 2 mesh sieve. Lime shall be uniform in composition, dry and free-flowing and shall be delivered to the site in the original sealed containers, each bearing the manufacturer's guaranteed analysis.

C. FERTILIZER:

1. Fertilizer shall be a complete, standard commercial fertilizer, homogenous and uniform in composition, dry and free-flowing, and shall be delivered to the site in the manufacturer's original sealed containers, each bearing the manufacturer's guaranteed analysis and marketed in compliance with State and Federal Laws. All fertilizer shall be used in accordance with the manufacturer's recommendations. Refer to Appendix E – Sand and Soil Amendments for required fertilizers. All fertilizers and soil amendments shall meet these requirements or be an approved equal.

2. Refer to Appendix E – Sand and Soil Amendments for required fertilization requirements.

D. SEED:

1. Seed shall be of an approved perennial variety mixture, the previous year's crop, clean, and high in germinating value. Weed seed content shall be less than 0.5 percent and include no noxious weeds. Seed shall be obtained from a reliable seed company and shall be accompanied by certificates of compliance relative to mixture

purity and germinating value. Seed shall be furnished and delivered in new, clean, sealed and properly labeled containers. All seed shall comply with applicable State and Federal laws. Seed that has become wet, moldy or otherwise damaged shall not be accepted.

2. Grass seed for lawn and playing field areas shall conform to the following requirements: TOUCHDOWN 80/20 MIX or approved equal.

Common Names	Proportion by Weight	Germination Rate	Purity Minimum
Touchdown Kentucky Bluegrass	30%	70%	97%
Mercury Kentucky Bluegrass	30%	90%	98%
Armada Bluegrass	20%	80%	85%
Futura 3000 Ryegrass Blend	20%	90%	98%
Refer to Appendix E – for technical information on the seed types			

3. Mix for restoration areas shall be "Erosion Control/ Restoration Mix for Dry Sites" and "Erosion Control/ Restoration Mix for Moist Sites" as provided by New England Wetland plants or approved equal. For seed requirements, refer to plans.

E. TEMPORARY COVER CROP:

1. Temporary cover crop shall conform to the following requirements:

Botanical and Common Names	Proportion by Weight	Germination Rate	Purity Minimum
Annual Ryegrass (Lolium multiflorum)	80% min.	85%	%
Creeping Red Fescue (Festuca rubra)	4% min.	85%	95%
Perennial Ryegrass (Lolium perenne)	3% min.	90%	98%
Red Clover (Trifolium pratense)	3% min.	90%	%
Other Crop Grass	0.5% max.		
Noxious Weed Seed	0.5% max.		
Inert Matter	1.0% max.		

F. MULCH

1. Materials to be used in mulching seeded areas shall be free of weed seed and shall conform to the following requirements:

   a. Hay Mulch shall consist of mowed and properly cured grass, clover or other acceptable plants. No salt hay shall be used.

   b. Straw Mulch shall consist of stalks or stems of grain after threshing.

G. HYDROSEED MULCH, TACKIFIERS AND WATER RETENTION AGENTS:

1. Wood fiber mulch for Hydroseed application shall be a manufactured product of natural wood cellulose fibers with a non-toxic green marking dye incorporated to ensure uniform distribution. Mulch shall be packed in sealed original containers, clearly labeled with brand name and manufacturer. It shall have delivered moisture content less than 12 percent.

2. Hydroseed tackifier shall be a powdered starch-based product approved by the Engineer. Hydroseed tackifier shall be applied in conjunction with the hydroseed slurry in accordance with the manufacturer's recommendations.

2. Moisture retention agent shall be a powdered starch-based product, approved by the Engineer, and shall be capable of retaining up to 400 times their weight in water. Moisture retaining agents shall be added to the hydroseed slurry in accordance with the manufacturer's recommendations. Moisture retention agent shall be 'Hydro-Gel', as manufactured by Finn Corporation, Fairfield, OH.

3. Contractor to submit mix ingredients prior to installation of hydroseed.

H. SLOPE EROSION PROTECTION:

1. Erosion control blanket shall be 100 percent biodegradable mesh with 100 percent biodegradable straw or straw/coconut fill. Fill shall be held together by biodegradable fastening. Weight shall be 0.50 pounds per square yard. Erosion control blankets shall be applied parallel to direction of water flow. The erosion control blankets shall be by North American Green, Evansville, IN or approved equal. For slopes 4:1 or greater, erosion control blanket shall be composed of 70 percent straw 30 percent coconut fiber, Model SC150. For slopes less than 4:1, erosion control blanket shall be high velocity straw matting, Model S150.

2. Six-inch wire staples shall be placed in accordance with the manufacturer's recommendations to anchor the mesh material. Staples shall be biodegradable.

I. WATER:

1. Water shall be furnished by the Contractor, unless otherwise specified, and shall be suitable for irrigation and free from ingredients harmful to plant growth and viability. The delivery and distribution equipment required for the application of water shall be the furnished by the Contractor, at no additional cost to the Owner.

PART 3 - EXECUTION

3.01 GENERAL:

A. All work shall be performed by skilled workers with a minimum of 2 years of seeded lawn construction and establishment experience and under the full-time supervision of a qualified foreman.

B. Seeding operations shall not begin less than 4 days after the application of lime and fertilizer and the seedbed areas are reviewed and approved by the Engineer.

C. Seeding shall be done when soil and weather conditions permit in early spring, until June 15, or from September 10 to October l5, unless otherwise approved. If it becomes necessary for seed to be sown after June 15, provisions shall be made for supplementary water and using mulch cover over lawn areas.

D. If there is a delay in seeding, during which weeds grow, or soil is washed out, the Contractor shall eliminate the weeds by physical means, or replace the soil before sowing the seed, without additional compensation. Immediately before seeding is begun, the soil shall be lightly raked.

E. Seed shall be sown at the approved rate, on a non-windy day by machine, or as approved by the Engineer.

F. The surface shall be kept moist by a fine spray until the seed shows uniform germination over the entire area. Wherever poor germination occurs in areas larger than 3 square feet, the Contractor shall reseed, roll, straw and water as necessary to obtain proper germination.

G. If there is insufficient time in the planting season to complete soil preparations, fertilizing, and seeding, permanent seeding may be left until the following planting season, at the option of the Contractor, or on order of the Engineer. In that event, a temporary cover crop shall be sown. This cover crop shall be cut and watered as necessary until the beginning of the following planting season, at which time it shall be plowed or harrowed into the soil, the area shall be fertilized and the permanent seed crop shall be sown as specified.

H. Protection of all newly loamed and graded areas is required and shall be accomplished by whatever means necessary such as mulch applied with a tackifier, or by other means approved by the Engineer. The Contractor shall be responsible for the prevention of siltation in areas beyond the limit of work and for all means of protection throughout the maintenance period at no additional cost to the Owner.

3.02 ROOT ZONE MIX TESTING REQUIREMENTS

A. Root zone mix (vegetative support layer) samples shall be collected from in-place loam at a minimum of every 1000 cubic yards and analyzed for grain size (ASTM D422), pH (Astm D6276) and organic content (ignition test).

3.02 SURFACE PREPARATION:

A. Refer to SECTION 02911 – ROOT ZONE MIX and Appendix E – Sand and Soil Amendments for surface preparation.

3.03 BROADCAST SEEDING, PLACING MULCH AND SLOPE EROSION PROTECTION:

A. The seed mix shall be broadcast at 6 pounds per 1000 square feet, as recommended by the seed supplier, or as directed by the Engineer. Seed shall be divided into 2 equal amounts and uniformly distributed in 2 applications at right angles to each other. Seed shall then be raked lightly into the soil to a depth of l/4 inch.

B. If mulch is not necessary the seed shall be directly firmed into the soil with a roller that will apply pressure between 75 and 100 pounds per linear foot of width.

C. Hay or Straw Mulch shall be used based on time of seeding as previously specified over all seeded areas, as designated on the plans, or as otherwise directed. If mulch is to be used, it shall be loosely spread to a uniform depth at a rate of 4-1/2 tons per acre to provide ¼ inch of cover, or as otherwise directed. The seed and mulch shall then be firmed into the soil with a roller that will apply a pressure between 75 and 100 pounds per foot of width.

D. Hay or Straw Mulch may be applied by mechanical apparatus, if in the judgment of the Engineer, the apparatus spreads the mulch uniformly and forms a suitable mat to control slope erosion. The apparatus shall be capable of spreading at least 80 percent of the hay or straw in lengths of 6-inches or more, otherwise it shall be spread by hand without additional compensation.

E. Slope erosion control blankets shall be placed as indicated on the plans or as directed by the Engineer.

3.04 HYDROSEEDING:

A. The application of lime, fertilizer, grass seed and mulch may be accomplished in a single operation with the use of approved hydroseeding equipment. The materials shall be mixed with water in the machine and kept in an agitated state in order that the materials may be uniformly suspended in the water. The slurry shall be of such consistency that it can be sprayed from a hydroseed gun or through at least 200 feet of 1 ½ inch diameter hose. The spraying equipment shall be so designed that when the solution is sprayed over an area, the resulting deposits of lime, fertilizer, grass seed, and mulch shall be equal to the specified quantities.

B. Prior to the start of hydroseeding, the Contractor shall furnish to the Engineer, in writing, the weights of limestone, fertilizer, grass seed, mulch, tackifier (as required) and moisture retention agent (as required) per 100 gallons of water to be used. This statement should also specify the number of square yards of seeding that can be covered with the solution specified above. If the results of hydroseeding operations are unsatisfactory, the Contractor will be required to abandon this method and to apply the lime, fertilizer, grass seed and mulch by other means.

C. Seed shall be incorporated with the mulching material to obtain a minimum hydroseeded sown coverage of 200 pounds of the specified seed mix per acre, as recommended by the seed suppliers, or as directed by the Engineer.

D. Wood fiber mulch shall be uniformly spread over certain selected seeded areas at the minimum rate of 1,400 pounds per acre unless otherwise directed. Mulch shall be placed by spraying from an approved spraying machine with pressure sufficient to cover the entire area in a single operation.

E. The Contractor shall immediately cleanup hydroseed oversprays from plant materials, pavements, furnishings, etc., to the satisfaction of the Engineer.

3.05 MAINTENANCE:

A. The Contractor shall maintain and protect the entire seeded area, as necessary to ensure dense healthy growth, until completion of the guarantee period and final acceptance of the project, or for 60 days, whichever is longer. If lawns are planted in late summer or during the fall, maintenance shall continue through the following spring for at least 60 days. Maintenance shall include watering as specified, liming, fertilizing, removal of stones, control of weeds, insect pests and fungal pathogens, and regular mowing. Defective work shall be corrected as soon as possible after it becomes apparent and weather and season permit.

B. The first cutting of lawn areas shall be done when the grass is between 2 ½ - 3 inches in height. The lawn shall be cut no shorter than 2 inches in height and shall be regularly mowed as necessary to maintain the above-prescribed conditions. All cuttings shall be removed from the lawn during the maintenance period and disposed of off-site. Cutting shall be accomplished with approved equipment that is weed free, clean of all herbicides and pesticides and has freshly sharpened blades. No mowing shall occur without inspection and approval of the owner or Engineer.

C. The Contractor shall be responsible to regularly water seeded areas with the equivalent of 1-inch minimum of rainfall per week, or as necessary to develop and sustain dense, green growth.

D. Six weeks after turf has established, and only during the months of April, May, or September, the Contractor shall apply fertilizer as specified above, at one half the rate recommended by the initial soils laboratory tests, or as directed by the Engineer.

E. The Contractor shall be responsible for securing all seeded areas from physical damage as necessary, including warning signs, barriers, temporary fencing, or other means of protection, through the guarantee period until final acceptance. All damaged areas shall be repaired to reestablish healthy vigorous growth of turf to the satisfaction of the Engineer, at no additional cost to the Owner. All temporary barriers shall remain the property of the Contractor and shall be removed by the Contractor upon final acceptance by the Engineer.

F. Pavement shall be kept clean and clear of cuttings and debris at all times during the maintenance period to the satisfaction of the Engineer.

3.06 INSPECTION AND PRELIMINARY ACCEPTANCE:

A. At the beginning of the planting season following that in which the permanent grass crop is sown, seeded areas will be inspected. Any section not showing dense, vigorous growth shall be promptly reseeded by the Contractor at no additional cost to the Owner. The seeded areas shall be watered, weeded, cut and otherwise maintained by the Contractor, as many times as necessary, in accordance with these specifications, until they are accepted.

B. The Contractor shall provide written notice to the Engineer not less than 10 days before the anticipated date of inspection for preliminary acceptance. The Engineer shall recommend preliminary acceptance of the work of this Section only after completion and re-inspection of all necessary repairs, renewals, or replacements.

C. Inspection and acceptance of seeded areas may be requested and granted in part, provided the areas for which acceptance is requested are relatively substantial in size, and with clearly definable boundaries. Acceptance and use of these areas by the Owner shall not waive any other provisions of this Contract.

D. Refer to Appendix E – Sand and Soil Amendments

3.07 GUARANTEE:

A. Seeded areas shall be guaranteed until final acceptance of the project, or, in the case of late summer or fall planting, the guarantee period shall extend through the following spring.

B. When the work is accepted in part, the guarantee period shall extend from each partial acceptance to the terminal date of the last guarantee period. All guarantee periods terminate at one time.

C. Guarantee shall not apply to the replacement of seeded lawns resulting from the removal, loss, or damage due to occupancy of the project in any part; vandalism or acts of neglect on the part of others; physical damage by animals, vehicles, etc.; and Acts of God, including but not limited to, catastrophic fire, hurricanes, riots, war, etc.

D. In the instance of curtailment of water by local water authorities (when supply was to be furnished by the Owner), the Contractor shall furnish all necessary water by water tanker, the cost of which will be approved and paid for by the Owner.

3.08 FINAL INSPECTION AND FINAL ACCEPTANCE:

A. At the end of the guarantee period, the Contractor shall provide written notice to the Engineer not less than 10 days before the anticipated date of final inspection for final acceptance.

B. The Engineer shall recommend final acceptance of the work of this Section only after completion and re-inspection of all necessary repairs, renewals or replacements.

END OF SECTION

SECTION 02324

ROCK EXCAVATION AND DISPOSAL

PART 1 - GENERAL

1.01 WORK INCLUDED:

The Contractor shall excavate rock, if encountered, to the lines and grades indicated on the drawings or as required, shall dispose of the excavated material, and shall furnish the required material as specified in Section 02350 EXCAVATION BORROW AND BACKFILL for backfill in place of the excavated rock. Based on boring and test pit information no rock is expected on this project. Should rock be encountered, the unit price will be utilized to compensate the contractor for unanticipated subsurface conditions as they relate to rock.

1.02 RELATED WORK:

A. Section 02252, SUPPORT OF EXCAVATION

B. Section 02350, EXCAVATION BORROW AND BACKFILL

C. Section 03302, FIELD CONCRETE

1.03 DEFINITIONS:

A. The word "rock," wherever used as the name of the excavated material or material to be excavated, shall mean only boulders and pieces of concrete or masonry exceeding one cubic yard* in volume, or solid ledge rock which, in the opinion of the Engineer, requires for its removal, drilling and blasting, wedging, sledging, barring, or breaking up with a power-operated tool. No soft or disintegrated rock which can be removed by normal earth excavation methods, no loose, shaken, or previously blasted rock or broken stone in rock fillings or elsewhere, and no rock exterior to the maximum limits of measurement allowed, which may fall into the excavation, will be measured or allowed as "rock."

B. The word "earth," wherever used as the name of an excavated material, or material to be excavated shall mean all kinds of material other than rock as above defined.

1.04 QUALITY ASSURANCE:

A. The Contractor shall conform to all municipal ordinances and state and federal laws relating to the transportation, storage, handling, and use of explosives. In the event that any of the above mentioned laws, ordinances, or regulations require a licensed blaster to perform or supervise the work of blasting, said licensed blaster shall, at all times, have his

license on the work site and shall permit examination thereof by the Engineer or other officials having jurisdiction.

B. The Contractor shall procure all permits required for blasting.

1.05 SUBMITTALS:

A. At least two weeks before beginning blasting operations, the Contractor shall submit to the Engineer for record the following data:

1. Name of Contractor or Subcontractor responsible for blasting and monitoring operations and license number.

2. Name, affiliation, and license number of the person or persons who will be directly responsible for designing each blast, supervising the loading of the shot, and firing it.

B. Copies of all permits required for blasting.

C. Results of pre-blast survey.

D. When blasting is in progress, daily reports on blasting operations and blast monitoring results.

1.06 DELIVERY/STORAGE AND HANDLING:

Delivery, storage and handling of explosives shall conform to all federal, state and local regulations and permits.

PART 2 - PRODUCTS - NOT APPLICABLE

PART 3 - EXECUTION

3.01 PREPARATION/PRE-BLAST SURVEY

If required, the pre-blast survey shall be conducted in accordance with state regulations and/or local permit requirements.

3.02 EXCAVATION:

A. The Contractor shall excavate rock to the lines and grades indicated on the drawings or as required by the Engineer. The excavated rock shall be removed and disposed of by the Contractor as specified for surplus excavated materials under Section 02300, EARTHWORK.

B. Work damaged by blasting shall be repaired or replaced at the Contractor's expense.

C. If rock is excavated beyond the limits of payment indicated on the drawings, specified, or authorized in writing by the Engineer, the excess excavation, whether resulting from overbreakage or other causes, shall be backfilled, by and at the expense of the Contractor, as specified below:

1. In pipe trenches, excess excavation shall be filled with the required material and compacted in the same manner as specified for the material in the zone around the pipe under Section 02350 EXCAVATION BORROW AND BACKFILL.

2. In excavations for structures, excess excavation in the rock beneath foundations shall be filled with concrete which shall have a minimum 28-day compressive strength of 3000 psi. Other excess excavation shall be filled with Class B backfill compacted to a minimum of 92 percent density (ASTM D1557 Method C) as specified under Section 02350 EXCAVATION BORROW AND BACKFILL.

3. If the rock below normal depth is shattered due to drilling or blasting operations of the Contractor, and the Engineer considers such shattered rock to be unfit for foundations, the shattered rock shall be removed and the excavation shall be backfilled with concrete as required, except that in pipe trenches crushed stone may be used for backfill, if approved. All such removal and backfilling shall be done by and at the expense of the Contractor.

D. When required by the Engineer, the Contractor shall remove all dirt and loose rock from designated areas and shall clean the surface of the rock thoroughly to determine whether seams or other defects exist.

E. When concrete is to be placed on rock, the rock shall be free of all vegetation, dirt, sand, clay, boulders, scale, excessively cracked rock, loose fragments, water, ice, snow, and other objectionable substances.

3.03 VIBRATION AND AIR BLAST MONITORING:

A. The Contractor shall measure air blast and vibration levels of blasting operations to assure compliance with all applicable regulations and local permits.

B. Records of each day's air blast and vibration measurements shall be submitted to the Engineer in writing no later than the start of the next day's work. Records shall include, as a minimum:

- Identification of instrument

- Name of observer

- Name of interpreter

- Distance and direction of recording station from the area of detonation

- Date and exact time of reading

- Type of ground at recording station

- Peak particle velocity for all components as well as resultant for all frequencies of vibrations

- Duration of motion with a velocity in excess of one thousandth of an inch per second

- A copy of the photographic record of seismograph readings

- Peak air blast level.

3.04 BLASTING RECORDS:

The Contractor shall prepare and submit to the Engineer daily blast reports, including logs of each blast. Reports shall be submitted to the Engineer no later than the start of the next day's work. However, during each day of blasting, the Contractor shall review and shall provide access for the Engineer to review the data from that day's blasting. Reports after each blast shall include at least the following information for each blast:

- Date, time, and location of blast

- Permit number and expiration date

- Amount and type of explosives used by weight and number of cartridges

- Total number of delays used and number of holes used for each delay

- On a diagram of the blast pattern, indicate total number and depth of holes, maximum charge per delay, maximum charge per hole, and corresponding delay number

- An evaluation of the blast indicating areas of significant overbreak, unusual results, and any recommended adjustments for the next blast.

3.05 POST BLASTING INSPECTIONS:

The Contractor shall examine any properties, structures, and conditions where complaints of damage have been received or damage claims have been filed. Advance notice shall be given to all interested parties so that the parties may be present during

the final examination. Records of the final examination shall be signed and distributed to the owner of the property, the head of the local fire department, and the Engineer.

END OF SECTION

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SECTION 02337

RECLAIM EXISTING ASPHALT

PART I - GENERAL

1.01 SCOPE OF WORK

a. The work under this Section shall consist of manufacturing a stabilized base course in accordance with Section 403 of the MassDOT Standard Specifications, 1995 Edition.

b. The depth of reclamation shall be no less than twelve (12) inches of existing bituminous concrete and gravel base materials. The limits of reclamation shall be as indicated on the contract drawings. The contractor shall verify the depth of the existing gravel base before commencing with reclamation.

c. The work shall include fine grading of the base course ready for finish paving at the specified elevations, and the addition or removal of gravel materials as necessary to achieve a minimum eight (8) inch compacted base course beneath proposed pavement.

d. Work shall also include the excavation, stockpiling, and transporting of reclaimed asphalt from surplus areas to the confines of the new sports courts and walkways for use as gravel base course material in conformance with project specifications and details.

PART II - MATERIALS

2.01 RECLAIMED BASE COURSE

a. All reclaimed material shall conform to Subsection M1.11.0 of Division III of the MassDOT Standard specifications. The Contractor shall test six (6) samples from within the reclamation limits and submit the results to the Engineer for approval. All necessary blending and furnishing of the required aggregate materials shall be accomplished by the Contractor to achieve the specified gradation.

2.02 Gravel required to supplement the reclaimed base course shall be in compliance with the General Technical Specifications.

PART III - EXECUTION

3.01 All work shall be executed per Section 403 of the MassDOT Standard Specifications.

- - - END OF SECTION - - -

SECTION 02350

EXCAVATION, BORROW AND BACKFILL

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. Under this Section, the Contractor shall furnish all labor, materials, equipment and transportation required to complete Excavation, Borrow and Backfill work indicated on the drawings, as designated by the Engineer, or as specified herein, to complete all proposed work.

B. Without limiting the generality thereof, Excavation, Borrow and Backfill shall include excavating, furnishing borrow materials as necessary and back-filling for the construction of all proposed work from existing grades to finished grades. Work shall include the removal of unclassified material, such as bituminous pavements, curbs, ledge and boulders under one (1) cubic yard in size, concrete, reinforced and plain, structures, fencing of various types, and metal or wood posts; and unsuitable materials of every nature throughout the site within twelve (12) inches below finished subgrade elevations for proposed work; transportation of the excavated materials; back-filling to proposed base course subgrades with approved excavated and/or furnished materials; and the disposal of unsuitable, and/or surplus excavated materials.

C. Work under this Section shall also include the discing and harrowing of existing grass or topsoil areas to break down all sod clumps and vegetation and the complete excavation, stockpiling, rehandling, spreading, and re-use (placing) of on-site topsoil in conformity with the lines, grades and dimensions shown on the plans. This material may be utilized where general embankment (not beneath pavements or structural improvements NOR ATHLETIC FIELD TURFGRASS rootzone mix without sod remnants is required) is proposed. The Contractor shall take extreme care in the process of discing and harrowing of the existing topsoil to insure that subsoil to remain in place is not mixed with the topsoil. Disc compacted areas subject to construction traffic to the full depth of topsoil without mixing in subsoil.

D. Work under this Section shall also include the excavation of existing base courses under existing pavement areas for re-use in proposed fill areas up to base course subgrades or loam borrow subgrades if the existing material is deemed suitable and is excavated without contamination by or mixing with unsuitable materials and subsoils. This material may be utilized for backfill over pipe cover in trenches only if all material over four (4) inches in size is removed prior to back filling. All existing materials shall be removed to the full depth of proposed work.

E. Work under this Section shall also include the excavation of subsoil to the limit lines of proposed work. If deemed suitable by the Engineer, as meeting the criteria or intent of paragraph 2.02 of this Specification, this material may be used as fill material for grading and general filling of any unpaved areas to bottom of proposed work. **No subsoil** shall be used for fill at proposed pavement areas or below proposed pipes or structures without meeting the requirements for paragraph 2.02a below.

F. Work under this Section shall include the furnishing of all borrow materials required
to complete the proposed work as designed. Where "processed gravel", "gravel borrow", or "gravel" is indicated in the specifications or on the drawings, only gravel conforming to this section of the specifications may be utilized.

G. All topsoil/loam for sod, seed or plant material beds, whether re-used or furnished from off-site, shall conform to the loam borrow section of these Specifications.

1.02 RELATED WORK:

A. Section 00890, PERMITS

B. Section 01110, CONTROL OF WORK AND MATERIALS

C. Section 01570, ENVIRONMENTAL PROTECTION

D. Section 02240, DEWATERING

E. Section 02252, SUPPORT OF EXCAVATION

F. Section 02324, ROCK EXCAVATION AND DISPOSAL

C. Section 02910, SCREENED LOAM BORROW AND TOPSOIL REUSED

1.03 REFERENCE STANDARDS AND SPECIFICATIONS:

A. References to specific standards, specifications and tests of the following technical societies, organizations, and governmental bodies may be made in the contract documents.

1. AASHTO - American Association of State Highway and Transportation Officials (tests or specifications).

2. ASTM - American Society for Testing and Materials.
American Society for Testing and Materials (ASTM)

ASTM	C131	Test Method for Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
ASTM	C136	Method for Sieve Analysis of Fine and Coarse Aggregates.
ASTM	C330	Specification for Lightweight Aggregate for Structural Concrete.
ASTM	D1556	Test Method for Density of Soil in Place by the Sand Cone Method.
ASTM	D1557	Test Methods for Moisture-density Relations of Soils and Soil Aggregate Mixtures Using Ten-pound (10 Lb.) Hammer and Eighteen-inch (18") Drop.
ASTM	D2922	Test Methods for Density of Soil and Soil-aggregate in Place by Nuclear Methods (Shallow Depth).

3. MassDOT Standard Specs. - Latest edition of the Standard Specifications for Highways and Bridges, Massachusetts Department of Transportation, hereinafter referred to as the "Massachusetts Standard Specifications."

4. AWWA - American Waterworks Association.

1.04 SAMPLING AND TESTING:

A. Four samples each of materials requested to be tested by the Engineer shall be taken at the locations ordered by, and in the presence of, the Engineer at the site or at the source of supply and under his direction for testing in accordance with requirements stated herein. The Contractor shall pay for these tests regardless of their results.

B. Test results shall be submitted directly to the Engineer by a Certified Testing Laboratory to be approved by the Engineer. No material shall be re-used or furnished until the Engineer's approval is given.

C. All tests of any kind ordered by the Engineer shall be paid for by the Contractor regardless of test results.

1.05 SPECIAL REQUIREMENTS:

A. If test results indicate that existing base course materials are suitable backfill material per paragraph 2.02, they shall be utilized as fill up to subgrade and for trench backfill over pipe cover. If results indicate that they meet the specifications for gravel, they may be utilized where gravel is proposed.

B. The sequences of all excavation operations shall be such as to insure the most efficient re-use of suitable excavated materials and the use of a minimum amount of specified borrow.

C. The Contractor shall inform and satisfy himself as to the character, quantity, and distribution of all material to be excavated. No payment will be made for the placement of any excavated material that is used for purposes other than those designated and as specified herein. Further, these shall be removed at no cost to the Owner if so required by the Engineer.

D. The Engineer shall have final determination over the excavation, moving, placing and disposition of all materials, and shall determine the suitability of materials to be placed in excavated areas.

E. All backfill to subgrade, shall be compacted to not less than ninety-five percent (95%) of the maximum dry density of the material as determined by the Standard AASHTO Test Designation T-180-86, Modified Proctor Test.

F. Unsuitable and/or excess excavated materials shall be removed and properly disposed of in legal disposal areas off of the site at no additional cost to the Owner.

G. Exploratory excavation to locate existing utilities or obstructions shall be at the Contractor's discretion to assist him in the work of this project and no extra payment shall be made for such verification. Although extra payment is not considered, lack of such payment does not constitute a waiver of the Contractor's responsibility to verify all utilities. The contractor must ensure verification of existing services and ensure the safety of the Contractor's work forces.

H. No on-site excavated backfill materials may be used as base courses for any pavements or structural elements unless test results show these materials to meet this specification for the type of material to be utilized and are so approved by the Engineer.

1.06 SUBMITTALS/COORDINATION:

A. The Contractor, per Section 01330 SUBMITTALS and Paragraph 1.04 of this Section shall furnish all necessary submittals and certifications as to Certified Testing Laboratory, disposal sites, etc.

B. The Contractor shall notify Digsafe at 1-888-344-7233 at least seventy-two (72) hours prior to initiating excavation.

C. Trench permit must be submitted prior to the beginning of any related excavation.

PART 2 - PRODUCTS

2.01 BORROW MATERIALS:

A. Excavated topsoil and furnished topsoil to be utilized for sodding, seeding and landscaping must conform to Section 02910 Screened Loam in order to be used as Loam Borrow. Existing topsoil not passing tests for Loam Borrow may be considered suitable as general fill below subgrade, in landscaped areas only and may be utilized throughout the proposed sod and seeded areas, up to subgrades of proposed work.

B. Gravel Borrow shall be as specified under paragraph 2.04 and shall be utilized whenever gravel is noted, including beneath pavements and structural elements unless otherwise noted. Gravel Borrow shall satisfy the requirements listed in MHD Specification Section M1.03.0, Type b. 3-inches largest dimension.

C. Although suitable excavated backfill materials and topsoil may be reused to fill to subgrade as specified herein, if there are insufficient quantities of materials available the Contractor shall furnish Suitable Backfill as specified in paragraph 2.02a below.

D. If approved by the Engineer, Suitable Backfill materials excavated from beneath pavements may be utilized as backfill from twelve (12) inches above the top of pipes so long as all material over four (4) inches in size is removed from the material prior to backfilling and all trench compaction requirements may be met.

E. Where Sand Borrow is required, materials shall conform to Section M1.04.1 of the Massachusetts Standard Specifications. Utilize Sand Borrow as necessary for pipe bedding and cover.

F. Where Crushed Stone is required, materials shall conform to Section M2.01 of the Massachusetts Standard Specifications. Utilize Crushed Stone as necessary for granite block setting beds, backfill for sub-drains, and other details as noted in contract documents.

G. Where Peastone is required peastone shall be smooth, hard, naturally occurring, rounded stone meeting the following gradation requirements:

Passing 5/8 inch square sieve opening	-	100%
Passing No. 8 sieve opening	-	0%

2.02 SUITABLE BACKFILL

A. Class B backfill shall be granular, well graded friable soil; free of rubbish, ice, snow, tree stumps, roots, clay and organic matter; with 30 percent or less passing

the No. 200 sieve; no stone greater than two-third (2/3) loose lift thickness, or six inches, whichever is smaller.

1. Class B Backfill:

   Class B backfill shall be granular, well graded friable soil; free of rubbish, ice, snow, tree stumps, roots, clay and organic matter; with 30 percent or less passing the No. 200 sieve; no stone greater than two-third (2/3) loose lift thickness, or six inches, whichever is smaller.

2. Select Backfill:

   Select backfill shall be granular, well graded friable soil, free of rubbish, ice, snow, tree stumps, roots, clay and organic matter, and other deleterious or organic material; graded within the following limits:

Sieve Size	Percent Finer by Weight
3-inch	100
No. 10	30-95
No. 40	10-70
No. 200	0-10

B. All other materials to be placed where Specifications or Drawings call for "fill," "back-filling," or "filling" to subgrade, shall be natural soil, well-graded and free from all organic weak, compressible, and frozen materials, and shall contain no stone larger than four (4) inches in maximum dimension. It shall be of such nature and character that it can be dried and compacted and shall be free of all expansive materials (such as high plastic clays) and of materials subject to decay, decomposition, or dissolution, and shall conform to the following gradations:

U.S. Sieve No.	Total Percent Passing by Weight
4 inch	100
#4	20-75
#40	0-25
#200	0-5

C. If, sufficient suitable fill material is not available from excavations under this Contract, to complete filling to subgrades as specified above, additional fill, as specified under paragraph 2.02A above, shall be furnished by the Contractor from other sources at no additional cost. Excavated material from the site, and furnished material for use as Suitable Backfill, shall be deemed suitable only if they meet the requirements of paragraph 2.02A above, can be properly compacted, and are satisfactory to the Engineer.

D. Use Suitable Backfill compacted as specified for general grading as backfill except as specified herein; fill to sub-grades of proposed work where shown.

I. PROCESSED GRAVEL:

1. Processed gravel shall consist of inert material that is hard, durable stone and coarse sand, free from loam and clay, surface coatings and deleterious materials. The coarse aggregate shall have a percentage of wear, by the Los Angeles Abrasion Test, of not more than 50.

2. The gradation shall meet the following requirements:

Sieve Designation	Percentage Passing
3-in.	100
1 ½-in.	70-100
¾-in.	50-85
No. 4	30-60
No. 200	0-10

3. The approved source of bank-run gravel material shall be processed by mechanical means. The equipment for producing crushed gravel shall be of adequate size with sufficient adjustments to produce the desired materials. The processed material shall be stockpiled in such a manner to minimize segregation of particle sizes. All processed gravel shall come from approved stockpiles.

2.03 CRUSHED STONE FOR TRENCHES (IN WATER ONLY):

A. If trench excavations contain water, the Contractor shall substitute crushed stone, one and one-half (1-1 /2) inch minus, for bedding and backfill, in accordance with MassDOT Standard Specifications M2.01.2, at no additional cost to the Owner, to three (3) inches above the standing water level; unless otherwise required by the Engineer.

2.04 GRAVEL BORROW:

All references to "Processed Gravel, "Gravel Borrow", or "Gravel" shall conform to the following:

A. All proposed gravel areas, utilizing salvaged or furnished materials shall conform to Section M1.03.0 Type "b", with maximum stone size two (2) inches in dimension, and Section 150 Embankment, of the Massachusetts Standard Specifications and shall consist of inert material that is hard, durable stone and coarse sand, free from loam and clay, surface coatings, and deleterious materials.

B. Gradation requirements for gravel borrow shall be determined by AASHO-T11

and T27 and shall conform to the following:

Sieve	Percent Passing
2"	100
1/2"	50-85
No. 4	40-75
No. 50	8-28
No. 200	0-10

C. Excavated materials from on-site may be utilized in all areas calling for gravel if they pass the test requirements for paragraph 2.04a above except that only stones above four (4) inches must be removed to reutilize the materials.

2.05 SAND BORROW:

A. The Sand Borrow shall consist of inert material that is hard durable coarse sand, free from loam, clay, roots, trash, frozen materials and other deleterious or organic materials. The sieve gradation requirements shall conform to the following:

	Percent By Weight Passing	
Size of Sieve	Minimum	Maximum
# 4	100	
# 16	55	80
# 50	10	25
#100	2	8
#200	0	2

PART 3 - EXECUTION

3.01 EXCAVATION AND FILLING:

A. Excavation and filling shall be executed to such depth that sufficient material will be left above the designated grade to allow for specified compaction to the required sub-grade. Should the Contractor, through negligence or other fault, excavate below the designated lines, he shall replace such excavation with approved materials, in an approved manner and condition, at his own expense.

B. When the plans require excavation in areas in proximity to existing sidewalks, structures and utilities, it shall be the responsibility of the Contractor, at his own expense, to provide adequate and suitable drainage away from proposed work and existing features or use other satisfactory means and methods to protect and

maintain the stability of such construction within or adjacent to the limits of work.

C. Protect all existing trees, shrubs or other plan referenced features to remain. Hand excavate around all items to remain including tree roots or where utilities must be verified. Exposed tree roots shall be immediately covered with Loam Borrow in accordance with these specifications.

D. No roots greater than two (2) inches in diameter shall be cut from trees to remain without approval of the Engineer. Roots greater than one-half (1/2) inch in diameter that are cut or broken shall be promptly pruned to a smooth clean cut and painted with an approved compound.

E. Any removal of existing facilities required in order to achieve the excavation to proceed, such as fences, walls, walkways, etc., shall be accomplished by the Contractor at no additional cost to the Owner. Restoration of these facilities shall be to a condition equal to that before removal, and safe and operational to the satisfaction of the Engineer.

F. Excavation shall be performed to the lines, grades, and elevations shown on the plans or as required by the Engineer, and shall be made in such a manner that the requirements for formation of the subgrade can be followed.

G. No excavation shall be started until the Engineer has reviewed and acknowledged the area of proposed construction. All material encountered, of whatever nature within the limits indicated, shall be removed and disposed of as directed. During the process of excavation, the grade shall be maintained in such condition that it will be well drained at all times.

H. The planes at the bottom of the excavation (in cut), or the top of the fill, when completed, shall be known as the subgrade, and shall be true to the lines, grades and cross section shown on the plans, to allow proposed work (base courses and finished courses) to be completed.

I. Hardpan, loose rock, boulders or other material unsatisfactory for subgrades shall be excavated to a depth as the Engineer may require below the contemplated subgrade. Muck, peat, matted roots or other yielding material unsatisfactory for subgrade foundation shall be removed to such depth as required to provide a satisfactory foundation. Unsatisfactory materials shall be disposed of by the Contractor. The portion so excavated shall be refilled with suitable backfill as specified, furnished or obtained from the grading operations, or gravel borrow, as required, and thoroughly compacted. Such excavation and filling beyond the limits called for on the plans shall be considered extra work and shall be processed accordingly. Solid ledge (not able to be removed by machine) or boulders (over 1 c.y.) encountered within the proposed work lines shall be removed as required by the Engineer and shall be considered extra work and processed accordingly. Clean off overburden for measurement by the Engineer

and do not proceed without the written approval of the Engineer. Cross sections shall be taken and reviewed by the Engineer for quantity approval.

J. The removal of existing structures and utilities required to permit the orderly prosecution of the work shall be accomplished by the Contractor as directed and under this Section, unless otherwise shown on the plans. All existing foundations and structures shall be excavated to at least three (3) feet below the bottom of the proposed subgrade and the material properly disposed of off site. All such excavations shall be back-filled with Suitable Backfill and compacted. Floors of structures to be abandoned shall be broken, to ensure drainage, at no additional cost.

K. All unsuitable excavated material shall be legally disposed of outside of, and away from, the project limits. All suitable excavated material deemed surplus by the Engineer shall become the property of the Contractor and shall be properly removed from the site.

L. The subgrade under areas to be paved shall be brought to proper line and grade by excavating and/or placement of compacted fill with suitable excavated material or gravel borrow as specified herein. Where filling is not required, the undisturbed subgrade shall be compacted according to the requirements stated herein.

M. Fills to subgrade level shall be formed of successive layers not exceeding lifts six (6) inches in depth and each layer shall be compacted to not less than 95 percent of maximum dry density of the material as determined by the standard AASHTO Test Designation T-180-86, Modified Proctor Test. Testing shall be done a minimum of 50 feet on center through out the site where pavements are proposed.

N. No additional payment will be made for materials removed, manipulated or replaced by the Contractor in order to obtain the specified density. Any removal, manipulation, aerating, replacement and re-compaction of materials necessary to obtain the required density shall be considered as incidental to the excavation and compaction operations and shall be performed by the Contractor at no additional cost.

O. Topsoil excavation and rehandling (FOR SOILS NOT TO BE USED IN ATHLETIC FIELD AREAS) shall consist of discing and harrowing grassed and existing topsoil areas at ninety (90) degrees to each prior operation to minimum 12-inch depth or as specified by Engineer, and removing topsoil from all areas of proposed work and placing and grading the topsoil in embankment areas. Topsoil encountered <u>below subgrade</u> shall remain in place <u>unless</u> new paving is to be placed thereon and only as required by the Engineer. Then, such topsoil shall be excavated and rehandled, replaced with Suitable Backfill materials or gravel borrow and compacted as herein specified or as required by the Engineer.

P. Topsoil to be amended and used in athletic field areas shall have all sod skimmed

and removed completely.

Q. All areas exhibiting grass or weed growth shall be tilled by disc/harrow or rototilled in two directions to completely break up sod clumps prior to stripping the topsoil, and shall be stored in stockpiles if necessary to ensure organic matter decomposition EXCEPT FOR AREAS FOR ATHLETIC TURFGRASS. Such on-site stockpiled materials must be tested prior to reuse, and treated to prevent weed growth.

R. After the areas to receive loam borrow or skinned infield (if required) mix have been brought to subgrade, and immediately prior to placing and spreading such material, the subgrade shall be loosened by discing or rototilling to a depth of at least three inches to permit bonding of the finished material to the subgrade material. Then place and spread the loam borrow or skinned infield material to the depths required by the Drawings to establish finish grades. Refer to Screened Loam Specifications and Skinned Infield Mix Specifications (as applicable).

S. Protect all existing areas against damage due to the work under this Contract, and perform all repair and replacement work to any such areas which are damaged hereunder.

T. Perform all excavation and back-filling required for the installation of subdrains, utility structures, and utility lines, and appurtenances required to the lines and grades shown on the Contract Drawings and as required by the Engineer.

U. No extra work shall be initiated without notification of the Engineer in writing, and the written approval of the Engineer in response.

V. The Contractor shall be responsible for any and all pumping or bailing necessary to complete his operations, and to keep all areas sufficiently dry to guarantee compaction in accordance with paragraph 3.01m. above.

W. Sawcut, with approved diamond-blade cutting device, at lines of all pavements to remain. Mark out prior to cutting for Engineer's approval.

X. Where insufficient suitable materials of any kind exist on site for incorporation into the proposed work within proposed work lines, the Contractor shall furnish materials from off site, as necessary and in accordance with these specifications, at no additional cost to the Owner.

3.02 DRAINAGE AND DEWATERING:

A. Upon entering the premises, the Contractor shall assume responsibility for site and surface drainage of all areas affected by its work and shall maintain such drainage during the life of this Contract in a manner acceptable to the Owner, at all times protecting and maintaining the existing conditions in adjacent areas.

B. Legally remove by pumping, draining or bailing all water that may accumulate or be found on the site within the contract limits where excavation and grading are to be done. Excavate and form all pump wells, sumps, dams, flumes or other necessary work to keep excavations entirely clear of water. Newly made and existing concrete and masonry shall be protected from injury resulting from dewatering work by the use of canvas, tar paper or by such other sufficient method. Maintain at all times upon the work sufficient and satisfactory pumping machinery, including standby equipment. Provide pump wells or well points and underdrains as may be required, where needed to properly handle the water. Maintain excavations free from water until date of acceptance of the project by the Owner.

C. Water from excavations shall be disposed of in such a manner as will not cause injury to public health nor to public or private property, nor to existing work, nor to the work completed or in progress, nor cause any interference with the use of the same by the public. Under no circumstances place concrete, place fill, or install appurtenances in excavations containing free water.

3.03 SHEETING AND BRACING:

A. The Contractor shall furnish, put in place, and maintain such sheeting and bracing, etc., as may be required to support the sides of the excavation and to prevent any movement of earth which could in any way diminish the width of the excavation below that necessary for proper construction, or otherwise injure or delay the work or endanger adjacent structures or personnel. If the Engineer is of the opinion that sufficient or proper supports have not been provided at any points, he may order additional supports put in at the expense of the Contractor.

B. Whenever possible, sheeting shall be driven ahead of the excavation to avoid loss of material from behind the sheeting. If necessary to excavate below the sheeting, care shall be taken to avoid trimming behind the face along which the sheeting will be driven. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, they shall be immediately filled with sand borrow and compacted.

C. The Contractor shall leave in place, to be embedded in the backfill, all sheeting, bracing, etc., which the Engineer may require it to leave in place at any time during the progress of the work, for the purpose of preventing injury to structures, personnel, utilities or property at no additional cost. Timber or steel sheeting and bracing to be left in place shall be cut-off at least two (2) feet below finish grade. This shall not constitute a waiver of the Contractor's responsibility to use his own judgement as to where sheeting shall be left in place, regardless of the Engineer's requirement.

D. All sheeting and bracing not to be left in place shall be carefully removed in such a manner as not to endanger the construction or other structures. All voids left or

caused by withdrawal of sheeting shall be immediately back-filled with approved material and compacted by ramming with tools especially adapted to that purpose, by watering, or otherwise as may be directed.

3.04 TRENCH HAND EXCAVATION:

A. When approaching the vicinity of the dripline of trees to remain, any roots from vegetation on abutting properties, underground pipes, conduits, or other structures, or any suspected functioning underground features, digging by machinery shall be discontinued and the excavation shall be done by hand. Hand excavation shall also be undertaken when so required by the Engineer. Such hand excavation shall be considered incidental to the trench excavation and no additional compensation will be allowed.

B. Protection of Existing Structures - All existing pipes, conduits, poles, wires, fences, curbings, property line markers, and other structures which, in the opinion of the Engineer, are not required to be changed in location, shall be carefully supported and protected from injury by the Contractor, and in case of damage, they shall be restored by the Contractor without additional compensation, to as good a condition as that in which they were found.

3.05 BACKFILLING IN OPEN TRENCH:

A. As soon as practical after the pipe has been installed and tested, back-filling shall begin, and shall thereafter be prosecuted expeditiously.

B. Drainage pipe shall be back-filled with Suitable Backfill or Gravel Borrow from a plane one (l) foot above the top of the pipe to the proposed subgrade.

C. The area around the pipe shall be bedded with Sand Borrow and back-filled only with
suitable backfill material conforming to paragraphs 2.01D or 2.02B of this Specification, or Gravel Borrow from the mid-diameter of the pipe to twelve (12) inches above the top of the pipe. Substitute crushed stone as specified if water is encountered.

D. Water pipe shall be back-filled with Suitable Backfill material or Gravel Borrow from six (6) inches above the top of the pipe to the proposed subgrade. The area around the pipe shall be bedded and back-filled only with Sand Borrow per these specifications, to six (6) inches above the top of the pipe.

3.06 BASE COURSE:

A. The gravel shall be spread and compacted in layers not exceeding six (6) inches in depth compacted measurement and all layers shall be compacted to not less than ninety-five percent (95%) of the maximum dry density of the material as

determined by the Standard AASHTO Test Designation T99 compaction test Method C at optimum moisture content as determined by the Engineer. If the material retained on the #4 sieves is fifty percent (50%) or more of the total sample this test shall not apply and the material shall be compacted to the satisfaction of the Engineer. The specific density of the Gravel Sub-base shall be maintained by determining the number of passes of a roller required to produce a constant and uniform density, after conducting a series of tests either using the sand/volume method or the nuclear device.

B. Compaction shall continue until the surface is even and true to the proposed lines and grades within a tolerance of three-eighths (3/8) inch above or below the required cross sectional elevations and to a maximum irregularity not exceeding three-eighths (3/8) inch under a ten (10) foot line extended longitudinally. Any specific area of gravel sub-base which, after being rolled, does not form a satisfactory, solid, stable foundation shall be removed and replaced and/or recompacted by the Contractor without extra compensation.

C. All tests for compaction shall be as ordered by the Engineer and paid for by the Contractor, regardless of their result.

3.07 SAND BORROW:

A. The Contractor shall deliver, spread and compact Sand Borrow to conform to the lines and grades shown on the plans, and shall spread and compact the Sand Borrow in no greater than six (6) inch layers.

B. Compaction shall continue until the surface is even and true to the proposed lines and grades indicated on the plans or as required by the Engineer.

C. Sand shall not be placed if it is excessively moist and unable to be satisfactorily spread and compacted.

D. Compaction for Sand Borrow shall be not less than ninety-five percent (95%) of the maximum dry density as determined by the standard AASHTO-T99, Standard Proctor Test.

E. Compaction of the sand and any adjoining embankment material shall be done simultaneously so that the respective materials will be confined substantially to the indicated lines.

F. Sand borrow shall be graded to a true even surface to the proposed lines and grades within a tolerance of three-eighths (3/8) inches above or below the required elevation.

G. Any tests of materials, and/or compaction, shall be as ordered by the Engineer and paid for by the Contractor regardless of their result. Percolation tests to be verified in the field by Engineer.

END OF SECTION

SECTION 02365

PLAY SAND

PART I - GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment and transportation required for the placement and compaction of approved Sand Borrow in accordance with these specifications and to the lines and grades shown on the plans or established by the Engineer.

PART II - MATERIALS

2.01 PLAY SAND

A. Sand for children's play area must meet requirements of ASTM C33 specifications. Sand must be washed at the source and free of additional lime residues that are harmful to children as an irritant.

Sieves (ASTM)	Play Sand(Washed)
4.75mm (#4)	100%
2.36 mm (#8)	100%
1.18 mm (#16)	98%
600 <m (#30)	94%
300 <m (#50)	55%
150 <m (#100)	11%
75 <m (#200)	2%

PART III - EXECUTION

3.01 PROCEDURES

A. The Contractor shall deliver, spread and compact Play Sand to conform to the lines and grades shown on the plans, and shall spread and compact the Sand Borrow in no greater than six (6) inch layers.

B. Compaction shall continue until the surface is even and true to the proposed lines and grades indicated on the plans or as directed by the Engineer.

C. Sand shall not be placed if it is excessively moist and unable to be satisfactorily spread and compacted.

D. Compaction for Play Sand shall be not less than ninety-five percent (95%) of the maximum dry density as determined by the standard AASHTO-T99, Standard

Proctor Test.

E. Compaction of the sand and any adjoining embankment material shall be done simultaneously so that the respective materials will be confined substantially to the indicated lines.

F. Play Sand shall be graded to a true even surface to the proposed lines and grades within a tolerance of three-eighths (3/8) inches above or below the required elevation.

G. Any tests of materials, and/or compaction, shall be as ordered by the Engineer and paid for by the Contractor regardless of their result.

PART IV – MEASUREMENT AND PAYMENT

Item 703 Play Sand shall be measured and paid under this item by the cubic yard and shall include any and all labor, placement material and equipment required to furnish and install play sand in accordance with these specifications and the Contract Drawings.

END OF SECTION

SECTION 02514

HYDRANTS AND VALVES

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This Section covers the relocation of outside hydrants, valves and appurtenances as indicated on the drawings and as specified herein.

B. Pipe and couplings shall be specified under the appropriate pipe sections.

1.02 RELATED WORK:

A. Section 02080, DUCTILE IRON PIPE AND FITTINGS FOR WATER MAINS

B. Section 02350, EXCAVATION BORROW AND BACKFILL

C. Section 02516, CONNECTIONS TO EXISTING WATER MAINS

1.03 REFERENCES:

A. The following standards form a part of this specification:

American Society for Testing and Materials (ASTM)

ASTM	A48	Gray Iron Castings
ASTM	Al26	Gray Iron Castings for Valves, Flanges, and Pipe Fittings
ASTM	A536	Ductile Iron Castings
ASTM	B62	Composition Bronze or Ounce Metal Castings
ASTM	D429	Test Method for Rubber Property Adhesion to Rigid Substrate.

American Water Works Association (AWWA)

AWWA	C500	Metal Seated Gate Valves ForWater Supply Service
AWWA	C502	Dry-Barrel Fire Hydrants
AWWA	C504	Rubber-Seated Butterfly Valves
AWWA	C509	Resilient-Seated Gate Valves for Water Supply Service

AWWA C515 Reduced Wall, Resilient-Seated Gate Valves for Water Supply Service

AWWA C550 Protective Interior Coatings for Valves and Hydrants

Federal Specifications (FS)

FS TT-V-51F Varnish, Asphalt

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF THE GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

A. Shop drawings shall be submitted for the valves and appurtenances indicating type of joint, and lining and coating, etc., in accordance with the specifications.

B. Shop drawings shall consist of manufacturer's scale drawings, cuts or catalogs including descriptive literature and complete characteristics and specifications, and code requirements.

C. Refer to Paragraph 3.01.A for Affidavit of Compliance required to be submitted**.**

PART 2 - PRODUCTS

2.01 GENERAL:

A. Valves shall open left.

2.02 HYDRANTS:

A. Hydrants are existing structures to be relocated.

2.03 HYDRANT PAINT:

A. Hydrants shall be thoroughly cleaned and given two shop or field coats of paint in accordance with AWWA C502 and the instructions of the paint manufacturer. Paint color shall be the standard hydrant color of the Owner as follows:

1. Barrel – **match existing**
2. Bonnet – **match existing**
3. Nozzle Caps – **match existing**.

C. Hydrant paint shall be as manufactured by Sherwin-Williams, Cleveland, OH; Tnemec Company, Inc., Kansas City, MO; or Minnesota Mining and Manufacturing Co. (3M), St. Paul, MN; or approval equal.

D. Alkyd gloss enamel shall be 801 DTM by Sherwin-Williams, 2H-Tneme by Tnemec; or approved equal. Reflective paint shall be Scotchlite #7211 by 3M.

2.04 YARD HYDRANT:

A. Yard hydrants shall have 2-1/8-inch minimum valve opening, 3-inches minimum inside diameter barrel, 2-1/2-inches screwed inlet and two 1-1/2-inch hose nozzles.

B. Yard hydrants shall be designed for 150 psi working pressure and 300 psi test pressure.

C. All passages through the hydrant shall have easy well- rounded curves.

D. The hydrants shall be provided with a positive non-corrodible drip, arranged to drain the barrel when the hydrant is shut off.

E. Hydrants shall be covered with two coats of rust-resisting tar below grade.

F. One set of outlet nozzle caps shall be provided for each hydrant, tapped and fitted for a 3/4-inch hose connection.

G. Yard hydrants shall be Mueller Co., Model A-411 or approved equal.

2.05 RESILIENT SEAT GATE VALVES:

A. Resilient seat, wedge type gate valves shall be manufactured to meet all applicable requirements of AWWA C509 or AWWA C515. All valves shall be bubble-tight at 200 psi water working pressure, tested in both directions.

B. Valve bodies shall be of cast or ductile iron and shall have non-rising threaded bronze stems acting through a bronze stem nut. Opening nuts shall be 2-inches square and shall open as specified above. All buried valves shall have mechanical joint ends.

C. Valve wedges shall be of ductile iron with resilient seating surfaces permanently bonded to the wedges in strict accordance with ASTM D429 or attached to the face of the wedges with stainless steel screws. Each valve shall have a smooth, unobstructed water way free from sediment pockets.

D. Valves shall have low friction, torque-reduction thrust bearings. All O-rings and gaskets shall be removable without taking the valves out of service.

E. An NSF 61-approved epoxy coating, which is safe for potable water, shall be applied to exterior and interior valve surfaces.

F. Valves for horizontal applications shall have Delrin wedge covers, and be specifically designed for horizontal installation.

G. Resilient seat gate valves shall be as manufactured by Clow Valve Co., Oskaloosa, IA; Mueller Co., Decatur, IL; American Valve and Hydrant; Birmingham, AL; Waterous Co., S. St. Paul, MN; MH Valve, Anniston, AL; Kennedy Valve, Elmira, NY; or approved equal.

H. Post indicating valve assemblies shall have a post and indicator as an integral part of the resilient seated gate valve assembly. The unit shall be provided with a detachable crank which OPENS the valve in a counterclockwise direction. Shafts shall be Type 304 stainless steel. Post indicators and valves shall be UL listed, FM approved. Post indicators and valves shall be as manufactured by Pratt, Clow or approved equal.

2.06 TAPPING SLEEVES AND VALVES:

A. Tapping sleeves and valves shall consist of a split cast iron or ductile iron sleeve tee with mechanical joint ends on the main and a flange on the branch. Tapping-type gate valves shall have one flange and one mechanical joint end. The valves shall conform to the requirements hereinbefore specified for gate valves and shall be furnished with a 2-inch square operating nut. The Contractor shall be responsible for verifying the outside diameter of the pipe to be tapped.

B. Oversized valves shall be provided as required to permit the use of full size cutters. Before backfilling, all exposed portions of bolts used to hold the two halves of the sleeve together shall be heavily coated with two coats of bituminous paint comparable to Inertol No. 66, Special Heavy. Sleeves shall be of cast iron furnished with rubber gaskets. Gaskets shall cover the entire area of flange surfaces.

C. Tapping sleeves and valves shall be as manufactured by Clow Valve Co., Oskaloosa, IA; Mueller Co., Decatur, IL; American Valve and Hydrant, Birmingham, AL; MH Valve, Anniston, AL; Kennedy Valve, Elmira, NY; US Pipe, Chattanooga, TN; or approved equal.

2.07 BUTTERFLY VALVES:

A. Buried butterfly valves shall be Class 150B, iron body, rubber seated, with mechanical joint ends. Butterfly valves shall conform to AWWA C504, except as otherwise specified herein. Butterfly valves shall have valve seats designed to provide bubble-tight shutoff at 150 psi upstream and downstream.

B. Butterfly valve designs utilizing continuous lining on the internal body surfaces and extending over the flanges, will NOT be acceptable. Valve disks shall seat at an angle of 90 degrees to the axis of the pipe.

C. Valve seats shall be of molded natural rubber, BUNA-NM or EPDM. Rubber seats may be attached to the body or the disk. If the seat is attached to the disk, the seat ring on the body shall be of stainless steel. Bolts shall extend through the seat.

D. Seats mounted on the disk shall be securely clamped to the disk. All clamps, retaining rings, and their fasteners shall be Series 300 stainless steel.

E. The valve disk shall be of either ductile iron conforming to ASTM A536 or Type 304 stainless steel.

F. The valve shaft shall be Type 300 stainless steel or carbon steel with stainless steel joints. The valve disk and shaft connection shall be by means of mechanically secured taper pins extending through the disk and shaft. Taper pins, lockwashers and nuts shall be 18-8 stainless steel. The shaft seals shall be designed for the use of standard chevron type packing or standard O-ring seals.

G. The manual operation mechanism shall be firm fixed to the valve body. The operator shall be permanently lubricated, and totally enclosed with a cast iron case, and the nut for buried valves shall turn in the direction specified above to open. The operator for buried valves shall be suitable for submersion. The operator shall have adjustable threaded collars at each end of the stroke.

H. Butterfly valves shall be as manufactured by MH Valve Company, Anniston, AL; Keystone Valves USA, Houston, TX; Henry Pratt Company, Aurora, IL; or approved equal and shall conform to the above specifications.

2.08 DAMPENED SWING CHECK VALVES:

A. Provide swing check valves with weighted arm plus an externally mounted air cushion cylinder APCO Series 6000 as manufactured by Valve and Primer Corporation, Inc.; Golden-Anderson Figure 250-D as manufactured by GA Industries, Cranberry Township, PA, or approved equal.

B. The dampened swing check valves shall be flanged with cast iron body, bronze seat ring and continuous stainless steel shaft connected to an external lever and weight and bronze air cushion cylinder.

C. Valves shall be full ported and prevent reverse flow when the inlet pressure becomes less than the downstream pressure, and shall be tight seated.

D. The disc shall be cast iron, utilizing a double clevis hinge connected to a ductile iron disc arm. The disc arm assembly shall be suspended from the stainless steel shaft.

E. The air cushion cylinder shall be constructed of corrosion resistant material and the piston shall be totally enclosed within the cylinder (not open at one end). The cushion cylinder assembly shall be externally attached to the right side of the valve body looking downstream and be adjustable to cushion the closure of the valve. Cushioning shall be by air trapped in the cushion cylinder, which shall be fitted with a one-way adjustable control check valve to cushion disc contact to the seat at the shut-off point.

2.09 INSERTION VALVES:

A. Insertion valves shall consist of a ductile iron or ASTM A-36 steel fusion bonded epoxy coated to 10-12 mils in accordance with AWWA C-213. The valves shall conform to the requirements herein specified for gate valves and shall be furnished with a 2-inch square operating nut. The contractor shall be responsible for verifying the outside diameter of the pipe where the valve will be inserted.

B. Before backfilling, all exposed portions of bolts used to hold the two halves of the sleeve together shall be heavily coated with two coats of bituminous paint comparable to Inertol No. 66, Special Heavy. Sleeves shall be furnished with a rubber gasket that fits 360 degrees around the pipe at each end.

C. Insertion valves shall be as manufactured by Hydra-Stop, Inc., Blue Island, IL; Romac Industries, Inc, Seattle, Washington; or approved equal.

2.10 WATER LINE STOPS:

A. Water line stop fitting body shall consist of a ductile iron or ASTM A-36 steel fusion bonded epoxy coated to 10-12 mils in accordance with AWWA C-213. The fitting shall be full encirclement, pressure retention-type split tee. The outlet of the fitting shall have locking pins built in to retain the completion plug. The contractor shall be responsible for verifying the outside diameter of the pipe where the valve will be inserted.

B. Before backfilling, all exposed portions of bolts used to hold the two halves of the sleeve together shall be heavily coated with two coats of bituminous paint comparable to Inertol No. 66, Special Heavy. Sleeves shall be furnished with a nitrile gasket that fits 360 degrees around the pipe at each end.

C. The completion plug shall be machined from a stress relieved carbon steel weldment. It shall contain two (2) circumferential grooves: one to receive the locking devices from line stop flange and second to contain a compressible “O” ring to seal tight under pressure. The line stop fitting shall be closed with a blind flange. Facing and drilling of the blind flange shall be compatible with that of the line stop flange.

D. The Contractor shall provide the materials, machines, and related equipment necessary to install the line stop into an existing piping system under full operating pressure without interrupting service.

E. Line stops shall be as manufactured by South Shore Pipeline, Hanover MA, John Hoadley & Sons, Inc. Rockland MA, Hydra-Stop, Inc., Blue Island, IL; IPSCO Paulsboro NJ; or approved equal.

2.11 VALVE BOXES AND EXTENSIONS:

A. Valve boxes shall be manufactured in North America. The minimum outside diameter of the boxes shall be 5½-inches and the lengths shall be as necessary to suit the ground elevation and the depth of each valve operator, regardless of the depth of cover.

B. When there is more than 6 feet of cover, valve operators shall have non-rising extension stems which raise the operating nut to a depth of approximately 4 feet below grade. The extension stem shall have a centering support ring at the upper end. The lower socket shall be tapped with a set screw into the valve nut to prevent the extension stem from lifting off the valve nut.

C. Each valve shall be provided with a box which has a close fitting 7-1/4-inch diameter cover and is substantially dirt-tight. The top of the cover shall be flush with the top of the box rim. The word "WATER" shall be cast in the top of the cover.

D. Valve boxes shall be of cast iron and of the adjustable sliding, heavy pattern type. They shall be so designed and constructed as to prevent direct transmission of traffic loads to the pipe or valve. The upper or sliding section of the box shall be provided with a flange on the top of the section (not on the bottom) having sufficient bearing area to prevent undue settlement. The lower section of the box shall be designed to enclose the operating nut and stuffing box of the valve and to rest on the backfill. The boxes shall be adjustable through at least 6 inches vertically without reduction of lap between sections to less than 8-inches.

2.12 POLYETHYLENE ENCASEMENT:

Where called for on the drawings, the pipe shall be encased in polyethylene conforming to AWWA C105.

PART 3 - EXECUTION

3.01 AFFIDAVIT OF COMPLIANCE

A. The manufacturer shall furnish as part of the shop drawing submittal the Engineer with an affidavit stating that valve(s), hydrants conform to the applicable requirements of the applicable AWWA Standard and the Engineer's specifications, and that all tests specified therein have been performed and all test requirements have been met and the test date.

B. A copy of the Affidavit of Compliance shall be delivered to the construction site attached to each valve and/or hydrant furnished. The Affidavit shall be attached to the valve or hydrant inside a waterproof pouch.

C. Any valve or hydrant received without the required affidavit shall be removed from the project and replaced at no expense to the Owner.

D. All materials shall be certified "NEW". No reconditioned or repaired materials are permitted. Any reconditioned or repaired materials furnished or installed shall be

removed and replaced with new materials at no expense to the Owner.

3.02 INSTALLATION:

A. All valves shall be carefully installed and supported in their respective positions free from distortion and strain. Care shall be taken to prevent damage or injury to the valves and appurtenances during handling and installation.

B. All material shall be carefully inspected for defects in workmanship and all debris and foreign material cleaned out of valve openings and seats. All mechanisms shall be operated to check for proper functioning, and all nuts and bolts checked for tightness.

C. Valves and other equipment that do not operate easily or are otherwise defective shall be repaired or replaced at the Contractor's expense.

D. Hydrants shall be set plumb. Earth fill shall be carefully tamped around the hydrants to a distance of 4 feet on all sides of the hydrant, or to the undisturbed trench face, if less than 4 feet. Hydrants and connecting pipe shall have at least the same depth of cover as the distributing main. Hydrants shall be set upon a layer of stone or a slab of concrete not less than 4-inches thick and 15-inches square. The side of the hydrant opposite the pipe connection shall be firmly wedged against the vertical face of the trench with a concrete thrust block, as indicated on the drawings.

E. Broken stone shall be placed around the base of the hydrant at the location of the drain hole, and backfill around the hydrant shall be thoroughly compacted to the grade line in a satisfactory manner. Hydrants shall have the interiors cleaned of all foreign matter before installation, and shall be inspected in both the open and closed positions.

F. The body of the hydrant shall be of sufficient length to allow the hydrant to be set at the proper elevation, as shown on the drawings. Extensions shall be furnished and installed at the Contractor's expense, when required for greater depths.

G. Valve boxes shall be set plumb, flush with the ground or paved surface, and centered directly over the operating nut of the valves. Earth fill shall be carefully tamped around the valve boxes to a distance of 4 feet on all sides of the boxes or to the undisturbed trench face, if less than 4 feet.

H. Valves shall be operational and accessible at all times during construction and warranty period. The Contractor shall verify proper operation of all valves in the presence of the Engineer and/or Owner following completion of the project and prior to the acceptance of Substantial Completion.

3.03 POLYETHYLENE ENCASEMENT:

A. The pipe, hydrants and valves to be encased shall be thoroughly cleaned of all soil and debris prior to installation of the polyethylene encasement. No soil or debris shall be allowed to enter the encasement during or after its installation.

B. Polyethylene encasement shall be installed using Method A as described in AWWA C105, with the encasement joints coincident with pipe joints. Adhesive tape shall be used to secure the encasement.

C. Minimum overlap of polyethylene encasement shall be 24-inches, 12-inches on each side of pipe joints.

D. If required, two layers of polyethylene encasement shall be installed. The first layer shall be completely installed on and secured to the length of pipe before the second layer is installed.

E. Tears, cuts and other damage shall be repaired with a piece of polyethylene covering secured with adhesive tape, when approved by the Engineer. Otherwise, the damaged length of polyethylene shall be replaced at the Contractor's expense.

F. Care shall be taken when backfilling to avoid damage to the polyethylene encasement.

END OF SECTION

SECTION 02515

BACKFLOW PREVENTER CABINETS

PART I - GENERAL

1.01 SCOPE OF WORK

a. The Contractor shall furnish and install one (1) Backflow Preventer Cabinet complete in place in accordance with the Contract Drawings.

b. Service lines, internal cabinet features and other related water work shall be accomplished in accordance with the requirements this specification and all relevant details and plans.

1.02 REFERENCE STANDARDS AND SPECIFICATIONS

a. Reference to specific standards, specifications and tests of the following technical societies, organizations, and governmental bodies may be made in the contract documents.

1. AASHTO - American Association of State Highway and Transportation Officials (tests or specifications). AASHTO or AASHO

2. ASTM - American Society for Testing and Materials.

3. Mass. Standard Specs. - Latest edition of the Standard Specifications for Highways and Bridges, Latest Edition, the Massachusetts Highway Department, hereinafter referred to as "the Massachusetts Standard Specifications."

4. AWWA - American Waterworks Association.

1.03 SHOP DRAWINGS

a. Submit shop drawings and manufacturer's cuts per Submittal Requirements of these Specifications.

PART II - MATERIALS

2.01 BACKFLOW PREVENTER CABINET

a. The backflow preventer cabinet shall be a standard manufactured item or custom built, conforming to the Contract details and requirements herein. The cabinet shall be constructed of galvanized, zinc-primed steel, .25" thick, painted black, and mounted on a concrete pad. The cabinet shall be furnished in the dimensions identified in the drawings, metal vandal resistant box over the handle/padlock area. No lifting eye bolts or holes shall be permitted in the top/roof of the cabinet. A local manufacturer of custom-sized cabinets is Commercial Sheetmetal Co., Inc. of Canton, MA 02021, Tel. 781-828-7900.

b. Submittal drawings of cabinet 2.01 (a) required for approval by Owner's Representative.

2.02 BACK FLOW ENCLOSURE

a. The backflow preventer cabinet shall be a standard manufactured item or custom built, conforming to the Contract details and requirements herein.

b. The back flow prevention device enclosure shall be of a vandal and weather resistant nature manufactured entirely of aluminum with a minimum wall thickness of one-eighth inch, painted with an approved black powder coating system and mounted on a concrete pad.

c. The cabinet shall be furnished in the dimensions identified in the drawings and shall contain louvers at the top of the doors, louvers at the sides and back and have metal vandal resistant boxes over the handle/padlock area.

d. All louvers shall contain insect screens.

e. No lifting eye bolts or holes shall be permitted in the top/roof of the cabinet.

f. The enclosure shall be as manufactured by Commercial Sheetmetal Co., Inc. of Canton, MA 02021, Tel. 781-828-7900 or approved equal.

2.02 CEMENT CONCRETE

a. Forms, reinforcing, and cement concrete cast in place for all backflow preventer cabinets shall conform to Section 03300.

PART III - EXECUTION

3.01 INSTALLATION

a. Include all necessary transportation, shipping and handling as necessary to properly and completely install the specified cabinets.

3.02 CONCRETE BASE

a. Install concrete base in conformance with the Contract Details. Pitch at edges for positive drainage.

b. Any surfaces of the specified cabinets that are chipped or scratched shall be wire brushed, primed and painted or otherwise restored to a flawless condition in a manner that is acceptable to the Owner's Representative.

- - - END OF SECTION - - -

SECTION 02515

SERVICE CONNECTIONS (WATER SERVICES)

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section covers the furnishing and installation of new water service connections and the repair, replacement, and/or transfer of existing water service connections as shown on the drawings, as specified herein, and as required by the Engineer.

1.02 RELATED WORK:

A. Not Used

1.03 REFERENCES:

A. The following standards form a part of this specification:

American Society for Testing and Materials (ASTM)

ASTM	B88	Seamless Copper Water Tube
ASTM	B584	Copper Alloy Sand Castings for General Applications
ASTM	D2737	Polyethylene (PE) Plastic Tubing

American Water Works Association (AWWA)

AWWA	C800	Water-Service Line Fittings
AWWA	C651	Disinfecting Water Mains
AWWA	C901	Polyethylene Pressure Pipe & Tubing, 1/2-inch through 3-inch for Water Service

Federal Specifications (FS)

FS	WW-T-799C	Tube, Copper, Seamless

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF THE GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

Six sets of manufacturer's literature of the materials of this section for review.

PART 2 - PRODUCTS

2.01 SERVICE PIPING:

A. Piping between the existing water main and the curb stop shall be buried continuous Type K annealed seamless copper water tubing conforming to ASTM B88 Standard Specification for Seamless Copper Water Tube or U.S. Federal Specification WW-T-799C for Tube, Copper, Seamless. Tubing shall be 1-inch diameter unless otherwise indicated.

B. Piping for copper water service pipe for installation in air release valve manholes and backflow preventer cabinets shall be ASTM B88, Type K, hard copper tubing with diameter as indicated on the plans.

C. Piping between the curb stop and the restroom facility shall be buried polyethylene (PE 4710) water services shall conform to ASTM D2737 and be as specified in AWWA C901. Polyethylene piping shall be designed for 200 psi minimum service and tested at 330 psi for 1,000 hours or greater. The tubing shall be copper O.D. size and be suitable for use with standard industry brass compression fittings without special adapters. Stainless steel insert stiffeners shall be provided for use with all compression joint connections.

D. Couplings, if required, for existing to new service pipe connections shall have compression connections on the inlet and compression connections on the outlet. Couplings shall be made of brass as specified in AWWA C800. All brass components that come into contact with potable water shall be made from either CDA/UNS Brass Alloys C89520 or C89833 and shall not contain more than twenty five hundredths of one percent (0.25% or less) total lead content by weight. The lead leach limit of the coupling shall be 5 parts per billion (ppb). Couplings shall be NSF/ANSI 61 Annex F and Annex G and NSF/ANSI 372 certified by an ANSI accredited organization and shall be stamped or embossed with a mark or name indicating that the product is manufactured from a low-lead alloy, as specified above.

E. Pipe joints inside air release manholes and backflow preventer cabinets shall be fittings conforming to ANSI B16.18 cast bronze solder fittings, or ANSI B16.22 wrought copper solder, lead free fittings and couplings. Solder shall be ASTM B32, Grade 95 TA, up to 250 degrees, and shall be lead-free; Silberbrite, Oately, Harris, or equal. Solder flanged bronze fittings will be used for connections of pipe to valves, backflow preventers and pipe nipples.

2.02 PVC PIPE:

A. PVC pipe shall be as sized on the drawings and details, Schedule 80, solvent weld PVC, ASTM No. D1785, NSF 61 approved, suitable for use with potable water, and as manufactured by IPEX or approved equal.

B. Fittings for all PVC piping shall be Schedule 80 solvent weld PVC as manufactured by IPEX, or approved equal.

C. PVC solvent shall conform to ASTM and shall be low VOC, NSF 61 approved. Solvent shall be appropriate for gluing of pipes and fittings up to 6 inches in size. Solvent shall be as manufactured by Weld-On or approved equal and shall be used in conjunction with an appropriate primer.

2.03. BACKFLOW PREVENTER:

A. Backflow preventer for water spray area shall be a reduced pressure zone assembly (RPZ), as sized on the drawings and details. The RPZ shall consist of a lead free bronze body; two, inline check valves; replaceable check seats with an intermediate relief valve; and ball valve test cocks. RPZ shall be Watts #LS009 or approved equal.

B. All Backflow preventers to be approved by the City's Plumbing Inspector prior to installation.

2.04 GATE VALVES:

A. Gate valves 3-inches and smaller shall be standard, bronze, single wedge, rising stem type gate valves with screwed ends for 125 pound working steam pressure, conforming to Federal Specification WW V 54D, Int. and No. 1, Screwed and Flanged (for land use). They shall have silicon bronze stems and Composition 2 for other parts.

2.05 CORPORATION STOPS:

A. Corporations stops shall be made of brass as specified in AWWA C800. All brass components that come into contact with potable water shall be made from either CDA/UNS Brass Alloys C89520 or C89833 and shall not contain more than twenty five hundredths of one percent (0.25% or less) total lead content by weight. The lead leach limit of the corporation stops shall be 5 ppb. Corporation stops shall be NSF/ANSI 61 Annex F and Annex G and NSF/ANSI 372 certified by an ANSI accredited organization and shall be stamped or embossed with a mark or name indicating that the product is manufactured from a low-lead alloy, as specified above.

B. Corporation stops shall be approved for use with copper and plastic water service pipe. The inlet shall have AWWA taper thread (CC) connections and the outlet shall have compression connections.

C. Service clamps shall be installed with all corporation stops 2-inches and larger in size and with all corporation stops installed in PVC pipe. Clamps shall be all bronze, ductile iron or stainless steel, double strap, AWWA taper thread (CC) with O-ring seal.

D. Corporation stops shall be by Ford Meter Box Co., Inc., Wabash, IN; Red Hed Manufacturing Co., Lincoln, RI; Mueller Co., Decatur, IL; or approved equal.

2.06 CURB STOPS:

A. Curb stops shall be of brass as specified in AWWA C800. All brass components that come into contact with potable water shall be made from either CDA/UNS Brass Alloys C89520 or C89833 and shall not contain more than twenty five hundredths of one percent (0.25% or less) total lead content by weight. The lead leach limit of the curb stops shall be 5 ppb. Curb stops shall be NSF/ANSI 61 Annex F and Annex G and NSF/ANSI 372 certified by an ANSI accredited organization and shall be stamped or embossed with a mark or name indicating that the product is manufactured from a low-lead alloy, as specified above.

B. Curb stops shall be inverted key style and the inlet and the outlet shall have compression connections.

C. Curb stops shall be by Red Hed Manufacturing Co., Lincoln, RI; Ford Meter Box Co., Inc., Wabash, IN; Mueller Co., Decatur, IL; or approved equal.

2.07 CURB BOXES:

A. The cast iron box shall be the sliding Buffalo type with Minneapolis pattern base. Minimum inside diameter of the upper section shall be 1-1/2-inch for 3/4-inch and 1-inch curb stops and 2-inch for 1-1/2-inch and 2-inch curb stops. Curb box lid shall shall be Erie pattern.

A. Boxes shall be equipped with 30-inch stationary extension rods with pinned connections to the curb stop.

2.08 WATER METER:

A. Water meter shall be size as shown on the drawings and supplied by the OWNER.

2.09 PRESSURE REDUCING VALVE:

A. Pressure reducing valves shall be installed where indicated on the drawings. The valves shall be self contained, bronze body, single port valves with a spring loaded diaphragm.

B. They shall be suitable for use with an inlet pressure of at least 150 psi and the outlet pressure shall be adjustable from 1 to 75 psi. The seat material shall be suitable for tight shut off.

C. Pipeline strainers shall be placed ahead of each pressure-reducing valve, and shall contain 20-mesh stainless steel or Monel screens.

D. The valves shall be manufactured by Fisher Governor Co., Marshaltown, IA; Watts Regulator Company, Lawrence, MA; Masoneilan International, Inc., Norwood, MA; or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Where new water mains are being installed and existing water services are to be transferred to the new main, the Contractor shall discontinue the existing water services by shutting down the corporation stop at the old water main, unless specifically otherwise required by the Engineer. The Contractor shall take special care to minimize the interruption of existing water service.

B. The Contractor shall tap a new corporation stop, cut the existing service piping and connect the new service piping to the old service piping using an approved coupling at a point between the main and the existing curb stop and box.

C. Where transfers are to be made and the existing curb stop and box cannot be utilized or a new curb stop and box is required, the Contractor shall connect the new service piping to the existing service piping using an approved coupling approximately 12-inches from the curb stop on the building side of the stop.

D. Where transfers are being made and the existing service is of lead, galvanized steel, or iron, the service shall be replaced to the curb stop and box unless otherwise required. If required, the curb stop and box shall be replaced as specified above.

E. Curb stops and boxes shall be set plumb, flush with the ground or paved surface, and centered with the box located directly over the stop. The box shall be set on a concrete block or flat stone. Earth fill shall be carefully tamped around the boxes to a distance of 4 feet on all sides of the box or to the undisturbed face of the trench, if less than 4 feet.

F. Curb stops shall be operational and accessible at all times during construction and warranty period. The Contractor shall verify the proper operation of all curb stops in the presence of the Engineer and/or Owner following completion of the project and prior to the acceptance of substantial completion.

G. All services shall be installed at 5 feet 0 inches of cover unless otherwise required by the Engineer.

H. Service connections shall be tested and disinfected in accordance with AWWA standards and Section 02080.

END OF SECTION

SECTION 02516

CONNECTIONS TO EXISTING WATER MAINS

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This section covers connections to existing water mains, complete.

B. The Contractor shall furnish all pipe, fittings, valves, tapping machines, if required, and appurtenances. The Contractor shall do all excavation and backfill as required.

1.02 RELATED WORK:

A. Section 02080, DUCTILE IRON PIPE AND FITTINGS.

B. Section 02514, HYDRANTS AND VALVES.

D. Section 03302, FIELD CONCRETE.

PART 2 - PRODUCTS: NOT APPLICABLE

PART 3 - EXECUTION

3.01 CONTRACTOR OPERATIONS:

A. The Contractor shall make all connections to the existing mains as indicated on the drawings and as herein specified.

B. The Contractor shall develop a program for the construction and putting into service of the new work subject to the approval of the Engineer. All work involving cutting into and connecting to the existing work shall be planned so as to interfere with operation of the existing facilities for the shortest possible time and when the demands on the system best permit such interference even to the extent of working outside of normal working hours to meet these requirements.

C. The Contractor shall have all possible preparatory work done prior to making the connection and shall provide all labor, tools, material, and equipment required to do the work in one continuous operation.

D. The Contractor shall have no claim for additional compensation, by reason of delay or inconvenience, for adapting his operations to the needs of the Owner's water supply. No damages shall be claimed by the Contractor for delays in dewatering pipelines nor

shall any damages be claimed because of water leaking through closed valves after dewatering is completed.

E. Under no circumstances shall any residents be without water for a period of more than 4 hours without prior approval of the Owner.

F. Existing pipeline that is not to be abandoned but is damaged by the Contractor during the work shall be replaced by him at his own expense in a manner approved by the Engineer.

3.02 TAPPING CONNECTION TO EXISTING MAINS:

A. Tapping connections to the existing mains, where indicated on the drawings, shall be made with service pressure in the main, using tapping sleeves and valves and a suitable tapping machine.

B. Other connections to existing mains shall be made with the main out of service, unless otherwise required by the Engineer. Such connections will not require tapping sleeves and valves but connections as indicated on the drawings.

END OF SECTION

SECTION 02518

TRACER TAPE

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section covers the furnishing, handling and installation of tracer tape, as called for on the drawings.

1.02 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

A. Six sets of manufacturer's literature on the materials, colors and printing specified herein, shall be submitted to the Engineer for review.

B. Tape samples shall also be submitted to the Engineer for review.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

Tracer tape shall be by Reef Industries, Houston, TX; Empire Level, Mukwonago, WI; Pro-Line Safety Products Co., W. Chicago, IL; or approved equal.

2.02 TRACER TAPE:

A. Tracer tape shall be at least 3-inches wide.

B. Tracer tape for non-ferrous pipe or conduit shall be constructed of a metallic core bonded to plastic layers. The metallic tracer tape shall be a minimum 5-mil thick and must be locatable at a depth of 18 inches with ordinary pipe locaters.

C. Tracer tape for ferrous pipe or conduit shall consist of multiple bonded plastic layers. The non-metallic tracer tape shall elongate at least 500% before breaking.

D. The tape shall bear the wording: "BURIED DRAIN LINE BELOW" (with "DRAIN" replaced by "WATER, "SEWER", "ELECTRICAL", "GAS", "TELEPHONE", or "CHEMICAL" as appropriate), continuously repeated every 30 inches to identify the pipe.

E. Tape colors shall be as follows, as recommended by the American Public Works Association (APWA):

Electric	Red
Gas & Oil	Yellow
Communications	Orange
Water	Blue
Sewer & Drain	Green
Chemical	Red (not APWA)

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Tracer tape shall be installed directly above the pipe or conduit it is to identify, approximately 12 inches below the proposed ground surface.

B. The Contractor shall follow the manufacturer's recommendations for installation of the tape, as approved by the Engineer.

END OF SECTION

SECTION 02533

CONNECTIONS TO EXISTING STRUCTURES

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. The Contractor shall furnish materials, tools, labor and equipment to cut suitable openings into the existing manholes, make connections to existing and all other work necessary to direct the existing flow as indicated on the drawings and as herein specified.

1.02 RELATED WORK:

A. Section 02630, DRAINAGE STRUCTURES

1.03 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF THE GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

A. Prior to start of work, submit details of the methods proposed for doing the work and for maintaining the sewage flow as herein specified.

PART 2 - PRODUCTS - NOT APPLICABLE

PART 3 - EXECUTION

3.01 INSTALLATION:

A. The Contractor shall provide temporary plugs or provide other suitable means for maintaining the new free of flow until such time as it can be inspected and tested for leakage.

B. Connections to the new structure shall be made when required by the Engineer and only after the new pipeline has been inspected and has successfully passed the leakage test.

C. The Contractor shall modify each existing structure for installation of the necessary piping, but in so doing shall confine the cutting to the smallest amount possible consistent with the work to be done.

D. All new piping connected to existing structures shall be encased in concrete in a manner satisfactory to the Engineer.

E. All work shall be done with the proper tools and by careful workmen competent to do work.

F. The Contractor shall cut, reshape and fill the existing manhole tables and plug existing outlets as indicated on the drawings and as directed by the Engineer, to accommodate the new connections. Reshaped manhole invert channels shall be smoothly shaped to permit the flow of sewage. Manhole invert channels shall be reconstructed as specified under Section 02631, DRAINAGE STRUCTURES.

END OF SECTION

SECTION 02625

CORRUGATED POLYETHYLENE [HDPE] DRAINAGE PIPE

PART 1 – GENERAL

1.01 WORK INCLUDED:

A. This section includes furnishing all materials, labor and equipment and installing corrugated polyethylene [HDPE] drainage pipe and fittings as shown on the drawings and as specified herein.

1.02 RELATED WORK:

A. Section 02300 – EARTHWORK

B. Section 02252 – SUPPORT OF EXCAVATION

1.03 REFERENCES:

A. The following standards form a part of this specification, as referenced:

American Society for Testing and Materials (ASTM

ASTM D2321	Standard for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications
ASTM F405	Standard Specification for Corrugated Polyethylene Pipe and Fittings
ASTM F667	Standard Specification for Large Diameter Corrugated Polyethylene Pipe and fittings

American Association Of State Highway and Transportation Officials

AASHTO M294	Standard Specification for Corrugated Polyethylene Pipe
AASHTO MP6	Standard Specification for Corrugated Polyethylene Pipe 42” and 48” Diameter

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

A. Six sets of manufacturer’s literature on the materials of this Section shall be submitted to the Engineer for review.

B. Manufacturer's certification that the product was manufactured, tested, and supplied in accordance with this specification shall be furnished.

1.05 DELIVERY, STORAGE AND HANDLING:

A. Pipe shall be packaged to withstand shipment without damage and handled carefully on the jobsite. Pipe shall be stored so that it is not exposed to sunlight.

PART 2 – PRODUCTS

2.01 MATERIALS:

A. This Section applies to corrugated polyethylene pipe with an integrally formed smooth interior.

B. The nominal size for the pipe and fittings is based on the nominal inside diameter of the pipe.

C. The pipe and fittings shall be free of foreign inclusions and visible defects. Fittings may be either molded or fabricated. Fittings supplied by manufacturers other than the supplier of the pipe shall not be permitted without the approval of the Engineer. The ends of the pipe shall be cut squarely and cleanly so as not to adversely affect joining.

2.02 MANUFACTURERS:

A. Pipe and fittings shall be manufactured by Ipex, Inc.; Plexco, Division of Chevron Chemical Co.; J-M Pipe Co.; Advanced Drainage Systems, Inc. (ADS) or approved equal.

PART 3 – EXECUTION

3.01 INSTALLATION:

A. Pipe interiors, fitting interiors, and joint surfaces shall be thoroughly cleaned before installation. Pipes and fittings shall be maintained clean.

B. Pipes shall be installed in the locations and to the required lines and grades shown on the drawings and provided in these Specifications, using an approved method of control.

C. Excavations shall be maintained free of water during the progress of the Work. No pipes shall be laid in water, nor shall there by any joints made up in water.

D. If any defective pipe is discovered after being placed, removal and replacement with sound pipe will be required at no additional cost to the Owner.

END OF SECTION

SECTION 02629

RAISING AND/OR RESETTING OF MANHOLE FRAME AND COVER

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This Section covers raising and/or resetting of sewer manhole frame and cover. The work includes raising, resetting, and/or adjusting of structures to line and grade.

1.02 RELATED WORK

A. Section 01014, SCOPE AND SEQUENCE OF WORK

B. Section 01330, SUBMITTALS

C. Section 02631, PRECAST MANHOLES AND CATCH BASINS

PART 2 - PRODUCT

2.01 MANHOLE COVER:

A. The Manhole cover shall be supplied by East Jordan Iron Works, Brockton, MA., Catalog Number (frame and cover) 1056Z UND Frame LC239 or approved equal (approximate weight of frame and cover = 450 pounds).

PART 3 - EXECUTION

3.01 RAISING AND/OR RESETTING OF MANHOLE FRAME AND COVER:

A. In areas where bituminous pavement exists, existing manhole castings shall be raised to the proper grade where indicated on the contract drawings or as required by the Engineer.

B. Cut around manhole castings a minimum of 8-inches from casting. Excavate and remove old masonry to such a depth as required by the Engineer and rebuild masonry below the bottom of the casting. Backfill with mortar or bituminous concrete. Place high, early strength concrete or bituminous concrete collar, as required, to approximately 1-1/2-inches below the raised casting grade.

C. Masonry work shall conform to the applicable provisions of Section 02630, BUILD MANHOLE INVERT.

D. The Contractor shall provide a top course approximately 1-1/2-inches thick and shall

match existing surrounding grades and pavement materials. The Contractor shall provide a watertight seal between the masonry work and the casting.

3.02 INSTALLATION OF MANHOLE FRAME AND COVER:

A. Where necessary, replacement covers and frames shall be furnished and installed in-place by the contractor. The cover and frame shall provide a watertight seal.

END OF SECTION

SECTION 02630

BUILD MANHOLE INVERT

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers all manholes complete, including, but not limited to, bases, mortar, and inverts.

1.02 RELATED WORK:

A. Section 01014, SCOPE AND SEQUENCE OF WORK

B. Section 01330, SUBMITTALS

C. Section 01331, DOCUMENTATION

1.03 SYSTEM DESCRIPTION:

A. Invert channel shall be formed of brick and mortar upon the base.

1.04 REFERENCES:

A. The following standards form a part of this specification as referenced:

American Society for Testing and Materials (ASTM)

ASTM C32	Sewer and Manhole Brick
ASTM C144	Aggregate for Masonry Mortar
ASTM C207	Hydrated Lime for Masonry Purposes
ASTM C923	Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes
ASTM C1244	Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test.

1.05 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

A. Six sets of manufacturer literature of the materials of this section shall be submitted to the Engineer for review.

B. Tests reports as required shall be submitted to the Engineer.

PART 2 – INVERT MATERIALS

2.01 The invert shall be formed of brick and mortar, as specified in this specification section.

2.02 BRICK MATERIALS:

A. Brick shall be sound, hard, and uniformly burned brick, regular and uniform in shape and size, of compact texture, and satisfactory to the Engineer. Bricks shall comply with ASTM C32, for Grade SS, hard brick, except that the mean of five tests for absorption shall not exceed 8 percent by weight.

B. Rejected brick shall be immediately removed from the work and brick satisfactory to the Engineer substituted.

C. Mortar shall be composed of portland cement, hydrated lime, and sand in which the volume of sand shall not exceed three times the sum of the volumes of cement and lime. The proportions of cement and lime shall be as required and may vary from l:l/4 for dense hard-burned brick to l:3/4 for softer brick. In general, mortar for Grade SS Brick shall be mixed in the volume proportions of 1:1/2:4-1/2; portland cement to hydrated lime to sand.

D. Cement shall be Type II portland cement as specified for concrete masonry.

E. Hydrated lime shall be Type S conforming to ASTM C207.

F. The sand shall comply with ASTM C144 specifications for "Fine Aggregate," except that all of the sand shall pass a No. 8 sieve.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. INVERT BRICK WORK:

1. All debris shall be removed from the bottom of the manhole before the invert is constructed.

2. Bricks shall be moistened by suitable means, as required, until they are neither so dry as to absorb water from the mortar nor so wet as to be slippery when laid.

3. Each brick shall be laid as a header in a full bed and joint of mortar without requiring subsequent grouting, flushing or filling, and shall be thoroughly bonded as required.

4. The brick inverts shall conform accurately to the size of the adjoining pipes. Side inverts shall be curved and main inverts (where direction changes) shall be laid out in smooth curves of the longest possible radius which is tangent to the centerlines of adjoining pipe.

3.02 CLEANING:

All manholes shall be thoroughly cleaned of all silt, debris and foreign matter of any kind, prior to final inspection.

END OF SECTION

SECTION 02631

PRECAST MANHOLES AND CATCH BASINS

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers all precast manholes and catch basins complete, including, but not limited to, bases, walls, cones, mortar, inverts, frames and covers.

1.02 RELATED WORK:

A. Section 02300, EARTHWORK

B. Section 02745, PAVING

C. Section 03302, FIELD CONCRETE

1.03 SYSTEM DESCRIPTION:

A. Precast sections shall conform in shape, size, dimensions, materials, and other respects to the details indicated on the drawings or as required by the Engineer.

B. All manholes and catch basins shall have concrete bases. Concrete bases shall be precast unless otherwise specified. Invert channels shall be formed of brick and mortar upon the base.

C. Catch basins shall have a 4-foot deep sump unless otherwise specified. Leaching basins shall have a bottom opening as shown on the drawings.

D. Riser and cone sections shall be precast concrete.

1.04 REFERENCES:

A. The following standards form a part of this specification as referenced:

American Society for Testing and Materials (ASTM)

ASTM	A48	Gray Iron Castings
ASTM	C32	Sewer and Manhole Brick
ASTM	C144	Aggregate for Masonry Mortar

ASTM C207	Hydrated Lime for Masonry Purposes
ASTM C478	Precast Reinforced Concrete Manhole Sections
ASTM C923	Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes
ASTM C1244	Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test.

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO M198	Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets

Occupational Safety and Health Administration

OSHA 29 CFR 1910.27	Fall Prevention Protection

1.05 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

A. Six sets of manufacturer literature of the materials of this section shall be submitted to the Engineer for review.

B. Test reports as required shall be submitted to the Engineer.

PART 2 - PRODUCTS

2.01 PRECAST CONCRETE SECTIONS:

A. All precast concrete sections shall conform to ASTM C478 with the following exceptions and additional requirements:

1. The wall thickness of precast sections shall be as designated on the drawings, meeting the following minimum requirements:

Section Diameter (Inches)	Minimum Wall Thickness (Inches)
48	5
60	6
72	7
84	8

2. Type II cement shall be used except as otherwise approved.

3. Sections shall be steam cured and shall not be shipped until at least five days after having been cast.

4. Minimum compressive strength of concrete shall be 4000 psi at 28 days.

5. No more than two lift holes may be cast or drilled in each section.

6. The date of manufacture and the name or trademark of the manufacturer shall be clearly marked on the inside of each precast section.

7. Acceptance of the sections will be on the basis of material tests and inspection of the completed product.

8. Circumferential steel reinforcement in walls and bases shall be a minimum of 0.12 sq. in./lin. ft. for 4-foot diameter sections and 0.15 sq. in./lin. ft. for 5- and 6-foot diameter sections. Reinforcing shall extend into tongue and groove.

B. Conical reducing sections shall have a wall thickness not less than 5-inches at the bottom and wall thickness of 8-inches at the top. Conical sections shall taper from a minimum of 48-inches diameter to 24 or 30-inches diameter at the top, as shown on the drawings.

C. Except where insufficient depth of cover dictates the use of a shorter base, bases shall be a minimum of 4 feet in height.

D. Slab top sections and flat riser sections (Grade Rings) shall conform to the contract drawings, with particular attention focused upon the reinforcing steel and be designed to meet or exceed an HS-20 Loading requirement.

E. The tops of the bases shall be suitably shaped by means of accurate ring forms to receive the riser sections.

F. Precast sections shall be manufactured to contain wall openings of the minimum size to receive the ends of the pipes, such openings being accurately set to conform with line and grade of the sewer or drain. Subsequent cutting or tampering in the field, for the purpose of creating new openings or altering existing openings, will not be permitted except as required by the Engineer.

G. "Drop-over" manholes shall be placed where indicated on the drawings. The Contractor shall accurately measure the diameter of the existing outlet pipe and inform the manufacturer of its size, so that the "Drop-over" type opening can be cut into the precast manhole base. The bottom shall be cast in place by the Contractor in accordance with Section 03302, FIELD CONCRETE. The invert channel shall be formed of brick and

mortar, as specified in this specifications section. The sub-base shall be a compacted, level foundation of crushed stone, at least 6-inches thick, as specified in Section 02300 EARTHWORK, but shall vary to the depth necessary to reach sound undisturbed earth.

H. The exterior surfaces of all precast manhole bases, walls, and cones shall be given a minimum of one shop coat of bituminous dampproofing.

I. The Engineer reserves the right to reject any unsatisfactory precast section and the rejected unit shall be tagged and removed from the job site immediately.

J. The Engineer may also require the testing of concrete sections as outlined under Physical Requirements in ASTM C478 with the Contractor bearing all testing costs.

2.02 BRICK MATERIALS:

A. Brick shall be sound, hard, and uniformly burned brick, regular and uniform in shape and size, of compact texture, and satisfactory to the Engineer. Bricks shall comply with ASTM C32, for Grade SS, hard brick, except that the mean of five tests for absorption shall not exceed 8 percent by weight.

B. Rejected brick shall be immediately removed from the work and brick satisfactory to the Engineer substituted.

C. Mortar shall be composed of portland cement, hydrated lime, and sand in which the volume of sand shall not exceed three times the sum of the volumes of cement and lime. The proportions of cement and lime shall be as required by the Engineer and may vary from l:l/4 for dense hard-burned brick to l:3/4 for softer brick. In general, mortar for Grade SS Brick shall be mixed in the volume proportions of 1:1/2:4-1/2; portland cement to hydrated lime to sand.

D. Cement shall be Type II portland cement as specified for concrete masonry.

E. Hydrated lime shall be Type S conforming to ASTM C207.

F. The sand shall comply with ASTM C144 specifications for "Fine Aggregate," except that all of the sand shall pass a No. 8 sieve.

2.03 FRAMES, GRATES, AND COVERS:

A. Castings shall be of good quality, strong, tough, even-grained cast iron, smooth, free from scale, lumps, blisters, sandholes, and defects of every nature which would render them unfit for the service for which they are intended. Contact surfaces of covers and frame seats shall be machined to prevent rocking of covers.

B. All castings shall be thoroughly cleaned and may be subject to a careful hammer

inspection at the Engineer's discretion.

C. Castings shall be ASTM A48 Class 30B or better.

D. The surface of the manhole covers shall have a diamond pattern with the cast words "WATER," "DRAIN" or "SEWER," whichever is appropriate.

E. Manhole frames with 32-inch covers for 30-inch openings shall be 500 pounds minimum by East Jordan Iron Works, No. LC328; Quality Water Products, Style 47; Neenah Foundry Co., R1740B or approved equal.

F. Watertight type manhole frames with 32-inch diameter covers (bolted and gasketed) shall be 4 bolt, 556 pounds minimum by East Jordan Iron Works, No. LCB328; Quality Water Products, Style C47WT; Neenah Foundary Co., R-17550-H or approved equal.

G. Manhole frames with 26-inch covers for 24-inch openings shall be 475 pounds minimum by East Jordan Iron Works No. LKll0A; Neenah Foundry Co. R1720; Quality Water Products, Style 40; or approved equal.

H. Watertight type manhole frames with 26-inch diameter covers (bolted and gasketed) shall be 4 bolt, 475 pounds minimum, and shall be East Jordan Iron Works No. LBB268; Mechanics Iron Foundry Type A2073; Quality Water Products, Style 40WT; or approved equal.

I. Frostproof manhole frames, with 26-inch diameter covers and inner lids, 435 pounds minimum, shall be R-1758 series by Neenah Foundry Co., Neenah, WI; LBF series by East Jordan Iron Works, Brockton, MA; B-3045 (or similar) by Mechanics Iron Foundry, Boston, MA; or approved equal.

J. 2-inch thick polystyrene insulation shall be firmly adhered to all frostproof inner lids.

K. Catch basin frames and 23-7/8-inch square grates with 2-inch square openings shall be 8-inches in height minimum. They shall be Neenah Foundry Co. No. R3588-A; Quality Water Products No. 45-600; East Jordan Iron Works 5548Z 5520M; or approved equal.

L. Catch basin frames with bar grate openings and 23-7/8-inch square grates shall be 8-inches in height minimum. Bar grates shall not be used in areas where bicycle traffic could be present. They shall be Neenah Foundry Co. No. R-3589; Quality Water Products No. 45; East Jordan Iron Works LK121; or approved equal.

M. Catch basin frames with cascade grate openings and 23-7/8-inch square grates shall be 8-inches in height minimum. They shall be Neenah No. R-3589; Quality Water Products LK121; East Jordan Iron Works 5548Z 5520M; or approved equal.

N. Catch basin frames set against curbing shall have three flanges only.

2.04 MANHOLE ACCESSORIES:

A. Gasket materials shall be top grade (100% solids, vulcanized) butyl rubber and shall meet or exceed AASHTO M-198.

B. Couplings at the manhole-pipe interface shall be made with a rubber seal system (with or without stainless steel straps) meeting the requirements of ASTM C923 and recommended for this type of connection.

C. Stubs installed as specified and indicated on the drawings shall be short pieces of the same class pipe as that entering the manhole and shall have either stoppers or end caps as shown on the drawings. Stoppers or end caps shall be especially designed for that application.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. PRECAST SECTIONS:

1. Precast bases shall be supported on a compacted level foundation of crushed stone, as specified in Section 02300 EARTHWORK, at least 6-inches thick, but shall vary to the depth necessary to reach sound undisturbed earth.

2. Precast reinforced concrete sections shall be set vertical and with sections in true alignment.

3. Butyl rubber joint sealant shall be installed between each concrete section. Catch basin sections do not require joint sealant if so indicated on the drawings.

4. All holes in sections used for handling the sections shall be thoroughly plugged with mortar. Mortar shall be one part cement to 1-1/2 parts sand, mixed slightly damp to the touch (just short of "balling"), hammered into the holes until it is dense and an excess of paste appears on the surface, and then finished smooth and flush with the adjoining surfaces.

B. BRICK WORK:

1. Bricks shall be moistened by suitable means, as required, until they are neither so dry as to absorb water from the mortar nor so wet as to be slippery when laid.

2. Each brick shall be laid as a header in a full bed and joint of mortar without requiring subsequent grouting, flushing or filling, and shall be thoroughly bonded as directed.

3. The brick inverts shall conform accurately to the size of the adjoining pipes. Side inverts shall be curved and main inverts (where direction changes) shall be laid out in smooth curves of the longest possible radius which is tangent to the centerlines of adjoining pipe.

C. CASTINGS:

1. Cast iron frames, grates and covers shall be as specified. The frames and covers shall be set by the Contractor to conform accurately to the grade of the finished pavement, existing ground surface, or as indicated on the drawings. Frames shall be adjusted to meet the street surface.

2. Cast iron manhole frames and covers not located in paved areas shall be set 6-inches above finished grade, at a height as required by the Engineer, or as indicated on the drawings. The top of the cone shall be built up with a minimum of 1 course and a maximum of 5 courses of brick and mortar used as headers for adjustment to final grade.

3. Frames shall be set concentric with the top of the concrete section and in a full bed of mortar so that the space between the top of the concrete section or brick headers and the bottom flange of the frame shall be completely filled and made watertight. A thick ring of mortar extending to the outer edge of the concrete shall be placed all around the bottom flange. The mortar shall be smoothly finished to be flush with the top of the flange and have a slight slope to shed water away from the frame.

4. Covers and/or grates shall be left in place in the frames, for safety reasons, except while work is being performed.

D. ACCESSORIES:

1. Accessories shall be installed in accordance with manufacturer's instructions.

2. Stubs shall be set accurately to the dimensions indicated on the drawings. Stubs shall be sealed with suitable watertight plugs.

3.02 LEAKAGE TESTS:

A. Leakage tests shall be made by the Contractor and observed by the Engineer on each manhole. The test shall be by vacuum or by water exfiltration as described below:

B. VACUUM TEST:

1. The vacuum test shall be conducted in accordance with ASTM C1244. Test

results will be judged by the length of time it takes for the applied vacuum to drop from 10 inches of mercury to 9 inches. If the time is less than that listed in Table 1 of ASTM C1244, the manhole will have failed the test. Test times from Table 1 are excerpted below.

TABLE 1

Minimum Test Times for Various Manhole Diameters

	Diameter (Inches)		
Depth (Feet)	48	60	72
	Times (Seconds)		
0-12	30	39	49
12-16	40	52	67
16-20	50	65	81
20-24	59	78	97
26-30	74	98	121

2. If the manhole fails the initial test, the Contractor shall locate the leaks and make proper repairs. Leaks may be filled with a wet slurry of accepted quick setting material. If the manhole should again fail the vacuum test, additional repairs shall be made, and the manhole water tested as specified below.

C. WATER EXFILTRATION TEST:

1. After the manhole has been assembled in place, all lifting holes shall be filled and pointed with an approved non-shrinking mortar. All pipes and other openings into the manhole shall be suitably plugged and the plugs braced to prevent blow out. The test shall be made prior to placing the shelf and invert. If the groundwater table has been allowed to rise above the bottom of the manhole, it shall be lowered for the duration of the test.

2. The manhole shall be filled with water to the top of the cone section. If the excavation has not been backfilled and observation indicates no visible leakage, that is, no water visibly moving down the surface of the manhole, the manhole may be considered to be satisfactorily water-tight. If the test, as described above, is unsatisfactory as determined by the Engineer or if the manhole excavation has been backfilled, the test shall be continued. A period of time may be permitted if the Contractor so wishes, to allow for absorption by the manhole. At the end of this period, the manhole shall be refilled to the top of the cone, if necessary, and a measuring time of at least 8 hours begun. At the end of the test period, the manhole shall be refilled to the top of the cone, measuring the volume of water added. This amount shall be extrapolated to a 24-hour loss rate and the leakage determined on the basis of depth. The leakage for each manhole shall not exceed one gallon per vertical foot for a 24-hour period. If the manhole fails this

requirement, but the leakage does not exceed 3 gallons per vertical foot per day, repairs by approved methods may be made as required by the Engineer to bring the leakage within the allowable rate of one gallon per foot per day. Leakage due to a defective section or joint or exceeding the 3 gallon per vertical foot per day, shall be cause for rejection of the manhole. It shall be the Contractor's responsibility to uncover the rejected manhole as necessary and to disassemble, reconstruct or replace it as required by the Engineer. The manhole shall then be retested and, if satisfactory, interior joints shall be filled and pointed.

3. No adjustment in the leakage allowance will be made for unknown causes such as leaking plugs, absorption, etc. It shall be assumed that all loss of water during the test is a result of leaks through joints or through the concrete. Furthermore, the Contractor shall take any steps necessary to assure the Engineer that the water table is below the bottom of the manhole throughout the test.

4. If the groundwater table is above the highest joint in the manhole, and there is no leakage into the manhole, as determined by the Engineer, such a test can serve to evaluate water-tightness of the manhole. However, if the Engineer is not satisfied with the results, the Contractor shall lower the water table and carry out the test as described hereinbefore.

3.03 CLEANING:

All new manholes shall be thoroughly cleaned of all silt, debris and foreign matter of any kind, prior to final inspection.

END OF SECTION

SECTION 02636

UNDERGROUND STORMWATER CHAMBER SYSTEMS

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. The Contractor shall furnish all labor, materials, equipment and incidentals required and install all underground stormwater chamber systems and appurtenances in accordance with the Drawings and these specifications.

1.02 RELATED WORK:

A. Section 02300, EXCAVATION, BORROW AND BACKFILL

B. Section 02745, PAVING

C. Section 03302, FIELD CONCRETE

1.03 QUALITY CONTROL INSPECTION:

A. The quality of materials, the process of manufacture, and the finished sections shall be subject to inspection by the Engineer. Such inspection may be made at the place of manufacture, or on the work site after delivery, or at both places, and the sections shall be subject to rejection at any time if material conditions fail to meet any of the specification requirements, even though sample sections may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the site shall be marked for identification and shall be removed from the site at once. All sections which have been damaged beyond repair during delivery will be rejected and, if already installed, shall be repaired to the Engineer’s acceptance level, if permitted, or removed and replaced, entirely at the Contractor's expense.

B. All sections shall be inspected for general appearance, dimensions, soundness, etc. The surface shall be dense, close textured and free of blisters, cracks, roughness and exposure of reinforcement.

C. Imperfections may be repaired, subject to the acceptance of the Engineer, after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be carefully inspected before final acceptance.

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

A. Shop Drawings

Structural design calculations and shop drawings shall be certified by a Professional Engineer retained by the system manufacturer or Contractor and licensed in the state where the system is to be installed. Six (6) copies of said shop drawings shall be submitted to the Engineer for review and approval.

B. Affidavit on patent infringement

The Contractor shall submit to the Engineer, prior to installation of the stormwater chamber system, an affidavit regarding patent infringement rights stating that any suit or claim against the Owner due to alleged infringement rights shall be defended by the Contractor who will bear all the costs, expenses and attorney's fees incurred thereof.

C. Performance Documentation

The following documentation must be submitted by the Contractor and approved by the Engineer prior to the manufacture and delivery of any materials.

1. Manufacturing Experience

The stormwater chamber supplier shall provide evidence of at least 5 years of successful product design and use. The supplier shall provide an installation list of projects, model sizes installed and installation dates where the same type systems as specified herein have been designed and produced by the supplier.

D. Operation and Maintenance Manuals

Furnish four copies of the operation and maintenance manuals for the stormwater treatment systems.

PART 2 - PRODUCTS

2.01 MATERIALS AND DESIGN:

A. Chamber, stone and fabric materials and design shall conform to those indicated the installation instructions provided by the system manufacturer.

2.02 MANUFACTURER:

A. Each stormwater chamber system shall be of a type that has been installed and used successfully for a minimum of 5 years. The manufacturer of said system shall have been regularly engaged in the engineering design and production of systems for the physical collection of stormwater runoff during the aforementioned period.

B. Each stormwater chamber system shall be as manufactured by Cultec, Inc., 878 Federal Road, Brookfield CT 06804 or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Each stormwater chamber system shall be constructed according to the sizes shown on the Drawings and as specified herein. Install at elevations and locations shown on the Drawings or as otherwise required by the Engineer.

B. Installation of Chambers, stone and fabric shall be completed as indicated in the manufacturer's installation instructions.

END OF SECTION

SECTION 02730

STABILIZED STONE DUST PAVEMENT

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. The work to be done under this Section shall be the furnishing, placement and compaction of stabilized stone dust surfacing as shown on the drawings and as specified herein. The Contractor shall be responsible for supplying the material, labor, equipment and transportation necessary to do the work.

1.02 RELATED WORK:

A. Section 01330, SUBMITTALS

B. Section 02350, EXCAVATION, BORROW AND BACKFILL

1.03 SAMPLES:

A. Prior to ordering and delivering materials to the site, (1) representative samples of stone dust shall be sent to the Engineer for approval. The material shall be analyzed by a certified testing laboratory and certified by the supplier as a byproduct of a stone quarry operation.

B. The color shall be medium to dark gray when wet and consistent throughout. Samples must match that product which is to be installed.

PART 2 - PRODUCTS

2.01 STONE DUST:

A. Stone dust shall be "DOUBLE CRUSHED" the product of a stone crusher and shall consist of inert materials that are hard, durable stone, free from surface coatings and deleterious materials.

B. Gradation requirements shall be as follows:

U.S. Sieve No.	Percent Passing by Weight
# 4	100
# 8	96
# 16	68
# 30	43
# 50	29
# 100	17
# 200	11

2.02 STABILIZER:

A. Non-toxic, non-staining water-activated soil stabilizer.

B. "STABILIZER" by Stabilizing Solutions, Inc. Phoenix, AX 1-800-336-2468 or approved equal.

PART 3 - EXECUTION

3.01 PLACING AND COMPACTING:

A. The stone dust shall be placed over a previously approved and installed compacted
base of gravel or concrete slab as detailed and as specified under Section 02350 of these Specifications.

B. The stone dust shall be placed to the line and grades shown on the plans and shall consist of a minimum of the detailed thickness after watering and compacting to ninety-five percent (95%) of the maximum dry density of the material as determined by the Standard AASHTO Test Designation T99 compaction test Method C at optimum moisture content as determined by the Engineer.

C. Compaction shall continue until the surface is even and true to the proposed lines and grades within a tolerance of three-eighths (3/8) inch above or below the required cross sectional elevations and to a maximum irregularity not exceeding three-eighths (3/8) inch under a ten (10) foot line longitudinally. Any specific area of material sub-base which, after being rolled, does not form a satisfactory, solid, stable foundation shall be removed, replaced and recompacted by the Contractor without extra compensation.

3.02 SOIL STABILIZER BLENDING:

A. The soil stabilizer shall be carefully measured and shall be subsequently blended with the stonedust at the manufacturers recommended rate for three (3) inch compacted stabilized stonedust pathways. (If 'STABILIZER' brand stabilizer is used the blending ratio shall be as follows: One (1) pound of 'STABILIZER' powder per one and one-quarter (1 ¼) cubic feet of stonedust OR as otherwise stated; one (1) pound of 'STABILIZER' powder per five (5) square feet of surface area for three (3) inch compacted depth stone dust.)

END OF SECTION

SECTION 02745

PAVING

PART 1 - GENERAL

1.01 WORK INCLUDED:

The Contractor shall furnish all labor, materials and equipment and shall replace the pavements as indicated on the drawings and as herein specified.

1.02 RELATED WORK:

A. Section 00890, PERMITS

B. Section 01562, DUST CONTROL

C. Section 02350, EXCAVATION BORROW AND BACKFILL

D. Section 02631, PRECAST MANHOLES AND CATCH BASINS

E. Section 09900, PAINTING

1.03 SYSTEM DESCRIPTION:

A. GENERAL

The types of pavement systems to be utilized on this project are as follows:

TYPE 1. PERMANENT TRENCH PAVEMENT

PAVEMENT SCHEDULE

B. TYPE 1. PERMANENT TRENCH PAVEMENT

Areas shall be paved with temporary trench binder course pavement, 2 inches thick, as soon as practicable after installation of individual pipeline segments. Temporary pavement shall be maintained a minimum of 90 days prior to installation of permanent trench binder course pavement, 2 inches thick and permanent trench top course pavement, 1-1/2 inches thick. This may require that the temporary pavement be maintained until the following year, at which time the permanent pavement shall be installed. Permanent trench binder course and trench top course pavement shall be installed only with the approval of the Engineer.

1.04 REFERENCES

The following standards form a part of these specifications and indicate the minimum standards required:

American Society for Testing and Materials (ASTM)

ASTM D1557 Test for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 Pound Rammer and 18-Inch Drop

Massachusetts Department of Transportation (MassDOT)
Standard Specifications for Highways and Bridges

MassDOT 403 Reclaimed Base Course

MassDOT 405 Gravel Base Course

MassDOT 420 Hot Mix Asphalt Base Course

MassDOT 460 Hot Mix Asphalt Pavement

MassDOT 476 Cement Concrete Pavement

MassDOT 860 Reflectorized Pavement Markings

Federal Specifications

SS-S-1401 Sealants, Joint, Non-Jet-Fuel-Resistant, Hot Applied, for Portland Cement and Asphalt Concrete Pavement

AASHTO Standard Specifications for Materials and Methods of Sampling and Testing

1.05 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

Six sets of complete job mix formula shall be submitted to the Engineer at least two weeks before any of the work of this section is to begin.

PART 2 - PRODUCTS

2.01 TRENCH REPAIR:

2.02 GRAVEL SUBBASE:

A. Gravel subbase shall consist of inert material that is hard durable stone and coarse sand, free from loam and clay, surface coatings and deleterious materials.

B. Gradation requirements for gravel subbase shall be as specified in Section 02300, EARTHWORK for Gravel Borrow.

2.03 RECLAIMED SUBBASE:

A. Reclaimed subbase shall consist of crushed asphalt pavement, crushed cement concrete, and gravel borrow (as specified in paragraph 2.02) uniformly pre-mixed.

B. Reclaimed subbase mixtures shall be within the composition limits in accordance with MassDOT M1.11.0, with constituents that conform to Table A, below.

C. The approved source of reclaimed pavement borrow material shall be processed by mechanical means. The equipment for producing crushed material shall be of adequate size and with sufficient adjustments to produce the desired materials. The processed material shall be stockpiled in such a manner as to minimize segregation of particle sizes. All reclaimed pavement borrow material shall come from approved stockpiles.

2.04 HOT MIX ASPHALT PAVEMENT:

A. Pavements shall consist of hot mix asphalt.

B. Pavement mixtures shall be within the composition limits of base courses, binder courses, top courses and surface treatment, in accordance with MassDOT M3.11.03, with constituents that conform to Table A, below.

TABLE A

PERCENT BY MASS PASSING SIEVE DESIGNATION

							Low Permeability	
Standard Sieves (in.)	Reclaimed Subbase	Base Course	Binder Course	Top Course	Mod. Top Course	Surface Treat.	**Dense Binder Course**	**Dense Top Course**
3 in	100							
2 in		100						
1-1/2 in	70-100							
1 in		57-87	100		100		**100**	
¾ in	50-85		80-100		95-100		**80-100**	
5/8 in				100				
½ in		40-65	55-75	95-100	79-100		**65-80**	**100**
3/8 in				80-	68-88	100		**80-**

							Low Permeability	
Standard Sieves (in.)	Reclaimed Subbase	Base Course	Binder Course	Top Course	Mod. Top Course	Surface Treat.	**Dense Binder Course**	**Dense Top Course**
				100				**100**
No.4	30-60	20-45	28-50	50-76	48-68	80-100	**48-65**	**55-80**
No.8		15-33	20-38	37-49	33-46	64-85	**37-49**	**48-59**
No.16				26-40	20-40	46-68		**36-49**
No.30		8-17	8-22	17-29	14-30	26-50	**17-30**	**24-38**
No.50	8-24	4-12	5-15	10-21	9-21	13-31	**10-22**	**14-27**
No.100				5-16	6-16	7-17		**6-18**
No.200	0-10	0-4	0-5	2-7	2-6	3-8	**0-6**	**4-8**
Binder		4-5	4.5-5.5	5.6-7.0	5.1-6	7-8	**5.1-6**	**7-8**

Percentages shown for aggregate sizes are stated as proportional percentages of total aggregate for the mix.

Unless authorized by the Engineer, no Job-Mix Formula will be approved which specifies:

More than 45% passing No. 8 for Top and Dense Binder Courses
More than 38% passing No. 8 for Modified Top Course
More than 55% passing No. 8 for Dense Mix
Less than 4% passing No. 200 for Top Course.
Less than 6% bitumen for Top Course.

C. The joint sealant shall be a hot poured rubberized emulsified asphalt sealant meeting the requirements of FS SS-S-1401.

D. The tack coat shall be an asphalt emulsion, RS-1 if required, conforming to MassDOT Section M3.03.0.

2.05 SEAL COAT:

A. Seal coats shall be within the composition limits for protective seal coat emulsion in accordance with MassDOT M3.03.3.

B. Silica sand when blended with seal coat emulsion shall be No. 30 silica sand.

2.06 PAVEMENT MARKINGS:

A. Pavement markings shall conform to the requirements of MassDOT 860.

B. The mixture of the marking material shall be within the composition limits for reflectorized pavement markings as described in the MassDOT Specifications as follows:

1. Thermoplastic reflectorized pavement markings - M7.01.03/04.

2. Fast drying traffic paint - M7.01.10/11.

3. Fast drying white and yellow water-borne traffic paints - M7.01.23/24.

C. Application of the glass beads to be used as reflector material on the striping shall conform to Sections 860.62 and M7.03.07 of the MassDOT Specifications.

PART 3 - EXECUTION

3.01 GENERAL:

Paving courses required for the project shall be as shown on the drawings and as specified herein. Pavement thicknesses specified are measured in compacted inches. If a pavement course thickness exceeds 2-1/2 compacted inches, the course shall be installed in multiple lifts with each lift not exceeding 2-1/2 compacted inches in thickness.

3.02 GRAVEL SUBBASE:

A. The gravel subbase to be placed under pavement shall consist of **12-inches** of gravel evenly spread and thoroughly compacted.

B. The gravel shall be spread in layers not more than 4-inches thick, compacted measure. All layers shall be compacted to not less than 95 percent of the maximum dry density of the material as determined by ASTM D1557 Method C at optimum moisture content.

3.03 RECLAIMED SUBBASE:

A. The reclaimed borrow material to be placed under the pavement shall consist of 12-inches of reclaimed borrow material evenly spread and thoroughly compacted.

B. The reclaimed borrow material shall be spread and compacted in layers not exceeding 4-inches thick, compacted measure, except the last layer of reclaimed pavement borrow material shall be 2-inches thick, compacted measure. All layers shall be compacted to not less than 95 percent of the maximum dry density of the material as determined by ASTM D1557 Method C at optimum moisture content.

3.04 TEMPORARY BITUMINOUS PAVEMENT:

A. Where specified and required by the Engineer and after placement of the gravel subbase, the Contractor shall place temporary bituminous pavement above the trench, between the edges of the existing pavement. It shall consist of hot mix asphalt, 2-inches thick, in accordance with MassDOT 460.

B. The temporary pavement shall be repaired as necessary to maintain the surface of the pavement until replaced by permanent pavement. When so required by the Engineer, the Contractor shall remove the temporary pavement and install or regrade the subbase for installation of permanent pavement.

3.05 PERMANENT BITUMINOUS PAVEMENT:

A. The bituminous paving mixture, equipment, methods of mixing and placing, and the precautions to be observed as to weather, condition of base, etc., shall be in accordance with MassDOT 460.

B. BASE COURSE AND BINDER COURSE PAVEMENT:

1. Immediately prior to installing the base and/or (**dense**) binder course, the trimmed edges shall be made stable and unyielding, free of loose or broken pieces and all edges shall be thoroughly broomed clean. Contact surfaces of trench sides, curbings, manholes, catch basins, or other appurtenant structures in the pavement shall be painted thoroughly with a uniform coating of asphalt emulsion (tack coat), just before any mixture is placed against them.

2. The (**dense**) binder course shall be repaired as necessary to maintain the surface of the pavement until placement of the permanent overlay. If required, the Contractor shall place a leveling course before placing the permanent overlay.

C. TOP COURSE OR SURFACE TREATMENT PAVEMENT (PERMANENT OVERLAY):

1. (**Dense)** top course or surface treatment shall be placed over the trench or full width as shown on the drawings or as specified.

2. Prior to placement of the (**dense**) top course or surface treatment, the entire surface over which the top course or surface treatment is to be placed shall be broom cleaned and tack coated.

3. (**Dense**) top course or surface treatment pavement placed over trenches may be feathered to meet existing paved surfaces, if approved by the Engineer.

4. Prior to placing full width (**dense**) top course or surface treatment pavements, keyways shall be cut in all intersecting streets.

3.06 PAVEMENT PLACEMENT:

A. Unless otherwise permitted by the Engineer for particular conditions, only machine methods of placing the pavement shall be used. The equipment for spreading and finishing shall be mechanical, self-powered pavers, capable of spreading and finishing the mixture true to line, grade, width and crown. The mixtures shall be placed and compacted only at such times as to permit proper inspection and checking by the Engineer.

B. After the paving mixtures have been properly spread, initial and intermediate compaction shall be obtained by the use of steel wheel rollers having a weight of not less than 240 pounds per inch width of tread.

C. Final rolling of the top course or surface treatment pavement shall be performed by a steel wheel roller weighing not less than 285 pounds per inch width of tread at a mix temperature and time sufficient to allow for final smoothing of the surface and thorough compaction.

D. Immediately after placement of top course or surface treatment pavement, all joints between the existing and new top course or surface treatment pavements shall be sealed with hot poured rubberized asphalt joint sealant.

E. Where there is no backing for the edges of the curb-to-curb pavement, the Contractor shall provide a gravel transition. The gravel transition shall be installed immediately after the pavement is placed, shall be feathered and extend a minimum of 18-inches, and shall be compacted using the same equipment as for pavement compaction. The gravel shall be uniformly graded material with a maximum size of 3/8- to ½-inch.

F. When required by the Engineer, the Contractor shall furnish and install additional paving to provide satisfactory transition for driveways and walkways impacted by a new curb-to-curb pavement installation. The transition installation will be considered incidental to the curb-to-curb pavement installation.

3.07 ADDITIONAL PAVING:

A. If the Engineer determines that the existing bituminous concrete pavement on local streets is thicker than the permanent pavement specified herein, the Contractor may be required to install hot mix asphalt to obtain the depth of the existing pavement.

B. If for the installation of full width paving, the Engineer determines that the existing road surface requires additional leveling pavement, then the Contractor shall install additional hot mix asphalt to bring the section to proper line and cross section. Additional paving required to restore the proper line and cross section of binder course installed by the Contractor which has become rough and uneven shall be furnished and installed at the expense of the Contractor.

3.08 PARKING LOTS AND DRIVEWAYS:

A. Pavement shall consist of a 2-inch binder course and a 1-1/2-inch top course on a 12-inch gravel sub-base. All thicknesses are compacted thicknesses.

B. Adjacent concrete work, slate work, sidewalks, structures, etc., shall be protected from stain and damage during the entire operation. Damaged or stained areas shall be replaced or repaired to equal their original condition.

C. All joints between binder and top course shall be staggered a minimum of 6-inches.

D. After final rolling, no vehicular traffic of any kind shall be permitted on the pavement until it has cooled and hardened sufficiently to prevent distortion and loss of fines, and in no case in less than 6 hours.

E. Smoothness of all areas of the finished surface shall not vary more than 1/4-inch when tested with a 16 foot straight-edge, applied both parallel to and at right angles to the centerline of the paved area. At building entrances, curbs, and other locations where an essentially flush transition is required, pavement elevation tolerance shall not exceed plus or minus 1/8-inch. Irregularities exceeding these amounts, or which retain water on the surface, shall be corrected by removing the defective work and replacing or repairing it to the satisfaction of the Engineer.

F. The surface area to be seal coated, as shown on the drawings, shall be swept and air cleaned. The first coat shall be applied with eight (8) pounds of #30 silica sand blended with each gallon of emulsion applied at a rate of 0.15 gallons per square yard. The second coat shall be a straight sealer applied at the rate of 0.1 gallons per square yard.

G. The Contractor shall prepare the pavement surface for painting lines according to the recommendations of the paint manufacturer. Applied markings shall have clean-cut edges, true and smooth alignment and uniform film thickness of 15 mils, +/- 1.0. The Contractor shall be responsible for removing, to the satisfaction of the Engineer, tracing marks, and spilled paint applied in an unauthorized area.

3.09 RAISING AND ADJUSTING CASTINGS:

A. In areas of permanent top course paving, existing municipally-owned catch basin and manhole castings and valve boxes shall be raised to the proper grade where required by the Engineer.

B. Castings owned by private utilities shall be raised by their own forces. The Contractor shall be responsible for coordinating this work.

C. The method of adjusting these castings shall be as follows: Cut around catch basin or manhole castings a minimum of 8-inches from casting. Excavate and if required rebuild

up to 12-inches of masonry below the bottom of the casting. Backfill with suitable material and compact to bottom of casting. Place high, early strength cement or bituminous concrete collar, as directed, to approximately 1½-inches below the raised casting grade. Masonry work shall conform to Section 02631, PRECAST MANHOLES AND CATCH BASINS.

D. In some areas, raising of castings may not be required. Where required by the Engineer, castings not to be raised shall have at least 12-inches of bituminous concrete pavement chipped and removed around the casting. New bituminous concrete pavement shall be placed and compacted around such castings to approximately 1-1/2-inches below the top of the casting. The overlay course shall then be sloped down to the level of the casting.

E. The method of raising valve boxes shall be as follows: Cut around valve box a minimum of 8-inches from valve box. Excavate as required and raise the valve box. Pour high early strength cement or bituminous concrete collar, as directed, to approximately 1-1/2-inches below the top of the valve box.

F. Castings which need to be raised or adjusted to complete permanent curb to curb paving shall be done immediately prior to paving.

3.10 PAVEMENT MARKINGS:

A. The Contractor shall replace all pavement markings removed or covered-over in carrying out the work, and as required by the Engineer, no sooner than 48 hours after completion of permanent pavement. The markings shall be 4-inches wide, white or yellow, single or double lines as required.

B. When required by the Engineer, the Contractor shall provide temporary markings at no additional cost to the Owner.

3.11 PAVEMENT REPAIR:

A. If required in the contract or if permanent pavement becomes rough or uneven, permanent pavement patches and trenches shall be repaired and brought to grade utilizing "infrared" paving methods following completion of the construction.

B. The Contractor performing the work shall use care to avoid overheating the pavement being repaired.

C. Pavement repair shall extend a minimum of 6-inches beyond all edges of the pavement patch to assure adequate bonding at the pavement joints.

END OF SECTION

SECTION 02755

BITUMINOUS CONCRETE PAVEMENT AND COLOR SEALCOAT

PART I - GENERAL

1.01 SCOPE OF WORK:

A. Under this Section, the Contractor shall furnish all necessary labor, materials, equipment, and transportation necessary to construct the following:

1. Bituminous concrete pavement shall be composed of materials as specified herein and shall be constructed on a prepared base course to the depth, grade and cross-section shown on the plans, as specified herein and as directed by the Engineer.

2. Unless otherwise specified in the Contract Drawings, bituminous concrete walkway pavement shall be composed of a one and one-half (1.5) inch bituminous concrete binder course, and a one and one half (1.5) inch bituminous concrete dense mix top course. Bituminous concrete vehicular pavement shall be composed of a two and one half (2.5) inch bituminous concrete binder course, and a one and one half (1.5) inch bituminous concrete dense mix top course.

3. Where an overlay is proposed, the depth of the bituminous concrete dense mix shall be typically one and one-half (1.5) inches except that it shall be of greater depth in places to eliminate puddling. Tack coat shall be applied utilizing Type SS-1 asphalt emulsion.

4. Crack repair of existing bituminous concrete pavements prior to installation of overlay pavement.

5. Color sealcoating of bituminous concrete pavements as shown on the plans and as specified herein.

1.02 REFERENCE STANDARDS AND SPECIFICATIONS:

A. Reference to the standards, specifications and tests of technical societies, organizations and governmental bodies are made in the Contract Documents.

1. AASHTO - American Association of State Highway and Transportation Officials (tests or specifications).

2. ASTM - American Society for Testing and Materials.

3. Mass. Standard Specs. - Latest edition of the Standard Specifications for Highways and Bridges, MassDOT, hereinafter referred to as the "Massachusetts Standard Specifications."

1.03 SUBMITTALS:

A. Asphalt emulsion Type SS-1 product and application specification.

B. Color Sealcoat: The Contractor shall submit catalog cuts, manufacturer's specifications and color chips or charts.

C. Field layout of color sealcoat must be approved by Engineer prior to installation.

D. Submit catalog cuts and manufacturer's specifications for Airport Grade Asphalt Emulsion Mix and Aggregate.

E. Compaction tests are required on all bituminous concrete base surfaces on a 5' grid interval or per Owner's direction. At the Contractor's expense, an independent testing agency must perform the work and submit the results directly to the Engineer.

1.04 QUALIFICATIONS/SPECIAL REQUIREMENTS – COLOR SEALCOAT APPLICATION (ONLY WHERE SHOWN IN PLAN):

A. The Contractor shall engage the manufacturer's representative to inspect and monitor the application of the initial filler coat upon the prepared surfaces of all pavements to receive color sealcoat.

B. If a latex-ite acrylic sealer/surfacer is to be utilized, the addition of silica by mechanical agitation on-site shall be inspected and monitored by the manufacturer's representative who is to be engaged by the Contractor at the Contractor's cost.

C. Adequate means shall be provided to protect the color seal coating(s) from damage until such time that each layer has cured sufficiently and no seal will adhere to and be picked up by the tires of vehicles or by pedestrian traffic.

D. No color seal coating shall be applied during any period within which rain or sub-application temperatures are predicted within forty-eight (48) hours, unless otherwise specified by the manufacturer.

PART II – MATERIALS:

2.01 BITUMINOUS CONCRETE PAVEMENT

A. Bituminous Concrete Pavement shall consist of binder mix and dense mix courses constructed to the thicknesses shown on the plans and shall conform to the relevant provisions of Sections 460 and (M3.11.03) of the MassDOT Standard Specifications for Highways and Bridges, Latest Edition, unless specified otherwise hereinafter.

B. Base/Binder Courses

1. Base/Binder Courses shall be Bituminous Concrete Pavement, Dense Finish Course Type I-1.

C. Leveling/Overlay Courses

1. Leveling/Overlay Courses may conform to "Surface Treatment" dense mix, Table A, Section M3.11.03 of the MassDOT Standard Specifications, comprised of Class I Dense Bituminous Concrete, Type St or Dense Mix Type I-1, at the Contractor's option.

2. The general composition of the bituminous concrete mixture (the proportion of asphalt cement to mineral aggregate) shall be in accordance with MHD requirements.

3. The mineral aggregate composition for Type St shall be as follows:

TYPE ST SIEVE ANALYSIS U.S. Standard Sieve No.	MINERAL AGGREGATE Percent Passing by Weight (per ASTM C-136)	
Size	Minimum	Maximum
1/2	100	-
3/8	80	100
4	55	80
8	48	63
16	36	49
30	24	38
50	14	27
100	6	18
200	4	8

2.02 ASPHALT EMULSION:

A. Asphalt emulsion tack coat shall be Type SS-1 or SS-1H as specified by the Asphalt Institute.

2.03 COLOR SEALCOAT:

A. The layout and design of color sealcoating shall be installed per contract drawings.

The two (2) filler coats shall be Plexipave as manufactured by California Products Corporation, 169 Waverly Street, Cambridge, Massachusetts, or approved equal. Colors shall be as indicated on the plans. The two (2) Plexipave filler coats shall be applied to the cleaned bituminous pavement as specified hereunder. It shall be non-flammable upon exposure to flame. The filler coats shall contain a minimum of 9 lb./gal. of Silica, 100 percent (100%) passing a 100% mesh as pre-mixed at the manufacturer's plant. No sand or silica shall be added to the emulsion in the field. The bituminous pavement shall cure for fourteen (14) days prior to applying the Plexipave Acrylic Color System. Colors shall be as selected by Engineer.

B. Water, if approved, may be added to the Plexipave emulsion mixes. In no case may the quantity of water in the filler coat emulsion mix exceed thirty-three percent (33%) of the emulsion volume. (One (1) part water: two (2) parts filler coat). In no case may the quantity of water in the finish coat emulsion mix exceed fifty percent (50%) of the emulsion volume. (One (1) part water: one (1) part finish coat). Water shall be potable and its temperature above forty degrees F (40^{o}F) upon addition to the emulsions.

C. The color emulsion coating shall be California Products Company's "Plexichrome" or an approved equal emulsion product. Colors shall match those of the Plexipave filler coats. The Plexichrome shall be applied lengthwise of the court with a wide type push broom.

D. The base vehicle for the finish coat shall be an acrylic polymer dispersed in water and which has the ability to withstand extremes in temperature and general weathering. The film former shall provide a non-skid surface upon drying and under all weather conditions. Pigment dispersions in the color coating are to be of the best quality chrome oxides so as to obtain a permanent true color. The coating shall contain no material, which will cause cracking due to extremes in temperatures and is to be factory mixed and consistent in color. It shall be a one hundred percent (100%) acrylic emulsion containing no alkyds, butadiene styrene, or vinyls and shall be thinned with water. It shall not chalk or discolor any equipment.

E. The finished surface shall be smooth and uniform, true to required grade and cross section, and free of depressions, ridges, or other irregularities.

PART III - EXECUTION

3.01 BITUMINOUS CONCRETE PAVEMENT:

A. Bituminous concrete pavements shall be constructed on a prepared foundation of gravel in accordance with the Massachusetts Standard Specifications, Section 405, except where overlayment is over existing pavement.

B. The bituminous mixtures shall be placed on the approved base only when, in the opinion of the Engineer, the course is sufficiently dry and weather conditions are suitable.

C. Where walls, curbing, or other suitable permanent supports are not present, the Contractor shall secure proper alignment and adequate compaction of the binder and surface courses as shown on the Contract Drawings and finish all edges with a neat tamped edge.

D. The mixture shall be placed in two (2) courses as shown on the Contract Drawings. Each course shall be spread and finished as required in the MassDOT Standard Specifications for Highways and Bridges, Section 460.63, latest edition.

E. Prior to completion of bituminous concrete overlay, the Contractor shall have the existing patched surfaces tack coated and leveled to eliminate all "birdbaths" or extreme lows which may create ponding or drainage problems. Leveling course (surface treatment) bituminous concrete applied as necessary, shall be raked and feathered and be properly rolled and compacted. The Contractor shall apply "level" lines, screeds, or use other measures to achieve the proper leveling surface suitable for overlay.

F. All adhesive fabric shall be in place and approved prior to completing this work.

G. After completion, the bituminous concrete courses shall conform to the thickness shown on the Contract Drawings, smooth and even and of a dense and uniform structure. When tested with a sixteen (16) foot straight edge placed parallel to the centerline of the pavement, there shall be no deviation from a true surface in excess of one-quarter (1/4) inch.

3.02 ASPHALT EMULSION TACK COAT:

A. To all existing surfaces to be paved against or overlaid, apply a single very thin (0.05 to 0.15 gallons per square yard) application of diluted asphalt emulsion (Type SS-1) to cover the entire surface of existing pavement.

B. Essential qualities of coverage are (1) it must be very thin and (2) uniformly cover entire surface of existing pavement.

C. Place only that amount of tack coat which can be overlaid with new pavement by the end of each day, and; **IF RAIN IS ANTICIPATED DO NOT APPLY TACK COAT.**

3.03 COLOR SEALCOAT:

A. The bituminous concrete pavement shall cure prior to applying the Color Sealcoat System in accordance with manufacturer recommendations.

B. The Contractor shall furnish and apply to the approved bituminous pavements so designated on the plans: two (2) filler coats and one (1) finish coat of acrylic emulsion color coating.

C. Prior to application of the filler coats, all dirt, sand, dust, and other loose material shall be cleaned from the paved areas to be covered, by sweeping and pressure washing with water. All surfaces shall be dry prior to starting any color seal coating process. The Contractor shall take special precautions to assure that existing pavements are thoroughly cleaned and that all cracks or joints in existing pavements are repaired in conformance with these specifications and to the satisfaction of the Owner. Limits or areas to be color coated shall be taped with minimum two (2) inch wide tape true as to alignment prior to application of the color coating material.

D. The two (2) filler coats shall be applied so that both coats are of a total quantity and with a uniform spread at the rate of one (1) gallon per each one hundred (100) square feet of surface area. Additional filler coating material is to be used if necessary to complete the court surfaces satisfactory to the Supervisor. The first coat shall be applied length-wise of the court or drive and the second coat cross-wise of the court or drive.

E. After the filler coat applications have been completed and approved, apply one (1) acrylic color emulsion coating to the properly prepared surfaces with a uniform spread at the rate of one (1) gallon per each two hundred (200) square feet of surface area. The color emulsion coating shall be California Products Company's "Plexichrome" or an approved equal emulsion product. Colors shall match those of the Plexipave filler coats. The Plexichrome shall be applied lengthwise of the court with a wide type pushbroom.

F. The entire system of two (2) filler and one (1) finish coat shall be applied with approved squeegees and hair-type pushbrooms, respectively. The material shall be thoroughly mixed by mechanical agitation and all work shall be done in a thorough and workmanlike manner. The emulsion shall be thoroughly stirred in its container as received, by stationery bucket power mixer, so that a creamy, smooth consistency of all the emulsion in the container is assured for ready application. The entire work of color coat surfacing shall be done in

accordance with the recommendations of the manufacturer's representative. Special care shall be taken so as to allow none of the material to spatter or flow beyond the perimeter of areas to be covered. The filler coats and finish coat shall not be applied in foggy or rainy weather, or when ambient temperature is below forty-five degrees F (45°F), nor shall they be applied if such conditions are anticipated during the next forty-eight (48) hours.

G. The finished surface shall be smooth and uniform, true to required grade and cross section, and free of depressions, ridges, or other irregularities.

PART IV - GUARANTEE/WARRANTY

4.01 The Contractor shall be solely responsible for protecting color sealcoated surfaces until final acceptance of the project by the Owner and shall take all necessary precautions to secure premises during the initial drying periods.

4.02 The pavement and coatings shall be guaranteed against defects in workmanship or quality for a period of one (1) year after final acceptance. The Contractor shall replace, repair, recoat or otherwise make satisfactory to the Owner any unacceptable pavement and or coating at no additional cost to the Owner.

END OF SECTION

SECTION 02773

CURBING

PART I- GENERAL

1.01 WORK INCLUDED:

A. Fabricate, furnish and install granite curbing, as indicated on the Drawings and as specified.

1.02 RELATED SECTIONS:

A. Section 02350- EXCAVATION BORROW AND BACKFILL

B. Section 02755 - BITUMINOUS CONCRETE PAVEMENT.

C. Section 03300 - CAST-IN-PLACE CONCRETE

1.03 REFERENCES:

A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01420 - REFERENCES.

1. ASTM C 131 - Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
2. Massachusetts Department of Transportation Standard Specifications for Highway and Bridges

1.04 SUBMITTALS:

A. Submit the following under provisions of these specifications:

1. Submit complete shop drawings of each curb type and size for Engineer's approval.

1.05 QUALITY ASSURANCE:

A. Unless otherwise indicated, concrete curb materials and construction shall conform to the applicable portions of MHD’s Standard Specifications Section 500, "Curb and Edging."

1.06 DELIVERY, STORAGE, AND HANDLING:

A. Curb units shall be delivered to the job adequately protected from damage during transit.

B. Curb shall be protected against staining, chipping, and other damage. Cracked, badly chipped, or stained units will be rejected and shall not be employed in the work.

PART II - PRODUCTS

2.01 GRANITE CURB- VERTICAL:

A. Granite for vertical curb shall be engineering grade structural granite conforming to ASTM C615 requirements. Sizing of curb and comers shall be as shown on the Drawings. Granite curb shall be Type VA-4 as per the "Standard Specification."

B. Granite shall be of smooth splitting character and free from seams which impair its structural integrity. Natural variations characteristic of the deposit will be permitted. Granite shall come from an approved quarry.

C. Cement mortar shall meet requirements of Section M4, Paragraph M4.02.15 of the Standard Specifications. Color shall be “natural” to match color of curb.

D. Concrete shall be 4,000 psi concrete as specified under Section 03300 CONCRETE, herein.

E. Processed gravel fill as specified under Section 02300 EARTHWORK, herein.

PART III – EXECUTION

3.01 INSTALLATION - GRANITE CURBS:

A. Furnish and install new granite curb and reset existing granite curb removed and stockpiled for reuse, herein. Curb shall be set straight, plumb and as shown on the Drawings.

B. Curb shall be set in a concrete cradle in a trench excavated to a width of twenty-four inches (24"). The subgrade of the trench shall be at a depth below proposed finish grade of the curb equal to six inches (6") plus the depth of the curb stone. Base course shall then be filled with processed gravel fill to proper level to support curb at final grade and thoroughly tamped.

C. Place curb units in accurate line, each piece butting the next with joint spacing no larger than one-quarter inch (1/4). Final points shall be joined by closure pieces made to order. No curb shall be cut in the field. After alignment, the curb shall be carefully backfilled as shown on the Drawings. Extreme care shall be taken not to disturb alignment.

D. Patch street pavement as required.

END OF SECTION

SECTION 02775

SIDEWALK CONSTRUCTION AND REPLACEMENT

PART 1 - GENERAL

1.01 WORK INCLUDED:

The Contractor shall furnish all labor, materials, equipment and incidentals required to restore sidewalks and/or construct new or replacement cement concrete sidewalks where required or where existing sidewalks are disturbed by the Contractor, as shown on the drawings and described herein. The Contractor shall also furnish all materials and install wheelchair ramps where shown on the drawings or as required by the Engineer.

1.02 RELATED WORK:

A. Section 02350, EXCAVATION BORROW AND BACKFILL

B. Section 02771, CURBING

1.03 REFERENCES

The following standards form a part of these specifications, as referenced:

Massachusetts Department of Transportation (MassDOT)
Standard Specifications for Highways and Bridges
Massachusetts Architectural Access Board (MAAB)

1.04 SUBMITTALS

A. The Contractor shall submit six (6) sets of shop drawings and/or materials specifications for each component of the work to be performed under this section of the Specifications.

1.05 SYSTEM DESCRIPTION:

A. CEMENT CONCRETE SIDEWALKS AND WHEELCHAIR RAMPS:

1. Except as otherwise indicated, bituminous and cement concrete sidewalks and wheelchair ramps shall be constructed in accordance with the requirements of Section 701, Sidewalks, Wheelchair Ramps and Driveways, of the latest edition of the MassDOT Standard Specifications for Highways and Bridges, and all amendments thereto.

2. Wheel chair ramps shall be installed in new sidewalks at intersections in accordance with 521 CMR. When curbs or sidewalks are constructed or reconstructed on one side of the street, curb cuts shall also be installed on the opposite sides of the street, where there is a pedestrian path of travel. Curb cuts shall be located within the crosswalk and/or the pedestrian path of travel.

C. Water boxes, manhole frames, and all other castings shall be carefully set to the proposed finished grade.

D. Sidewalks shall not be less than 48 inches in width, excluding curbing. An unobstructed path of travel shall be provided which is at least 36 inches clear, excluding curbing.

PART 2 - PRODUCTS

2.01 CEMENT CONCRETE SIDEWALKS AND WHEELCHAIR RAMPS:

A. Cement concrete sidewalks shall be constructed with air entrained Cement Concrete with a minimum compressive strength of 4000 psi at 28 days and include the required detectable warning strip per code.

B. Cement concrete shall conform to the requirements of MassDOT M4.02.

PART 3 - EXECUTION:

3.01. CEMENT CONCRETE SIDEWALKS AND WHEELCHAIR RAMPS:

A. Concrete for sidewalks and wheelchair ramps shall be a minimum of 4-inches thick. At driveways, the sidewalks shall be 6-inches thick.

B. The subgrade for the walk or driveway shall be shaped to a true surface conforming to the proposed slope of the walk, thoroughly rolled at optimum moisture content and tamped with a power roller weighing not less than one ton and not more than 5 tons. All depressions occurring shall be filled with suitable material and again rolled or tamped until the surface is smooth and hard.

C. After the subgrade has been prepared as hereinbefore specified, a subbase of gravel borrow at optimum moisture content shall be placed, thoroughly rolled by a power roller, and tamped. The gravel borrow shall be a minimum of 8-inches in thickness.

D. The forms for sidewalks shall be smooth, free from warp, strong enough to resist springing out of shape, and deep enough to conform to the thickness of the proposed walk. All mortar or dirt shall be completely removed from forms that have been previously used. The forms shall be well staked, thoroughly braced, and set to the established lines with their upper edge conforming to the grade of the finished walk. The finished walk shall have sufficient pitch from the outside to the edge of the walk to

provide for surface drainage. This pitch shall be ¼-inch per foot unless otherwise required by the Engineer. Before the concrete is placed, the subbase for sidewalks shall be thoroughly dampened until it is moist throughout but without puddles of water.

E. Concrete shall be conveyed from the place of mixing to the place of deposit in such a manner that no mortar will be lost, and the composition of the mix shall be uniform, showing neither excess nor lack of mortar in any one place. The consistency shall be such that water will float to the surface under heavy tamping. The concrete shall be placed as close to its final position as practicable and thoroughly consolidated, with precautions taken not to overwork it while it is still plastic. The concrete shall be thoroughly spaded along the forms or screeds to eliminate voids and honeycombs at the edges. Retempering of concrete will not be permitted.

F. Concrete shall be placed in alternate slabs not exceeding 30 feet in length. Slabs shall be separated by transverse preformed expansion joint filler ½-inch thick. The surface of all concrete sidewalks shall be uniformly scored into block units of not more than 40 square feet. The depth of the scoring shall be at least one quarter of the thickness of the sidewalk.

G. When concrete sidewalks are constructed adjacent to curbing, building foundations, retaining walls, light pole bases or fixed structures, ½-inch thick premolded joint filler shall be used between the newly constructed sidewalk and the structure.

H. Finishing of the concrete surface shall be done by experienced and competent cement finishers as soon as is practicable. Finishing shall be delayed until all bled water and water sheen has left the surface and the concrete has begun to stiffen. The concrete surface shall be finished as directed with a steel trowel or wood float to give a smooth, uniform and attractive surface finish and uniformly scored into block units or areas of not more than 36 square feet. Following this, the Contractor shall draw a nylon push broom lightly over the surface to produce a non-slip surface. Application of neat cement to the surface to hasten hardening is prohibited.

I. The Contractor shall protect the newly placed concrete surface against vandalism and marking or defacing and must stand ready to replace any blocks which, in the opinion of the Engineer, are excessively marked or defaced, at no additional cost to the Owner. When completed the walks shall be kept moist and protected from traffic and weather for at least 3 days.

J. Adequate protection shall be provided where temperatures of 40ºF or lower occur during placing of concrete and during the early curing period. The minimum temperature of fresh concrete after placing and for the first 3 days shall be maintained above 55ºF. In addition to the above requirements, an additional 3 days of protection from freezing shall be maintained.

END OF SECTION

SECTION 02790

INFIELD MIX

PART 1 - GENERAL

1.01 SCOPE OF WORK:

A. The Contractor shall furnish and construct infield mix surfaces to the lines and grades shown on the plans as specified in this Section, including the provision of all materials, labor, tools, equipment and transportation necessary to complete the work.

B. In advance of installing the new infield mix surfacing, the Contractor shall be responsible for removal of existing infield materials and installing a 4-inch gravel base as indicated on the details. Excavated materials may be reused as stipulated on the construction drawings and specifications.

1.02 SUBMITTALS:

A. Two (2) weeks prior to ordering the material, the Contractor shall submit to the Engineer, at the Contractor's expense, a representative sample of the material to be used, and a copy of a soils analysis from an accredited laboratory classifying the mixture and tabulating the sieve analysis.

B. If the mixture is disapproved by the Engineer, the Contractor shall continue to obtain other sources of material and have them tested, at his own cost, until the Engineer approves the mixture to be utilized for the clay infield.

1.03 RELATED WORK:

A. Section 01330, SUBMITTALS

B. Section 02350, EXCAVATION, BORROW AND BACKFILL

PART 2 – PRODUCTS

2.01 INFIELD MIX:

A. The clay infield mixture shall be DuraEdge Classic by Read Custom Soils of Canton, MA, or an approved equal product.

B. Infirld mix shall contain 65-75% sand.

C. Silt-to-clay ratio shall be less than 1.00.

2.01 GRAVEL BASE:

B. The 4-inch Gravel Base shall be in conformance with Section 02315 Excavation, Borrow and Backfill.

PART 3 - EXECUTION

3.01 INSTALL, ROLL AND COMPACT INFIELD MIX:

A. Upon removal of existing surfaces and installation of the required **2-inch** bed, the Contractor shall install, roll and compact the infield mix specified to a compacted finished depth of three (3) inches. Complete installation of clay infield surfaces in conformance with the manufacturer's recommendations or as otherwise required by the Engineer.

B. The edges of the infield mix shall meet the grades of adjacent turf areas and stonedust warning tracks. No ridges or depressions will be permitted at edges.

END OF SECTION

SECTION 02800

SITE FURNISHINGS

PART 1 – GENERAL:

1.01 RELATED DOCUMENTS:

A. The General Documents, as listed in the Table of Contents, and applicable parts of Division 1, General Requirements shall be included in and made a part of this Section.

B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this trade.

1.02 SCOPE OF WORK:

A. The work of this Section consist of all site improvements and related items as indicated on the Drawings and/or as specified herein and includes, but is not limited to, the following:

1. Benches with Back (City Standard)
2. Curved Wooden Benches
3. Bike Racks (City Standard)
4. Solar Compacting Trash & Recycling Receptacles
5. Accessible Drinking Fountain & Bottle Filling Station
6. Players Benches
7. Foul Poles
8. Safety Netting
9. Softball Bases, Home Plate, and Pitchers Rubber
10. Basketball Posts and Goals
11. Metal Trash Receptacles (City Standard)
12. Collapsible Bollards
13. Lounge Chairs
14. Hammocks
15. Dog Valet Station
16. Picnic Tables
17. Tree Grates
18. Storage Sheds
19. Storage Box

1.03 RELATED WORK UNDER OTHER SECTIONS:

A. The following items of related work are specified and included in other Sections of the Specifications:

1. Section 02350– Excavation, Borrow & Backfill

2. Section 03300– Cement Concrete

1.04 EXAMINATION OF CONDITIONS:

A. The Contractor shall fully inform himself of existing conditions of the site before submitting his bid, and shall be fully responsible for carrying out all site work required to fully and properly execute the work of the Contract, regardless of the conditions encountered in the actual work. No claim for extra compensation or extension of time will be allowed on account of actual conditions inconsistent with those assumed.

B. Plans, surveys, measurements and dimensions under which the work is to be performed are believed to be correct to the best of Engineer's knowledge, but the Contractor shall have examined them for himself during the bidding period, as no allowance will be made for any errors or inaccuracies that may be found therein.

1.05 SCHEDULING:

A. The Contractor shall submit to the Landscape Architect, for approval by the Owner, a progress schedule for all work as specified herein.

1.06 QUALITY ASSURANCE:

A. Materials and methods of construction shall comply with the following standards:

1. ASTM: American Society for Testing and Materials
2. ANSI: American National Standards Institute
3. FS: Federal Specifications
4. IMI: International Masonry Institute
5. PCA: Portland Cement Association

B. Qualifications of Workers: Use adequate numbers of skilled workers who are trained in the necessary crafts and who are completely familiar with the specified requirements and methods needed for the proper performance of the work of this Section.

C. Layout: After staking out the work, and before beginning final construction, obtain the Landscape Architect’s approval for layout. Contractor shall make adjustments as determined by the Landscape Architect. Landscape Architect may make adjustments to layout as is required to meet existing and proposed conditions without additional cost to the contract price.

1.07 SUBMITTALS:

A. Shop Drawings: Submit shop drawings in accordance with Division 1 requirements.

B. Product Information: Provide manufacturer’s data showing installation and limitations in use. Supply Certificates of Compliance for all materials required for fabrication and

installation, certifying that each material item complies with, or exceeds, specific requirements.

PART 2 – PRODUCTS:

2.01 BENCHES WITH BACK:

A. The benches shall be Model CFPB-018-06 with surface mounting as manufactured by Custom Fabrication Inc. of Harpursville, NY 1-607-693-3226, DuMor, Wabash Valley, or approved equal. Benches are to be installed per manufacturer's specifications. Bench to be powder coated, color shall be selected by the Engineer. Refer to contract drawings for quantities and locations. All final locations are to be approved in the field by the Engineer.

2.02 CURVED WOODEN BENCHES

A. The benches shall be Model Rough and Ready Curved Bench (500 cm radius and 600 cm radius) with surface mounting as manufactured by Streetlife Studio America, or approved equal. Wood slats shall be FSC Certified Hardwood and base to be galvanized. Benches are to be installed per manufacturer's specifications. Refer to contract drawings for quantities and locations. All final locations are to be approved in the field by the Engineer.

2.03 BIKE RACKS:

A. The bike racks shall be manufactured by Cycle-Safe, Inc. of Ada, MI 1-888-950-6531, DuMor, Wabash Valley, or approved equal. Contractor shall order and install three (3) bike racks to meet the following specifications:

1. The racks will be a "vintage style" with a Somerville custom "Powderhouse" rack plate as per Cycle-Safe Inc.'s design of September 6, 2007. Images are available from the City upon request.

2.04 SOLAR COMPACTING TRASH & RECYCLING RECEPTACLES:

A. Solar Compacting Trash and Recycling Units by Big "smart" Belly or approved equal – see Attachment A of this specification section.

2.05 ACCESSIBLE DRINKING FOUNTAINS:

A. Drinking Fountains shall be model number 4420BF dual arm with single ADA accessible bubbler and bottle filler AND model 4420bfdb HT with dog water bowl feature as noted in the site furnishing schedule as manufactured by Halsey Taylor, Oak Brook, IL (800.223.5529). Drinking Fountains shall be freeze-resistant and tamper-resistant, tubular steel construction with weather-resistant internal and external coating. Color shall be BLACK.

2.06 PLAYERS BENCHES:

A. Players benches shall 12' length, Permanent Single Tier Aluminum Benches shall be equipped with back rest and shall be surface mounted. Benches shall be Model #LG-STAL-BRSP-12 as manufactured by Sportsfield Specialties or approved equal. Color to be selected by Owner's Representative.

2.07 FOUL POLES:

A. Foul poles shall flagged and meshed baseball foul poles, 20' height, telescoping type post with 3-½ inch outside diameter at the base. Foul Poles shall be Model # BBFP-20 as manufactured by Jaypro Sports, Incorporated of Waterford, CT (800-988-3363), or approved equal.

2.8 SAFETY NETTING

A. Netting shall be installed in the softball field outfield at the dog park area (30' ht model #gpfsns63050p) and between the splash pad and the basketball hoop (10' ht model #tfbss210p).
B. Netting to be made by Sportsfield Specialties or approved equal.

2.9 SOFTBALL BASES, HOME PLATE, AND PITCHER'S RUBBER:

A. Softball Bases shall be model #lghibl, as provided by Sportsfield Specialties, or approved equal.

B. Home Plate shall be model #lgsrhp, stanchion mounded with sleeve, as provided by Sportsfield Specialties, or approved equal.

C. Pitcher's Rubber shall be 6" x 18", model # lgbbp8 with interior PVC tube, as provided by Sportsfield Specialties, or approved equal.

2.10 BASKETBALL POSTS AND GOALS

A. Basketball posts shall be 5-9/16" schedule 40 steel, gooseneck style with 6' extension. Posts shall be model #656 as manufactured by Jaypro Sports, Incorporated of Waterford, CT (800-988-3363), or approved equal.

B. Basketball goals shall 18" inside diameter, double ring goals constructed of two 5/8" O.D. steel rods with 3/16" steel brace mounting frame. Basketball goals shall be model

UBG-500 as manufactured by Jaypro Sports, Incorporated of Waterford, CT (800-988-3363), or approved equal.

C. Basketball backboards (2 total) shall be JayPro acrylic basketball backboard AB-4832 32" x 48", as manufactured by Jaypro Sports, Incorporated of Waterford, CT (800-988-3363), or approved equal.

2.11 METAL TRASH RECEPTACLES:

A. Trash Receptacle shall be manufactured by Custom Fabrication, Inc., P.O. Box 431, Harpursville, NY 13787; phone (607) 693-3223, fax (607) 693-3226, DuMor, Wabash Valley, or an approved comparable product.

B. Model: CFTR-003 – Black Trash Receptacle with Hinged Lockable Side Door and 32-gallon Rubbermaid liner.
   1. Designs with slatted facing surrounds and other repeating parallel members typically require support framing; sheet or molded materials may not.
   2. Mounting: Provide stainless steel vandal proof Anchor Bolts (2) minimum.
   3. Lids and Tops: Bonnet Style Steel Lid permanently secured.
   4. Receptacle Height: 36"
   5. Overall Width: 23 ¼"
   6. Inner Container: 32-gallon Rubbermaid Container. Retain subparagraph above or subparagraph below, or both, to suit project and product.
   7. Capacity: not less than 32 gal.
   8. Service Access: Side access with inner container.
   9. Exterior Finish: Black Polyester (exterior grade) powder coat from manufacturer. Final coating shall be a minimum of 4 mils thick on all surfaces.

2.12 COLLAPSIBLE BOLLARDS

A. Collapsible Bollards shall be the Double Post DHB lockable bollard as manufactured by TrafficGuard, P.O. Box 201, Geneva, IL (877)-727-7347 or approved equal. Bollards shall be double post/leaf with stainless steel lock pin and pad lock secured at high locking position. Bollard shall be 30" tall when locked and upright, and fold down to 3" height required vehicle clearance. All pins and hinges shall be stainless steel. Bollard shall be surface mounted to anchor pins and footing per the manufacturer's recommendations. Finish shall be custom color BLACK TGIC polyester coating with 3M reflective safety labels.

2.13 LOUNGE CHAIRS

A. Lounge Chairs shall be "Chill" model as manufactured by LandscapeForms, Kalamazoo, MI or approved equal. Lounge Chairs shall be one-piece lounge style constructed of 100% linear medium density polyethylene with a 0.312" nominal

thickness. Lounge chair shall be pigmented and UV stabilized, molded from ground powder. Product shall be durable, moisture resistant, with a melt temperature of approximately 262^{o}F and a flash point of approximately 620^{o}F minimum. Color to be selected by the Owner's Representative.

2.14 HAMMOCKS

A. Hammock (3 total) shall be by Corocord or approved equal model #2050 without manufacturer's posts. Posts are to be hot dip galvanized metal in a custom PANTONE #375 color as specified in Section 05000 Miscellaneous Metals with custom connection for hammock (see detail).

2.15 DOG VALET STATION

Dog Waste Station shall be the Aluminum DOGIPOT Junior Bag Dispenser Model #1002-2 as manufactured DOGIPOT, 2100 Principal Row, Suite 505, Orlando FL, (800) 364-7681 or approved equal. Dog Waste Station shall be 12-guage powder coated aluminum, 400-bag capacity with single opening hanging bag access slot and front locking access panel. Dog waste station shall include mounting pole and footing and shall be mounted per manufacturer's recommendations.

2.16 PICNIC TABLES

A. Shall be Victor Stanley Type: PT-2 from the Parsons Series or approved equal.

B. Materials will be 3" x 4" (64mm x 89mm) slats; 3" (76mm) O.D. tubular steel end frames

C. Standard table size: 6ft (1.8 meters); ADA table 8ft

D. Table top: standard

E. Ipe or Philippine mahogany

F. Slat sizes:
   a. Wood: 3" x 4" (64mm x 89mm)

G. Custom color PANTONE #375.

H. Mounting: Surface mounted with vandal resistant bolts

I. Finishes:

All fabricated metal components are steel shotblasted, etched, phosphatized, preheated, and electrostatically powder-coated with TGIC polyester powder coatings. Products are fully cleaned and pretreated, preheated and coated while hot to fill crevices and build

coating film. Coated parts are fully cured to coating manufacturer's specifications. The thickness of the resulting finish coat averages 8-10 mils (200-250 microns).

2.17 TREE GRATES

A. Shall be 36" square ADA Tree Grate # 3622 by Ironsmith 800.338.4766 Palm Desert, CA or approved equal, in aluminum.

2.18 STORAGE SHED

A. There are to be two storage sheds purchased and installed on a concrete pad. The first is the 4 x 10 "Garbage Shed" and the second is the 4 x 8' "Saltbox". Both are manufactured by Jamaica Cottage Shop 866-297-3760 or approved equal and will be made of hemlock with 4x4 post and beam wall framing, double pine doors with a pressure treated ramp. Gabled standing seam metal roof. Color as selected by Owner's Representative. Siding shall be 1" rough sawn pine board and batten siding with rough sawn pine trim.

2.19 STEEL STORAGE BOX

A. Steel storage box shall be constructed with steel with a sloped lid and measure 60-inch in length, 30-inch in width, and 39.5-inch in height with padlock lockstyle, surface mounted on concrete pad per manufacturer's recommendation. Storage box shall be model 1-680990 as manufactured by Jobox, (800) 643-0084 or approved equal.

PART 3 – EXECUTION:

3.01 INSTALLATION:

A. The installer shall examine previous work, related work, and conditions under which this work is to be performed and notify the Contractor in writing of all deficiencies and conditions detrimental to the proper completion of this work. Beginning work means installer accepts substrates, subgrades, previous work, and conditions.

3.02 SITE FURNSHINGS:

A. Install each site furnishing in accordance with the Drawings and the manufacturer's instructions.

B. The Contractor shall be responsible for timing the delivery of site furnishings so as to minimize on-site storage time prior to installation. All stored materials must be protected from weather, careless handling and vandalism.

3.03 ACCESSIBLE DRINKING FOUNTAIN:

A. Locate and install Accessible Drinking Fountain, complete in place, as shown on the Drawings and in accordance with approved Shop Drawings.

B. Accessible Drinking Fountain shall be set vertically plumb, true to line and grade, and shall be anchored in cement concrete footings. Accessible Drinking Fountain shall be assembled in accordance with approved Shop Drawings and per manufacturer's specifications.

C. The color system specified is a factory applied finish coating. Upon arrival on the job site it is the Contractor's responsibility to handle the Accessible Drinking Fountain in such a manner as to minimize damage to the finish. Should any damage occur to the coating surface in shipping or handling at the job site, it is the responsibility of the Contractor to touch up said damage to color system using suitable touch-up materials, either liquid or aerosols, available from the manufacturer. Dry film thickness of applied repair paint to be not less than what was originally specified herein.

END OF SECTION

City of Somerville, Massachusetts
Lincoln Park Improvements - Furnishings E□UIPMENT LIST

		Quantity	Model #	Phone	Location	Comment
Victor Stanley						
	Parson's pt-2 ADA picnic table	2	pt-2 ADA	1.800.368.2573	Dunkirk, MD	ADA top extension, custom color
	Parson's pt-2 6 ft picnic table	2	pt-2			6 ft standard, no umbrella, custom color
Landscape Forms						
	Chill Lounge	5	"chill Lounge"	800.430.6209	Kalamazoo, MI	colors tbd in submittals
Custom Fabrication Inc.						
	Standard Somerville Bench	23	cfpb-018-06	1-607-693-3226	Harpursville, NY	
	Trash Receptacle	9 each (18 total)	cftr-003			black, locking, bonnet lid
Streetlife Studio America						
	Rough and Ready Curved Bench	7	R&R-Curve-200-60/ R&R-Curve-200-60-Ext	1 646 583 2937		500 cm radius, wood slat, galvanized base
	Rough and Ready Curved Bench	7				600 cm radius, wood slat, galvanized base- contractor to provide manufacturer's drawings specific to the site
Sportsfield Specialties						
	Team Bench	2	LG-stal-Brsp-12	1-888-975-3343	Delhi, NY 13753	permanent with backrest
	Foul Pole	2	LG-fp630			
	10' safety netting	1	tfbss210p			
	30' safety netting	1	gpfsns63040p			
	softball bases	1 of each	lghibl, lgsrhp, lgbbp8			includes all necessary bases (set of 3 bases, home plate, and pitchers mound)
Big Belly Solar, Inc.						
	BigBelly and Smartbelly double station	4		888.820.0300	Needham, MA	double station receptacle
DOGIPOT						
	Dogipot junior bag dispenser	2	1002-2	(800) 364-7681	Orlando, FL	on post
Halsey Taylor						
	Drinking fountain	3	4420bf endura 2 dual arm	800.223.5529	Oakbrook, Ill.	bottle filler and single accessible fountain
	Drinking Fountain with Dog Bowl	1	4420bfdb endura 2 dual arm w dogbowl			
Cycle-Safe Inc.						
	Bike Rack	9	"vintage style"	1-888-950-6531	Ada, MI	
Corocord						
	Hammock	3	corocord 2050	+49 30 408988-0	Berlin, Germany	custom- without posts
Ironsmith						
	36" square ADA Tree Grate	3	3622	800.338.4766	Palm Desert, CA	aluminum
□amaica Cottage Shop						
	4x8 saltbox	1		866 297 3760	Londonderry, vt.	
	4x10 garbage shed	1				
□obo□						
	sloped lid chest	1	1-680990	(800) 643-0084	Sparks, MD	

February 23, 2016

SPECIFICATION CFPB-018 STEEL SLAT BENCH

- ALL STEEL TO BE A-36 GRADE
- ALL WELDS TO ASTM STANDARD
- SLATS COLD FORMED TO SPECIFICATION
- ALL HARDWARE COATED STAINLESS STEEL
- PROVISIONS FOR ANCHORING THRU BENCH LEGS
- CAST IRON END WITH INTEGRATED ARMRESTS

PAINT PROCESS AS FOLLOWS:

1. AFTER FABRICATION METAL RECEIVES WHITE METAL BLAST TO REMOVE SCALE AND ADD TE□TURE FOR PROPER ADHESION
2. 240 DEGREE PHOSPHATE WASH OF METAL THEN DRIED FOR 15 MINUTES AT 250 DEGREES
3. ZINC RICH POWDER APPLIED TO METAL AND RE-HEATED TO 250 DEGREES
4. POL□ESTER (E□TERIOR GRADE) POWDER COAT FROM CUSTOM FABRICATION "SPECIAL FINISHES" APPLIED TO WARM PRIMER
5. PARTS ARE BAKED TO 400 DEGREES FOR 30 MINUTES AND ALLOWED TO COOL
6. UNITS ARE PACKAGED AND SHIPPED ON DEDICATED CFI TRUCKS TO ENSURE PROPER HANDLING

- AS MANUFACTURED B□ ***CUSTOM FABRICATION INC. 2903 N.Y. RT.7 HARPURSVILLE N.Y. 13787***

2903 NY RT. 7 • HARPURSVILLE N.Y. • 13787
PHONE: 607 693 3223 • FAX: 607 693 3226

STREETLIFE®

Product Certificate Rough & Ready Curve

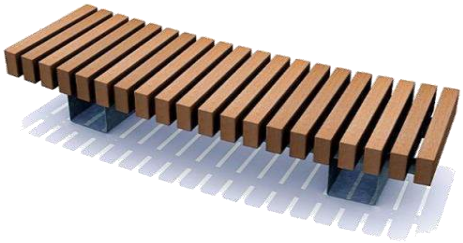
Curved bench with radial mounted beams, extendable with extension set

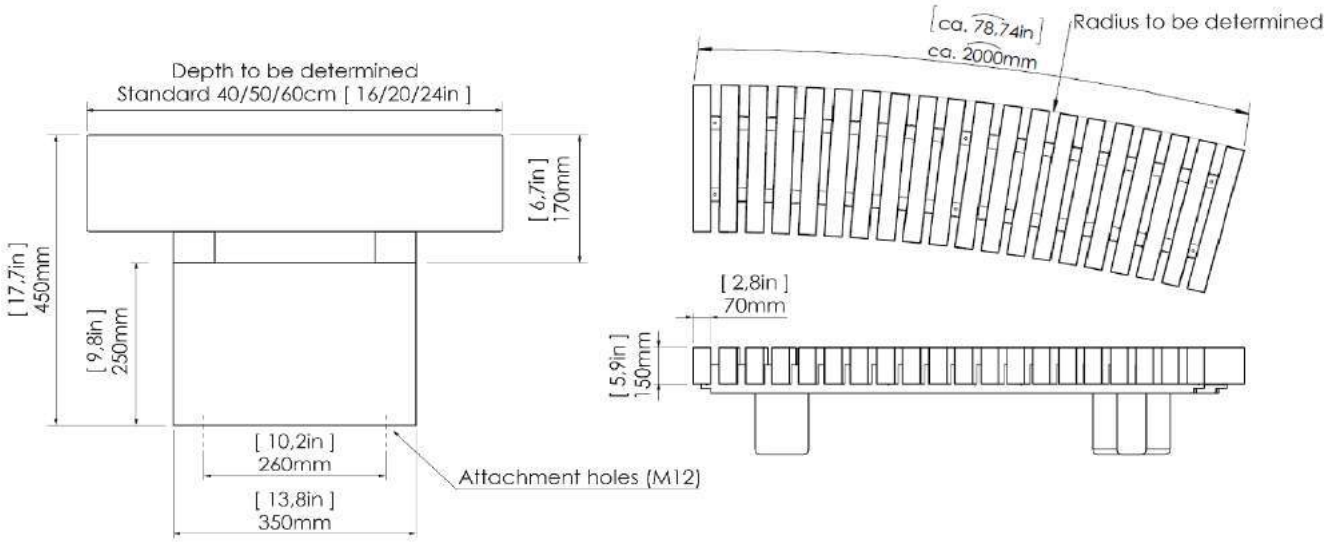




Product Code	**R&R-Curve-200-60 / R&R-Curve-200-60-Ext**
Dimensions	ca. 200x60x45cm | 79x24x18” (lxwxh)
Weight	ca. 155kg (plain, no accessories)
Materials	Seat: timber, untreated 100% Hardwood (Louro Gamela) 20 beams (7x15cm | 2.8x5.9”) ca. 60cm | 24” depth Mounted in Streetlock® comb system
	 Legs: open rectangular shaped leg of hot dip galvanized steel Comb: set of two curved profiled combs of hot dip galvanized steel According to NEN-EN-ISO 1461: 1999NL Optional: CorTen Steel (weathering steel) or double powder coated finish
Mounting equipment	Pin-torx bolt mounting using supplied specialty tools
Available accessories	Double beam backrest 100% Hardwood convex planed on one side Armrest in stainless steel with micro-peen finish Seat in black recycled plastic (All Black)
Packing unit	Pre mounted seat modules and separate legs

STREETLIFE®

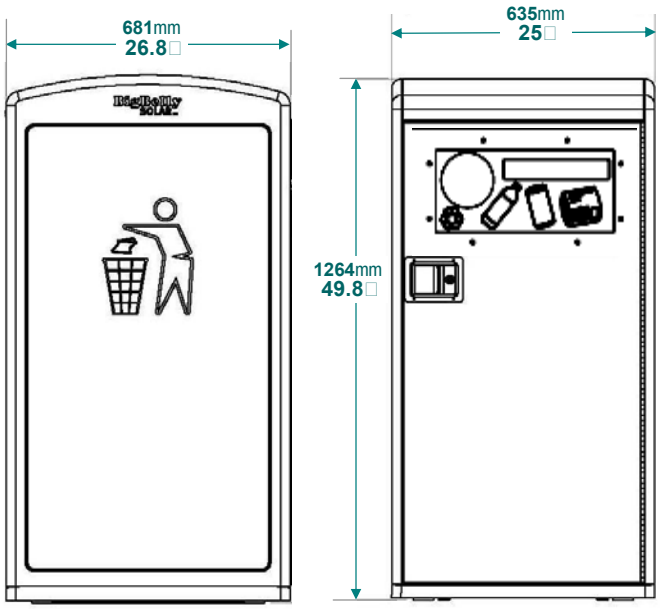
Surface attachment	Each support has two holes for M12 bolts to connect to pavement or concrete
Cleaning & Maintenance	Timber: with clear water and soft brush or cloth; do not use high pressure cleaner or similar (this can open up the wood grain and make the surface coarse). The timber can be gently sanded every 2-3 year (in the direction of the wood grain) Steel supports: with clear water and brush or high pressure water cleaner (avoid the timber seat)
Rendering	
Minimum diameter	Seating depth 40cm | 16" - minimum outer diameter: ca. 3m | 118" Seating depth 50cm | 20" - minimum outer diameter: ca. 4m | 158" Seating depth 60cm | 24" - minimum outer diameter: ca. 5m | 197"



*Metric units are leading

Design: Streetlife
Protected by int. Modeldepots & Patents

Smartbelly® Standard Capacity Station



Configurations: Mi ed waste or single-stream recycling (with appropriate markings)

Materials

- o S compliant
- alvani ed sheet metal steel interior and e terior construction
- eavy duty plastic side panels or dent and scratch resistance (recycled content)
- nterior in Single bin is lea proo made out o low density polyethylene plastic

Power & Electronics

- olycrystalline silicon cell V module (20 watts). (0 watts E high energy upgrade available)
- V panel protected by polycarbonate bubble
- Spill-proo sealed maintenance-ree battery
- Sel-powered unit re uires no wiring

Technical Specifications

Overall Machine Dimensions

- eight .. (12 mm)
- idth 25 (5mm)
- epth 2 .. (1mm)
- eight 1 5 lbs (0 g) Shipping weight 205 lbs (1 g)
- nsertion pening an be con igured or multiple recycling or waste streams.
- in Volume 50 gallons (22 L)

Features

- ully automated microprocessor controlled system senses ullness and machine status
- LE status indicate ullness level machine status and error codes
- S wireless data lin or remote monitoring and management
- S assisted location service

Safety Features

- E approved
- ully interloc ed access doors protect users and service personnel
- Loc ed ront trash removal door. (Loc ed rear door option available)
- Separately eyed service access

Durability

- eather resistant UV stabili ed polyester powder-coat inish on all e terior parts
- Electronic components temperature range o -0 to 1 5 (-0 to 5)
- ully weatheri ed but in the event o a lood Smartbelly can withstand up to 0 (1.0 m) o water without harming electronics

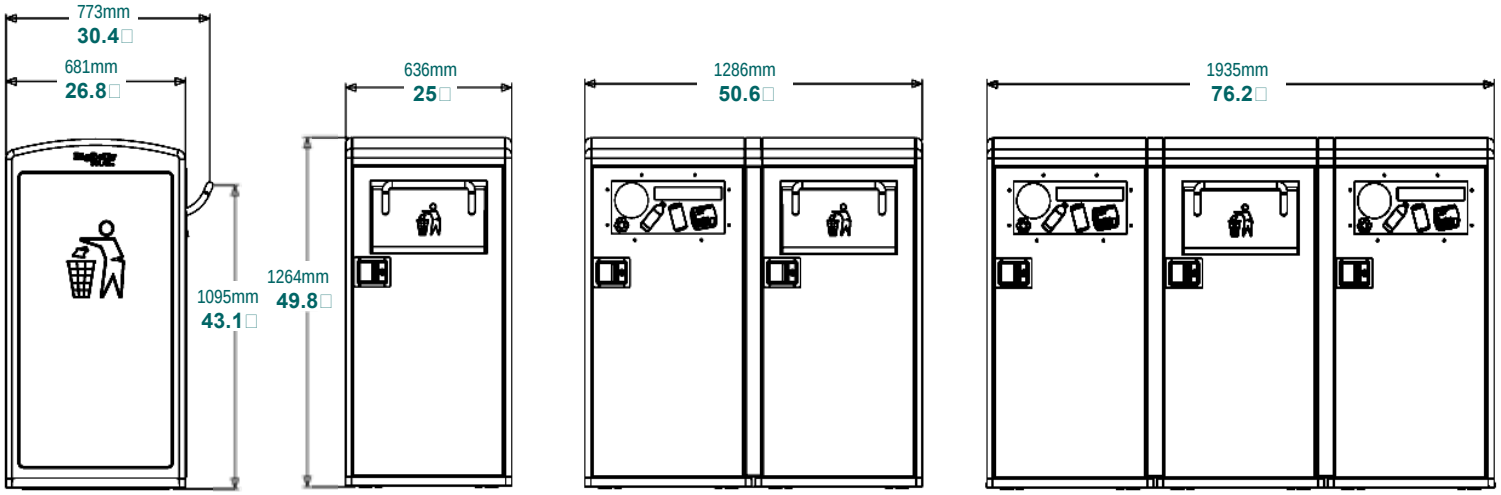
Bigbelly Solar, Inc.
150 A Street Suite 103
Needham, MA 02494 USA

Bigbelly
CHANGE YOUR SPACE

Sales Bigbelly.com
Bigbelly.com

Toll-free: 1 888.820.0300
International: 1 781.444.6002
FAX: 1 781.444.5651

Station Dimensions



Bigbelly single station
Approximately 270 lbs (123kg)

Bigbelly & Smartbelly double station
Approximately 445 lbs (202kg)

Bigbelly & Smartbelly triple station
Approximately 610 lbs (277kg)

Overall Dimensions	Bigbelly® High Capacity	Smartbelly® Standard Capacity	Smartbelly® Companion
Height	□□.□□ (12□□mm)	□□.□□ (12□□mm)	□□.□□ (12□□mm)
Width	25□ (□□5mm)	25□ (□□5mm)	25□ (□□5mm)
Depth	2□.□□ (□□1mm)	2□.□□ (□□1mm)	2□.□□ (□□1mm)
Handle Height	□□.1□ (10□5mm)	-	-
Weight	2□0 lb (122□g)	1□5 lb (□0□g)	1□□ lb (□5□g)
Shipping Weight	□00 lb (1□□□g)	205 lb (□□□g)	205 lb (□□□g)
System Voltage	12V	12V	-
Insertion Opening (see below)	□□□ 1□□ (15.2cm□ □□.2cm)	□ an be con□igured □or multiple recycling or waste streams.	□ an be con□igured □or multiple recycling or waste streams.
Bin Volume	□□ gallons (125L) compacted□ 150 gallons uncompacted	50 gallons (22□L)	50 gallons (22□L)
Other			
Liner Bags	□ ustom □ igbelly Liner □ ags (□□□ S-□ □□□□□) are available □or purchase. □ ontact □ aste□ ero at □00.□□□.□□5□ or *www.WasteZero.com/Bigbelly*. The blac□ bags are □□□□ □□□□ (120cm□ 11□cm) and 2.5mil (□□□) thic□.	□ ustom Smartbelly Liner □ ags (□□□ S-□ □□255) are available □or purchase. □ ontact □ aste□ ero at □00.□□□.□□5□ or *www.WasteZero.com/Bigbelly*. The clear bags are 55□□ □□2.5□□ (1□0cm□ 10□cm) and 1.25mil (□2□) thic□.	□ ustom Smartbelly Liner □ ags (□□□ S-□ □□255) are available □or purchase. □ ontact □ aste□ ero at □00.□□□.□□5□ or *www.WasteZero.com/Bigbelly*. The clear bags are 55□□ □□2.5□□ (1□0cm□ 10□cm) and 1.25mil (□2□) thic□.

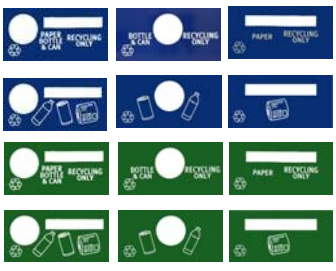
Bigbelly Hoppers



Smartbelly Flaps

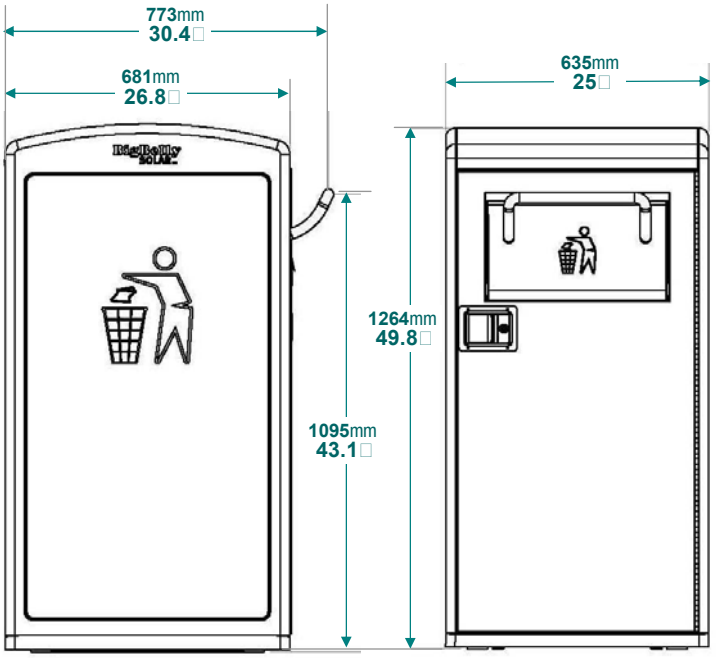


Smartbelly Faceplates



□LEASE□□TE□□reen hoppers□□aceplates or □laps re□uire additional□wee□s to process.

Bigbelly® High Capacity Compactor



Configurations: Mi ed waste or single-stream recycling (with appropriate markings)

Materials

- o S compliant
- alvani ed sheet metal steel interior and e terior construction
- eavy duty plastic side panels or dent and scratch resistance (recycled content)
- nterior in Single bin is lea proo made out o low density polyethylene plastic

Power & Electronics

- olycrystalline silicon cell V module (20 watts). (0 watts E high energy upgrade available).
- V panel protected by polycarbonate bubble
- Spill-proo sealed maintenance-ree battery
- Sel-powered unit re uires no wiring

Technical Specifications

Overall Machine Dimensions

- eight . (12 mm)
- idth 25 (5mm)
- epth 2 . (1mm)
- andle eight (A A ompliant) .1 (10 5mm)
- eight 2 0 lbs (122 g) Shipping weight 00 lbs (1 .0 g)
- opper pening 1 (152mm 2mm)
- in Volume gallons (125 L) compacted trash approximately 150 gallons (5 L) uncompacted trash

Compactor Features

- ompaction Up to 5-to-1 compaction ratio
- ully automated microprocessor controlled system senses ullness and machine status
- -color LE status lamps indicate compacted trash level machine status and error codes
- S wireless data lin or remote monitoring and management
- S assisted location service

Safety Features

- E approved
- ully interloc ed access doors protect users and service personnel
- Loc ed ront trash removal door. (Loc ed rear door option available)
- Separately eyed service access
- ault-tolerant design or hopper insertion door prevents access to compaction area

Durability

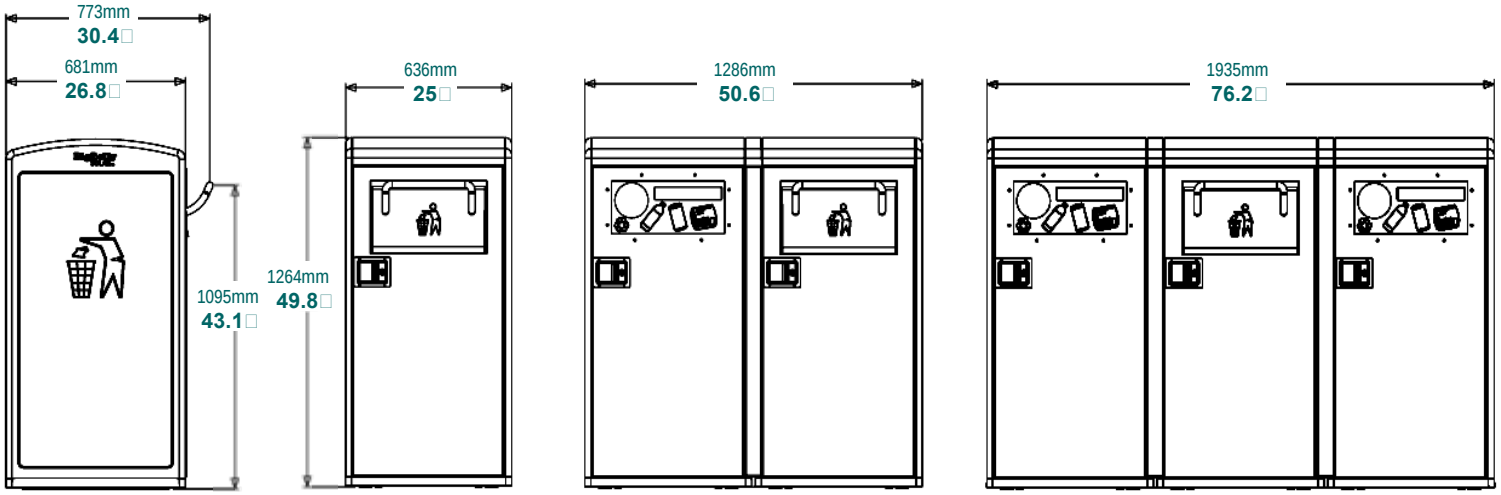
- eather resistant UV stabili ed polyester powder-coat inish on all e terior parts
- Electronic components temperature range o - 0 to 1 5 (- 0 to 5)
- ully weatheri ed but in the event o a lood igbelly can withstand
  - Up to 20 (50 mm) o water without harming the electronics
  - Up to (15mm) o water with only minor damage to electronics

Bigbelly Solar, Inc.
150 A Street Suite 103
Needham, MA 02494 USA

Sales Bigbelly.com
Bigbelly.com

Toll-free: 1 888.820.0300
International: 1 781.444.6002
FAX: 1 781.444.5651

Station Dimensions



Bigbelly single station
Approximately 270 lbs (123kg)

Bigbelly & Smartbelly double station
Approximately 445 lbs (202kg)

Bigbelly & Smartbelly triple station
Approximately 610 lbs (277kg)

Overall Dimensions	Bigbelly® High Capacity	Smartbelly® Standard Capacity	Smartbelly® Companion
Height	□□.□□ (12□□mm)	□□.□□ (12□□mm)	□□.□□ (12□□mm)
Width	25□ (□□5mm)	25□ (□□5mm)	25□ (□□5mm)
Depth	2□.□□ (□□1mm)	2□.□□ (□□1mm)	2□.□□ (□□1mm)
Handle Height	□□.1□ (10□5mm)	-	-
Weight	2□0 lb (122□g)	1□5 lb (□0□g)	1□□ lb (□5□g)
Shipping Weight	□00 lb (1□□□g)	205 lb (□□□g)	205 lb (□□□g)
System Voltage	12V	12V	-
Insertion Opening (see below)	□□□ 1□□ (15.2cm□ □□.2cm)	□ an be con□igured □or multiple recycling or waste streams.	□ an be con□igured □or multiple recycling or waste streams.
Bin Volume	□□ gallons (125L) compacted□ 150 gallons uncompacted	50 gallons (22□L)	50 gallons (22□L)
Other			
Liner Bags	□ ustom □ igbelly Liner □ ags (□□□ S-□ □□□□□) are available □or purchase. □ ontact □ aste□ ero at □00.□□□.□□5□ or *www.WasteZero.com/Bigbelly*. The blac□ bags are □□□□ □□□□ (120cm□ 11□cm) and 2.5mil (□□□) thic□.	□ ustom Smartbelly Liner □ ags (□□□ S-□ □□255) are available □or purchase. □ ontact □ aste□ ero at □00.□□□.□□5□ or *www.WasteZero.com/Bigbelly*. The clear bags are 55□□ □□2.5□□ (1□0cm□ 10□cm) and 1.25mil (□2□) thic□.	□ ustom Smartbelly Liner □ ags (□□□ S-□ □□255) are available □or purchase. □ ontact □ aste□ ero at □00.□□□.□□5□ or *www.WasteZero.com/Bigbelly*. The clear bags are 55□□ □□2.5□□ (1□0cm□ 10□cm) and 1.25mil (□2□) thic□.

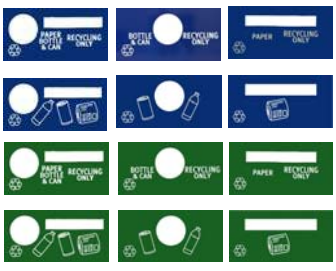
Bigbelly Hoppers



Smartbelly Flaps



Smartbelly Faceplates



□LEASE□□TE□□reen hoppers□□aceplates or □laps re□uire additional□wee□s to process.

Halsey Taylor®
Satisfying Thirsts Since 1912

Endura II™ Outdoor Tubular Bottle Filling Station

Model 4420BFDB

Dual Station with Pet Fountain



This fountain is certified to NSF/ANSI 61-Annex G, AB1953

GENERAL
Pedestal, Endura II™ Steel Outdoor Dual Station Fountain with Bottle Filling Station and Pet Fountain. Rounded corner design with textured powder-coat finish and E-Coat immersion for year-round beauty with minimum maintenance. The E-coat immersion process coats the inside and outside for the ultimate in corrosion protection.

BOTTLE FILLER
Provides a quick fill at 1 gallon per minute. Laminar flow provides a clean fill with minimal splash and easy maintenance.

BUBBLER
Vandal-resistant bubbler is one-piece, chrome-plated. Unit has integral hood guard design to prevent contamination from other users, airborne deposits and tampering.

BASIN
Contour-formed stainless steel design with rounded edges reduces splatter, ensures proper drainage and prevents standing water.

PUSHBUTTON ACTUATION MECHANISM
Self-closing, vandal-resistant pushbutton does not require grasping or twisting.

INLET STRAINER
Easily cleaned in-line strainer screen traps particles of 140 microns or larger before they enter the waterway.

WATER INLET & DRAIN OUTLET
Inlet: 3/8" O.D. tubing
Outlet: 1-1/4" tube outlet for 1-1/4" slip joint connection

ACCESS PANELS
Heavy-gauge steel with vandal-resistant screws. Provides access for easy hook-up of all plumbing connections.

PET FOUNTAIN
Actuated by upper pushbutton. Slow drainage feature for easy drinking.

SUGGESTED SPECIFICATION
Unit shall include powder-coated finish with vandal-resistant pushbutton actuation, vandal-resistant bubblers with integral hood guard, and contour-formed rounded basins to reduce splash and prevent standing water. Bottle Filler shall include a laminar flow for minimal splash and provide 1 gallon per minute fill rate. Shall comply with ADA standards and be certified to lead-free compliance including NSF/ANSI 61-Annex G, AB1953.

Model 4420BF1UDB is shown. Image varies based on quantity and location of bottle fillers.

Standard Finish is Evergreen Textured powder-coat Endura II™
Additional colors available.

Trap and service stop not included.

OPTIONS
Available with single or dual bottle fillers.

JOB NAME: _____

_____

_____

ENGINEER/CONTRACTOR NAME:

_____

APPROVAL: _____

DATE: _____

Model 4420BFDB

Endura II™ Dual Station Outdoor Tubular Bottle Filling Station with Pet Fountain

(CONTINUED)

MOUNTING INSTRUCTIONS and PLUMBING CONNECTIONS

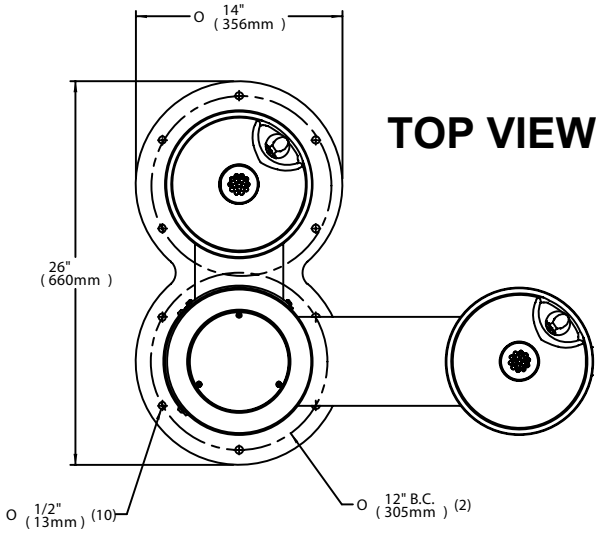
Provide solid, well-drained surface to mount pedestal fountain (concrete pad recommended). (10) ½" anchor bolts (not included) should be attached firmly to mounting surface in order to secure unit. (Refer to rough-in diagram)

Locate and install plumbing through ground as required. NOTE: Unit is not furnished with service valve.

Position pedestal over plumbing and secure base to anchor bolts. Remove access panels and connect supply and water lines. Turn on water supply and check for leaks. Reassemble access panels to pedestal.

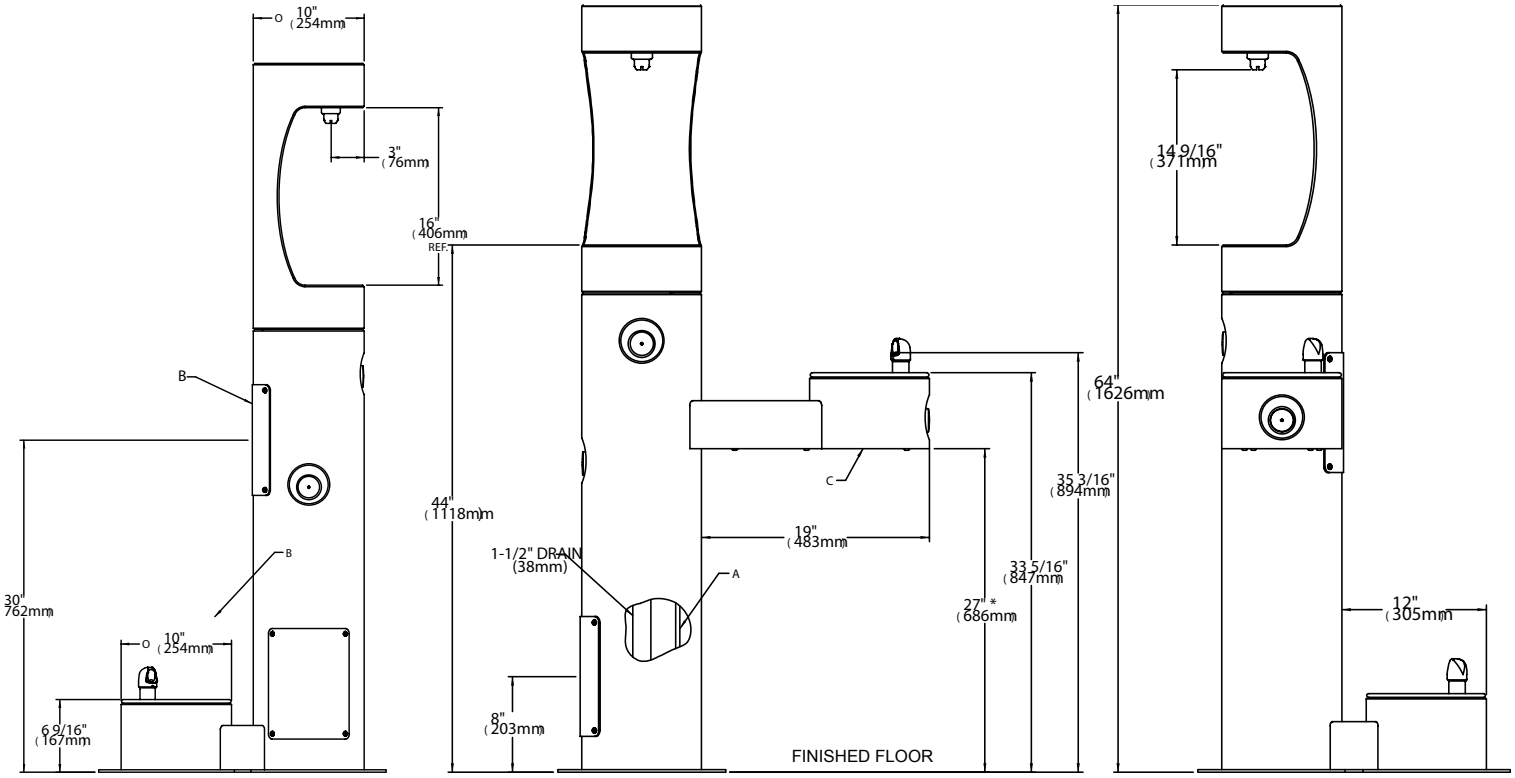
Trap and service stop not included.

OPERATING PRESSURES:
Supply water – 105 psi maximum



FRONT & SIDE VIEWS

(Model 4420BF1UDB is shown. Image varies based on quantity and location of bottle fillers.)



*ADA Requirement

LEGEND:
A = 3/8" O.D. UNPLATED COPPER TUBE CONNECT- SHUT OFF VALVE BY OTHERS
B = ACCESS PANEL (8" x 10")
C = REMOVABLE BOTTOM COVER

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Endura II™ Outdoor Tubular Bottle Filling Station

Model 4420BF

Dual Arm Station

This fountain is certified to NSF/ANSI 61-Annex G, AB1953



Model 4420BF2 is shown. Image varies based on quantity and location of bottle fillers.

GENERAL
Pedestal, Endura II™ Steel Outdoor Dual Station Fountain with Bottle Filling Station with rounded corner design, textured powder-coat finish and E-Coat immersion for year-round beauty with minimum maintenance. The E-coat immersion process coats the inside and outside for the ultimate in corrosion protection.

BOTTLE FILLER
Provides a quick fill at 1 gallon per minute. Laminar flow provides a clean fill with minimal splash and easy maintenance.

BUBBLER
Vandal-resistant bubbler is one-piece, chrome-plated. Unit has integral hood guard design to prevent contamination from other users, airborne deposits and tampering.

BASIN
Contour-formed stainless steel design with rounded edges reduces splatter, ensures proper drainage and prevents standing water.

PUSHBUTTON ACTUATION MECHANISM
Self-closing, vandal-resistant pushbutton does not require grasping or twisting.

INLET STRAINER
Easily cleaned in-line strainer screen traps particles of 140 microns or larger before they enter the waterway.

WATER INLET & DRAIN OUTLET
Inlet: 3/8" O.D. tubing
Outlet: 1-1/2" tube outlet for 1-1/2" slip joint connection

ACCESS PANELS
Heavy-gauge steel with vandal-resistant screws. Provides access for easy hook-up of all plumbing connections.

SUGGESTED SPECIFICATION
Unit shall include powder-coated finish with vandal-resistant pushbutton actuation, vandal-resistant bubblers with integral hood guard, and contour-formed rounded basins to reduce splash and prevent standing water. Bottle Filler shall include a laminar flow for minimal splash and provide 1 gallon per minute fill rate. Shall comply with ADA standards and be certified to lead-free compliance including NSF/ANSI 61-Annex G, AB1953.

Standard Finish is Evergreen Textured powder-coat Endura II™

Trap and service stop not included.

OPTIONS
Available with single or dual bottle fillers.

JOB NAME: _____

_____

_____

ENGINEER/CONTRACTOR NAME:

_____

APPROVAL: _____

DATE: _____

Model 4420BF
Endura II™ Dual Arm Station
Outdoor Tubular
Bottle Filling Station

(CONTINUED)

MOUNTING INSTRUCTIONS and PLUMBING CONNECTIONS

Provide solid, well-drained surface to mount pedestal fountain (concrete pad recommended). (6) ½" anchor bolts (not included) should be attached firmly to mounting surface in order to secure unit. (Refer to rough-in diagram)

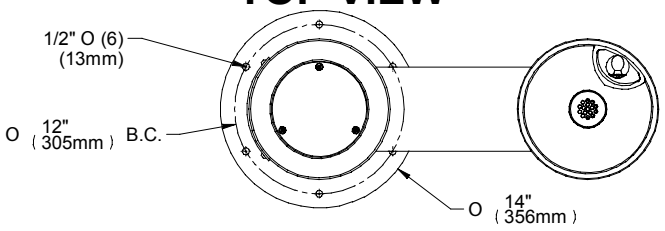
Locate and install plumbing through ground as required. NOTE: Unit is not furnished with service valve.

Position pedestal over plumbing and secure base to anchor bolts. Remove access panels and connect supply and water lines. Turn on water supply and check for leaks. Reassemble access panels to pedestal.

Trap and service stop not included.

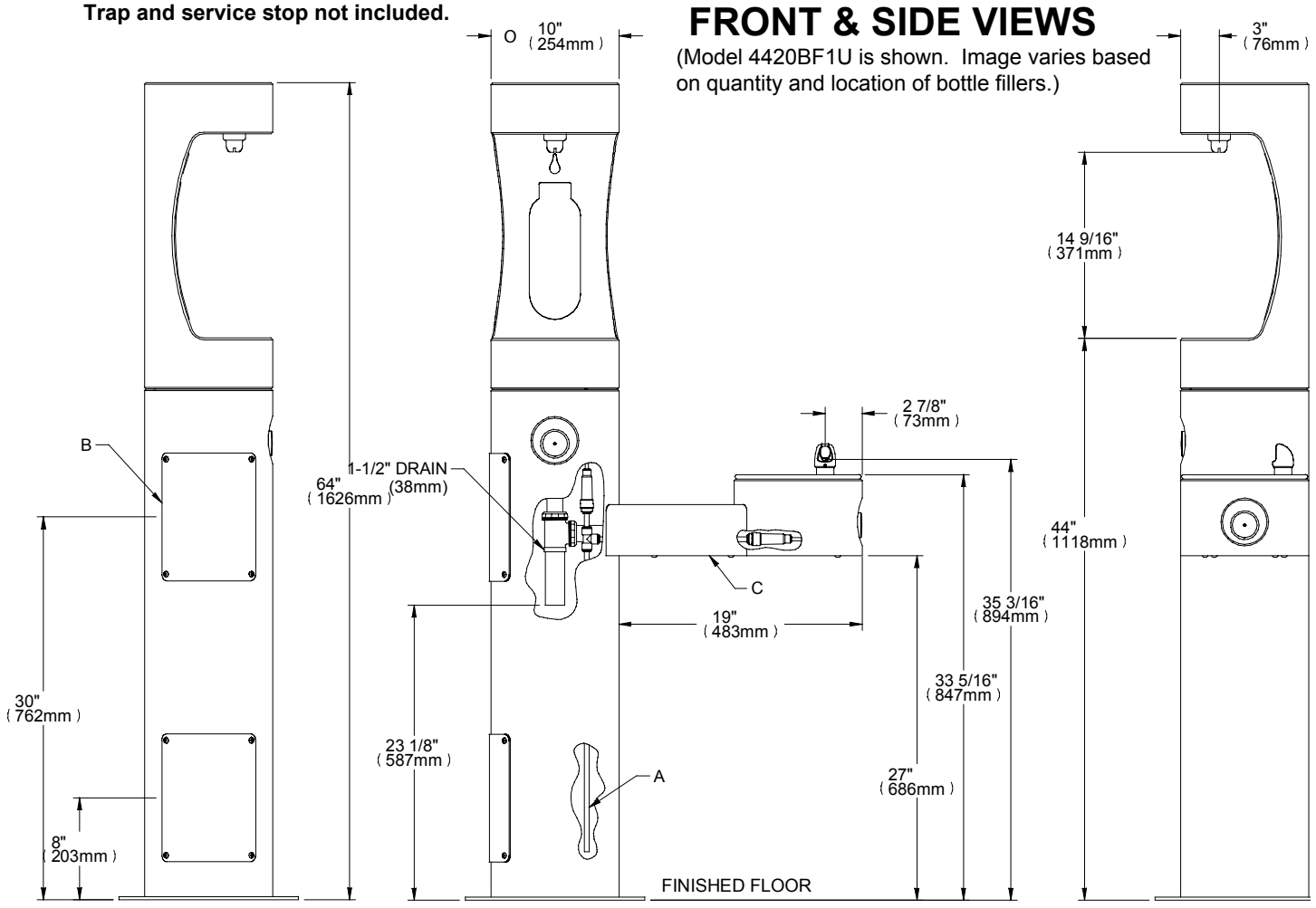
OPERATING PRESSURES:
Supply water – 105 psi maximum

TOP VIEW



FRONT & SIDE VIEWS

(Model 4420BF1U is shown. Image varies based on quantity and location of bottle fillers.)



* ADA Requirement

LEGEND:
A = 3/8" O.D. UNPLATED COPPER TUBE CONNECT SHUT OFF VALVE BY OTHERS
B = ACCESS PANEL (8" x 10")
C = REMOVABLE BOTTOM COVER

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BUILT TO YOUR NEEDS & SPECIFICATIONS

Long Gone Aluminum Team Benches

Sportsfield Specialties Long Gone aluminum team benches are designed for both two-tier and single tier seating and consist of a powder coated aluminum frame and aluminum plank seating. They are available with or without a backrest and can be semi-permanently installed, portable or wall mount. All of the aluminum team benches have a durable powder coated finish with a variety of standard colors to choose from. Custom sizes and/or designs are available upon request.







Two-Tier Aluminum Team Benches:

LG-TTAL-08:	8'L Aluminum Team Bench, Two-Tier Seating, Permanent or Portable
LG-TTAL-10:	10'L Aluminum Team Bench, Two-Tier Seating, Permanent or Portable
LG-TTAL-12:	12'L Aluminum Team Bench, Two-Tier Seating, Permanent or Portable
LG-TTAL-15:	15'L Aluminum Team Bench, Two-Tier Seating, Permanent or Portable

Two-Tier Aluminum Wall Mount Team Benches:

LG-TTAL-WM-08:	8'L Aluminum Team Bench, Two-Tier Seating, Wall Mount
LG-TTAL-WM-10:	10'L Aluminum Team Bench, Two-Tier Seating, Wall Mount
LG-TTAL-WM-12:	12'L Aluminum Team Bench, Two-Tier Seating, Wall Mount
LG-TTAL-WM-15:	15'L Aluminum Team Bench, Two-Tier Seating, Wall Mount

Portable Single Tier Aluminum Team Benches:

LG-STAL-BRPT-08:	8'L Aluminum Team Bench, Single Tier Seating with Backrest, Portable
LG-STAL-BRPT-10:	10'L Aluminum Team Bench, Single Tier Seating with Backrest, Portable
LG-STAL-BRPT-12:	12'L Aluminum Team Bench, Single Tier Seating with Backrest, Portable
LG-STAL-BRPT-15:	15'L Aluminum Team Bench, Single Tier Seating with Backrest, Portable
LG-STAL-NBPT-08:	8'L Aluminum Team Bench, Single Tier Seating, Portable
LG-STAL-NBPT-10:	10'L Aluminum Team Bench, Single Tier Seating, Portable
LG-STAL-NBPT-12:	12'L Aluminum Team Bench, Single Tier Seating, Portable
LG-STAL-NBPT-15:	15'L Aluminum Team Bench, Single Tier Seating, Portable

Permanent Single Tier Aluminum Team Benches:

LG-STAL-BRSP-08:	8'L Aluminum Team Bench, Single Tier Seating with Backrest, Permanent
LG-STAL-BRSP-10:	10'L Aluminum Team Bench, Single Tier Seating with Backrest, Permanent
LG-STAL-BRSP-12:	12'L Aluminum Team Bench, Single Tier Seating with Backrest, Permanent
LG-STAL-BRSP-15:	15'L Aluminum Team Bench, Single Tier Seating with Backrest, Permanent
LG-STAL-NBSP-08:	8'L Aluminum Team Bench, Single Tier Seating, Permanent
LG-STAL-NBSP-10:	10'L Aluminum Team Bench, Single Tier Seating, Permanent
LG-STA:-NBSP-12:	12'L Aluminum Team Bench, Single Tier Seating, Permanent
LG-STAL-NBSP-15:	15'L Aluminum Team Bench, Single Tier Seating, Permanent

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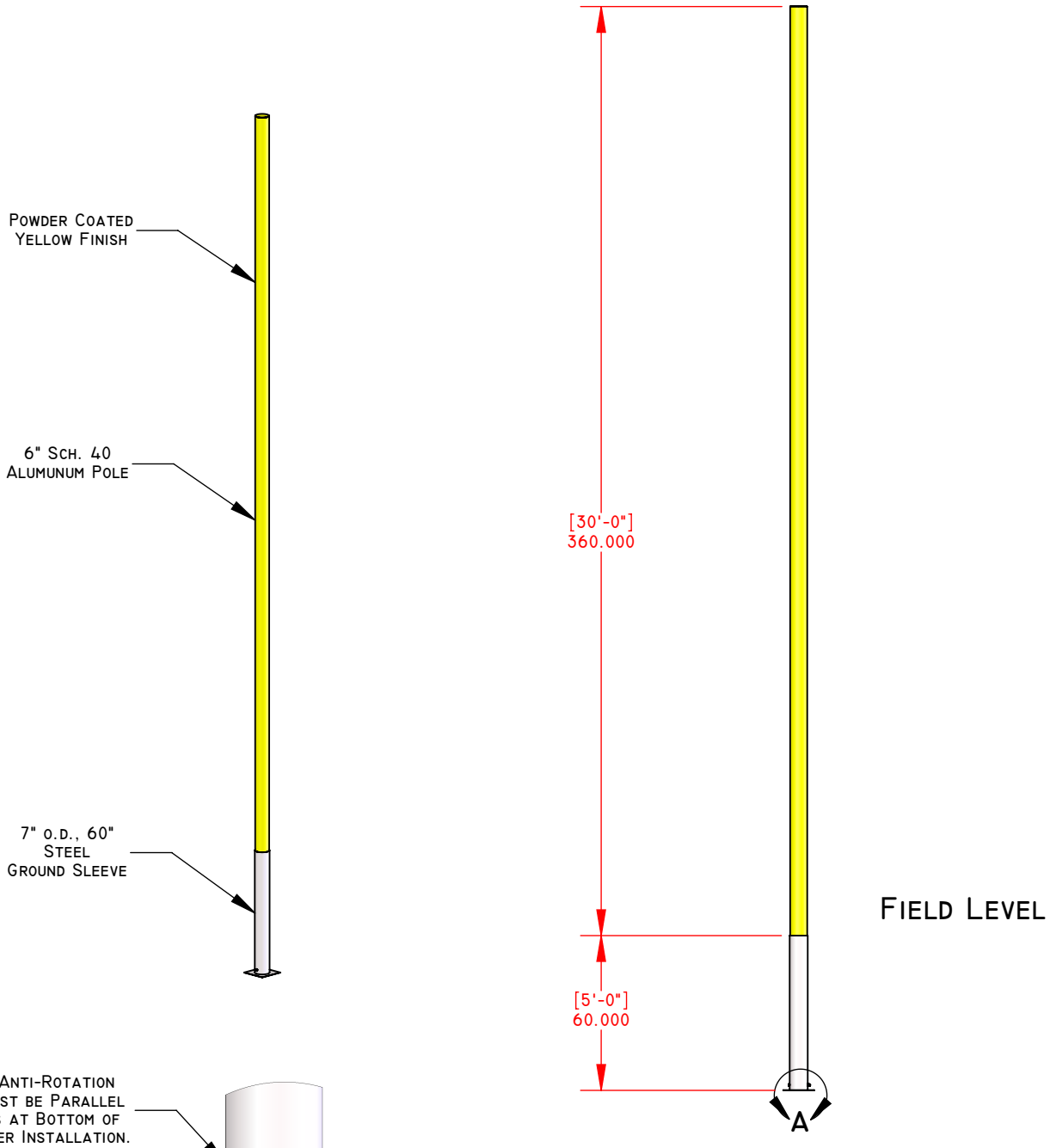
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Delhi, NY 13753
Toll Free: 888-975-3343
Fax: 607-746-8481



Foundation Requirements
Based on Local Codes
and Soil Conditions

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LGFP630 - 30' Foul Pole

Not To Scale

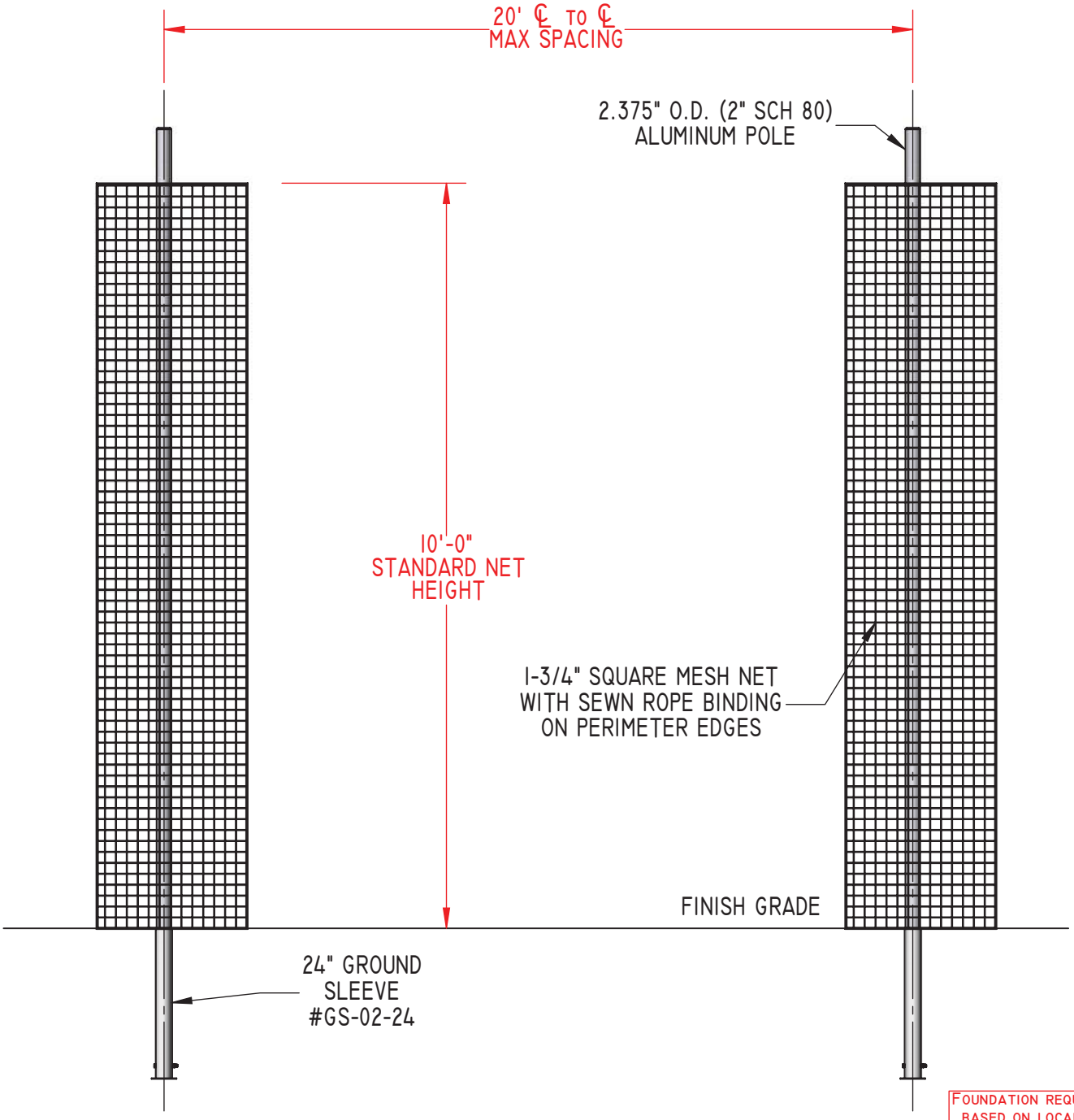
Sportsfield Specialties Inc 11012014

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Delhi, NY 13753
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Fax: 607-746-8481

Standard Black Powder Coated Finish



Foundation requirements based on local codes and soil conditions

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TFBSS210P - 10' Ball Safety Netting System

Not To Scale

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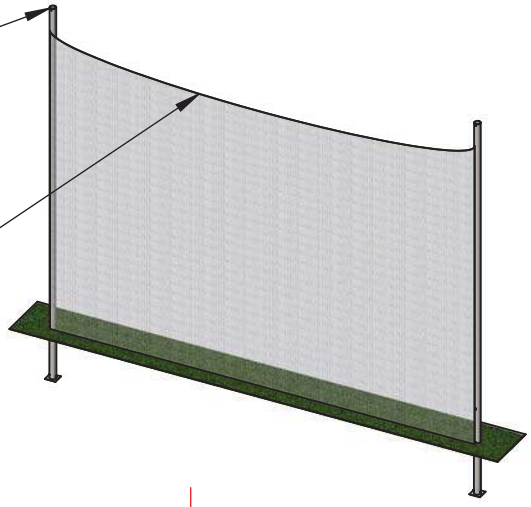
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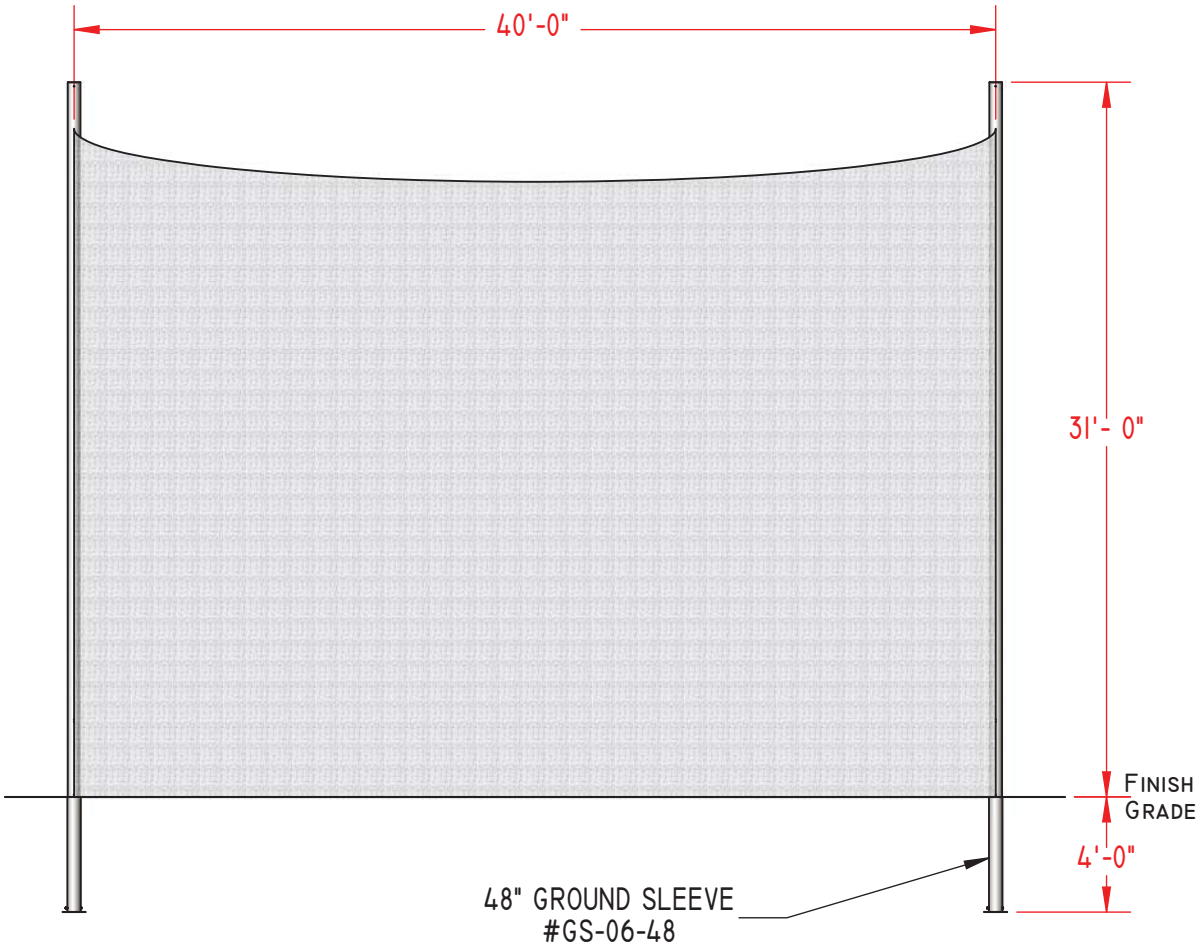
STANDARD BLACK POWDER COATED FINISH

HARDWARE KIT INCLUDED
#4710-630P

6.625" O.D. (6" SCH 40)
STEEL POLE
#4700-630P

30'H X 40'W 4" SQUARE MESH
NET WITH SEWN ROPE BINDING
ON PERIMETER EDGES
#4715-3040





FOUNDATION REQUIREMENTS
BASED ON LOCAL CODES
AND SOIL CONDITIONS

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GPFSNS63040P
30'H X 40'W FOOTBALL SAFETY NETTING SYSTEM

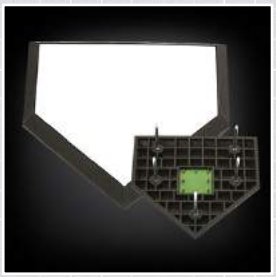
NOT TO SCALE

SPORTSFIELD SPECIALTIES INC 01292015

Baseball/Softball Field Equipment and Accessories

Sportsfield Specialties has partnered with Schutt® Sports, the market leader in baseball/softball equipment to offer a complete product line of baseball/softball field equipment, including Schutt®/Hollywood bases, home plates and pitching rubbers as well as the remaining miscellaneous field equipment necessary for game day and practice situations.










Schutt®/Hollywood Baseball/Softball Field Equipment:

LGBBPL:	Schutt® Original Jack Corbett® MLB® Hollywood Bases without Ground Anchors and Plugs, Set of Three (3)
LGHIBL:	Schutt® Hollywood Impact® Bases without Ground Anchors and Plugs, Set of Three (3)
LGHIBD:	Schutt® Hollywood Impact Double First Base Set without Ground Anchors and Plugs
LGBBP-44:	Schutt® Ground Anchor Mounts, 8"L Female Painted Orange Steel Ground Anchor, 1-3/4" Square, Set of Three (3)
LGBBP-64:	Schutt® Mushroom Base Plugs, Set of Three (3)
LGSHP-UM:	Hollywood MLB® Pro Style Universal Home Plate with Ground Anchor and Plug and Five (5) Anchor Spikes
LGSHP-PS:	Schutt® Pro Home Plate with Ground Anchor
LGSRHP:	Schutt® Hollywood Bury All Home Plate
LGSHP-RBA:	Schutt® Bury All Rubber Home Plate
LGBBPB:	Schutt® Hollywood MLB® Official Size Four (4) Sided Professional Pitching Rubber, 6" x 24"
LGSPR-4SO:	Schutt® Official Size Four (4) Way Professional Pitching Rubber, 6" x 24"
LGSPR-4SY:	Schutt® Youth Size Four (4) Way Professional Pitching Rubber, 4" x 18"
LGSRSLSD:	Schutt® Hollywood 24" Step Down Pitching Rubber, Official Size - 6" x 24"
LGSPR-SD:	Schutt® Step Down Pitching Rubber, Official Size - 6" x 24"
LGTRB51:	Digout Tool

*Additional Schutt® Sports Field Equipment Options Available Upon Request

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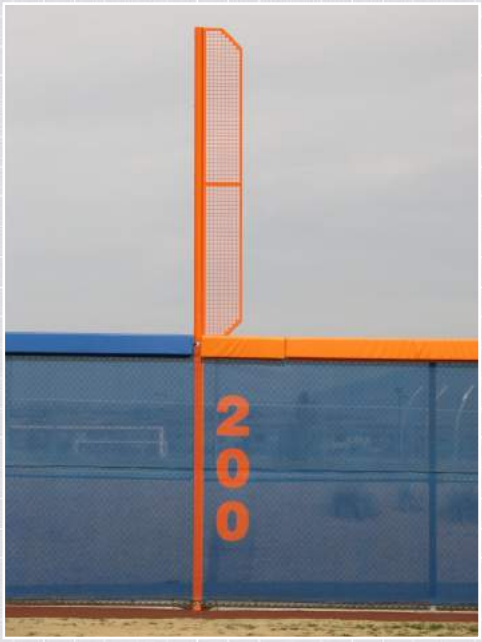
SportsTurf Managers Association

Member American Sports Builders Association

Long Gone Baseball/Softball Foul Poles

Sportsfield Specialties Long Gone baseball/softball foul poles are manufactured from 4” or 6.625” outside diameter aluminum pipe and are available in standard above ground heights of 15’, 20’, 30’ and 40’. All foul poles are powder coated yellow, utilize ground sleeves with corresponding caps or a base plate mounting system for a semi-permanent installation, and are available with or without a wing. Standard wings start 8’ above finished grade and consist of 1/8” stamped aluminum sheet with double reinforced bends making them much more durable and longer lasting than weaker competitive mesh products. Custom foul pole heights and/or wing sizes are available upon request.





Long Gone Baseball/Softball Foul Poles with Wings:

LGFPW415/LGFPW415PL:	15’H - 4” O.D Foul Pole with 7’H Wing
LGFPW420/LGFPW420PL:	20’H - 4” O.D. Foul Pole with 12’H Wing
LGFPW630/LGFPW630PL:	30’H - 6.625” O.D. Foul Pole with 22’H Wing
LGFPW640/LGFPW640PL:	40’H - 6.625” O.D. Foul Pole with 32’H Wing

Long Gone Baseball/Softball Foul Poles without Wings:

LGFP415/LGFP415PL:	15’H - 4” O.D. Foul Pole, No Wing
LGFP420/LGFP420PL:	20’H - 4” O.D. Foul Pole, No Wing
LGFP630/LGFP630PL:	30’H - 6.625” O.D. Foul Pole, No Wing
LGFP640/LGFP640PL:	40’H - 6.625” O.D. Foul Pole, No Wing
SSI-PE-STAMP-FP:	Ground Sleeve Mount Concrete Anchoring Foundation PE Stamped Design
SSI-PE-STAMP-FP-PL:	Base Plate Mount Concrete Anchoring Foundation PE Stamped Design

*Professionally Pre-Engineered to Meet ASCE Wind Rating up to 90 mph

**PL Indicates Base Plate Mount Long Gone Baseball/Softball Foul Pole

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BUILT TO YOUR NEEDS & SPECIFICATIONS

Long Gone Baseball/Softball Batting Tunnels

Sportsfield Specialties manufactures cantilever, overhead and tension style baseball/softball batting tunnels. All batting tunnels come with a black #36 nylon 1-3/4" square mesh net with entrance/exit, block pulley system, corresponding ground sleeves with caps and hinged net stabilizer extension arms to ensure that the net remains taut and secure to the ground. Custom sizes, layouts and base plate mounting systems are available upon request.



Long Gone Cantilever Baseball/Softball Batting Tunnels:

LGBBT-P:	Baseball Batting Tunnel—13'H x 14'W x 75'L
LGSBT-P:	Softball Batting Tunnel—13'H x 14'W x 55'L

*Custom Cantilever Baseball/Softball Batting Tunnel Sizes and Layouts Available Upon Request

**Standard Powder Coated Black Pole Finish, Other Standard Powder Coat Colors Available Upon Request

Long Gone Overhead Baseball/Softball Batting Tunnels:

LGOBT-BS-P:	Single Overhead Baseball Batting Tunnel
LGOBT-BD-P:	Double Overhead Baseball Batting Tunnel
LGOBT-BT-P:	Triple Overhead Baseball Batting Tunnel
LGOBT-SS:-P	Single Overhead Softball Batting Tunnel
LGOBT-SD-P:	Double Overhead Softball Batting Tunnel
LGOBT-ST-P:	Triple Overhead Softball Batting Tunnel

*Custom Overhead Baseball/Softball Batting Tunnel Sizes and Layouts Available Upon Request

**Standard Powder Coated Black Pole Finish, Other Standard Powder Coat Colors Available Upon Request

Long Gone Tension Baseball/Softball Batting Tunnels:

LGBBTTN-BS:	Single Tension Baseball Batting Tunnel
LGBBTTN-BD:	Double Tension Baseball Batting Tunnel
LGBBTTN-BT:	Triple Tension Baseball Batting Tunnel
LGBBTTN-SS:	Single Tension Softball Batting Tunnel
LGBBTTN-SD:	Double Tension Softball Batting Tunnel
LGBBTTN-ST:	Triple Tension Softball Batting Tunnel

*Custom Tension Baseball/Softball Batting Tunnel Sizes and Layouts Available Upon Request

**Standard Powder Coated Black Pole Finish, Other Standard Powder Coat Colors Available Upon Request

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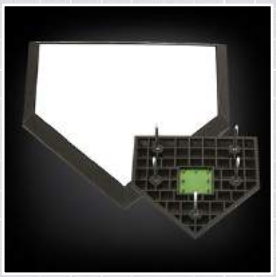
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SPORTSFIELD SPECIALTIES
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Baseball/Softball Field Equipment and Accessories

Sportsfield Specialties has partnered with Schutt® Sports, the market leader in baseball/softball equipment to offer a complete product line of baseball/softball field equipment, including Schutt®/Hollywood bases, home plates and pitching rubbers as well as the remaining miscellaneous field equipment necessary for game day and practice situations.










Schutt®/Hollywood Baseball/Softball Field Equipment:

LGBBPL:	Schutt® Original Jack Corbett® MLB® Hollywood Bases without Ground Anchors and Plugs, Set of Three (3)
LGHIBL:	Schutt® Hollywood Impact® Bases without Ground Anchors and Plugs, Set of Three (3)
LGHIBD:	Schutt® Hollywood Impact Double First Base Set without Ground Anchors and Plugs
LGBBP-44:	Schutt® Ground Anchor Mounts, 8"L Female Painted Orange Steel Ground Anchor, 1-3/4" Square, Set of Three (3)
LGBBP-64:	Schutt® Mushroom Base Plugs, Set of Three (3)
LGSHP-UM:	Hollywood MLB® Pro Style Universal Home Plate with Ground Anchor and Plug and Five (5) Anchor Spikes
LGSHP-PS:	Schutt® Pro Home Plate with Ground Anchor
LGSRHP:	Schutt® Hollywood Bury All Home Plate
LGSHP-RBA:	Schutt® Bury All Rubber Home Plate
LGBBPB:	Schutt® Hollywood MLB® Official Size Four (4) Sided Professional Pitching Rubber, 6" x 24"
LGSPR-4SO:	Schutt® Official Size Four (4) Way Professional Pitching Rubber, 6" x 24"
LGSPR-4SY:	Schutt® Youth Size Four (4) Way Professional Pitching Rubber, 4" x 18"
LGSRSLSD:	Schutt® Hollywood 24" Step Down Pitching Rubber, Official Size - 6" x 24"
LGSPR-SD:	Schutt® Step Down Pitching Rubber, Official Size - 6" x 24"
LGTRB51:	Digout Tool

*Additional Schutt® Sports Field Equipment Options Available Upon Request

BUILT TO YOUR NEEDS & SPECIFICATIONS

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February 23, 2016

CITY OF SOMERVILLE MA.

SPECIFICATION CFTR-003-02 TRASH RECEPTACLE

- ALL STEEL TO BE A-36 GRADE
- ALL WELDS TO ASTM STANDARD
- RECEPTACLE WITH LID, LID TO BE WELDED TO UNIT
- HINGE DOOR FOR ACCESS WITH BRONZE BUSHINGS AND CFI UNI□UE LOCK MECHANISM
- PAINT PROCESS AS FOLLOWS:

1. AFTER FABRICATION METAL RECEIVES WHITE METAL BLAST TO REMOVE SCALE AND ADD TE□TURE FOR PROPER ADHESION
2. 240 DEGREE PHOSPHATE WASH OF METAL THEN DRIED FOR 15 MINUTES AT 250 DEGREES
3. ZINC RICH POWDER APPLIED TO METAL AND RE-HEATED TO 250 DEGREES
4. POL□ESTER (E□TERIOR GRADE) POWDER COAT FROM CUSTOM FABRICATION "SPECIAL FINISHES" APPLIED TO WARM PRIMER
5. PARTS ARE BAKED TO 400 DEGREES FOR 30 MINUTES AND ALLOWED TO COOL
6. E□CLUSIVE CFI POWDER APPLIED GRAFITTI REMOVER THEN APPLIED AND BAKED AT 375 DEGREEES
7. UNITS A PACKAGE AND SHIPPED ON DEDICATED CFI TRUCKS TO ENSURE PROPER HANDLING

- CFI DESIGNED SACRIFICIAL CATHODE PROVIDED TO FOR CORROSION RESISTANCE
- AS MANUFACTURED B□ ***CUSTOM FABRICATION INC. 2903 N.Y. RT.7 HARPURSVILLE N.Y. 13787***

2903 NY RT. 7 • HARPURSVILLE N.Y. • 13787
PHONE: 607 693 3223 • FAX: 607 693 3226

7800 E. Michigan Ave.
Kalamazoo, Michigan 49048
Phone: (800) 521-2546
Fax: (269) 381-3455
www.landscapeforms.com
specify@landscapeforms.com

Chill Lounge
Product Guide Specification

Specifier Notes: This product guide specification is written according to the Construction Specifications Institute (CSI) 3-Part Format, including *MasterFormat, SectionFormat,* and *PageFormat,* as described in *The Project Resource Manual—CSI Manual of Practice, Fifth Edition.*

The section must be carefully reviewed and edited by the Architect to meet the requirements of the project and local building code. Coordinate this section with other specification sections and the Drawings. Delete all "Specifier Notes" after editing this section.

Section numbers are from *MasterFormat 2010 Edition*.

SECTION 12 93 43.13 BENCHES

Specifier Notes: This section covers Landscape Forms, Inc. "Chill Lounge" benches. Consult Landscape Forms, Inc. for assistance in editing this section for the specific application.

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Benches.

1.2 REFERENCES

Specifier Notes: List standards referenced in this section, complete with designations and titles. This article does not require compliance with standards, but is merely a listing of those used.

A. ASTM Testing Standards:
   1. ASTM D 256 – Izod Impact Resistance.
   2. ASTM D 638 – Tensile Strength.
   3. ASTM D 648 – Heat Deflection Temperature.
   4. ASTM D 790 – Flexural Modulus.
   5. ASTM D 792 – Density.
   6. ASTM D 1693 – Environmental Stress Crack Resistance, Condition B.

B. ANSI/BIFMA Testing Standards:
   1. ANSI/BIFMA 5.4-2005 – Standard Test for Lounge Seating.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's product data, storage and handling requirements and recommendations, installation methods and available colors, styles, patterns and textures.
B. Shop Drawings: Submit manufacturer's shop drawings, including plans and elevations, indicating overall dimensions.
C. Samples: Submit manufacturer's samples of materials, finishes, and colors.
D. Warranty: Manufacturer's standard warranty.

1.4 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Manufacturer regularly engaged in manufacture of site furnishings since 1969.
B. Product Support: Products are supported with complete engineering drawings and design patents.
C. Base Worth: An installed base of products worth in excess of one hundred million dollars.
D. Assets: Excess of twenty million dollars in assets.
E. Production: Orders are filled within a 40-day schedule.
F. Facility Operator: Welders and machine operators are certified.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
B. Storage: Store materials in clean, dry area in accordance with manufacturer's instructions. Keep materials in manufacturer's original, unopened containers and packaging until installation.
C. Handling: Protect materials and finish during handling and installation to prevent damage.

1.6 WARRANTY

A. Warranty Information:

-Products will be free from defects in material and/or workmanship for a period of three years from the date of invoice.

-The warranty does not apply to damage resulting from accident, alteration, misuse, tampering, negligence, or abuse.

- Landscape Forms, Inc. shall, at its option, repair, replace, or refund the purchase price of any items found defective upon inspection by an authorized Landscape Forms service representative.

-Purchasers should be aware that normal use of these high quality products can result in superficial damage affecting the finish. Scratches, nicks, and dents are to be considered normal wear and tear, and are not the responsibility of the manufacturer.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Landscape Forms, Inc., 7800 E. Michigan Ave, Kalamazoo, Michigan 49048.
Phone: (800) 521-2546. Fax (269) 381-3455. Website www.landscapeforms.com
E-mail: specify@landscapeforms.com

2.2 BENCHES

A. "Chill ™ Lounge" Benches
1. Size:
-Depth: 27-3/4 inches.
-Overall Height: 32-1/2 inches.
-Length: 62 inches.

Specifier Notes: Specify bench mounting.

2. Mounting:
a. Free Standing

b. Surface mounted: Mounting plates are made of 0.25" thick 6061 anodized aluminum.

2.3 MATERIAL

A. Composition: Chill is a one piece lounge with a 0.312" nominal wall thickness, made from 100□ linear medium density polyethylene (LMDPE) molded from ground powder to form finished products. Pigment and UV stabilizer are added in the molding process to give the desired color and resist fading from UV rays.
   1. Resistance to Environmental Stresses: Because Chill is made from LMDPE, it has exceptional resistance to moisture, corrosive substances, insects, and other environmental stresses. It does not absorb moisture, so it will not rot, splinter or crack. It requires no waterproofing, staining or similar maintenance and can handle extreme temperature changes. Chill has excellent weathering resistance□however, as with other polyolefins, it is possible that the material will fade slightly over the service life of the product.
   2. Melt Temperature and Flash Point: Chill has a melt temperature of approximately 262°F and a flash point of approximately 620°F. This is a higher flash point than wood and Chill must be exposed to a severe combustion source for a longer period than wood to ignite. But, like wood, when exposed to a combustion source for a long enough period of time, it will burn.

B. Test Results:
   1. Density: 0.0338 lbs/in^3□ASTM D-792
   2. Heat Deflection Temperature (@ 66 psi): 140°F□ASTM D-648
   3. Tensile Strength: 2,500-4,000 psi□ASTM D-638
   4. Flexural Modulus: 89,000 psi□ASTM D-790
   5. Izod Impact Resistance (125 mil sample notched): 9.9 ft-lb/in□ASTM D 256
   6. ESCR: □1,000 f50 hr□ASTM D-1693

2.4 RECYCLED CONTENT

A. Polyethylene: Chill has no recycled content but is 100□ recyclable.

2.5 FABRICATION

A. Shop assembled benches.

2.6 FINISHES

A. Finish: Chill lounge appears with a #230 shot peen texture and light flame treatment. Unit is molded with UV stabilizer, which is resistant to UV rays.

Specifier Notes: Specify polyethylene color. Consult Landscape Forms, Inc. for selection of standard colors and availability of custom colors.

B. Color: _____ .

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas to receive benches.
B. Notify Architect of conditions that would adversely affect installation or subsequent use.
C. Do not begin installation until unacceptable conditions are corrected.

3.2 INSTALLATION

A. Install benches in accordance with manufacturer's instructions at locations indicated on the Drawings.
B. Install benches level.
C. Anchor benches securely in place.

3.3 ADJUSTING

A. Finish Damage: Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Architect.
B. Component Damage: Remove and replace damaged components that cannot be successfully repaired as determined by Architect.

3.4 CLEANING

A. Clean benches promptly after installation in accordance with manufacturer's instructions.
B. Do not use harsh cleaning materials or methods that could damage finish.

3.5 PROTECTION

A. Protect installed benches to ensure that, except for normal weathering, benches will be without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 129300 (02870)
SITE FURNISHINGS

PART 1 GENERAL
Model: PT-2

1.1 DESCRIPTION
- A. Section includes information, materials, and options for products manufactured by Victor Stanley, Inc. All specifications are subject to change. Contact manufacturer for details.

1.2 SUBMITTALS
- A. Specifications Drawing: Detail drawing of product including overall dimensions and options.
- B. Samples: Various component samples available upon request.
- C. Qualifications: Installer must submit evidence of a successful installation history with comparable materials and designs specified.

1.3 DELIVERY, STORAGE, and HANDLING
- A. Delivery: Deliver products to site in manufacturer's original, unopened containers and packaging. Upon delivery, examine packages immediately to ensure all products are complete and undamaged.
- B. Storage: Store products in a protected, dry area in manufacturer's unopened containers and packaging.
- C. Handling: Protect product's finish from damage during handling and installation.

1.4 COORDINATION
- A. Coordinate with site work and other appropriate sections of the specifications to maintain proper provisions of the work specified.
- B. All site furnishings shall be laid out in the field and approved prior to installation.

PART 2 PRODUCTS

2.1 MANUFACTURER
- A. Victor Stanley, Inc.
  P.O. Drawer 330
  Dunkirk, MD 20754 USA
  Toll Free: (800) 368-2573 (USA & Canada)
  Tel: (301) 855-8300 Fax: (410) 257-7579
  E-mail: sales@victorstanley.com
  Web site: http://www.victorstanley.com

2.2 TABLE WITH SEATS
- A. Type: PT-2 from the Parsons Series

2.3 MATERIALS

A. 3" x 4" (64mm x 89mm) slats; 3" (76mm) O.D. tubular steel end frames

2.4 OPTIONS

A. Standard table size: 6ft (1.8 meters)
B. Table top: Umbrella Hole and Gameboard (Checkerboard)
C. Slats: Ipe and Philippine mahogany
D. Slat sizes:
    a. Wood: 3" x 4" (64mm x 89mm)
E. Standard colors: VS Bronze, VS Black, VS Green, VS Tavern Square Green, VS Teal, VS Blue, VS Burgundy, VS Red, VS White, VS Gray (custom colors available, including the RAL range.)
F. Mounting: Standard freestanding

2.5 FINISHES

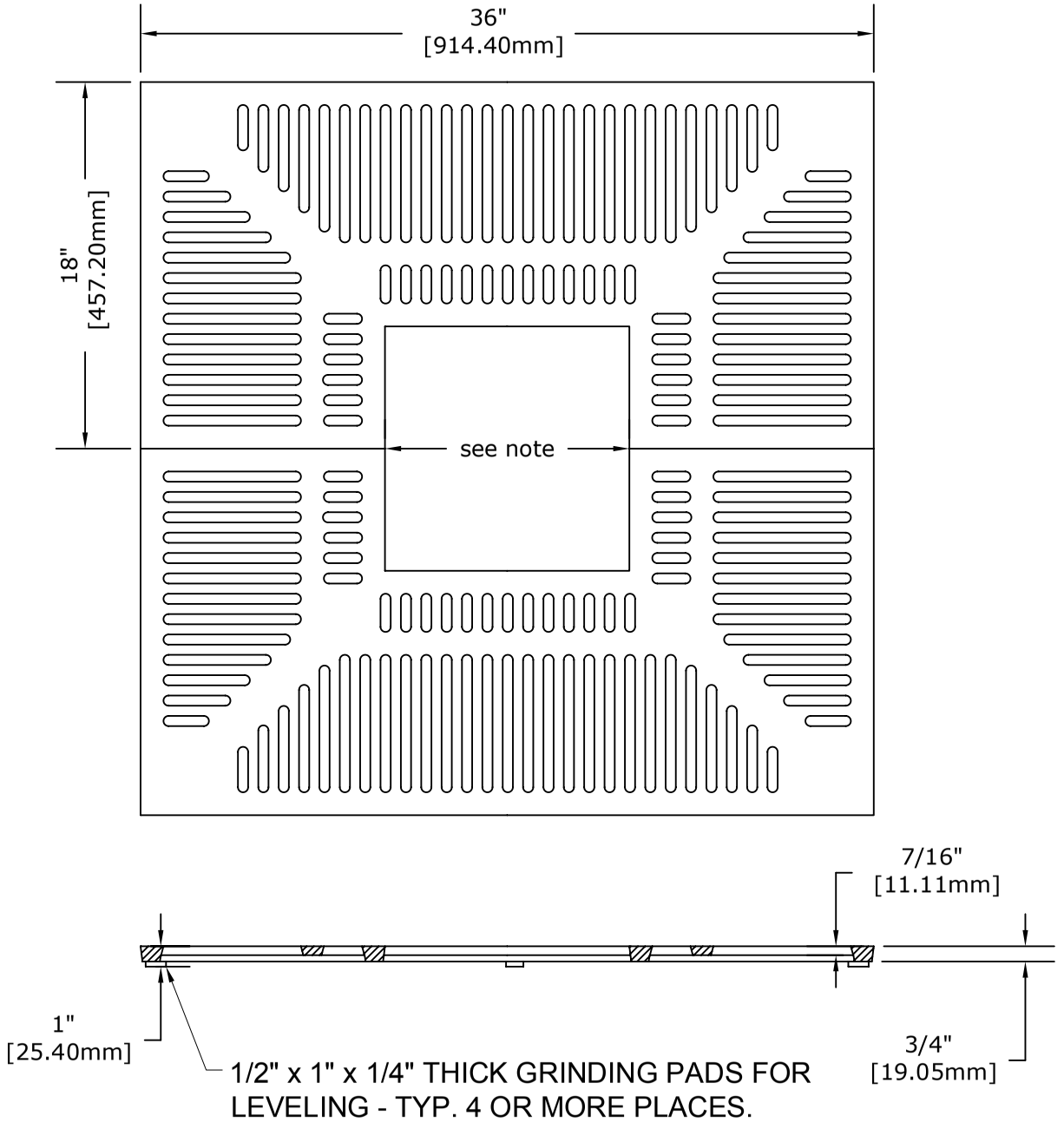
A. All fabricated metal components are steel shotblasted, etched, phosphatized, preheated, and electrostatically powder-coated with TGIC polyester powder coatings. Products are fully cleaned and pretreated, preheated and coated while hot to fill crevices and build coating film. Coated parts are fully cured to coating manufacturer's specifications. The thickness of the resulting finish coat averages 8-10 mils (200-250 microns).
B. In high salt abusive climates, hot-dip galvanizing before powder coating is available. Hot-dip galvanizing is performed for Victor Stanley, Inc. by an experienced qualified firm to which products are shipped for galvanizing. Hot-dip galvanizing includes an aggressive pre-treatment and immersion in a tank of charged liquid zinc at or around 860°F (460°C). The resulting surface is resistant to rust but has some unevenness resulting from the bonding of the zinc to the steel surface. As a result, the powder-coating surface finish over that galvanized surface may exhibit bumps, unevenness, and may not be as smooth as Victor Stanley, Inc.'s standard finish; this uneven and inconsistent finish is normal for hot-dip galvanizing. Most fabricated metal components and castings can be hot-dip galvanized, please contact manufacturer for details.

PART 3 EXECUTION

3.1 PROTECTION

A. Protect products prior to installation by having them remain in the manufacturer's packaging and container.

P.O. Drawer 330, Dunkirk, MD 20754 1.800.368.2573 (USA + Canada) TEL 301.855.8300 FAX 410.257.7579 VICTORSTANLEY.COM



3622
ADA TREE GRATE

36" x 36" tree grate in two sections.

1/2 Maximum slot opening for pedestrian safety and A.D.A Compliance.

Cast from 100% recycled Iron, Aluminum,or Bronze for pedestrian loads only.

Tree opening: 12",18" Grates can be ordered with or later expanded to these openings. please specify when ordering.

Finish: unfinished or
Black dip or
Enamel paint or
Polyurethane Paint or
Powder coat
Specify finish and color

Use frame models: 3600F

Weight:
Iron= 114lb/ 52 Kg
Aluminum=38 lb/17 Kg

This drawing embodies a confidential proprietary design of IRONSMITH,INC. Palm Desert,Ca. All design, manufactuing ,reproduction ,use, sale, and other rights regarding the same are expressly reserved. This drawing is submitted under confidential relationship for a specific purpose and the recipient agrees by accepting this drawing not to supply or disclose any information regarding it to any unauthorized person or to incorporate any special feature peculiar to this design in other projects. The information in this drawing may be covered completely or in part by partents pending.

IRONSMITH
41-701 Corporate Way #3
Palm Desert, CA 92260
800.338.4766

4□10 Garbage Shed

Call Toll-Free: (866) 297-3760

Originally designed as a garbage shed strong enough to withstand the pesky critters that frequent our area, this little building is practical for many uses. The two sets of double doors allow for easy access making it effortless to separate your garbage and recycling. Use this little shed as a great storage area for bycicles or small yard tools.

Hand made in Vermont, from native rough sawn hemlock and pine lumber, this cottage is delivered fully assembled to your prepared site. Rugged post and beam techniques, passed down through the centuries, are used to construct this sturdy picturesque retreat, reminiscent of old New England. Have your own Vermont cabin in the woods□

All of our wood sheds, storage sheds, outdoor storage sheds, garden sheds, storage shed kits, cottages and utility enclosures are built of the finest Vermont lumber and handcrafted for long life and durability. New England weather can really put a wood garden shed or cottage to the test, and Jamaica Cottage Shop's products have proven to stand the test of time and strength.

Included in the kit: □All Fastening Hardware
□Step-by-Step Plans

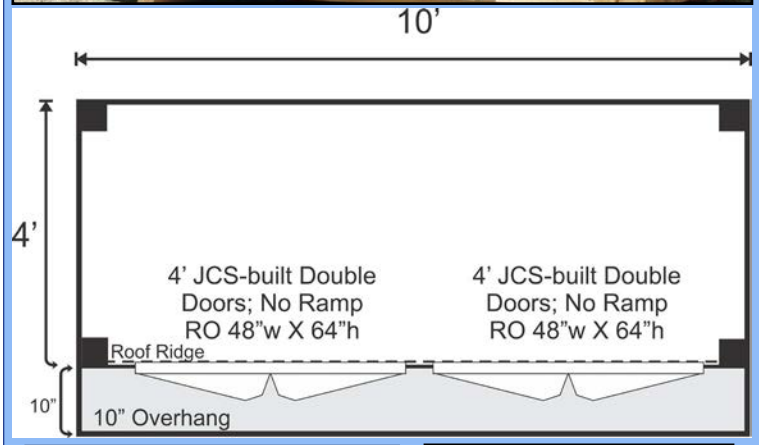
Specifications:

Square Footage: 40 Square Feet
Overall dimensions: 10' 9" wide x 6'5" long x 8'6" high
Recommended Foundation: 3" □4" Crushed Gravel
Floor: Two 4x6x10' Hemlock Skids
2x6 rough sawn Hemlock Joists□24" on center
1" rough sawn Hemlock Board Flooring
Walls: 4x4 Post & Beam Wall Framing
80" Front Wall Height□ 50" Rear Wall Height
Doors: Two Sets of 4'-0" JCS-built Pine Double Doors
no windows, no ramps
Roof: 2x6 rough sawn Hemlock Rafters□24" on Center
8/12 Saltbox Roof Pitch
1" rough sawn Hemlock Roof Strapping□20" on Center
10" Front Overhang
Corrugated Metal Roofing; 29 gauge: Evergreen
Siding: 1" rough sawn Pine Board & Batten Siding
1" rough sawn Pine Trim Includes Fascia, Shadow, Corner, Door & Window Trim
Kit Weight: 2,000 lbs
Pallet Si□e: 42"x42"x120" **Assembly Time:** 20 hours

Fully Assembled □3,453

Fully assembled from native rough sawn lumber here at our manufacturing facility, this design is delivered to your client prepared, truck accessible site in one piece. The building is set and leveled by our delivery crew and ready to use when we leave your site. Due to road restrictions, fully assembled models are available in the northeastern United States only. Customizable using our Option Pricing on our website.









Additional Options

Roof Color Change □50.00

Plans □50.00

Jamaica Cottage Shop, Inc. engineered the plans for our designs to do-it-yourself homeowners. The detailed plans include foundation options, a shopping list, and a color coded cut list. The trigonometry of the roof triangles has all been simplified with tracing the cut out roof templates. The plans are set for full dimensional lumber and provide a clear step-by-step path.

Pre-Cut Kit □3,453

The rough sawn native Vermont lumber package has all the pieces cut and ready for assembly. The fasteners, hardware, windows, and doors are included as well as the step by step plans. The kit is geared to a do-it-yourself homeowner with beginner knowledge of carpentry.

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4□8 Saltbo□

Call Toll-Free: (866) 297-3760

Deep enough to step inside, this cottage will house garbage, recyclables, general storage or a hobby. With some organization bicycles could be hung, shelving and hooks added for additional storage. A ramp is included if you want it, push mowers will roll right in.

Hand made in Vermont, from native rough sawn hemlock and pine lumber, this cottage is delivered fully assembled to your prepared site. Rugged post and beam techniques, passed down through the centuries, are used to construct this sturdy picturesque retreat, reminiscent of old New England. Have your own Vermont cabin in the woods□

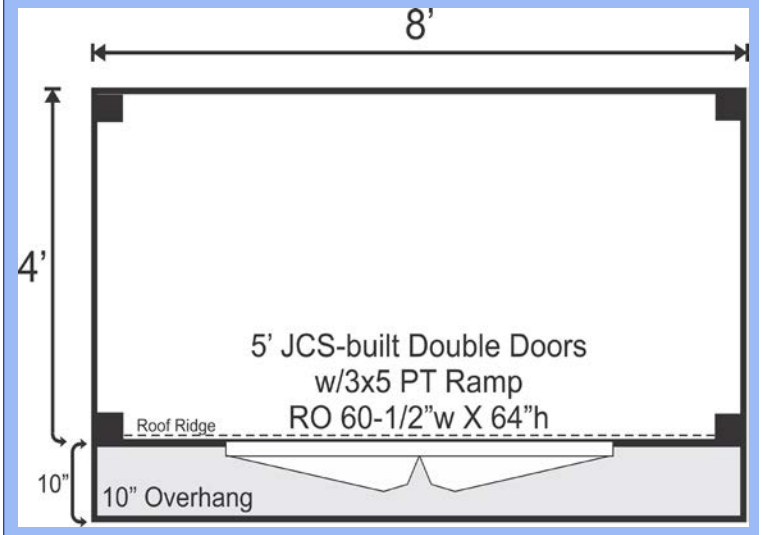
All of our wood sheds, storage sheds, outdoor storage sheds, garden sheds, storage shed kits, cottages and utility enclosures are built of the finest Vermont lumber and handcrafted for long life and durability. New England weather can really put a wood garden shed or cottage to the test, and Jamaica Cottage Shop's products have proven to stand the test of time and strength.

Specifications:

Square Footage: 24 sq/ft
Overall dimensions: 8'9" W x 6'6" D x 8'6" H
Recommended Foundation: 3" □4" Crushed Gravel
Floor: Two 4x6x8' Hemlock Skids
2x4 rough sawn Hemlock Joists□24" on Center
3/4" CD□ Plywood Floor Decking
Walls: 4x4 Post & Beam Wall Framing
80" Front Wall Height□48" Rear Wall Height
Doors: Double 5'-0" JCS-built Pine Doors with a 3x5 Pressure Treated Ramp
Roof: 2x4 rough sawn Hemlock Rafters□24" on center
8/12 Gable Roof Pitch
1" rough sawn Hemlock Strapping□20" on center
Corrugated Metal Roofing; 29 gauge: Evergreen
Siding: 1" rough sawn Pine Board & Batten Siding
1" rough sawn Pine Trim includes Fascia, Shadow, Corner and Door Trim

Overall Weight: 1300 lbs





Roof Color Change **□50.00**

Plans **□50.00**

Jamaica Cottage Shop, Inc. engineered the plans for our designs to do-it-yourself homeowners. The detailed plans include foundation options, a shopping list, and a color coded cut list. The trigonometry of the roof triangles has all been simplified with tracing the cut out roof templates. The plans are set for full dimensional lumber and provide a clear step-by-step path.

Fully Assembled **□2,501**

Fully assembled from native rough sawn lumber here at our manufacturing facility, this design is delivered to your client prepared, truck accessible site in one piece. The building is set and leveled by our delivery crew and ready to use when we leave your site. Due to road restrictions, fully assembled models are available in the northeastern United States only.

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SECTION 02810

IRRIGATION SYSTEM

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. Include GENERAL CONDITIONS and applicable parts of Division 1 as part of this Section.

B. Coordinate work of this Section with new and existing underground utilities and with trades responsible for their installation. Refer to respective drawings pertaining to other work.

1.02 WORK TO BE DONE

A. Work to be done includes furnishing labor, materials, equipment and services required to complete irrigation work indicated on the drawings, as specified herein, or both.

B. The mechanical point of connection for the irrigation system shall be connection to the cistern. (See Irrigation Water Supply Specifications 02812)

C. The electrical point of connection for the irrigation system shall be to a 120-volt, 20-amp building electrical circuit provided.

D. The drawings and specifications must be interpreted and are intended to complement each other. Furnish and install all parts, which may be required by the drawings and omitted by the specifications, or vice versa, just as though required by both. Should there appear to be discrepancies or question of intent, the matter shall be referred to the Owner's Representative for decision, and his interpretation shall be final, conclusive and binding.

E. Necessary changes to the drawings to avoid obstacles shall be made with the approval of the Owner's Representative.

F. Trench excavation, backfilling and bedding materials, together with the testing of the completed installation shall be included in this work.

G. The Work shall be constructed and finished in every respect in a good, workmanlike and substantial manner, to the full intent and meaning of the drawings and specifications. Parts necessary for the proper and complete execution of the Work, whether the same may have been specifically mentioned or not, or indicated on the drawings, shall be done or furnished in a manner corresponding with the rest of the work as if the same were specifically herein described.

H. Record drawing as well as Operating & Maintenance Manual generation, in accordance to these specifications shall also be included in this work.

1.03 SCOPE

A. The irrigation system shown on the drawings and described within these specifications represents a single controller, turf and landscape, and athletic field irrigation system supplied from potable water. The system is designed for 75 gallons per minute. Minimum 75-psi dynamic pressure at full system flow is required from the irrigation point of connection.

1.04 RELATED WORK

A. Carefully examine the Contract Documents for requirements that affect the Work of this Section.

1. Grading Section - 02310.

2. Excavating and Backfilling for Utilities - Section 02320.

3. Planting - Section 02900

4. Electrical Power Supply - Division 16.

1.05 ORDINANCES, PERMITS AND FEES

A. The Work under this Section shall comply with ordinances and regulations of authorities having jurisdiction.

B. Permits, tests, and certifications required for the execution of Work under this Section shall be obtained and paid for.

C. Furnish copies of Permits, Certifications and Approval Notices to the Owner's Representative prior to requesting payment.

D. Include in the bid charges by the Water Department, Utility Company, or other authorities for work done by them.

1.06 EXAMINATION OF CONDITIONS

A. Be fully informed of existing conditions on the site before submitting bid, and be fully responsible for carrying out work required to fully and properly execute the work of the Contract, regardless of the conditions encountered in the actual Work. No claim for extra compensation or extension of time will be allowed on account of actual conditions inconsistent with those assumed, except those conditions described in the GENERAL CONDITIONS.

1.07 QUALITY ASSURANCE

A. Installer: A firm which has at least five (5) years' experience in work of the type and size required by this Section and which is acceptable to the Owner's Representative.

B. References: Supply three references for work of this type and size with the bid including names and phone numbers of contact person(s).

C. Applicable requirements of accepted Standards and Codes shall apply to the Work of this Section and shall be so labeled or listed:

1. American Society for Testing & Materials (ASTM)

a. ASTM: D1784 Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.

b. ASTM: D1785 Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and Cl200.

c. ASTM: D2464 Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.

d. ASTM: D2466 Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.

e. ASTM: D2564 Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.

f. ASTM: F477 Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

g. ASTM: D2737-99 Polyethylene (PE) Pressure rated tube.

2. National Standard Plumbing Code (NSPC)

3. National Electric Code (NEC)

4. National Sanitary Foundation (NSF)

5. American Society of Agricultural and Biological Engineers (ASABE)

6. Underwriters Laboratories, Inc. (UL)

7. Occupational Safety and Health Administration (OSHA)

8. American Society of Irrigation Consultants (ASIC)

1.08 TESTS

A. Observation: Owner’s Representative will be on site at various times to insure the system is being installed according to the specifications and drawings.

B. Coverage Test: After completion of the system, test the operation of entire system and adjust sprinklers and drip tubing as directed by the Owner's Representative. Demonstrate to the Owner's Representative that irrigated areas are being adequately covered. Furnish and install materials required to correct inadequacies of coverage due to deviations from the drawings or where the system is obviously inadequate or inappropriate. (See Part 3 - Execution).

C. The Owner’s Representative shall be notified 7 days in advance for observations.

1.09 SHOP DRAWINGS

A. Provide copies of product specification sheets on proposed equipment to be installed to the Owner's Representative for approval prior to the start of work, in accordance with the parameters of Division-1. Work on the irrigation system may not commence until product sheets are submitted and approved. Submittals shall be marked up to show proper nozzles, sizes, flows, etc. Equipment to be included, but not limited to:

1. Sprinklers
2. Deep Drip Tree Stakes
3. Valves: Manual and Automatic
4. Controller
5. Valve Boxes
6. Pipe and Fittings
7. Wire and Connectors
8. Quick Coupling Valves
9. Rain Sensor
10. Decoders
11. Surge Arrestors
12. Grounding Equipment

B. Project Record Documents:

1. Provide and keep up-to-date a complete redlined record set of drawings of the system as the project proceeds. Drawings shall be corrected daily, showing every change from the original drawings and specifications. Record drawings shall specify and exactly locate sprinkler type; pop up height and nozzle for each sprinkler installed. Each valve box location to be referenced by distance from a minimum of two permanent locations. Controller, decoders, isolation valves, rain sensor, flushing valves, quick coupling valves, hose bibs, back flow prevention device and other equipment shall be indicated on the drawings. Wire routing, wire size and splices shall be indicated. Mainline pipe and wire route shall have two (2) distinctly different graphic symbols (line types). This redlined record set of drawings shall be kept at job site and shall be used only as a record set.

2. Make neat and legible notations on this record set of drawings daily as the Work proceeds, showing the Work as actually installed. For example, should a piece of equipment be installed in a location that does not match the plan, indicate that equipment in a graphic manner in the location of installation and so as to match the original symbols as indicated in the irrigation legend. Should the equipment be different from that specified, indicate with a new graphic symbol both on the drawings and the irrigation legend. The relocated equipment dimensions and northing and easting coordinates should then be transferred to the appropriate drawing in this record set of drawings at the proper time.

3. On or before the date of final field observation, deliver corrected and completed AutoCAD computer plots of "record drawings" on vellum and AutoCAD electronic files on disk to Owner's Representative as part of contract closeout. Delivery of plots will not relieve the responsibility of furnishing required information that may have been omitted from the prints.

1.10 DELIVERY, STORAGE AND HANDLING

A. Store and handle materials in compliance with manufacturer instructions and recommendations. Protect from possible damage. Minimize on-site storage.

1.11 GUARANTEE

A. Obtain in the Owner's name the standard written manufacturer's guarantee of materials furnished under this Section where such guarantees are offered in the manufacturer's published product data. Guarantees shall be in addition to, and not in lieu of, other liabilities that the Contractor performing the work under contract may have by law.

B. In addition to the manufacturer's guarantees the entire irrigation system shall be warrantied, both parts and labor for a period of one (1) year from the date of acceptance by the Owner.

C. As part of the one-year warranty the first year-end winterization and spring start-up for the irrigation system shall be performed.

D. Should problems develop within the warranty period because of inferior or faulty materials or workmanship, they shall be corrected to the satisfaction of the Owner's Representative at no additional expense to the Owner.

E. A written warranty showing date of completion and period of warranty shall be supplied upon completion of the project.

1.12 COORDINATION

A. Work shall be coordinated closely with the Owner's Representative to avoid misunderstandings and to efficiently bring the project to completion. Owner's Representative shall be notified as to the start of work, progression and completion, as well as changes to the drawings before the change is made. Coordinate work with those of other trades.

B. Be responsible and pay for damage to other work caused by work or workmen. Repairing of such damage shall be done by the Company who installed the work as directed by the Owner's Representative.

1.13 MAINTENANCE AND OPERATING INSTRUCTIONS

A. Include in Bid an allowance for four (4) hours of instruction of Owner and/or Owner's personnel upon completion of check/test/start-up/adjust operations by a competent operator (Owner's Representative office shall be notified at least one (1) week in advance of check/test/start-up/adjust operations).

B. Upon completion of work and prior to application for acceptance and final payment, a minimum of three (3) three ring, hard cover binders titled MAINTENANCE AND OPERATING INSTRUCTIONS FOR THE LINCOLN PARK IRRIGATION SYSTEM, shall be submitted to the Owner's Representative office. After review and approval, the copies will be forwarded to the Owner. Included in the Maintenance and Operating binders shall be:

1. Table of Contents

2. Written description of Irrigation System.

3. System drawings:

a. One (1) copy of the original irrigation plan;

b. One (1) copy of the Record Drawing;

c. One (1) reproducible of the Record Drawing;

d. One (1) copy of the controller valve system wiring diagram

4. Listing of Manufacturers.

5. Manufacturers' data where multiple model, type and size listings are included; clearly and conspicuously indicating those that are pertinent to this installation.

a. "APPROVED" submittals of irrigation equipment;

b. Operation:

c. Maintenance: including complete troubleshooting charts.

d. Parts list.

e. Names, addresses and telephone numbers of recommended repair and service companies.

6. A copy of the suggested "System Operating Schedule" which shall call out the controller program required (zone run time in minutes per day and days per week) in order to provide the desired amount of water to each area under "no-rain" conditions.

7. Winterization and spring start-up procedures.

8. Guarantee data.

1.14 PROCEDURE

A. Notify city departments and/or public utility owners concerned, of the time and location of work that may affect them. Cooperate and coordinate with them in the protection and/or repairs of utilities.

B. Provide and install temporary support, adequate protection and maintenance of structures, drains, sewers, and other obstructions encountered. Where grade or alignment is obstructed, the obstruction shall be permanently supported, relocated, removed or reconstructed as directed by the Owner's Representative.

PART 2 - PRODUCTS

2.01 GENERAL

A. Materials to be incorporated in this system shall be new and without flaws or defects and of quality and performance as specified and meeting the requirements of the system. All material overages at the completion of the installation shall be removed from the site.

B. No material substitutions from the irrigation products described in these specifications and shown on the drawings shall be made without prior approval and acceptance from the Owner's Representative.

2.02 PVC IRRIGATION PIPE

A. Pipe shall bear the following markings: Manufacturer's name, nominal pipe size, schedule or class, pressure rating in psi, and date of extrusion.

B. Reclaimed water piping shall be purple color pigmented PVC pipe with the words "Reclaimed Water" stenciled thereon. Pipe size and type shall be as indicated on drawings or specified.

C. In lieu of purple pipe, a 6-inch wide, purple color strip of adhesive tape may be affixed to the pipe. The strip tape shall be printed with the following message in yellow "Reclaimed Water".

D. Pipe in sizes 2-1/2 inches and smaller shall be PVC, Class 200, Type 1120, SDR 21, Solvent-Weld PVC, conforming to ASTM No. D2241 as manufactured by Certainteed, Caresline, JM Eagle or equal.

E. Pipe in sizes 3 inches shall be PVC, Class 200, Type 1120, SDR 21, Gasket-Joint PVC, conforming to ASTM No. D178 as manufactured by Certainteed, Cresline, JM Eagle or equal.

F. The pipe insertion mark shall be visible to show the proper depth into spigot.

2.03 MARKING TAPE

A. Reclaimed water marking tape shall be six inches wide, magnetic/traceable, purple in color with "CAUTION, RECLAIMED WATER MAIN BURIED BELOW" message printed in yellow, manufactured by Line Guard Corp, Christy's, or approved equal.

B. Marking tape shall be provided and installed 12-inches above center line of buried reclaimed water pipe.

2.04 PVC PIPE SLEEVES

A. Pipe sleeves beneath non-soil areas shall be minimum PVC, Class 160 water pipe as manufactured by Certainteed, Cresline, JM Eagle or equal. Minimum sleeve size to be 3-inch.

2.05 WIRE CONDUIT

A. Conduit for wiring beneath non-soil areas shall be PVC, SCH-40 conduit with solvent-weld joints, as manufactured by Cresline, Carson, JMM or equal.

B. Communication wire and cable shall be installed within a schedule 40 1-inch PVC conduit with solvent welded joints a minimum of 18-inches below grade. Provide 6-inch minimum separation between communication cable conduit and irrigation pressure mainline piping. If communication cable is not installed under this contract, install a 1/4-inch nylon pull rope within entire length of conduit.

C. Sweep ells shall be standard electrical type PVC schedule 40 long sweep elbows.

D. Above ground wiring to rain sensor or controller shall be schedule 40 PVC conduit.

2.06 PVC IRRIGATION FITTINGS

A. Fittings for solvent weld PVC pipe, 2-1/2 inch and smaller in size, shall be Schedule 40 solvent weld PVC fittings as manufactured by Dura, Lasco, Spears, or equal.

B. Fittings shall bear manufacturer's name or trademark, material designation, size, and applicable I.P.S. schedule.

C. PVC threaded connections in and out of valves shall be made using Schedule 80 toe nipples and Schedule 40 couplers or socket fittings. Schedule 40 threads will not be approved for installation.

D. PVC solvent shall be NSF approved, for Type I and Type II PVC pipe, and Schedule 40 and 80 fittings. Cement shall be medium not fast or hot, no wet and dry. Cement is to meet ASTM D2564 and FF493 for potable water pipes. PVC solvent cement shall be Rectorseal Gold, IPS Weld-ON 711, Oatey Heavy Duty Cement or equal, and shall be used in conjunction with the appropriate primer. Primer shall be NSF approved, and formulated for PVC and CPVC pipe applications. Primer is to meet ASTM F 656. Primer shall be Rectorseal Jim PR-2, IPS Weld-ON P-70, Oatey Primer for PVC and CPVC, or equal. Clear primers shall not be allowed.

E. Fittings for PVC mainline pipe, for directional changes, pipe reductions and plugs 3-inches in size shall be deep bell push-on gasket joint ductile iron fittings for PVC pipe. Fittings shall be manufactured of ductile iron, grade 70-55-05 in accord with ASTM A536 and gaskets shall meet ASTM F477. Fittings shall be as manufactured

by Harrington Corporation, or equal. For mainline pipe to zone valve / lateral pipe connections, Harco or equal push-on gasket joint ductile iron service tees shall be used. Saddles, (strap, bolt down or snap) will not be approved for installation.

F. Nipples to be schedule 80 PVC.

2.07 POLYETHYLENE IRRIGATION PIPE

A. Polyethylene piping shall be HDPE IPS polyethylene piping; CP Chem or approved equal, SDR 11, PE 4710, 200 psi rated. Pipe shall also meet the requirements of ASTM F714, D3261 and D3350. Polyethylene pipe shall not be furnished in lengths more than 50 feet. Coiled pipe shall not be accepted in sizes 1-1/2 inch or smaller without the pipe being installed after being run through a rounder.

2.08 POLYETHYLENE IRRIGATION FITTINGS

A. Polyethylene piping shall be joined by butt fusion method using personnel experienced in the procedure.

B. Except for transition IPS threaded fittings, all other connections shall be made of butt fused HDPE. Drip tree rings shall connect using 1-inch HDPE IPS transition fittings with schedule 80 threaded couplers and schedule 80 threaded reducer bushings.

C. All HDPE fittings shall be PE4710, SDR 11 200 psi rated IPS molded fittings, meeting the requirements of ASTM D3261, and pressure rated for 200 PSI.

D. Molded fittings shall be used. PE4710 molded tees shall be used, and if reduction is required, PE4710 concentric reducer(s) shall be fused to the tee. Fittings shall be pressure rated at a minimum of 200 psi and IPS sized.

2.09 SPRAY SPRINKLERS

A. Full and part circle pop up spray sprinklers shall be pressure regulating (30-psi), plastic construction with ratcheting riser, removable nozzle and check valve. Nozzle size shall be as indicated on the drawing and in the legend. Pop-up height shall be 6 inches for turf and 12 inches for the rain gardens.

B. Sprinkler shall carry a minimum 3-year exchange warranty against defects. Sprinklers shall be manufactured by Rain Bird, model 1800-SAM-PRS, Hunter Industries, model PRO30-CV or approved equal.

2.10 MP ROTATOR SPRINKLERS

A. Full and part circle pop up spray sprinklers with multi-stream rotary nozzles shall be pressure regulating (40-psi), plastic construction with ratcheting riser, removable

nozzle and check valve. Nozzle size shall be as indicated on the drawing and in the legend. Pop-up height shall be 6 inches for turf.

B. Multi-stream rotary nozzles shall be manufactured by Hunter Industries, model MPCORNER for angles less than 90 degrees, MP1000 for 8-12 foot spacing, MP2000 for 15-20 foot spacing, MP3000 for 25-30 foot spacing and MPLCS515, MPRCS515 and MPSS530 for 4-6 foot strips.

C. Sprinkler shall carry a minimum 3-year exchange warranty against defects. Sprinklers shall be manufactured by Hunter Industries model PROS-XX-PRS40-CV, Rain Bird model 1800-SAM-PRS-P45 or approved equal.

2.11 SMALL/MEDIUM ROTARY SPRINKLERS

A. Small/medium rotary sprinklers shall be gear-driven, rotary type sprinklers, designed for in-ground installation with integral check valves and in-riser flow shut-off capability. Sprinkler shall be capable of covering a 25-44 foot radius and flow range of 0.9-7.0 gpm at 50-55 pounds per square inch of pressure. Sprinklers shall have a one hundred percent warranty for two years minimum against defects in workmanship.

B. The nozzle assembly shall elevate minimum four inches when in operation and retraction shall be achieved by a stainless steel spring. Riser assembly shall be plastic. A nozzle wiper seal shall be included in the sprinkler for continuous operation under the presence of sand and other foreign material.

C. Sprinkler parts shall be removable through the top of the unit through the removal of a heavy-duty threaded cap. The sprinkler shall have a three quarter-inch (3/4") IPS water connection on the bottom of the sprinkler.

D. Sprinklers shall be manufactured by Rain Bird model 5004-PL-SAM, Hunter Industries model I20-04 or approved equal.

E. Approved Performance Chart (25’ Spacing):

Model	Pressure	Arc	Nozzle	Flow	Radius
Rain Bird 5004-PL-SAM	45psi	90 Deg.	MPR 25Q	1.00	26’
Rain Bird 5004-PL-SAM	45psi	180 Deg.	MPR 25H	1.98	27’
Rain Bird 5004-PL-SAM	45psi	360 Deg.	MPR 25F	3.82	31’

Hunter I20-04	50psi	90 Deg.	.75SR	0.75	25’
Hunter I20-04	50psi	180 Deg.	1.5SR	1.5	25’
Hunter I20-04	50psi	360 Deg.	3.0SR	3.0	25’

F. Approved Performance Chart (35’ Spacing):

Model	**Pressure**	**Arc**	**Nozzle**	**Flow**	**Radius**
Rain Bird 5004-PL-SAM	55psi	90 Deg.	1.5	1.71	35’
Rain Bird 5004-PL-SAM	55psi	180 Deg.	3.0	3.47	40’
Rain Bird 5004-PL-SAM	55psi	360 Deg.	6.0	6.63	47’
Hunter I20-ADV	50psi	90 Deg.	2.0	2.0	38’
Hunter I20-ADV	50psi	180 Deg.	4.0	4.2	41’
Hunter I20-36V	50psi	360 Deg.	8.0	6.8	44’

G. Approved Performance Chart (45’ Spacing):

Model	**Pressure**	**Arc**	**Nozzle**	**Flow**	**Radius**
Rain Bird 5004-PL-SAM	55psi	90 Deg.	4.0	4.15	42’
Rain Bird 5004-PL-SAM	55psi	180/360 Deg.	8.0	8.31	47’
Hunter I20-04	55psi	90 Deg.	4.0	4.5	41’
Hunter I20-04	55psi	180/360 Deg.	8.0	9.0	46’

2.12 LARGE ROTARY SPRINKLERS

A. Large rotary sprinklers shall be gear-driven, rotary type with drain check valve and stainless steel riser designed for in-ground installation. The nozzle assembly shall elevate three inches when in operation and retraction shall be achieved by a stainless steel spring. Check valve shall be capable of holding up to 10 feet of elevation. Sprinkler shall be capable of covering a 49-61 foot radius and flow range of 7.5 to 23.5 gpm at 60 pounds per square inch of pressure.

B. Sprinkler parts shall be removable through the top of the unit by removing a heavy-duty threaded cap. The sprinkler shall have a one- inch (1") IPS water connection on the bottom of the sprinkler.

C. Sprinklers shall be manufactured by Hunter Industries model I25-04-SS, Rain Bird model 8005-SS or approved equal.

D. Approved Performance Chart (45' Spacing):

Model	Pressure	Arc	Nozzle	Flow	Radius
Rain Bird 8005-SS	60psi	90 Deg.	6	6.1	45'
Rain Bird 8005-SS	60psi	180/360 Deg.	8	8.4	49'
Hunter I25-04-SS	60psi	90 Deg.	5	5.3	45'
Hunter I25-04-SS	60psi	180/360 Deg.	8	9.2	50'

E. Approved Performance Chart (50' Spacing):

Model	Pressure	Arc	Nozzle	Flow	Radius
Rain Bird 8005-SS	60psi	90 Deg.	6	6.1	45'
Rain Bird 8005-SS	60psi	180/360 Deg.	10	10.1	53'
Hunter I25-04-SS	60psi	90 Deg.	7	7.5	48'
Hunter I25-04-SS	60psi	180/360 Deg.	13	12.3	54'

F. Approved Performance Chart (55’ Spacing):

Model	Pressure	Arc	Nozzle	Flow	Radius
Rain Bird 8005-SS	60psi	90 Deg.	8	8.4	49’
Rain Bird 8005-SS	60psi	180/360 Deg.	12	12.0	59’
Hunter I25-04-SS	60psi	90 Deg.	8	9.2	50’
Hunter I25-04-SS	60psi	180/360 Deg.	18	15.7	59’

G. Approved Performance Chart (60’ Spacing):

Model	Pressure	Arc	Nozzle	Flow	Radius
Rain Bird 8005-SS	60psi	90 Deg.	12	12.0	59’
Rain Bird 8005-SS	60psi	180/360 Deg.	16	15.9	65’
Hunter I25-04-SS	60psi	90 Deg.	15	14.3	57’
Hunter I25-04-SS	60psi	180/360 Deg.	25	23.5	66’

2.13 ELECTRIC CONTROL VALVES

A. Electric control valves shall be one, one and one half and two-inch remote control, diaphragm type, fiberglass or reinforced nylon body plastic valves with manual flow control, manual bleed screw and 200 psi pressure rating.

B. Valves shall be manufactured by Rain Bird model PEB, Hunter Industries model ICV or approved equal.

2.14 IDENTIFICATION TAGS

A. Valves regardless of type, shall have reclaimed water ID tags attached. ID tags shall be manufactured from Polyurethane Behr Desopan. Tags shall be hot- stamped with black letters on purple background. Tags shall read “Warning- Reclaimed Water-

Do Not Drink." Tag shall be printed in English and Spanish on one side. Provide one tag for each quick coupling valve and for each electric valve.

B. Use one maxi size tag for electric control valve. Each tag shall provide valve ID information on one side and reclaimed water information on the other side.

C. Each electric control valve tag shall include CCU, field satellite and field satellite number.

D. Tags shall be as manufactured by T. Christy Enterprises or approved equal.

2.15 VALVE BOXES

A. All valve boxes shall be manufactured from unformed resin with a tensile strength of 3,100-5,500 psi conforming to ASTM D638. All boxes shall be green or black in color.

B. Valve boxes for flushing valves on drip zones shall be 6-inch round valve boxes with metal detection.

C. Valve boxes for single 1 inch and 1-1/2 inch electric valves, isolation valves and quick coupling valves, and hose bibs shall be 10-inch round valve boxes with metal detection, t-tops, and bolt down covers

D. Valve boxes for single 2 inch and multiple electric valves shall be 12-inch standard valve boxes with metal detection, t-tops, and bolt down covers. When multiple electric valves are installed in the same area, they are to be installed two (2) 1-1/2 inch valves or up to three (3) 1 inch valves in a 12-inch standard box

E. Valve boxes for three 1 inch, three 1-1/2 inch and dual 2 inch electric valves with isolation shall be 18-inch jumbo valve boxes with metal detection, bolt down covers and t-top lids.

F. Valve boxes for wire splices shall be 10 inch round valve boxes with metal detection, bolt down covers and t-top lids. All splices shall be in separate valve boxes and not included with isolation valves.

G. Cable pull boxes or splice boxes for communication cable or sensor cables shall have bolt down covers. Valve boxes shall be 12-inch standard valve boxes. All pull or splice boxes shall be located each 200ft. on center along new communication or sensor cable conduit, at each change in direction, and each new splice.

H. Valve box extensions shall be provided and installed as required for proper box depth. Valve box extensions shall be made by the same manufacturer.

I. Valve boxes shall be manufactured by Highline Products, Olde Castle Specifications Grade, NDS Pro Series or approved equal.

2.16 AUTOMATIC CONTROLLER

A. Controller shall be electronic in construction with capability of 1 second to 6 hour run times per zone. Controllers to have minimum six independent programs, auto/off switch and be capable of manual, semi-automatic and automatic operation. Controller shall have water budgeting feature, cycle and soak feature, sensor input terminal, locking, weather resistant metal cabinet and internal transformer. Terminal strip connection shall be easily accessible. The controller shall be U.L. listed, 120 volt, 60 Hertz, A.C. type.

B. Controller shall have flow monitoring capability with compatible flow sensor connection. Controller shall be capable of automatic flow learning per station and have station level flow diagnostics and alarm shutdown.

C. Controller shall be as manufactured by Hunter Industries model ACC-99D, Rainbird ESP-LXP or approved equal.

D. Station quantity shall be minimum of 50.

2.17 DECODERS

A. Decoders shall be installed between the central controller and the electric control valves to provide the 24-volt power supply for individual valves. Each decoder shall be available in 1, 2 or 4-station devices. Decoder shall have a unique serial number and controller-assigned address to identify it in the network.

B. Decoder shall be manufactured by Rainbird FD series, Hunter Industries ICD series or approved equal.

2.18 SURGE ARRESTORS

A. The modular surge arrester shall be a single phase, two pole arrester designed to protect single or split phase 120 volt or 120/240 volt electrical systems. Electrical connections shall be embedded in a UL recognized epoxy to seal and protect them from moisture and corrosion.

B. The surge arrestor shall be molded from weather and UV resistant polycarbonate, complying with the UL Standard for flame and strength resistance.

C. Surge Arrestor shall be manufactured by Intermatic model, AG2401C, or approved equal.

D. Manufacturer’s names and/or model numbers identified herein are intended to assist in establishing a general level of quality, configuration, functionality, and appearance required. This is NOT a proprietary specification and it should be noted that “Or equal” applies to all products denoted herein. It is understood that all manufactures will have minor variations in configuration, appearance, and product

specifications and such minor variations shall not eliminate such manufacturers as an equal". It is the intent of this specification to encourage open and competitive involvement from multiple manufacturers that are able to supply similar products.

2.19 WIRE

A. All valve control wire from the decoder to the valve shall be minimum #14-awg, common #14-awg, single strand, solid copper; UL- approved direct burial AWG-U.F. 600V and shall meet all state and local codes for this service. Individual wires must be used for each zone valve. Common wire shall be white in color, control wire for spray and rotor zones shall be red in color, drip zone control wire shall be orange and spare wires, installed where indicated on the drawings shall be blue. White color shall be used for common wire only.

B. In ground wire connections shall be UL listed, manufactured by 3M, model DBR/Y-6 splice kits or equal. All wire splices shall be made in valve boxes, electrical junction boxes, at the controller or at valves. See Mechanical/Electrical/Plumbing Drawings.

C. All valve control wire from the controller to the decoder shall be through two-wire. Wiring shall be polyethylene double-jacketed or UF-B UL PVC double-jacketed two-conductor solid copper designed for direct burial systems. Wire connections shall be DBR/Y-6 or equivalent on the wire side of the decoder and shall utilize DBR/Y-6 or equivalent on the valve side. All connections shall be installed as per their manufacturers' instructions. Wire shall be manufactured by Paige Electric (maxi wire) or approved equal. Wire gauge shall be AWG #14.

D. Wire type and method of installation shall be in accordance with local codes for NEC Class II circuits of 30-volt A.C. or less.

E. All wiring shall be in strict accordance with all national, state and local electrical codes.

2.20 QUICK COUPLING VALVES

A. The valve body shall be of cast brass construction with a working pressure of 125 psi. The valve seat disc plunger body shall be spring loaded so that the valve is normally closed under all conditions when the key is not inserted.

B. The top of the valve body receiving the key shall be equipped with ACME threads and smooth face to allow the key to open and close the valve slowly. The quick coupling valve shall be equipped with a vinyl cover.

C. The valve body construction shall be such that the coupler seal washer may be removed from the top for cleaning or replacement without disassembling other parts of the valve.

D. Keys shall be ACME with 1-inch male thread and 3/4-inch female thread at the top.

E. Quick coupling valves, keys and swivels shall be manufactured by Hunter Industries, model HQ-44RC-AW, HK-44A and HS-1 or approved equal.

2.21 ISOLATION VALVES

A. Isolation valves 2-1/2 inches and smaller in size shall be gate type, of bronze construction, US Manufacture, 200 WOG with steel cross handle and 200 psi rating. Gate valves to be as manufactured by Nibco, model T-113-K, or approved equal.

B. Isolation valves 3 inches in size shall be cast iron epoxy coated inside and outside, long bell length ring-tite valves, 200 psi rated, US manufacturer, stainless steel stem, 2 inch operating nut and replaceable disc as manufactured by Waterous 500 Series, Clow 2630 Series, Kennedy Ken-Seal Series, or approved equal.

2.22 SWING JOINTS

A. Spray sprinklers and small and medium rotary sprinklers shall be installed on ¾-inch prefabricated PVC unitized swivel joint assemblies with double O-ring seals, minimum 315 psi rating and minimum length of 12 inches. Prefabricated PVC swivel joints shall be as manufactured by Lasco, model T732-212 or T732-218.

B. Large rotary sprinklers shall be installed on 1-inch prefabricated PVC unitized swing joint assemblies with double O-ring seals, minimum 315 psi rating and minimum length of 12 inches. Prefabricated PVC swing joints shall be as manufactured by Lasco, model G132-212 or G132-218.

C. Quick coupling valves to be installed on 1-inch prefabricated PVC unitized swing joint assemblies with double O-ring seals, minimum 315 psi rating and minimum length of 12 inches with brass insert and stabilizer (unless stabilizer is an integral part of the quick coupling valve). Prefabricated PVC swing joints shall be as manufactured by Dura, Lasco, or Spears.

2.23 AUTOMATIC RAIN SENSOR

A. Rain sensor shall be plastic in construction with adjustable interruption point, 1/2-inch IPS threads and stainless steel vandal resistant guard. Rain sensor shall be manufactured by Hunter Industries, model Rain-Clik or approved equal with sensor guard.

2.24 DRIP STAKE ASSEMBLIES

A. The Deep Drip Stake shall be constructed of PVC material. The Stake Tube shall have an outside diameter of 1¼" for all models. The cap material shall be made of ABS and the combination of stake tube and cap shall be able to withstand multiple strikes from a 3 lb. sledge hammer for the purpose of installing.

B. Deep Drip Stakes shall incorporate a screen filter within the unit to eliminate debris from entering the internal area of the stake. Deep Drip Stakes shall be designed so as to permit twisting of stakes after installation to dislodge root intrusion.

C. The stake cap shall have an opening to accommodate 1/8" to ¼" diameter drip or low volume distribution tubing. The internal stake tube dimensions shall be able to house a fixed or variable low volume emitter.

D. Stakes shall have a 2 GPH emitter installed in the stake. Emitter shall be as manufactured by Rain Bird, model XB-20PC.

E. Drip stake assemblies shall be manufactured by Green King, model A-DD36.

2.25 GROUNDING EQUIPMENT

A. Controller shall include factory-installed and factory-recommended lightning protection and shall be connected to a 5/8-inch diameter x 10-foot long copper clad grounding rod with minimum #6 AWG, solid, bare copper wire and 4-inch x 96-inch x 0.0625-inch copper grounding plate as outlined below. Minimum 20-foot separation between rod and plate. Minimum 12-foot separation between controller and ground rod. Connection to rod shall be with Cadweld or approved equal connector as specified. Connection to plates shall be performed by the plate manufacturer (Paige #182199L) or approved equal with 25-feet of bare copper wire already attached. Grounding rod is to be covered by a 4-inch round, grated top, plastic valve cover with metal detection and six inches of 4-inch ADS or approved equal drainage pipe. Plate shall be installed in ground enhancement material. Plate shall be covered with 4-inch plastic grated cover with detection and minimum 36 inches of 4 inch ADS or approved equal drainage pipe. Ground rod and plate shall be UL listed.

B. Controller shall be grounded to one rod and one plate. The 10-foot rod shall be installed penetrating into the soil to its full length. Plate shall be installed at a 36-inch depth with 50 lbs of Power Set or approved equal ground enhancement material spread evenly below the plate and 50 lbs spread evenly above the plate in accordance with manufacturer's requirements. The grounding electrodes shall be installed at least 10 feet from wires connected to the field controllers.

2.26 GROUNDING EQUIPMENT

A. Two-wire communication path shall be grounded at 600 foot maximum intervals, at every termination of a part of the wire path to a surge arrestor decoder where indicated on the drawings, and 50 feet from the controller. Each surge decoder shall be connected to a 5/8-inch diameter x 8-foot long copper clad grounding rod with minimum #6 AWG, solid, bare copper wire as outlined below. Minimum 8-foot separation between rod and other equipment. All connections to rods shall be with Cadweld connectors as specified. Each grounding rod is to be covered by a 4-inch

round, grated top, plastic valve cover with metal detection and six inches of 4-inch ADS drainage pipe. Ground rods and plates shall be UL listed.

2.27 CRUSHED STONE

A. Crushed stone shall be as specified in SECTION: EARTHWORK. Crushed stone shall be used under valve boxes.

2.28 SAND

A. Sand used for backfilling of trenches; under, around and over PVC lines shall be as specified in SECTION: EARTHWORK.

2.29 CONCRETE BASES AND THRUST BLOCKS

A. Standard concrete mix shall be in accordance with ASTM C150, ASTM C-33, and ASTM C-94 with a compressive strength (28 days) of 3,000 psi.

B. Bell and gasket mainline pipe and fittings shall have thrust blocks sized and placed in accordance with pipe manufacturer's recommendations for standard concrete mix. Thrust blocks shall be installed at all tees, elbows, crosses, reducers, plugs, caps and valves. Company performing the work shall be responsible to insure the stability of all thrust blocks.

C. Concrete base shall be standard concrete mix. Sizes shall be as indicated on the drawings and cited in the specifications.

2.30 SPARE PARTS

A. Supply the following tools and equipment to the Owner's Representative before final observation:

1. Two (2) wrenches or keys for disassembling and adjusting each type of sprinkler provided.

2. Two (2) quick coupler key assemblies.

3. Five (5) of each type sprinkler and pattern (PC & FC) used in the project.

4. Five (5) of each type nozzle used in the project.

5. One hundred (100) feet of drip tubing used on the project.

6. Drip air release valves, assortment of fittings, stakes, flush valves, etc.

B. Before final observation can occur, written evidence that the Owner's Representative has received the tools and equipment must be shown.

PART 3 - EXECUTION

3.01 GENERAL

A. Before work is commenced, hold a conference with the Owner's Representative to discuss general details of the work.

B. Examine contract documents applying to this Section noting discrepancies and bringing the same to the attention of the Owner's Representative for timely resolution.

C. Works indicated on drawings shall be provided whether or not specifically mentioned in the specifications.

D. If there are ambiguities between drawings and specifications, and specific interpretation or clarification is not issued prior to bidding, the interpretation or clarification will be made only by Owner's Representative, and compliance with the decisions shall be required. In the event the installation contradicts the directions given, the installation shall be corrected at no additional cost to Owner.

E. Verify dimensions and grades at job site before work is commenced. Do not proceed with installation of the irrigation system when it is apparent that obstructions or grade differences exist or if conflicts in construction details, legend or specific notes are discovered. All such obstructions, conflicts, or discrepancies shall be brought to the attention of the Owner's Representative.

F. Make field measurements necessary for the work noting the relationship of the irrigation work to the other trades. Coordinate with other trades (landscaping and other site work trades). Project shall be laid out essentially as indicated on the Irrigation Plans, making minor adjustments for variations in the planting arrangement. Major changes shall be reviewed with the Owner's Representative prior to proceeding.

G. Layout of sprinkler lines indicated on drawings is diagrammatic. Location of sprinkler equipment is contingent upon and subject to integration with all other underground utilities. Employ all data contained in the Contract Documents and verify this information at the construction site to confirm the manner by which it relates to the installation.

H. Coordinate installation of all sprinkler materials, including pipe, to avoid conflict with the trees, shrubs, or other plantings.

I. During progress of work, a competent superintendent and all assistants necessary shall be on site. All shall be satisfactory to the Owner's Representative. The superintendent shall not be changed, except with the consent of the Owner's Representative, unless that person proves unsatisfactory and ceases to be employed. Directions given to the superintendent shall be binding.

J. At all times, protect landscaping, paving, structures, walls, footings, etc. from damage. Inadvertent damage to the work of another trade shall be reported at once.

K. Replace, or repair to the satisfaction of the Owner, all existing paving disturbed during course of work. New paving shall be the same type, strength, texture, finish, and be equal in every way to removed paving.

3.02 PIPE AND FITTINGS INSTALLATION

A. Using proper width trencher chain, excavate a straight (vertical) and true trench to a depth of 2-inch of pipe invert elevation.

B. Loam or topsoil encountered within the limits of trench excavation for irrigation mains and branch lines shall be carefully removed to the lines and depths as shown on the drawings and stockpiled for subsequent replacement in the upper 6 inches of the trench from which it is excavated. Such removal and replacement of the quantities of loam shall be considered incidental to the irrigation system and no additional compensation will be allowed therefore.

C. Pipe shall be laid on undisturbed trench bottom provided suitable base is available - no rock; if not, excavate to 2-inch below pipe invert and provide and install sand base or crushed stone upon which to lay pipe.

D. Backfilling shall be accomplished as follows: backfill material shall contain no foreign matter and no rock. Carefully place material around pipe and wire and tamp in place. Remainder of backfill shall be laid-up in 6-inch (maximum) lifts and tamped to compaction with mechanical equipment. Compact backfill in trenches to dry density equal to the adjacent undisturbed soil, and conform to adjacent grades without dips, sunken area, humps, or other irregularities. Frozen material shall not be used for backfill.

E. Clean bell and spigot ends and make all gasketed joints in strict accordance with manufacturer's recommendations, making certain not to apply an excess of lubricant, and wiping off excess lubricant from each connection. Maximum deflection per joint shall not exceed manufacturer's recommendations.

F. Make all solvent-weld joints in strict accordance with manufacturer's recommendations, making certain not to apply an excess of primer or solvent, and wiping off excess solvent from each connection. Allow welded joints at least 15 minutes set-up/curing time before moving or handling. When the temperature is above 80º F, allow connections to set minimum 24 hours before pulling or pressure is applied to the system. When temperature is below 80º F, follow manufacturer’s recommendations. Provide and install for expansion and contraction as recommended. Wire shall be laid in same trench as mainline and at pipe invert (see Wire Installation).

G. All HDPE and polyethylene pipe shall be installed such that its curvature does not exceed manufacturer's recommendations.

H. Mainline pipe shall have minimum 22 inches of COVER (excavate to invert as required by pipe size). Lateral pipe shall have minimum 16 inches of COVER for PVC and 12 inches of cover for Polyethylene (excavate to invert as required by pipe size). HDPE lateral pipe installed in the athletic fields shall have as much cover as the soil profile allows, up to 12 inches.

I. Cut plastic pipe with handsaw or pipe-cutting tool, removing all burrs at cut ends. All pipe cuts are to be square and true. Bevel cut end as required to conform to Manufacturer's Specifications.

J. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the trench. At times, when installation of the piping is not in progress, the open end(s) of the pipe shall be closed by a watertight plug or other means. All piping, which cannot temporarily be joined, shall be sealed to make as watertight as possible. This provision shall apply during the lunch hour as well as overnight. Pipe not to be installed that day shall not be laid out. Should water enter the trench during or after installation of the piping, no additional piping may be installed or backfilled until all water is removed from the trench. Pipe shall not be installed when water is in the trench, when precipitation is occurring, or when the ambient temperature is at 40º F or below. Pipe installed at temperatures below 40º F shall be removed and replaced at no cost to the Owner. PVC pipe shall be snaked in the trench to accommodate for expansion and contraction due to changes in temperature.

K. In installing irrigation pipe route the pipe as necessary to prevent damage to tree roots. Where trenching must occur near trees provide proper root pruning and sealing methods to all roots 1-inch and larger.

L. Maintain 6-inch minimum clearance between sprinkler lines and lines of other trades. Do not install sprinkler lines directly above another line of any kind.

M. Maintain 1-inch minimum between lines which cross at angles of 45 to 90 degrees.

N. Throughout the guarantee period refill trenches that have settled due to incomplete compaction.

O. Pulling of pipe will be allowed provided soil is suitable and specified depth of bury can be maintained.

3.03 THRUST BLOCKING

A. Ringtite bell-end fittings shall be blocked with an adequately sized thrust block as per ASABE Standard S376.2 and as depicted in the details. Blocking shall be in accordance with pipe and fitting manufacturer's recommendations. Thrust blocks shall

be required at all changes in size and direction of bends, reducers, plugs and tees. Thrust blocks shall be installed against undisturbed soil in all cases. Concrete thrust blocks shall utilize 3,000-psi standard concrete mixture. Bricks, stones, boulders, etc. will not be accepted as thrust blocks or thrust block material. Sackcrete will not be permitted as a thrust blocking material. Supply all material needed for thrust blocking.

B. Size of thrust block shall be determined by working pressure, size and type of fitting, and soil conditions. Calculate area required for concrete thrust block in contact with soil. Refer to fittings manufacturer's thrust block sizing table and ASABE S376.2 to determine size of thrust block for each condition.

C. Ensure stability of thrust blocks.

D. Under no circumstances will concrete block be approved for thrust blocks.

3.04 ELECTRICAL WIRE CONDUIT INSTALLATION

A. Electrical conduit shall be installed in all non-soil areas, as well as for all above ground wiring where wire passes under or through walls, walks and paving to controller and rain sensor.

B. Conduit shall extend 18 inches beyond edges of walls and pavement.

3.05 PIPE SLEEVING INSTALLATION

A. Sleeving shall be installed wherever piping is going under hardscape areas where indicated on the drawings. Minimum cover over all sleeving pipe shall be 24 inches as shown on the detail.

B. Sleeving shall extend 18 inches beyond edges of walls and pavement. Prior to the installation of irrigation piping and wiring, the ends of all sleeving shall be field marked with a vertical wood stake extending above grade to allow field location at the time of irrigation installation.

C. Ensure required sleeving is installed prior to starting pavement operations. Review all sleeve locations in the field to confirm that sleeves are properly located for the required irrigation pipe runs. In no case will sawcutting into newly installed pavements or jacking under new pavements be permitted to install sleeving which was not installed in proper sequence or in the required orientations or locations.

3.06 ISOLATION VALVE INSTALLATION

A. Install isolation valves per detail where indicated on the drawings. Install all isolation valves on a level crushed stone base so that they can be easily opened or closed with the appropriate valve wrench. Install specified valve box over each isolation valve.

B. Check and tighten valve bonnet packing before valve box and backfill installation.

C. Provide and install thrust blocks for ring-tite valves as per detail.

3.07 VALVE BOX INSTALLATION

A. Furnish and install a valve access box for each electric valve, decoder, surge arrestor, quick coupling valve, isolation valve, flushing valve, and wire splice.

B. Valve access boxes shall be installed on a minimum 4-inch crushed stone base. Finish elevation of all boxes shall be at grade. Supply all crushed stone and install before valve box. Crushed stone shall not be poured into previously installed valve boxes.

C. Valve boxes shall be installed neatly at all times. Boxes shall be parallel or perpendicular to hardscape edges and to other valve boxes installed in the same location. A sufficient amount of turf shall remain in place between each valve box and between valve boxes and hardscapes.

D. Valve box extensions shall be provided as required on valve boxes in order to install valve box covers at grade.

E. Bricks, stones, etc. shall not be used to support valve boxes.

3.08 24 VOLT CONTROL VALVE INSTALLATION

A. Control valves shall be installed on a level crushed stone base. Grade of bases shall be consistent throughout the project so that finish grades fall within the limits of work. Valves shall be set plumb with adjusting handle and all bolts, screws and wiring accessible through the valve box opening. Valves shall be set in a plumb position with 24-inch minimum maintenance clearance from other equipment.

B. Install at sufficient depth to provide more than 6-inch, nor less than 4-inch cover from top of valve to finish grade.

C. Adjust zone valve operation after installation using flow control device on valve.

3.09 WIRING INSTALLATION

A. Wiring shall be installed alongside and at the same invert as, the irrigation mainline. Sufficient slack for expansion and contraction shall be maintained and wiring shall at no point be installed tightly. Provide and install an additional 8 inches to 12 inches slack at all changes of direction. Wiring in valve boxes shall be a sufficient length to allow the valve solenoid, decoder, splice, and all connections to be brought above grade for servicing. This additional slack shall be coiled for neatness in the valve box..

B. All wire shall be laid in trenches and shall be carefully back-filled to avoid \ damage to the wire insulation or wire conductors themselves. In areas of unsuitable material, the trench shall have a 2 inches layer of sand or stone dust on the bottom before the wires are laid into the trench and back-filled. The wires shall have a minimum of 22 inches of cover (See detail). Wire not to be installed that day shall not be laid out.

C. An expansion curl shall be provided and installed within 6 inches of each wire connection to a solenoid. Expansion curls can be formed by wrapping five (5) turns of wire around a 1-inch diameter or larger pipe and then withdrawing the pipe.

D. Service wiring in connection with drawings and local codes for low voltage service. All in-ground wire connections shall be waterproofed with 3M DBR/Y-6 splice kits. All splices shall be made in valve boxes (wire runs requiring splices between valve locations shall be provided and installed in splice box-valve box shall be used). Splice locations shall be shown on the record drawings.

E. Provide a complete wiring diagram showing wire routing for the connections between the controller, decoder, and valves. See section one for the inclusion of wiring diagram in operation and maintenance manuals.

3.10 CONTROLLER INSTALLATION

A. Install controller on interior wall of the pump system control enclosure, per detail. Wire communication cable and rain sensor into controller and set proper program.

B. Wire controller to electrical supply furnished and installed to the controller location.

C. Keys shall be turned over to Owner's Representative.

3.11 CONTROLLER GROUNDING INSTALLATION

A. The grounding rod shall be driven into the ground its full length 12-feet from the controller and connected via a Cadweld or approved equal connection to #6 solid, bare copper wire. The copper wire is to be installed in as straight a line as possible, and if it is necessary to make a turn or bend, it shall be done in a sweeping curve with a minimum radius of 8 inches and a minimum included angle of 90 degrees. There shall be no splices in the bare copper wire. The top of the ground rod shall be driven below the ground surface. A 4-inch grated cover as specified, set a minimum of 1-inch below grade, shall be placed over the ground rod and Cadweld or approved equal connection for periodic maintenance. Cover shall be installed on a minimum of 6 inches of 4-inch ADS corrugated polyethylene, perforated drainage pipe. Plate shall be installed 36 inches below grade with 50 lbs of Power Set or approved equal ground enhancement material spread evenly below the plate and 50 lbs of Power Set or approved equal ground enhancement material spread evenly above the plate in accordance with the manufacturer's requirements. Plates shall also be covered with a 4 inch grated cover as specified, set a minimum of 1-inch

below grade, to facilitate drainage onto the plate. Cover shall be installed on a minimum of 36 inches of 4-inch ADS or approved equal corrugated polyethylene, perforated drainage pipe.

B. When tested, grounding grid shall have an earth resistance no greater than 10 ohms. If earth resistance is greater than 10 ohms, additional grounding rods and/or plates and enhancement material shall be added to system until desired test results have been meet. The minimum requirements of the NEC shall be met, which are:

1. a resistance reading of no more than 25 ohms or

2. a two electrode ground grid.

3.12 DECODER GROUNDING INSTALLATION

A. Lightning arrestor shall be installed per manufacture's recommendations and instructions.

B. Each surge decoder shall be grounded to one rod and plate. Plate shall be installed at a 36-inch depth with 50 lbs of non-migrating ground enhancement material or approved equal spread evenly below the plate and evenly above the plate. The grounding electrode shall be installed at least 10 feet from wires connected to the surge arrestor.

C. Each surge arrestor shall have a separate ground.

D. The grounding rod shall be driven into the ground its full length minimum 10-feet from the surge arrestor and connected via a fusion type connector or approved equal connection to #10 solid, bare copper wire. The copper wire is to be installed in as straight a line as possible, and if it is necessary to make a turn or bend, it shall be done in a sweeping curve with a minimum radius of 8 inches and a minimum included angle of 90 degrees. There shall be no splices in the bare copper wire. The top of the ground rod shall be driven below the ground surface. A 4-inch grated cover as specified, set a minimum of 1-inch below grade, shall be placed over the ground rod and fusion type connector or approved equal connection for periodic maintenance. Cover shall be installed on a minimum of 6 inches of 4-inch corrugated polyethylene, perforated drainage pipe.

E. Grounding plate shall be installed 36 inches below grade with 50 lbs of ground enhancement, non-migrating, or approved equal ground enhancement material spread evenly below the plate and evenly above the plate in accordance with the manufacturer's requirements. Plate shall also be covered with a 4 inch grated cover as specified, set a minimum of 1-inch below grade, to facilitate drainage onto the plate. Cover shall be installed on a minimum of 36 inches of 4-inch or approved equal corrugated polyethylene, perforated drainage pipe.

F. When tested, grounding grid shall have an earth resistance no greater than 10 ohms from any electrical device or wire to earth ground. If earth resistance is greater than 10 ohms, additional grounding rods and/or plates and enhancement material shall be added to system until desired test results have been meet.

G. Grates shall be set a minimum of 10 feet below grade.

3.13 RAIN SENSOR INSTALLATION

A. Install rain sensor on exterior building wall, generally where indicated on the drawings. Coordinate final location of rain sensor with Owner's Representative. Rain sensor shall be in direct contact with the weather and not in contact with the irrigation spray.

B. Install rain sensor wiring within 1/2-inch conduit where exposed. All above ground wires shall be installed in conduits.

3.14 SPRINKLER INSTALLATION

A. Spray sprinklers shall be installed flush (perpendicular) to grade on swing pipe assemblies, minimum length 6 inches, maximum 18 inches.

B. Small and medium rotary sprinklers shall be installed flush to grade on 3/4-inch prefabricated PVC unitized swing joint assemblies with integral O-rings, minimum length 12 inches.

C. Large rotary sprinklers shall be installed flush to grade on 1-inch prefabricated PVC unitized swing joint assemblies with integral O-rings, minimum length 12 inches.

D. Sprinklers shall not exceed maximum spacing indicated

E. Adjust sprinkler zone after installation using flow control device on valve.

3.15 QUICK COUPLING VALVE INSTALLATION

A. Provide and install quick coupling valves where indicated on the drawings.

B. Quick coupling valves to be mounted on 1-inch prefabricated PVC unitized swing joint assemblies with integral O-rings, minimum length 12 inches with brass insert and stabilizer as per details.

3.16 DRIP STAKE INSTALLATION

A. Drip stakes to be installed four per tree as shown on the details. Stakes shall have 2GPH emitter installed in the stake.

3.17 CHECK/TEST/START-UP/ADJUST

A. Flushing:

1. After all piping, valves, sprinkler bodies, pipelines and risers are in place and connected, but prior to installation of sprinkler internals and drip line open the control valves and flush out the system under a full head of water.

2. Sprinkler internals, flush caps and nozzles and drip line shall be installed only after flushing of the system has been accomplished to the full satisfaction of the Owner's Representative.

3. Flush the entire system after installation is complete and service clogged nozzles or emitters for thirty (30) days after substantial completion of this portion of the landscape irrigation system.

B. Testing:

1. Leakage test: test all lines for leaks under operating pressure. Repair all leaks and re-test.

2. Coverage test: perform a coverage test in the presence of the Owner's Representative (notify Owner's Representative at least seven (7) days in advance of scheduled coverage test). Representative will determine if the water coverage is complete and adequate. Readjust sprinklers and/or sprinkler locations as necessary or directed to achieve proper coverage.

3. All testing shall be at no additional expense to the Owner.

3.18 CLEANING AND ADJUSTING

A. At the completion of the work, all parts of the installation shall be thoroughly cleaned. All equipment, pipe, valves and fittings shall be cleaned of grease, metal cuttings and sludge which may have accumulated by the operation of the system for testing.

B. Adjust sprinklers, drip line, valve boxes, and quick coupling valves to grade as required, so that they will not be damaged by mowing operations.

C. Continue sprinkler coverage adjustment as required by settlement, etc., throughout the guarantee period.

D. Each control zone shall be operated for a minimum of 5 minutes and all sprinklers and drip zones checked for consistency of delivering water. Adjustments shall be made to sprinklers and drip zones that are not consistent to the point that they match the manufacturer's standards. All sprinklers, valves, drip tubing, timing devices, or

other mechanical or electrical components, which fail to meet these standards, shall be rejected, replaced and tested until they meet the manufacturer's standards.

3.19 ACCEPTANCE AND OPERATION BY OWNER

A. Upon completion of the work and acceptance by the Owner, train the Owner's Personnel in the operation of the system (provide minimum 7 day written notice in advance of test). Furnish, in addition to the record drawings and operational manuals, copies of all available specification sheets and catalog sheets to the Owner's personnel responsible for the operation of the irrigation system. Guarantee all parts and labor for a minimum period of one (1) year from date of acceptance.

3.20 CLEAN UP

A. Upon completion of all installation work remove all leftover materials and equipment from the site in a safe and legal manner.

B. Remove all debris resulting from work of this section.

C. Regrade, lightly compact, and replant around sprinklers where necessary to maintain proper vertical positioning in relation to established grade.

D. Fill all depressions and eroded channels with sufficient soil mix to adjust grade to ensure proper drainage. Compact lightly, and replant filled areas in accord with drawings requirements.

END OF SECTION

SECTION 02812

IRRIGATION WATER SUPPLY

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. Include GENERAL CONDITIONS and applicable parts of Division 1 as part of this Section.

B. Coordinate work of this Section with new and existing underground utilities and with trades responsible for their installation. Refer to respective drawings pertaining to other work.

1.02 WORK TO BE DONE

A. Work to be done includes furnishing labor, materials, equipment and services required to complete all work indicated on the drawings, as specified herein, or both.

B. The primary source for irrigation water shall be from harvested rain water collected in a 20,000 gallon underground storage system, treated and pumped out to the irrigation distribution system.

C. The secondary source for irrigation water shall be from an existing groundwater well with a sustainable yield of 90 gallons per minute. A new submersible well pump is required. When the cistern is empty, the well shall directly supply the irrigation distribution system, by-passing the storage system and water treatment skid.

D. The entire pump system control skid including controls, mechanical equipment, water treatment and overall enclosure shall be pre-fabricated and delivered to the site requiring minimum on-site assembly and testing. Pump treatment skid shall be delivered to the site having been pre-tested at manufacturing and assembly facility. Entire water supply skid shall be manufactured by Watertronics (Hartland, Wisconsin) or approved equal.

E. The electrical point of connection for the irrigation control system shall be to a 120-volt, 20-amp building electrical circuit provided by and within pump enclosure.

F. The electrical point of connection for the irrigation pump system shall be to a new, 480-volt, 20-amp building electrical circuit provided by contractor.

G. The drawings and specifications must be interpreted and are intended to complement each other. Furnish and install all parts, which may be required by the drawings and omitted by the specifications, or vice versa, just as though

required by both. Should there appear to be discrepancies or question of intent, the matter shall be referred to the Owner's Representative for decision, and his interpretation shall be final, conclusive and binding.

H. Necessary changes to the drawings to avoid obstacles shall be made with the approval of the Owner's Representative.

I. Trench excavation, backfilling and bedding materials, together with the testing of the completed installation shall be included in this work.

J. The Work shall be constructed and finished in every respect in a good, workmanlike and substantial manner, to the full intent and meaning of the drawings and specifications. Parts necessary for the proper and complete execution of the Work, whether the same may have been specifically mentioned or not, or indicated on the drawings, shall be done or furnished in a manner corresponding with the rest of the work as if the same were specifically herein described.

K. Record drawing as well as Operating & Maintenance Manual generation, in accordance to these specifications shall also be included in this work.

1.03 SCOPE

A. The irrigation system shown on the drawings and described within these specifications represents a single controller, turf and landscape irrigation system supplied from reclaimed storm water. The system is designed for 75 gallons per minute. A minimum 75 psi dynamic pressure at full system flow is required from the irrigation point of connection downstream of the pump control and treatment skid located in the new utility enclosure.

1.04 RELATED WORK

A. Carefully examine the Contract Documents for requirements that affect the Work of this Section.

1. Grading

2. Excavating and Backfilling for Utilities

3. Planting

4. Electrical Power Supply

1.05 ORDINANCES, PERMITS AND FEES

A. The Work under this Section shall comply with ordinances and regulations of authorities having jurisdiction.

B. Permits, tests, and certifications required for the execution of Work under this

Section shall be obtained and paid for.

C. Furnish copies of Permits, Certifications and Approval Notices to the Owner's Representative prior to requesting payment.

D. Include in the bid charges by the Water Department, Utility Company, or other authorities for work done by them.

1.06 EXAMINATION OF CONDITIONS

A. Be fully informed of existing conditions on the site before submitting bid, and shall be fully responsible for carrying out work required to fully and properly execute the work of the Contract, regardless of the conditions encountered in the actual Work. No claim for extra compensation or extension of time will be allowed on account of actual conditions inconsistent with those assumed, except those conditions described in the GENERAL CONDITIONS.

1.07 QUALITY ASSURANCE

A. Installer: A firm which has at least five (5) years' experience in work of the type and size required by this Section and which is acceptable to the Owner's Representative.

B. References: Supply three references for work of this type and size with the bid including names and phone numbers of contact person(s).

C. Applicable requirements of accepted Standards and Codes shall apply to the Work of this Section and shall be so labeled or listed:

1. American Society for Testing & Materials (ASTM)

a. ASTM: A536 Ductile Iron Castings

b. ASTM: D1784 Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.

c. ASTM: D1785 Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and Cl200.

d. ASTM: D2464 Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.

e. ASTM: D2466 Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.

f. ASTM: D2564 Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.

g. ASTM: B43-98 Brass pipe.

h. ASTM: B88-99 Seamless Copper Water Tube

i. ASTM: B828-00 Soldered Copper Joints.

j. ASTM: F477 Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

k. ASTM: D2737-99 Polyethylene (PE) Pressure rated tube.

2. National Standard Plumbing Code (NSPC)

3. National Electric Code (NEC)

4. National Sanitary Foundation (NSF)

5. American Society of Agricultural and Biological Engineers (ASABE)

6. Underwriters Laboratories, Inc. (UL)

7. Occupational Safety and Health Administration (OSHA)

8. American Society of Irrigation Consultants (ASIC)

1.08 TESTS

A. Observation: Owner's Representative will be on site at various times to insure the system is being installed according to the specifications and drawings.

B. Performance Test: After completion of work, test the operation of entire water supply system, pumps and control system throughout the entire operating range of the system. It shall be demonstrated through the performance test that the system meets all operating requirements specified herein.

C. The Owner's Representative shall be notified 7 days in advance for observations.

1.09 SHOP DRAWINGS

A. Provide copies of product specification sheets on proposed equipment to be installed to the Owner's Representative for approval prior to the start of work, in accordance with the parameters of Division-1. Work on the irrigation system may not commence until product sheets are submitted and approved. Submittals shall be marked up to show proper nozzles, sizes, flows, etc. Equipment to be included:

1. Valves: Manual and Automatic

2. Controller/ Enclosure

3. Pipe and Fittings

4. Wire and Connectors

5. Grounding Equipment

6. Pumps and motors

7. Storage tank system

8. UV disinfection system

9. Pump filtration system

10. Pump system control panel

11. Pump system sensors

12. Pump system bladder tank

B. A complete pump system submittal including wiring circuitry with all terminals, components and wiring identified shall be provided with the Maintenance and Operating Manuals.

C. The contractor shall maintain complete Record Drawings of the system as the project proceeds

1.10 DELIVERY, STORAGE AND HANDLING

A. Store and handle materials in compliance with manufacturer instructions and recommendations. Protect from possible damage. Minimize on-site storage.

1.11 GUARANTEE

A. The Contractor shall obtain in the Owner's name the standard written manufacturer's guarantee of all materials furnished under this Section where such guarantees are offered in the manufacturer's published product data. All these guarantees shall be in addition to, and not in lieu of, other liabilities that the Contractor may have by law.

B. In addition to the manufacturers guarantees the Contractor shall warrant the entire irrigation system, both parts and labor for a period of one (1) year from the date of acceptance by the Owner.

C. As part of the one-year warranty the Contractor shall perform the first year-end winterization and spring start-up for the irrigation system.

D. Should any problems develop within the warranty period because of inferior or faulty materials or workmanship, they shall be corrected to the satisfaction of the Owner’s Representative at no additional expense to the Owner.

E. A written warranty showing date of completion and period of warranty shall be

supplied upon completion of each segment of the project.

1.12 COORDINATION

A. Work shall be coordinated closely with the Owner's Representative to avoid misunderstandings and to efficiently bring the project to completion. Owner's Representative shall be notified as to the start of work, progression and completion, as well as changes to the drawings before the change is made. Coordinate work with those of other trades.

B. Be responsible and pay for damage to other work caused by work or workmen. Repairing of such damage shall be done by the Company who installed the work as directed by the Owner's Representative.

1.13 MAINTENANCE AND OPERATING INSTRUCTIONS

A. Contractor shall include in their Bid an allowance for four (4) hours of instruction of Owner and/or Owner's personnel upon completion of check/test/start-up/adjust operations by a competent operator. (Owner's Representative's office shall be notified at least one (1) week in advance of check/test/start-up/adjust operations).

B. Upon completion of work and prior to application for acceptance and final payment, a minimum of two (2) three-ring, hard cover binders titled MAINTENANCE AND OPERATING INSTRUCTIONS FOR THE LINCOLN PARK IRRIGATION WATER SUPPLY SYSTEM, shall be submitted to the Owner's Representative's office. After review and approval, the copies will be forwarded to the Owner. Included in the Maintenance and Operating binders shall be:

1. Table of Contents

2. Written description of the System

3. System drawings:

   a. One (1) copy of the Record Drawing;

   b. One (1) reproducible of the Record Drawing;

   c. One (1) copy of the control system wiring diagram

4. Listing of Manufacturer's.

5. Manufacturer's data where multiple model, type and size listings are included; clearly and conspicuously indicating those that are pertinent to this installation.

   a. "APPROVED" submittals of all equipment;

b. Maintenance: including complete troubleshooting charts.

c. Parts list.

d. Names, addresses and telephone numbers of recommended repair and service companies.

6. Winterization and spring start-up procedures.

7. Guarantee data.

1.14 PROCEDURE

A. Notify city departments and/or public utility owners concerned, of the time and location of work that may affect them. Cooperate and coordinate with them in the protection and/or repairs of utilities.

B. Provide and install temporary support, adequate protection and maintenance of structures, drains, sewers, and other obstructions encountered. Where grade or alignment is obstructed, the obstruction shall be permanently supported, relocated, removed or reconstructed as directed by the Owner's Representative.

PART 2 - PRODUCTS

2.01 GENERAL

A. Materials to be incorporated in this system shall be new and without flaws or defects and of quality and performance as specified and meeting the requirements of the system. All material overages at the completion of the installation shall be removed from the site.

B. No material substitutions from the irrigation products described in these specifications and shown on the drawings shall be made without prior approval and acceptance from the Owner's Representative.

2.02 PVC IRRIGATION PIPE

A. Pipe shall bear the following markings: Manufacturer's name, nominal pipe size, schedule or class, pressure rating in psi, and date of extrusion.

B. Pipe in sizes 2 inches and smaller shall be PVC, Class 200, Type 1120, SDR 21, Solvent-Weld PVC, conforming to ASTM No. D2241 as manufactured by Certainteed, Cresline, JM Eagle or equal.

C. Pipe in sizes 3 inches and larger shall be PVC, Class 200, Type 1120, SDR 21, Gasket-Joint PVC, conforming to ASTM No. D178 as manufactured by Certainteed, Cresline, JM Eagle or equal.

D. The pipe insertion mark shall be visible to show the proper depth into spigot.

2.03 COPPER PIPE AND FITTINGS

A. Copper pipe shall be Type K, hard tempered ASTM B88.

B. Copper fitting shall be wrot copper, solder joint type in accordance with ASTM B828-00.

C. Joints shall be soldered with silver solder ASTM B32, Grade 95TA up to 250 degree using non-corrosive flux.

D. Supply only pipes and fittings that are marked by the manufacturer with the appropriate ASTM designations and pressure ratings and are free from cracks, wrinkles, blisters, dents or other damage.

2.04 IRRIGATION WELL DROP PIPE (IN WELL)

A. Well pump pull and discharge pipes shall be 3-inch, galvanized seamless steel pipe, minimum Schedule 40. Use stainless steel reducer bushings as required to connect to 2-inch submersible pump discharge.

B. Steel pipe shall conform to ASTM A-53, A-106, A-120, and API-5L as manufactured by U.S. Steel, or approved equal.

2.05 BRASS PIPE AND FITTINGS

A. Brass fittings shall be cast bronze, screwed, 125lb. Class.

2.06 PVC PIPE SLEEVES

A. Pipe sleeves beneath non-soil areas shall be minimum PVC, Class 160 water pipe as manufactured by Certainteed, Cresline, JM Eagle or equal. Minimum sleeve size to be 3-inch.

2.07 WIRE CONDUIT

A. Conduit for wiring beneath non-soil areas shall be PVC, SCH-40 conduit with solvent-weld joints, as manufactured by Cresline, Carson, JMM or equal.

B. Sweep ells shall be standard electrical type PVC schedule 40 long sweep elbows.

C. Above ground wiring to rain sensor or controller shall be galvanized, rigid metallic conduit.

2.08 PVC IRRIGATION FITTINGS

A. Fittings for solvent weld PVC pipe, 2 inch and smaller in size, shall be Schedule 40 solvent weld PVC fittings as manufactured by Dura, Lasco, Spears or equal.

B. Fittings shall bear manufacturer’s name or trademark, material designation, size,

and applicable I.P.S. schedule.

C. PVC threaded connections in and out of valves shall be made using Schedule 80 toe nipples and Schedule 40 couplers or socket fittings. Schedule 40 threads will not be approved for installation.

D. PVC solvent shall be NSF approved, for Type I and Type II PVC pipe, and Schedule 40 and 80 fittings. Cement shall be medium not fast or hot, no wet and dry. Cement is to meet ASTM D2564 and FF493 for potable water pipes. PVC solvent cement shall be Rectorseal Gold, IPS Weld-ON 711, Oatey Heavy Duty Cement or equal, and shall be used in conjunction with the appropriate primer. Primer shall be NSF approved, and formulated for PVC and CPVC pipe applications. Primer is to meet ASTM F 656. Primer shall be Rectorseal Jim PR-2, IPS Weld-ON P-70, Oatey Primer for PVC and CPVC, or equal. Clear primers shall not be allowed.

E. Nipples to be schedule 80 PVC.

F. Industries model ICV or approved equal.

2.09 JUNCTION BOXES

A. See ELECTRIAL specifications for all single and 3-phase power wire junction and pull boxes.

2.10 WIRE

A. Wire type and method of installation shall be in accordance with local codes for NEC Class II circuits of 30-volt A.C. or less.

B. Irrigation cistern pump power wiring shall be rated for underground, direct burial and wet applications, THWN, and have a minimum AWG wire size of #10, copper.

C. Irrigation well pump power wiring shall be rated for underground, direct burial and wet applications, THWN, and have a minimum AWG wire size of #10 copper.

D. All submersible wires shall be PVC twisted submersible pump cable, 3-conductor with ground. Wire size shall be minimum AWG #10. Wires shall be spliced in watertight, quick disconnects.

E. In-ground wire connections for 480-Volt pump power wire shall be UL Listed, 3M 82A or approved equal splice kits. All wire splices shall be made in valve boxes or at disconnects.

F. Wire shall be manufactured by Centri-Line, Paige Electric Corporation, or approved equal.

G. Wiring to liquid level sensor in cistern between utility building and cistern shall be shielded, copper, multi-strand cable, #18AWG, rated for underground, direct burial in wet locations. No splices shall be allowed.

2.11 ISOLATION VALVES

A. Isolation valves shall be gate type, of bronze construction, US Manufacture, 200 WOG with steel cross handle and 200 psi rating. Gate valves to be as manufactured by Nibco, model T-113-K, or approved equal.

2.12 LIGHTNING AND SURGE PROTECTION

A. All electrical equipment shall have an option to be protected by a UL approved Category C and Category B surge arrester, which shall suppress excessive voltage surges on incoming power. The device shall withstand an impulse of 10Kv/10Ka under IEEE C62.41 Category C and shall withstand a ringwave of 6Kv/500a and an impulse of 6Kv/3Ka under Category B. Pass voltage for a 480v device to the end equipment shall not exceed 1800V when subjected to an 8 x 20 microsecond wave shape, resulting in the following performance statistics: 3720 joules minimum dissipation at 82,500,000VA and 1800V maximum voltage. Response time shall be less than 5 nanoseconds.

2.13 EQUIPMENT SERVICE GROUND

A. All grounding shall be in accordance with the National Electrical Code and manufacturer's requirements.

B. Grounding rod to be 5/8 inch x 10-foot copper clad, UL Listed.

C. Grounding plate to be 4 inch x 96 inch x 0.06 inch copper alloy with integral connection of 25 feet of #6 AWG bare, solid copper wire, UL Listed conforming to the minimum requirements of Section 250 of the National Electric Code. Connection of the wire to plate shall be performed by the plate manufacturer.

D. Grounding connection to utilize a exothermic welding process, Cadweld connector, UL Listed, Model GT1161G.

E. Grounding wire shall be #6 AWG solid bare copper wire

F. Ground enhancement material shall be PowerSet as manufactured by Loresco, 50 pound bags.

2.14 IRRIGATION PUMPS

A. Submersible irrigation pump and motor shall be set at bottom of storage tank as depicted on the drawings, enclosed in a high density polyethylene skid.

B. Primary irrigation pump in cistern shall be capable of delivering 230 feet Total Dynamic Head (100psi) at 75 gpm at the irrigation system point of connection,

adjacent to the storage tank. Pump shall provide a minimum of 75 psi at the irrigation contractor's point of connection adjacent to pump control enclosure.

C. Secondary irrigation well pump shall be capable of delivering 275 feet of Total Dynamic Head (119psi) at 75 gpm. Pump shall provide a minimum of 75 psi at the irrigation contractor's point of connection adjacent to pump control enclosure.

D. Irrigation pump motors shall operate at 3600 rpm and each be a minimum of 7.5-horsepower. Power supply for the motors shall be 460-volt, 3, phase. Pump shall have a minimum efficiency of 60% at 75 gpm.

E. Submersible irrigation pumps shall be as manufactured by Goulds Pumps (XYLEM), model 75GS75 or approved equal.

F. Pump shall be tested to the greatest extent possible before installation. Pump discharge piping shall be tested at 150% of maximum pump pressure and be leak and drip free. The electrical components shall be tested at the rated voltage and the control circuits shall be tested in simulated conditions.

2.15 PUMP CONTROL PANEL

A. Pump control panel shall be mounted on the prefabricated pump control and treatment skid, located in the new utility enclosure. Final location shall be approved by Owner's Representative.

B. The water harvesting and well pump electrical controls shall be mounted in a self-containing NEMA 4 enclosure fabricated from not less than 12 gauge steel. Door gasket seals shall be neoprene sponge, sufficient to protect interior components from weather and dust. The electrical panel doors shall be constructed from 12 gauge steel with integral latches.

C. All external operating devices shall be dust and weatherproof. All internal components of the enclosure shall be mounted on a removable back panel. Mounting screws for components shall not be tapped into the enclosure wall. No pressure gauges, pressure switches, water activated devices, or water lines of any sort shall be installed in any electrical control panel.

D. The control panel shall be designed, built, tested and U.L. listed by the system manufacturer, Watertronics (Hartland, Wisconsin) or approved equal.

E. Main Disconnect

1. A fused three-pole, main station disconnect shall be contained within the NEMA 4 control enclosure and shall be SERVICE RATED. Disconnect shall isolate all power to the control enclosure. The disconnect shall have an operating handle mounted in the enclosure door, mechanically interlocked to prevent entry while disconnect is in ON position.

SECTION 02825

STEEL PICKET FENCE & GATES

PART 1 - GENERAL

1.01 SCOPE OF WORK

a. The work under this Section consists of furnishing and installing steel picket fence and steel picket gates with posts, sleeves and appurtenances, as shown on the drawings and as specified herein including all labor, materials and equipment necessary to finish the work complete in place.

b. Fence must meet all playground code requirements for picket spacing, etc.

1.02 REFERENCE STANDARDS

a. References herein to any technical society, organization, group or body are made in accordance with the following abbreviations:

ASTM American Society for Testing Materials

AWS American Welding Society

CPSC Consumer Product Safety Commission

1.03 SHOP DRAWINGS

a. The Contractor shall submit complete manufacturer's shop drawings which shall include the horizontal layout and vertical alignment for the proposed installation to the Engineer for approval. Field verify all post sleeve spacings prior to fabrication. No material may be ordered prior to receiving written approval from the Engineer.

1.04 SAMPLES

a. The Contractor shall supply representative samples, in factory-sealed containers, of the cold galvanizing compound (for touch up ONLY) and the finish paint and primer, if necessary. Also, provide samples of other fencing materials and hardware as the Engineer directs.

b. The Contractor shall submit finished samples of all parts of the fences for the Engineer's review and approval. The workmanship and finish of the completed fences shall equal the approved samples.

PART II - MATERIALS

2.01 STEEL MEMBERS

a. Posts shall be carbon steel structural tubing conforming to ASTM Designation A500.

1. Line posts shall be 2.5" x 2.5" x 1/4" thick steel tubing, weighing 5.40 lbs./ft.

2. End posts and corner posts shall be 3" x 3", 17 ga. steel tubing.

3. Gate posts shall be 3" x 3", 1/4" thick wall steel tubing.

4. Sleeves for fence posts shall be 3" x 3" x 1/2" thickness steel square tube weighing 20.88 lbs./ft.

5. Pickets shall be ¾" pickets.

b. Galvanizing:

1. Hot-dip galvanize all items under this section in compliance with ASTM A 123, ASTM A 153, or ASTM A 386. Provide minimum 1.5 oz./ft.^{2} zinc coating. Galvanize after fabrication.

2. Following galvanizing, each item shall receive surface grinding to remove lumps, sags or spikes resulting from the galvanizing process. The finished surface following grinding shall be hand smooth and without irregularities. Take care not to damage the galvanized surface coating.

c. Pickets, top and bottom rails and crossbars and hinge assemblies, called for on the drawings, shall conform to ASTM Designation A36.

d. Bolts, nuts, washers and any other fasteners shall conform to ASTM Designation A307.

e. Post caps shall be cast iron or steel in the sizes required, finished in conformance with all other fence elements. Caps shall be as manufactured by Julius Blum & Co., Inc., Carlstadt, New Jersey; Boundary Fence and Railing Systems, Inc. Richmond Hill New York; Monumental Iron Works, Inc., Baltimore, Maryland; or approved equal. All caps are to be coated with a minimum 3.0 mil thickness of liquid galvanizing compound by dipping.

f. All gates shall be equipped with a positive type latching device capable of retaining the gate in a closed position and have provision for padlock. Latches

shall permit operation from either side of gate and must be approved by the Landscape Architect prior to the installation

g. Double gates: Provide locking cane-bolt style drop rod to hold inactive leaf. Provide gate stop pipe to engage center drop rod. Provide locking device and padlock eyes as an integral part of the latch, requiring one padlock for locking both gate leaves.

2.02 FINISH

a. Cold galvanizing compound shall be a single component zinc rich compound yielding a dry film of at least 85% pure zinc. Galvanizing compound shall meet or exceed the requirements of Federal Specification MIL-P-21035, TT-P-641d primer for zinc rich compounds.

b. Finish color coating shall be Color Galvanized Black as provided by Duncan Galvanizing, Inc., or approved equal.

2.03 CEMENT CONCRETE

a. Cement concrete for footings and edgings shall conform with Section 03300 of these Specifications.

PART III - EXECUTION

3.01 FENCE FABRICATION, GALVANIZING FINISHING AND ERECTION

a. The fence sections shall be shop fabricated in strict conformance to the sizes and dimensions called for on the approved shop drawings and in accordance with these specifications, all as field verified by the Contractor.

b. All welding shall be by arc welding process conforming to the latest AWS Specifications. All welds shall be as designated on the drawings, shall be ground smooth to a neat finish and shall be watertight with care to minimize locked-up stresses and distortion due to hear. All welds shall be made on bare, clean metal equal to "white" metal.

c. After fabrications, all steel surfaces shall be thoroughly cleaned of all mill scale, rust, dirt, weld flux, weld splatter and other foreign matter by power wire brushing or sand blasting.

d. Prime and finish all materials in accordance with industry requirements. Galvanizing shall provide a visually acceptable substrate for applied coatings, and be free of lumps, globules, or heavy deposits which will interfere with intended use or esthetic appearance of materials.

e. Field erection of the fabricated fence sections shall be as called for on the drawings. Excavation for post footings shall conform to Section 2.04 of these Specifications. Fence posts shall be set plumb in cement concrete footings which shall be mixed and placed in accordance with Section 9.01 of these Specifications. The fence rails shall be parallel to the walk and the fence posts and pickets shall be set plumb, when the fence is erected into its final position.

g. Surfaces that are abraded or damaged during field erection or from which galvanizing compound has been damaged shall be thoroughly wire brushed and cleaned, removing all loose and cracked coating, after which the surface shall be painted with two (2) coats of the approved cold galvanizing compound.

3.02 TOUCHUP PAINTING

a. After erection, all rust spots, scratches or abrasions in the galvanized surface shall be repaired with finish surfacing treatments that are compatible with factory applied color galvanizing applications and satisfactory in all regards to the Engineer.

- - - END OF SECTION - - -

SECTION 02822

BALLFIELD BACKSTOP

PART I - GENERAL

1.01 SCOPE OF WORK

A. Under this Section the Contractor shall furnish all labor, materials, equipment and transportation required to furnish and install protective netting in compliance with the contract drawings and all requirements described herein.

B. In general, the protective netting is incorporated directly above the backstop on all sides.

1.02 REFERENCE STANDARDS AND SPECIFICATIONS

A. References herein to any technical society, organization, group or body are made in accordance with the following abbreviations:

1. ASTM American Society for Testing Materials

2. AWS American Welding Society

B. See the following sections for related work:

1. Section 02350 EXCAVATION BORROW AND BACKFILL
2. Section 02820 BVC CHAINLINK FENCING
3. Section 03300 CAST IN PLACE CONCRETE

1.03 QUALITY ASSURANCE

A. All fencing shall conform to the specifications of the Chain Link Fence Manufacturer’s Institute and as specified herein.

1.04 SHOP DRAWINGS

A. Shop drawings or manufacturer's specifications shall be submitted in accordance with the provisions of the Special Conditions Section of the Contract Specifications.

B. The Contractor shall submit complete manufacturer's shop drawings to the Owner’s Representative for approval. Such drawings shall show details for posts, rails, fabric, fittings, attaching hardware and all other necessary appurtenances.

C. No backstop fencing materials shall be procured by the Contractor until written approval is received from the Owner's Representative.

1.04 SAMPLES

A. Samples of all fence materials furnished under this Section shall be submitted for approval prior to the start of construction.

B. Samples of the cold galvanizing compound shall be submitted for approval in factory-sealed containers.

C. Submit the following samples in accordance with the provisions of the SPECIAL CONDITIONS.

1. Submit samples and descriptive literature of all items specified by the Engineer.

PART II - MATERIALS

2.01 POSTS, RAILS AND FRAMEWORK

A. All backstop pipe shall be black vinyl clad steel conforming to ASTM Designation A120, Schedule 40. All members shall be furnished in one-piece lengths for each section of backstop fencing.

B. Member sizes are as follows:

1. Posts shall be 4.00" O. D. pipe, weighing 9.11 lbs. per linear foot.

2. Rails for the backstop section shall be 1.66" O. D. pipe, weighing 2.27 lbs. per linear foot

3. Canopy frame shall be 1.90" O. D. pipe, weighing 2.72 lbs. per linear foot.

4. Truss rods shall be provided as required to support the structure and submitted via shop drawing from fence manufacturer for approval by Owner's Representative.

2.02 FENCE FABRIC

A. The fabric shall be woven black vinyl coated steel chain link conforming to ASTM Designation A491-63T in its entirety.

B. The fabric shall be supplied in the following sizes:

1. 6 gauge (0.192"), 1.5 inch mesh for general vertical uses

2. 9 gauge (0.148"), 1.5 inch mesh for canopy sections

C. All fabric shall be furnished with top and bottom selvage knuckled.

D. After fabrication, the fabric shall be thoroughly cleaned and given a clean organic coating by the complete immersion process. The coating shall be a minimum of 0.40 ounces per square foot of wire fabric with the weight of coating determined by the strip test specified in ASTM Designation A428-58T.

2.03 FENCE ACCESSORIES

A. Tension Bars and Bands

1. Tension bars shall be three-sixteenth (3/16) inch by three-quarter (3/4) inch galvanized steel conforming to ASTM Designation A123. 2.Tension bands shall be 7/8" x 12 gauge beveled, galvanized, sized to fit the backstop posts and framework and furnished with galvanized fasteners. Galvanizing shall conform to ASTM Designations A123 or A153 as they pertain.

3. Tension cables shall be 3/8" diameter galvanized 7-strand steel cable conforming to ASTM Designation A475, Common Grade. Accessories such as turnbuckles, thimbles, hooks, eyes and other fasteners shall be compatible for the required use per ASTM 567.

B. Fittings, Rail Clamps and Fabric Bands

1. Fittings, lugs, clamps and other accessories shall be steel conforming to ASTM Designation F626 and galvanized in conformance with ASTM Designation A153.

2. Rail clamps shall be standard clamps (boulevard clamps) furnished complete with fasteners, all conforming to the same requirements as for fittings above.

3. Fabric shall be attached using A-58 self-locking fabric bands as manufactured by Band-It Ties, or an approved equal.

C. Post Caps

1. Furnish and install tight fitting pressed steel or malleable iron caps, designed as a weather tight closure cap. Provide one (1) pass-through

looped cap for each line post, and one (1) acorn style cape for each end or corner post. Where top rail is used, provide looped cap tops to permit passage of top rail.

2.04 COLD GALVANIZING COMPOUND

A. Cold galvanizing compound shall be a single component zinc rich compound yielding a dry film of at least eighty-five percent (85%) pure zinc. Galvanizing compound shall meet or exceed the requirements of Federal Specifications MIL-P-21035, TT-P-641d primer for zinc rich compounds.

2.05 CEMENT CONCRETE

A. Cement concrete for post footings shall conform to Section 03300 of these Specifications.

2.06 EXCAVATION AND BACKFILL

A. Excavation and backfill for post footings shall conform to Section 02350 of these Specifications.

PART III – EXECUTION

3.01 LAYOUT

A. The Contractor shall layout the backstop and place wood stakes as required at post locations and then notify the Owner's Representative that the unit has been laid out. It shall be the Contractor's responsibility to offset the stakes installed by his Engineer and take extreme care not to disturb these stakes before incorporating them into his work. Layout shall include setting of wood stakes at 1st, 2nd, and 3rd base and home plate.

3.02 POSTS

A. The Contractor shall excavate for proposed reinforced foundations and post footings and shall inspect the excavation to ensure that surrounding areas of footing are stable and holding vertically.

B. Pour footings against undisturbed subsoil and onto compacted bottom of void. Set posts plumb and to the proper heights for assembly and place foundations.

C. Allow footings to cure sufficiently prior to assembly of backstops, and brace and stay all posts sufficiently until curing is adequate.

D. Under bituminous pavements, pitch tops of foundations one (1) inch away from posts.

E. Backfill and compact in no greater than eight (8) inch layers around foundations.

3.03 POSTS AND RAILS

A. All framework, rails, posts, shall be joined as detailed on the drawings, as specified under Section 7.01 of these Specifications, and as modified herein.

B. Rails at the front of canopy shall be fastened to the framework with fittings and ornamental post caps. At end and corner posts, the Contractor shall install three-quarter (3/4) inch by three sixteenth (3/16) inch galvanized steel tension bars to hold wire to tension bands or ties.

C. At all end, corner and line posts, the Contractor shall furnish and install 1/4" galvanized steel lugs welded to the pipe frame, as shown on the plans. These steel lugs shall be attached to receive collar ends bolted onto braces, struts, and rails and shall be bolted to the framework as indicated on the plans. All bolt ends shall be peened or prick-punched after tightening.

D. At existing backstops, after existing fabric has been removed, install another intermediate rail in the bottom panel. Tie at twelve (12) inches on center typically.

3.04 WELDING

A. Hood framing shall be strongly welded at all joints shown on the plans. Struts shall be welded to post and hood frame.

B. After the welding has been completed, the surfaces of all welds shall be thoroughly cleaned, wire brushed and coated with two (2) coats of liquid galvanize.

3.05 WIRE TENSION CABLES

A. The backstops shall be properly stayed horizontally, as shown on plan, with three-eighths (3/8) inch galvanized steel wire tension cables complete with necessary galvanized turnbuckles, hooks, eyes, bolts, etc. Cable to be fastened around galvanized malleable iron thimbles and wire rope clamps.

3.06 FABRIC

A. All fabric shall be installed by means of standard chain link stretching equipment.

The finished backstop shall be plumb, taut, true to line and grade and complete in every detail.

B. The fabric shall be fastened to all intermediate posts, all rails, and backstop framework with Band-It Ties, spaced every twelve (12) inches, with ties bent inward to prevent injury.

C. Tops and bottoms of fabric shall have knuckled selvages; and no twisted, knurled, exposed or cut metal wire fabric ends shall be permitted. Fabric sections shall be jointed as directed by the Owner's Representative, so that no selvages protrude out towards the playing field.

END OF SECTION

SECTION 02820

BLACK VINYL CLAD CHAIN LINK FENCE AND GATES

PART I - GENERAL

1.01 SCOPE OF WORK

A. The work under this Section consists of furnishing and installing vinyl coated chain link fence fabric and hardware and framework of various heights as shown on the Contract Drawings and as specified herein including all labor, materials and equipment necessary to finish the work complete in place.

1.02 REFERENCE STANDARDS

B. References herein to any technical society, organization, group or body is made in accordance with the following abbreviations:

1. ASTM American Society for Testing Materials

2. AWS American Welding Society

1.03 QUALITY ASSURANCE

A. All fencing shall conform to the specifications of the Chain Link Fence Manufacturer's Institute and as specified herein.

1.04 SUBMITTALS

Per Section SPECIAL CONDITIONS of these Specifications, submit:

A. Three (3) samples, approximately 3" long or 6" square of fabric material, post sections and typical accessories.

B. Shop drawings or catalog cuts including details illustrating fence height, fence post spacing, and sizes of posts, rails, braces, footings, gates and all accessories.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver material in manufacturer's original packaging with all tags and labels intact and legible. Handle and store material in such a manner as to avoid damage.

PART II - MATERIALS

2.01 VINYL CLAD STEEL POSTS, RAILS AND BRACES

A. General

1. All fence pipe for posts, rails, and all braces and appurtenances shall be vinyl clad, schedule 40 round, seamless hot dip galvanized pipe conforming to ASTM-A-120-1, or approved equal.

2. All structural shapes shall be vinyl clad, and galvanized in conformance with ASTM Designation A123.

3. All vinyl clad materials shall be fusion bonded in accordance with ASTM-F668 Class 2B.

B. End, Corner and Pull Posts

1. Fence up to and including 5'-0" in height: 2.375"O.D. pipe, 3.65 lbs. per linear foot.

2. Fence over 5'-0" in height: 2.875" O.D. pipe, 5.79 lbs. per linear foot.

3. Fence over 10'-0" in height: 4.00" O.D. pipe, 9.11 lbs. per linear foot.
4. Maximum Spacing 10’-0” on Center.

C. Line Posts (10'-0" Maximum Spacing)

1. Fence up to 5'-0" in height: 1.90" O.D. pipe, 2.28 lbs. per linear foot.

2. Fence over 5'-0" in height: 2.375" O.D. pipe, 3.12 lbs. per linear foot.

3. Fence over 10'-0" in height: 2.875" O.D. pipe, 5.79 lbs per linear foot.

D. Gate Posts

1. Gate posts for single leaf gates six (6) feet or less in width: 2.875" O.D. pipe, 4.64 lbs. per foot min.

2. Gate posts for single leaf gates six (6) to twelve (12) feet in width: 4.00" O.D. pipe, 6.56 lbs. per foot.

E. Rails

1. All rails shall be 1.66" O.D. pipe weighing 2.27 lbs. per linear foot furnished in manufacturer's standard lengths of approximately 21'-0" with

outside sleeve type couplings, at least six (6) inches long for each joint – one (1) coupling in each five (5) to have expansion spring. Provide means for attaching rails securely to each corner, pull and end post. Rails shall form continuous brace from end to end of each run of fence.

F. Post Bracing Assembly

1. 1.66" O.D. pipe weighing 2.27 lbs. per linear foot (for horizontal braces). Provide at each side of corner and pull posts and at end posts for fence six (6) feet or higher.

2.02 CHAIN LINK FABRIC (VINYL CLAD)

A. Chain Link fence fabric shall be factory coated 6 gauge core wire (or 9 gauge in certain circumstances as indicated on the details) with a min .02 inch thick coating of plasticized polyvinyl-chloride applied by the fusion method over a thermoset plastic bonding agent. The bond shall exhibit equal or greater strength than the cohesive strength of the vinyl. All cut ends shall be coated with vinyl at the factory. Fabric shall be 1.5" mesh and black in color.

B. Top and bottom of fabric shall have knuckled selvage, both sides.

2.03 FITTINGS AND ACCESSORIES (VINYL CLAD)

A. All accessories shall be vinyl clad in accordance with paragraph 2.01 above, and galvanized in conformance with ASTM Designation A153.

B. Post Caps

Furnish and install tight fitting pressed steel or malleable iron caps, designed as a weather tight closure cap. Provide one (1) pass-through looped cap for each line post, and one (1) acorn style cape for each end or corner post. Where top rail is used, provide looped cap tops to permit passage of top rail.

C. Tension Bars

1. One (1) piece lengths equal to full height of fabric with minimum cross section of 3/16" x 3/4", conforming to ASTM Designation A123. Provide one (1) stretcher bar for each end post and two (2) for each corner and pull post.

2. Tension bands and brace bands, if utilized, shall be 7/8" x 12 gauge beveled, galvanized, sized to fit pipe sizes and furnished with galvanized fasteners. Galvanizing shall conform with ASTM Designations A123 or A153 as they pertain.

D. Rail Clamps

1. Rail clamps shall be standard clamps (boulevard clamps) furnished complete with fasteners with ASTM Designation A153.

E. Fabric Bands for Tying Fabric

1. Fabric shall be attached using a BAND-IT band and buckle system
2. Bands shall be 0.020" thickness, 200/300 series stainless steel ½" wide bands, with a minimum breaking strength of 850 lbs., ½" band capacity ear-loct design buckles to be manufactured with 0.050" thick material, 201/301 series stainless steel.

F. Fittings, lugs, clamps and other accessories shall be steel conforming to ASTM Designation F626 and galvanized in conformance with ASTM Designation A153.

2.04 ANCHORING CEMENT

A. Cement for anchoring posts in sleeves embedded in concrete walls shall be "POR-ROK", as manufactured by Hallemite (Lehn and Fink Industrial Products, Division of Sterling Drugs, Inc.), Montage, New Jersey, or approved equal.

B. "Sika Cola-Due" by the Sika Co.

C. "Five Star Grout" the Five Star Co.

2.05 CEMENT CONCRETE

A. Cement concrete for post footings shall conform to Section 03300 of these Specifications.

PART III - EXECUTION

3.01 POST INSTALLATION

A. Install new vinyl coated chain link fence in the location(s) shown on the Contract Drawings, and as approved by the Landscape Architect.

B. Excavation for post footings as herein before specified in Section 02300 of these Specifications, shall be in firm undisturbed or compacted soil. Post footing diameters vary according to post sizes required and are in accordance with attached details. Excavate hole depths six (6) inches lower than post bottom with bottom of posts set not less than thirty-six (36) inches below surface when in firm, undisturbed soil. Where ledge is encountered, the Contractor shall notify the Landscape Architect to determine method of installation. Payment for any

additional work required when installations are in ledge shall be in accordance with methods described in SPECIAL CONDITIONS of these Specifications.

C. Place concrete around posts in a continuous pour, tamp for consolidation. Check each post for vertical and top alignment and hold in position during placement and finishing operation. Crown the top of the concrete footings to pitch water away from posts.

D. Under bituminous pavements, tops of footings are to be finished smooth and are to pitch one (1) inch from the posts to the outside edge of the foundation.

E. In mower strip locations, form top twelve (12) inches square and finish to match mower strip with 1/4" pitch away from posts.

1. If applicable, top of fence footings at players' benches and cement concrete mower strips shall terminate six (6) inches below pavement finish grade.

3.02 FENCE ERECTION

A. Top and Bottom Rails

1. Top and bottom rails shall form a continuous brace from end to end of each fence run. In addition, all end and corner posts shall be braced to the nearest line post with center brace rails. Outside sleeve type top rail coupling shall be placed a maximum of twelve (12) inches from line posts.

B. Middle Rails

1. All chain link fencing ten (10) feet or more in height shall have a continuous middle rail.

C. Brace Assemblies

1. Furnish and install braces and appurtenances so posts are plumb when diagonal rod is under proper tension. All "tension" assemblies shall conform to ASTM 567 and the MASS DPW Standard Specifications Section M.8.09

D. Fabric

1. The fabric shall be installed on the "public" or "sports field" side of the fence.

2. All fabric shall be aligned so that the top row of the fabric mesh is tied to the top rail, and so that the bottom selvage of fabric mesh stands one (1)

inches above the finish grade of the lawns, pavements or concrete wall grade and that the bottom row of the fabric mesh is tied to the bottom rail.

3. Fabric shall be properly stretched and securely fastened to the posts and rails, and between posts the top and bottom of the fabric shall be fastened to the horizontal braces as herein specified, and approved by the Landscape Architect. Fabric shall be stretched uniformly taut and as tight as possible, true to line and grade and complete in all details. Install tension bars at corners.

4. The fabric shall be fastened to end and corner posts with tension bars and stretcher bar bands spaced at one (1) foot intervals.

E. Stretcher Bars

1. Thread through fabric and secure to posts with approved metal bands spaced not over twelve (12) inches O.C.

F. Fabric Bands

1. Fabric Bands shall be placed at the intervals indicated on the details and securely fastened to all fence posts.
2. All bands shall be pulled tight an raw ends of steel bands shall be secured in buckle by folding ear tabs around steel bands as per manufacturer's recommended installation procedure. No sharp edges shall protrude from band-it buckles. Band will be PVC coated, color to match fabric and framework.

G. Fasteners

1. Install nuts for tension band and hardware bolts on side of fence opposite fabric side unless directed otherwise by the Landscape Architect.

3.03 GATE FRAMES (WHERE APPLICABLE)

A. Gate frames shall be galvanized steel 1.90" O.D. standard weight pipe, 2.72 pounds per linear foot. Gates shall be fabricated using welded construction with all welds ground smooth and coated with 3.0 mil. thickness of cold galvanizing compound. Gates must be properly braced to eliminate any possible sagging condition. For gates over eight (8) feet in height, provide additional horizontal and vertical interior members to ensure proper strength.

B. Fabric shall be installed with hookbolts and tension bars on all four (4) sides and attached to gate frame at twelve (12) inches on center.

C. Hardware materials shall be hot dipped galvanized steel. All moveable parts (e.g., hinges, latch, keeper, and drop bar) shall be field coated with PVC touch-up paint, provided by the manufacturer.

D. Hinges shall be of sufficient structural strength and design to support gate leaf and to permit easy and trouble free operation. Non-lift-off type hinge design shall permit the gate to swing 180 degrees inward or outward in accordance with the Contract Drawings

E. All gates shall be equipped with a positive type latching device capable of retaining the gate in a closed position and have provision for padlock. Latches shall permit operation from either side of gate and must be approved by the Landscape Architect prior to the installation. Refer to details for latch device.

F. Gate keepers shall be provided for each gate leaf over five (5) feet wide. Gate keeper shall consist of mechanical device for securing free end of gate when in full open position.

G. Double gates: Provide drop rod to hold inactive leaf. Provide gate stop pipe to engage center drop rod. Provide locking device and padlock eyes as an integral part of the latch, requiring one padlock for locking both gate leaves.

H. Gate Installation

1. Check gate posts for vertical alignment and maintain in position during placement and finishing operations.

2. Set keeper, stops, sleeves into concrete.

3. Install gates plumb, level and secure for full opening without interference.

4. Attach hardware by means which will prevent unauthorized removal.

5. Adjust hardware for smooth operation.

3.03 FINISH PROTECTION

A. During the fence installation, care shall be taken to avoid damaging the vinyl clad or galvanized surfaces of the fence components. All scratches and abrasions shall be thoroughly corrected in a manner satisfactory to the Landscape Architect before final acceptance.

END OF SECTION

F. Variable Frequency Drive (VFD)

1. A Variable Frequency Drive shall be provided for EACH submersible pump to maintain a constant pressure over a range of flow.

2. The variable frequency drive shall be IGBT based with selectable carrier frequency up to 15 KHZ. The VFD shall include terminals for incoming power, motor output power and control terminals.

3. The VFD shall generate a sine-coded, variable voltage/ frequency, three phase output for optimum speed control. The VFD shall incorporate power loss ride-through for a minimum of 2 seconds. VFD protective features shall include current limit, auto restart, short circuit protection, electronic motor overload protection and ground fault protection. The VFD shall have a push button programming display for easy access to operation parameters. The VFD shall be protected on the primary side a breaker of the appropriate amperage. Overload capacity: 120% rated output current for one minute. Voltage Fluctuation: +10%, -15%. Sine wave, PWM, with full range, and automatic torque boost. Frequency Control Range: 0.5 to 500Hz. Frequency Accuracy: Digital, 0.01Hz, Analog, .1%. Motor overload protection, Instantaneous over current of 180% of rated output current. Over voltage at 820VDC if 460V input. Under voltage: user adjustable. Momentary Power Loss: up to 2 second ride through. Electronic Ground Fault. LED capacitor charge indicator. Input Phase loss alarm. Ambient temperature range of 0 to 50 degrees C. Humidity of 95% non-condensing.

G. Control Transformer

1. A control transformer shall provide 120 volt power to the pump station controls. The control transformer shall be protected on primary and secondary sides with appropriately sized fuses. No load other than the pump controls shall be supplied by the control transformer.

H. Secondary Control Circuit Breakers

1. Single-pole secondary distribution breakers with appropriate ratings shall supply power to each pump starter coil circuit, the control system and to other circuits as specified.

I. Main Panel Power and Motor Phase Monitor

1. The incoming power and each motor shall be protected by a phase loss/low voltage system dropout relay to de-energize the pump station control circuit or motor contactor if either a phase failure, phase reversal or low voltage condition occurs. If after attempted automatic re-starts the phase failure/low voltage alarm condition remains, the alarm must be manually reset. Individual motor overloads will also act as phase monitors

for each motor.

J. Corrosion Inhibiting Modules

1. Corrosion inhibiting modules shall be installed in all electrical enclosures in accordance with the manufacture's recommendations.

K. Control Logic

1. The system sequence controller shall be an industrial grade PLC with diagnostic LEDs for monitoring of discrete inputs and outputs. Not less than two additional analog inputs and outputs shall be standard for monitoring and control purposes. The PLC shall contain RS232 and RS485 communication ports for monitoring and programming purposes. The PLC shall contain an EEPROM, battery backed RAM and non-volatile memory for storage of critical configuration data. The PLC will have a high speed counter, clock and calendar function with year, month, day, hour, minute, and day of week.

L. Automatic Pressure Regulation Based On Variable Flow

1. The system controls shall be capable of changing the regulated downstream pressure while in operation, based on discharge flow or discrete input. The system controls shall also be capable of up to six, user adjustable pressure regulation set points based on discharge flow or one additional set point based on a discrete input. In addition to adjustment of downstream pressure, the controls shall be capable of up six pressure regulation algorithms to insure accurate pressure regulation regardless of regulated pressure, discharge flow or connected pump combination.

M. Alarms

1. Controls shall shut down the pump station and/or related components in the event of the following alarm conditions. The controls shall attempt to restart the system after alarm shutdown or loss of power to minimize loss of water. After a user adjustable number of attempts to re-pressurize the system, the controls will go into hard shut down and remain there until manually reset unless otherwise stated in description of operation on drawing.

2. Low discharge pressure cutout. Pressure remains 20 PSI below regulate set point for 240sec (adjustable).

3. High discharge pressure cutout. Pressure remains 11 PSI above regulate set point for 120sec (adjustable).

4. High or low voltage, loss of phase, or phase reversal. (Power alarm not adjustable)

5. Low water level cutout (soft alarm) re-sets at user defined level or (3) re-try (40sec. adjustable)

6. Low water level cutout (hard shutdown) instant shut off of pump system.

7. VFD fault and VFD bypass status.

8. Automatic Filter alarm. Filter flush to restore to clean screen psi differential (3) attempts. After 3rd, hard shutdown

9. Control Panel power alarm. Loss of control panel low voltage circuit power

10. Pipe fill Alarm, system unable to pressurize @ 1psi/ 10sec in 900sec.

11. Low inlet pressure alarm. Below set point for 30sec…adjustable (use with HC booster pumps only)

N. Operator Interface

1. Operator interface shall be a full color STN display unit mounted in the enclosure door. Operator interface shall be used for logical display of all system functions. The operator interface shall be NEMA 4 rated. The operator interface shall be touch sensitive with intuitive on-screen user instruction for ease of operator use. The use of buttons or keys or off-screen user instructions shall not be permitted. The operator interface shall be STN color display type with no less than 240 x 320 pixel resolution, with viewing area measuring not less than 7.5" diagonal. User memory for storing critical pump operation data shall not be less than required for up to 1 year of data.

2. The operator interface shall allow the user to view and modify all pertinent operation parameters. The operator interface shall incorporate password protection for modification of critical system parameters. The operator interface capabilities shall include but are not limited to the following:

   a. Overview screen showing pump system configuration. Screen shall show if each individual pump is enable or disabled, the number of hours on each pump, station full flow and pressure design criteria. Water harvesting specific graphics to show tank level in “inches” and “gallons”, and visual tank level gauge. Alternate water sources other than rainwater shall be displayed in total usage, user re-settable, and real time flow rate. Total harvested water used and total non-harvested water used shall be displayed.

   b. System screen with information on current regulation pressure, set-point, regulation pressure, System status, restarts remaining, VFD reference speed, pressure regulation method (VFD or EBV modes) and adjust settings button. Adjust settings button will allow

changing parameters etc. after entering password.

c. Settings menu to allow changes to pressure regulation settings, pipe saver mode, VFD manual mode, analog calibration, flow calibration, program or register settings.

d. Flow screen will display pressure in PSI, flow in GPM and total gallons pumped in thousands of gallons. Separate display for total gallons pumped since last reset.

e. Alarm status with time stamping, display of system conditions at shutdown and restart. Alarms will be displayed in red when activated and a separate listing will be displayed in green when the alarm is reset. Alarms will be logged to a compact flash disk allowing the service technician to upload data to a spreadsheet type program.

f. Full control of and capability of monitoring, adjusting and viewing any options present such as water level, inlet strainer, wye strainer, filtration, chemical injection, or liquid tank levels. Adjustment of automatic/manual pressure regulation set points.

g. Graphing capability for up to 1 full year detailing flow rate and pressure. Graphing function shall give option to graph and plot a point every minute. The graph function will be selectable by day, month and year as well as the time of desired graph. All data will be logged to a compact flash disk allowing the service technician to upload data to a spreadsheet type program.

h. Time of use lock-out screen shall allow user to group any or all motors/selected devices to only operate in a desired time frame. Multiple digital time clocks built into the touch screen allow for (3) different user groups.

O. Pressure Transducer

1. A solid state pressure transducer shall provide for each VFD and water supply and shall be a noise free, linear output proportional to discharge pressure. Transducer shall be solid-state, strain gauge type with integral voltage regulation and output accuracy not less than 0.25%. Transducer shall be constructed of stainless steel and rated for the pump station discharge pressure. If filtration is also selected a second transducer will be used to monitor downstream pressure differential for filter flush logic. Transducers to have an M12 wiring connector and be IP67 or higher rated.

P. Flow Sensor

1. A flow sensor shall be installed for each water supply, providing the pump station flow rate and total flow through the operator interface device. The

flow sensor shall be a six bladed design, which provides a low impedance signal proportional to the flow. The accuracy shall be plus/minus 2% of actual flow rate between flow velocities of 1-30 ft./sec. A flow meter run shall be included with a minimum of 5 pipe diameters straight run upstream and 2.5 pipe diameters downstream for proper meter accuracy. Flow sensor model must have internal noise filtering feature. Flow sensor wire must be encased in 1½" liquid tight conduit from sensor to enclosure.

Q. Cistern Liquid Level Sensor

1. The cistern shall be continuously monitored by an electronic pressure transducer, which will send a 4-20ma signal to the PLC. The reservoir level will be read on the Touchscreen operator interface and displayed in inches. The user shall be able to control the remote signal activation level by making the desired adjustments on the screen. When low (set point) level has been maintained for the pre-set period of time, a 120 VAC signal shall be sent to a dry contact relay in the pump station panel to activate the start signal for a fill pump or valve. Upon a rise in the reservoir level the signal will stop and the relay will drop out to stop the filling operation. Lake level wire terminal connections will be located in a J-box on the control panel exterior.

R. Float Switch

1. A float switches shall be provided to provide further protection of the pump. Float switches shall be set in cistern to stop pumping at 12-inches above pump inlet. .

2. Float Switch shall have appropriate manufacturer-supplied submersible wire within cistern for underwater operation. Float Switch wiring shall travel in conduit from cistern to Pump Control Panel.

3. Float switches shall be provided and installed for the following functions:

4. Turn off Irrigation Pump When water level is within 12-inches of the pump inlet. (Irrigation pump shall resume operation based on elapsed time of 30 minutes). (Switch located in the storage tank)

5. Float Switch shall be manufactured by Goulds, CentriPro line, sized for expected cistern depth, or approved equal.

2.16 PUMP CONTROL SKID AND MECHANICAL EQUIPMENT

A. Skid Construction

1. Pump station skid shall be formed from a single sheet of 3/8" or ¼" steel, continuous welded and smooth ground at all corners resulting in a seamless, one piece structure with rounded edges and corners. Two holes shall be located at each corner of the skid, on the side wall, for the purpose

of lifting the pump station. The skid shall be strategically reinforced underneath with structural channel iron to support pumps, manifolds, control enclosures and periphery. The skid shall be drilled and tapped for mounting of pumps, manifolds, tanks, relief valves and other equipment. All tolerances shall be sufficient to permit direct bolting of pump station components to skid. No slotted holes shall be permitted in the pump station skid and no nuts or bolt heads shall be permitted on the under- side of the skid. The skid shall be primed and painted per enclosed specification on both top and bottom. If a stainless steel or aluminum skid is selected, painting shall be noted on the drawings.

B. Fabricated Piping

1. All fabricated piping shall conform to ASTM specifications A53 for Grade B welded or seamless pipe. Discharge piping 8" and above shall be a minimum of Schedule 10. Discharge piping 6" and smaller shall be Schedule 40. All welded flanges shall be forged steel slip-on or weld neck type. All welded fittings shall be seamless, conforming to ASTM Specification A234, with pressure rating not less than 150 psi.

C. Drains

1. Drains are to be provided from any possible low point in the system and are to be equipped with 3/8 A or 1/4" brass valves.

D. Pump Check Valve

1. Pump check valve(s) shall be located near discharge of pump and are to hold back entire system pressure. System will not function properly without check valve. Check valve to be rated for min 150psi working pressure and be of the inline silent or poppet type.

E. Three-Way Control Valve

1. 2-inch brass motorized ball valve shall be placed in on pump skid to control operation of irrigation water source.

2. Brass motorized valve shall be Single-Pole Single-Throw (SPST) switch actuated by Pump Control Panel such that:

   a. Valve shall be opened to cistern water port if there adequate water in cistern.
   b. Valve shall be opened to well water port if low water in cistern. Valve shall return to cistern water upon cistern recovery to a safe level.

3. Brass motorized valve shall utilize 24 VAC operators to actuate ball valve (from Pump Control Panel).

4. Three-port brass motorized valve shall be as provided by Conservation Technologies, 2-inch size, or approved equal.

F. Isolation Valves

1. Each pump shall be isolated by means of a butterfly valve after the check valve and before the discharge manifold. The discharge manifold shall also have an isolation valve at the skid edge. Isolation valves shall be butterfly type with ten position lever for valves 4" and smaller or gear operators for valves 5" and larger, rated for 200 PSI WOG working pressure. Trim shall include stainless steel stem, bronze or nickel coated iron streamlined disk with full faced resilient seat design to eliminate need for flange gaskets. Valves smaller than 2" shall be threaded style ball valve.

G. Pressure Gauge

1. A pressure gauge shall be located on the discharge manifold for the purpose of measuring regulated, downstream pressure. Pressure gauge shall be 304 stainless steel case and bezel construction. Gauge shall be 3-4" diameter, liquid filled. Pressure sensing connection shall be 1/4" NPT lower gauge connection.

2.17 PUMP FILTRATION SYSTEM

A. The pump station shall be equipped with a filtration system to assure a clean water supply to the water distribution system. The filtration shall consist of individual barrels containing removable filter elements. Filter shall be self-cleaning and automatic back-flushing. Each removable filter element shall consist of a course screen in series with a fine screen. The fine screen shall be flushed periodically to remove accumulated debris.

B. Filter Screen Size to be 5 Micron

C. Flushing initiation shall be a timed interval, total gallons pumped, user adjustable, and a pressure drop/differential across the screen, also user adjustable whichever occurs first. Flushing control shall be governed by the pump station PLC. Separate flushing controls shall not be accepted.

D. Flushing action shall be initiated by an electronically actuated butterfly valve or adjustable solenoid. To assure tolerance to dirty water, electric butterfly valve shall open/close at a programmed rate to eliminate excessive pressure drop or pressure spike.

E. Operation: Water shall flow into the 316 stainless steel or composite filter body and through the 316 stainless steel filtering screen from the inside out allowing blocked contaminates to accumulate on the inside surface of the filtering screen. Differential pressure across the filtering screen shall be continuously monitored as the filter cake builds on the inside of the filtering screen. The differential pressure

across screen shall be monitored using a pressure transducer upstream and downstream of the filter assembly. Using a differential pressure switch is not acceptable. The pump station control logic shall have the capability of graphically tracking the pressure across the filter for troubleshooting purpose locally at the pump station through the touch screen operator interface device and through the remote monitoring and control software. When the differential pressure reaches an adjustable threshold (recommended at 7 psi) a flush cycle shall be initiated by the opening of the electric butterfly valve. The opening of the flush valve drops the pressure inside the drive chamber allowing flow to reverse through the suction scanner nozzles. The suction scanner nozzles transfer this reduced pressure at the nozzle location onto the inside of the filtering screen surface. This reduced pressure on the inside of the filtering screen creates a reversed flow through the filtering screen, pulling the containments off the screen, back through the suction scanner nozzles and out the flush valve. Once the nozzles have traversed and cleaned the entire screen surface, the flush valve shall close stopping the flush cycle.

F. The drive mechanism of the filter shall not consist of electric motor, or limit switches to return the drive mechanism to its start position. The drive mechanism shall allow the suction scanner nozzles to traverse across the screen and return to their start position, and if required, to continue this cycle indefinitely without interrupting the flush flow. A hydraulic motor directly attached to the suction scanner shall drive the suction scanner.

G. The filter screen element shall be 316 stainless steel with 5 micron openings. The filter housing and cover shall be manufactured from 316 stainless steel or composite and shall be manufactured to ASME standards but not stamped unless called for.

H. Filters shall be manufactured by VAF, Tekleen or equal.

2.18 UV DISINFECTION SYSTEM

A. Irrigation control and treatment skid shall contain UV (Ultra Violet) lamps to treat the water prior to entering the water distribution system. UV unit to contain 365 day lamp life counter and have an output of 30mj/cm2 @ 60% UVT @ 30 GPM and utilize a 254nm wave length. Housing shall be constructed of polished 304ss with an internal quartz sleeve. Max operating pressure to be 125psi. UV units require UVT% be met in order to properly disinfect water.

B. UV unit shall shut down pump station on UV alarm should there be a problem with UV unit. UV unit to contain a UV intensity monitor and display intensity on UV operator interface.

2.19 PUMP SKID ENCLOSURE

A. The pump station shall be totally enclosed by a modular type enclosure that is constructed of non-corrosive composite materials.

B. The composite enclosure shall completely enclose the pump station mounting base and be flush with pump station pad.

C. The pump station enclosure shall consist of the following:

1. Side panels, two sets of double doors and pitched roof panels formed from fiberglass reinforced composite material. This material will be a 32-lb density closed cell fiberglass reinforced polyurethane panel having the following physical properties.

Material Properties	**.05”**	**.75”**	**1.0”**
Tensile Parallel: strength	6,220 psi	4,298 psi	3,837 psi
Tensile Perpendicular: strength	186 psi	274 psi	343 psi
Shear: Strength	530 psi	641 psi	685 psi
Shear: Modulus	3,750 psi	5,376 psi	6,243 psi
Compression: Strength @ 2.5% strain	366 psi	454 spi	339 psi
Compression: Modulus	14,700 psi	18,154 psi	13,627 psi
Flex: Strength	6,813 psi	5,372 psi	5,669psi
Flex: Modulus	311,180 psi	217,520 psi	278,440 psi
Static Bending: Strength	6,813 psi	5,563 psi	6,422 psi
Static Bending: Modulus	378,770 psi	279,310 psi	286,450 psi
R-Value:	1.22F(ft^2)h /Btu	1.92F(ft^2) h/Btu	2.24F(ft^2) h/Btu
Coefficient of Linear Expansion:	1.33 X 10^-5 in/in/F	1.33 X 10^-5 in/in/F	1.33 X 10^-5 in/in/F
Mold/Fungi Test:	Passed Rating of 0	Passed Rating of 0	Passed Rating of 0

2. Corner posts, center posts and header beams shall be formed from structural composite profiles having UL 94 VO Flame Resistance Properties. The chart below is a typical listing of mechanical properties of the structural profiles utilized within the composite enclosures.

Mechanical Properties	**Unit**	**Value**
Tensile Strength	Psi	12,500
Tensile Modulus	Psi X 10^6	1.2
Flexural Strength	Psi	25,000
Flexural Modulus	Psi X 10^6	1.1
Compressive Strength - flatwise	Psi	34,000
Compressive Strength - edgewise	Psi	29,500
Shear Strength	Psi	13,000
IZOD Impact Strength	Ft. lb/in	9.6
Water absorption in 24 hrs	% by weight	.2
Specific Gravity		1.8

D. A header beam shall run from corner post to corner post on all sides of the enclosure. The header beam shall be chemically fused to the corner posts and center posts utilizing a Methacrylate structural adhesive. The composite framework is then attached to the skid utilizing the supplied mechanical hold-downs.

E. Each side panel shall have either a corner or center post on each side. Corner and center posts hold side panels in place from behind. Header beams hold side panels in place at the top and front.

F. The entire roof shall be removable without disturbing the remainder of the building. The roof panels shall sit on top of and bolt to the header beams. Bolts shall be spaced no farther than 20" apart around the lower flange of each roof panel. Removal of these bolts shall be the only obstacle to removing the entire roof. Two lifting points will be attached to the roof assembly for ease of removal. When two roof panels are joined together the mated pair is easily removed with a lifting strap and a boom. Removing the roof panels allows full access to pumps and motors from above.

G. One incandescent light fixture shall be mounted at least 54" above the floor. The fixture will be suitable for wet locations and a cage will protect the light bulb. The switch will also be suitable for wet locations and be mounted at the edge of the door giving access to the control cabinet. All wire will be protected inside ½" sealtite flexible conduit.

H. A fan shall be incorporated into one fixed side panel. The fan motor shaft shall be placed at least 48" above the top of the pump station skid. The fan shall have protective screening completely surrounding the blades and self-opening shutters on the outside of the panel. The fan shall be at least 18" in diameter and move at least 2800 cfm. The fan shall draw air from within the enclosure. A self-opening louvered panel shall be placed in a fixed side panel as far from the fan as possible. This louvered panel shall serve as air intake into the enclosure. An industrial thermostat will activate the fan.

I. Painting shall consist of a multi-step coating system including composite preparation for use of a two part ultraviolet insensitive Aliphatic Urethane finish having a total dry film thickness of not less than 5 mils. All exposed enclosure components including side panels, doors, roof panels, posts, headers, and mounting brackets shall be painted flat black.

2.20 STORAGE TANK

A. Tank shall be manufactured of pre-cast concrete meeting following standards

1. Cement used shall be Portland Cement which conforms to the "Standard Specifications for Portland Cement" of the ASTM Designation C150, latest revision and shall be Type I or II

2. Sand used shall be clean, hard, strong and durable particles, free of

chemicals; coatings or clay and other fine materials and shall meet the requirements of ASTM C33

3. Stone used shall conform with the above specifications for sand, size shall be ASTM C33 No. 57 (1 inch maximum) and in addition no particle shall be larger in size than three-fourths of the minimum clear spacing between reinforcing bars

4. Water used shall be potable, fresh, clean and free from detrimental amounts of alkali, oil, acid, organic matter and other deleterious substances.

5. Admixtures used shall conform to ASTM C260 for air entrainment and ASTM C494 for water reducers. Calcium chloride or salts shall not be used

B. Concrete mix design shall meet the following requirements:

1. Compressive Strength: 5,000 psi @ 28 days

2. Maximum Slump: 4 inches

3. Maximum Water/Cement Ratio (by weight): 0.45

4. Minimum Cement Content: 564 pounds /cubic yard

5. Air Content: 6%, + 1-1/2%.

6. Air entraining mixture required

C. All reinforcing bars shall be deformed type, new billet steel, conforming to ASTM A-615, Grade 60. Welded wire fabric shall conform to ASTM A-185 specifications for Welded Steel Wire Fabric.

D. Cistern shall consist of one (1) chamber tank to achieve required storage volume. Minimum total storage capacity of cistern shall be 8,000 gallons (nominal). Cistern shall be placed on a bed of transit-leveled crushed stone of 12 inches thick.

E. Service entrances shall be through manhole risers with covers at grade where indicated on Drawings:

1. Eccentric 30-inch diameter round manhole shall be provided for cistern outlet access

2. Provide Vented Cast-Iron Manhole cover for round manhole with "STORAGE" designation label by manufacturer

F. Concrete grade rings may be used as needed on top of flat top section in order to

align properly manhole cover to grade.

A. Cisterns shall have cast-iron ladder rungs integrated with concrete walls for cistern access (as shown on Drawings).

B. Cistern shall be designed and manufactured for H-20 loading with a minimum cover depth of 1 feet and maximum cover depth of 5 feet.

C. Concrete cisterns and manhole riser sections shall be manufactured by Old Castle, Model STORM CAPTURE or approved equal.

D. Cast-iron manhole cover shall be manufactured by Neenah Foundry Company or equivalent.

2.21 TANK SEALS FOR PIPES

A. Cisterns shall utilize flexible rubber connectors to seal between storm water pipes, conduits, pump discharge, and inside walls of cistern.

B. Rubber seals shall be installed as needed. All holes shall be pre-cast and to exact tolerances as necessary to connect to pipes and conduits as shown on Drawings.

C. Seals shall be NPC Kor-N-Seal or approved equal (4-inch pipe size or greater).

D. Seals shall be Link-Seal or approved equal (less than 4-inch pipe or conduit size)

2.22 CRUSHED STONE

A. Crushed stone shall be as specified in SECTION: EARTHWORK. Crushed stone shall be used under valve boxes.

2.23 SAND

A. Sand used for backfilling of trenches; under, around and over PVC lines shall be as specified in SECTION: EARTHWORK.

2.24 CONCRETE SLAB FOR PUMP ENCLOSURE

A. Standard concrete mix shall be in accordance with ASTM C150, ASTM C-33, and ASTM C-94 with a compressive strength (28 days) of 3,000 psi.

B. Concrete slab shall be 6-inches thick and be standard concrete mix with reinforcement. Size shall be as indicated on the drawings and as necessary to accommodate the pump enclosure.

PART 3 - EXECUTION

3.01 GENERAL

A. Before work is commenced, hold a conference with the Owner's Representative to discuss general details of the work.

B. Examine all contract documents applying to this Section noting discrepancies and bringing the same to the attention of the Owner's Representative for timely resolution.

C. All works indicated on drawings shall be provided whether or not specifically mentioned in the specifications.

D. If there are ambiguities between drawings and specifications, and specific interpretation or clarification is not issued prior to bidding, the interpretation or clarification will be made only by Owner's Representative, and compliance with the decisions shall be required. In the event the installation contradicts the directions given, the installation shall be corrected at no additional cost to Owner.

E. Verify dimensions and grades at job site before work is commenced. Do not proceed with installation of the irrigation system when it is apparent that obstructions or grade differences exist or if conflicts in construction details, legend or specific notes are discovered. All such obstructions, conflicts, or discrepancies shall be brought to the attention of the Owner's Representative.

F. Make all field measurements necessary for the work noting the relationship of the irrigation work to the other trades. Coordinate with other trades (landscaping and other site work trades).

G. During progress of work, a competent superintendent and all assistants necessary shall be on site. All shall be satisfactory to the Owner's Representative. The superintendent shall not be changed, except with the consent of the Owner's Representative, unless that person proves unsatisfactory and ceases to be employed. Directions given to the superintendent shall be binding.

H. At all times, protect landscaping, paving, structures, walls, footings, etc. from damage. Inadvertent damage to the work of another trade shall be reported at once.

I. Replace, or repair to the satisfaction of the Owner, all existing paving disturbed during course of work. New paving shall be the same type, strength, texture, finish, and be equal in every way to removed paving.

3.02 UNDERGROUND PIPE AND FITTINGS INSTALLATION

A. Using proper width trencher chain, excavate a straight (vertical) and true trench to a depth of 2-inch of pipe invert elevation.

B. Loam or topsoil encountered within the limits of trench excavation for irrigation mains and branch lines shall be carefully removed to the lines and depths as shown on the drawings and stockpiled for subsequent replacement in the upper 6 inches of the trench from which it is excavated. Such removal and replacement of the quantities of loam shall be considered incidental to the irrigation system and no additional compensation will be allowed therefore.

C. Pipe shall be laid on undisturbed trench bottom provided suitable base is available - no rock; if not, excavate to 2-inch below pipe invert and provide and install sand base or crushed stone upon which to lay pipe.

D. Backfilling shall be accomplished as follows: backfill material shall contain no foreign matter and no rock. Carefully place material around pipe and wire and tamp in place. Remainder of backfill shall be laid-up in 6-inch (maximum) lifts and tamped to compaction with mechanical equipment. Compact backfill in trenches to dry density equal to the adjacent undisturbed soil, and conform to adjacent grades without dips, sunken area, humps, or other irregularities. Frozen material shall not be used for backfill.

E. Make all solvent-weld joints in strict accordance with manufacturer's recommendations, making certain not to apply an excess of primer or solvent, and wiping off excess solvent from each connection. Allow welded joints at least 15 minutes set-up/curing time before moving or handling. When the temperature is above 80º F, allow connections to set minimum 24 hours before pulling or pressure is applied to the system. When temperature is below 80º F, follow manufacturer's recommendations. Provide and install for expansion and contraction as recommended. Wire shall be laid in same trench as mainline and at pipe invert (see Wire Installation).

F. Pipe shall have minimum 22 inches of COVER (excavate to invert as required by pipe size

G. Cut plastic pipe with handsaw or pipe-cutting tool, removing all burrs at cut ends. All pipe cuts are to be square and true. Bevel cut end as required to conform to Manufacturer's Specifications.

H. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the trench. At times, when installation of the piping is not in progress, the open end(s) of the pipe shall be closed by a watertight plug or other means. All piping, which cannot temporarily be joined, shall be sealed to make as watertight as possible. This provision shall apply during the lunch hour as well as overnight. Pipe not to be installed that day shall not be laid out. Should water enter the trench during or after installation of the piping, no additional piping may be installed or backfilled until all water is removed from the trench. Pipe shall not be installed when water is in the trench, when precipitation is occurring, or when the ambient temperature is at 40º F or below. Pipe installed at temperatures below 40º F shall be removed and replaced at no cost to the Owner. PVC pipe shall be snaked in the trench to accommodate for expansion and

contraction due to changes in temperature.

I. In installing irrigation pipe route the pipe as necessary to prevent damage to tree roots. Where trenching must occur near trees provide proper root pruning and sealing methods to all roots 1-inch and larger.

J. Maintain 6-inch minimum clearance between sprinkler lines and lines of other trades. Do not install sprinkler lines directly above another line of any kind.

K. Maintain 1-inch minimum between lines which cross at angles of 45 to 90 degrees.

L. Throughout the guarantee period refill trenches that have settled due to incomplete compaction.

M. Pulling of pipe will be allowed provided soil is suitable and specified depth of bury can be maintained.

3.03 ELECTRICAL WIRE CONDUIT INSTALLATION

A. Electrical conduit shall be installed in all non-soil areas, as well as for all above ground wiring where wire passes under or through walls, walks and paving to controller and rain sensor.

B. Conduit shall extend 18 inches beyond edges of walls and pavement.

3.04 PIPE SLEEVING INSTALLATION

A. Sleeving shall be installed wherever piping is going under hardscape areas where indicated on the drawings. Minimum cover over all sleeving pipe shall be 24 inches as shown on the detail.

B. Sleeving shall extend 18 inches beyond edges of walls and pavement. Prior to the installation of irrigation piping and wiring, the ends of all sleeving shall be field marked with a vertical wood stake extending above grade to allow field location at the time of irrigation installation.

C. Ensure all required sleeving is installed prior to starting pavement operations. Review all sleeve locations in the field to confirm that sleeves are properly located for the required irrigation pipe runs. In no case will sawcutting into newly installed pavements or jacking under new pavements be permitted to install sleeving which was not installed in proper sequence or in the required orientations or locations.

3.05 ISOLATION VALVE INSTALLATION

A. Install isolation valves per detail where indicated on the drawings. Install all isolation valves on a level crushed stone base so that they can be easily opened or closed with the appropriate valve wrench. Install specified valve box over each

isolation valve.

B. Check and tighten valve bonnet packing before valve box and backfill installation.

C. Provide and install thrust blocks for ring-tite valves as per detail.

3.06 WIRING INSTALLATION

A. Wiring shall be installed along with the mainline. Multiple wire bundles shall be cinched together at maximum 12-foot centers using plastic cable cinches and shall be laid beside, and at the same invert as, the irrigation lines. Sufficient slack for expansion and contraction shall be maintained and wiring shall at no point be installed tightly. Provide and install an additional 8 inches to 12 inches slack at all changes of direction. Wiring in valve boxes shall be a sufficient length to allow the valve solenoid, splice, and all connections to be brought above grade for servicing. This additional slack shall be coiled for neatness in the valve box. Each valve shall have a separate wire back to the controller.

B. All wire shall be laid in trenches and shall be carefully back-filled to avoid \ damage to the wire insulation or wire conductors themselves. In areas of unsuitable material, the trench shall have a 2 inches layer of sand or stone dust on the bottom before the wires are laid into the trench and back-filled. The wires shall have a minimum of 22 inches of cover (See Detail). Wire not to be installed that day shall not be laid out.

C. An expansion curl shall be provided and installed within 6 inches of each wire connection to a solenoid. Expansion curls can be formed by wrapping five (5) turns of wire around a 1-inch diameter or larger pipe and then withdrawing the pipe.

D. Service wiring in connection with drawings and local codes for low voltage service. All in-ground wire connections shall be waterproofed with 3M DBR/Y-6 splice kits. All splices shall be made in valve boxes (wire runs requiring splices between valve locations shall be provided and installed in splice box-valve box shall be used). Splice locations shall be shown on the record drawings.

E. Provide a complete wiring diagram showing wire routing for the connections between the controller, and valves. See section one for the inclusion of wiring diagram in operation and maintenance manuals.

3.07 CONTROLLER GROUNDING INSTALLATION

A. Grounding rod shall be driven into the ground its full length 12-feet from the controller and connected via a Cadweld or approved equal connection to #6 solid, bare copper wire. The copper wire is to be installed in as straight a line as possible, and if it is necessary to make a turn or bend, it shall be done in a sweeping curve with a minimum radius of 8 inches and a minimum included angle of 90 degrees. There shall be no splices in the bare copper wire. The top of the ground rod shall be driven below the ground surface. A 4-inch grated cover as

specified, set a minimum of 1-inch below grade, shall be placed over the ground rod and Cadweld or approved equal connection for periodic maintenance. Cover shall be installed on a minimum of 6 inches of 4-inch ADS corrugated polyethylene, perforated drainage pipe. Plate shall be installed 36 inches below grade with 50 lbs of Power Set or approved equal ground enhancement material spread evenly below the plate and 50 lbs of Power Set or approved equal ground enhancement material spread evenly above the plate in accordance with the manufacturer's requirements. Plates shall also be covered with a 4 inch grated cover as specified, set a minimum of 1-inch below grade, to facilitate drainage onto the plate. Cover shall be installed on a minimum of 36 inches of 4-inch ADS or approved equal corrugated polyethylene, perforated drainage pipe.

B. When tested, grounding grid shall have an earth resistance no greater than 10 ohms. If earth resistance is greater than 10 ohms, additional grounding rods and/or plates and enhancement material shall be added to system until desired test results have been meet. The minimum requirements of the NEC shall be met, which are:

1. a resistance reading of no more than 25 ohms or

2. a two electrode ground grid.

3.08 WELL PUMP INSTALLATION

A. Well pump shall be installed in new well per AWWA standards. Install downstream control equipment in valve boxes. Install well cap on well casing and hang pump on 3-inch Schedule 40 Steel pipe.

B. Set 7.5-hp pump in well with water inlet 150 feet below ground surface.

3.09 CISTERN INSTALLATION

A. Excavation for installation of the storage tank system shall be performed by personnel experienced in this procedure as indicated on the drawings. Care shall be taken to minimize the size of the excavation to the minimum outside dimensions required for proper installation. Tank shall be provided by the contractor.

B. Tank shall be installed in strict accordance with the manufacturer's installation instructions AND in accordance to all OSHA regulations.

C. All excess excavated material shall be disposed of by the Contractor on the property where designated by the Owner's Representative.

D. Topsoil shall be placed to a minimum depth of 12 inches below grade near disturbed area around the tank excavation.

E. Base of tank shall be installed on 2 inches of bedding sand, level and dry. Sand and native sub-grade material shall be compacted to a minimum of 95% proctor

density.

F. The excavation must be pumped and kept dry during installation.

G. The joints must be kept clean of foreign material while the sections are being drawn together.

H. All exterior tank walls, with the exception of the top of the tank, shall be covered with a non-woven geotextile filter fabric.

3.10 CHECK/TEST/START-UP/ADJUST

A. Pump System Testing:

1. Technical start-up of the pump system:

a. When the piping and electrical connections have been completed, the following services shall be performed by the manufacturer at no further cost to the Owner:

i Start-up pump system and pressurize irrigation system.

ii The Contractor shall conduct training (2 hours minimum) to familiarize the operator(s) with the station operation, maintenance and adjustments.

iii Adjust valve and pump on/off pressures and flows for optimum performance of the irrigation system.

iv Adjust pump system controller for optimum pump performance and efficiency.

v Monitor a partial cycle of the irrigation system.

2. Testing:

a. The complete pump system shall operate without undue vibration throughout the range of operating conditions. The pump shall be given a running test of normal start and stop operations under load. During such tests, the pump shall demonstrate its ability to operate without undue vibration and shall demonstrate without question its general fitness for service. All defects shall be corrected and adjustments made without expense to Owner(s). Tests shall be repeated until satisfactory results are obtained.

b. Test all lines in pump system under pressure for leaks. Repair all leaks and retest.

c. Furnish all necessary equipment to perform tests.

d. Review all maintenance and operating manuals section by section with Owner(s) personnel. Turn manuals over to the Owner's Representative.

3.11 ACCEPTANCE AND OPERATION BY OWNER

A. Upon completion of the work and acceptance by the Owner, train the Owner's Personnel in the operation of the system (provide minimum 7 day written notice in advance of test). Furnish, in addition to the record drawings and operational manuals, copies of all available specification sheets and catalog sheets to the Owner's personnel responsible for the operation of the irrigation system. Guarantee all parts and labor for a minimum period of one (1) year from date of acceptance.

3.12 CLEAN UP

A. Upon completion of all installation work remove all leftover materials and equipment from the site in a safe and legal manner.

B. Remove all debris resulting from work of this section.

C. Regrade, lightly compact, and replant around sprinklers where necessary to maintain proper vertical positioning in relation to established grade.

D. Fill all depressions and eroded channels with sufficient soil mix to adjust grade to ensure proper drainage. Compact lightly, and replant filled areas in accord with drawings requirements.

END OF SECTION

SECTION 02833

CAST-IN-PLACE CONCRETE RETAINING WALL

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This section covers design and construction of the cast-in-place concrete retaining wall complete, as shown on the drawings and as specified herein.

B. The Contractor shall furnish all labor, materials, tools and equipment and shall do all work to satisfactorily construct the cast-in-place concrete retaining wall, including foundation and bedding, supervision of backfill and compaction, clean-up and all incidentals necessary to complete the work.

1.02 RELATED WORK:

A. Section 01330, SUBMITTALS

B. Section 01570, ENVIRONMENTAL PROTECTION

C. Section 02350, EXCAVATION BORROW AND BACKFILL

D. Section 03100, CONCRETE FORMS

E. Section 03200, CONCRETE REINFORCEMENT

F. Section 03300, CAST-IN-PLACE CONCRETE

1.03 QUALITY ASSURANCE:

A. The quality of materials and the finished sections shall be subject to inspection by the Engineer. Walls shall be subject to rejection at any time if they fail to meet any of the specification requirements. Any sections, which are rejected, shall be promptly removed from the job site by the Contractor.

1.04 REFERENCES:

A. The following standards form a part of this specification, as referenced:

American Society for Testing and Materials (ASTM)

All standards included in Section 03200 Concrete Reinforcement

All standards included in Section 03300 Cast-in-Place Concrete

American Concrete Institute (ACI)

All standards included in Section 03200 Concrete Reinforcement

All standards included in Section 03300 Cast-in-Place Concrete

1.05 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

A. Six sets of shop drawings of the materials specified herein shall be submitted to the Engineer for review.

B. Six copies of the statement of materials constituting the design of mixes which satisfy the specified strength for each size aggregate as required by ASTM C94 shall be submitted to the Engineer within one week following award of the contract.

C. Provide one copy of the "Certificate of Delivery" for each load of concrete as it arrives on the site, under the provisions of ASTM C94.

PART 2 - PRODUCTS

2.01 CONCRETE:

A. Concrete shall have a minimum 28-day strength of 4000 psi.

B. Type II cement shall be used except as otherwise approved.

C. Aggregate shall be ¾-inch for walls less than 18-inches thick and 1-1/2-inch for walls greater than 18-inches thick.

2.02 STEEL REINFORCEMENT:

A. Steel reinforcement shall be Grade 60 and conform to ASTM A615 with a minimum of 2-inches of concrete cover over steel unless otherwise noted on the Drawings.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. The retaining wall shall be constructed to the lines and grades indicated on the drawings. .

B. Weep holes shall be provided as shown on the drawings to prevent build-up of hydrostatic pressure behind the wall.

C. All exposed surfaces shall be smooth and free of voids. Where boardform or formliners are required, contractor shall follow manufacturer's requirements.

END OF SECTION

PART II - MATERIALS

2.01 VINYL CLAD STEEL POSTS, RAILS AND BRACES

A. General

1. All fence pipe for posts, rails, and all braces and appurtenances shall be vinyl clad, schedule 40 round, seamless hot dip galvanized pipe conforming to ASTM-A-120-1, or approved equal.

2. All structural shapes shall be vinyl clad, and galvanized in conformance with ASTM Designation A123.

3. All vinyl clad materials shall be fusion bonded in accordance with ASTM-F668 Class 2B.

B. End, Corner and Pull Posts

1. Fence up to and including 5'-0" in height: 2.375"O.D. pipe, 3.65 lbs. per linear foot.

2. Fence over 5'-0" in height: 2.875" O.D. pipe, 5.79 lbs. per linear foot.

3. Fence over 10'-0" in height: 4.00" O.D. pipe, 9.11 lbs. per linear foot.
4. Maximum Spacing 10’-0” on Center.

C. Line Posts (10'-0" Maximum Spacing)

1. Fence up to 5'-0" in height: 1.90" O.D. pipe, 2.28 lbs. per linear foot.

2. Fence over 5'-0" in height: 2.375" O.D. pipe, 3.12 lbs. per linear foot.

3. Fence over 10'-0" in height: 2.875" O.D. pipe, 5.79 lbs per linear foot.

D. Gate Posts

1. Gate posts for single leaf gates six (6) feet or less in width: 2.875" O.D. pipe, 4.64 lbs. per foot min.

2. Gate posts for single leaf gates six (6) to twelve (12) feet in width: 4.00" O.D. pipe, 6.56 lbs. per foot.

E. Rails

1. All rails shall be 1.66" O.D. pipe weighing 2.27 lbs. per linear foot furnished in manufacturer's standard lengths of approximately 21'-0" with

outside sleeve type couplings, at least six (6) inches long for each joint – one (1) coupling in each five (5) to have expansion spring. Provide means for attaching rails securely to each corner, pull and end post. Rails shall form continuous brace from end to end of each run of fence.

F. Post Bracing Assembly

1. 1.66" O.D. pipe weighing 2.27 lbs. per linear foot (for horizontal braces). Provide at each side of corner and pull posts and at end posts for fence six (6) feet or higher.

2.02 CHAIN LINK FABRIC (VINYL CLAD)

A. Chain Link fence fabric shall be factory coated 6 gauge core wire (or 9 gauge in certain circumstances as indicated on the details) with a min .02 inch thick coating of plasticized polyvinyl-chloride applied by the fusion method over a thermoset plastic bonding agent. The bond shall exhibit equal or greater strength than the cohesive strength of the vinyl. All cut ends shall be coated with vinyl at the factory. Fabric shall be 1.5" mesh and black in color.

B. Top and bottom of fabric shall have knuckled selvage, both sides.

2.03 FITTINGS AND ACCESSORIES (VINYL CLAD)

A. All accessories shall be vinyl clad in accordance with paragraph 2.01 above, and galvanized in conformance with ASTM Designation A153.

B. Post Caps

Furnish and install tight fitting pressed steel or malleable iron caps, designed as a weather tight closure cap. Provide one (1) pass-through looped cap for each line post, and one (1) acorn style cape for each end or corner post. Where top rail is used, provide looped cap tops to permit passage of top rail.

C. Tension Bars

1. One (1) piece lengths equal to full height of fabric with minimum cross section of 3/16" x 3/4", conforming to ASTM Designation A123. Provide one (1) stretcher bar for each end post and two (2) for each corner and pull post.

2. Tension bands and brace bands, if utilized, shall be 7/8" x 12 gauge beveled, galvanized, sized to fit pipe sizes and furnished with galvanized fasteners. Galvanizing shall conform with ASTM Designations A123 or A153 as they pertain.

D. Rail Clamps

1. Rail clamps shall be standard clamps (boulevard clamps) furnished complete with fasteners with ASTM Designation A153.

E. Fabric Bands for Tying Fabric

1. Fabric shall be attached using a BAND-IT band and buckle system
2. Bands shall be 0.020" thickness, 200/300 series stainless steel ½" wide bands, with a minimum breaking strength of 850 lbs., ½" band capacity ear-loct design buckles to be manufactured with 0.050" thick material, 201/301 series stainless steel.

F. Fittings, lugs, clamps and other accessories shall be steel conforming to ASTM Designation F626 and galvanized in conformance with ASTM Designation A153.

2.04 ANCHORING CEMENT

A. Cement for anchoring posts in sleeves embedded in concrete walls shall be "POR-ROK", as manufactured by Hallemite (Lehn and Fink Industrial Products, Division of Sterling Drugs, Inc.), Montage, New Jersey, or approved equal.

B. "Sika Cola-Due" by the Sika Co.

C. "Five Star Grout" the Five Star Co.

2.05 CEMENT CONCRETE

A. Cement concrete for post footings shall conform to Section 03300 of these Specifications.

PART III - EXECUTION

3.01 POST INSTALLATION

A. Install new vinyl coated chain link fence in the location(s) shown on the Contract Drawings, and as approved by the Landscape Architect.

B. Excavation for post footings as herein before specified in Section 02300 of these Specifications, shall be in firm undisturbed or compacted soil. Post footing diameters vary according to post sizes required and are in accordance with attached details. Excavate hole depths six (6) inches lower than post bottom with bottom of posts set not less than thirty-six (36) inches below surface when in firm, undisturbed soil. Where ledge is encountered, the Contractor shall notify the Landscape Architect to determine method of installation. Payment for any

additional work required when installations are in ledge shall be in accordance with methods described in SPECIAL CONDITIONS of these Specifications.

C. Place concrete around posts in a continuous pour, tamp for consolidation. Check each post for vertical and top alignment and hold in position during placement and finishing operation. Crown the top of the concrete footings to pitch water away from posts.

D. Under bituminous pavements, tops of footings are to be finished smooth and are to pitch one (1) inch from the posts to the outside edge of the foundation.

E. In mower strip locations, form top twelve (12) inches square and finish to match mower strip with 1/4" pitch away from posts.

1. If applicable, top of fence footings at players' benches and cement concrete mower strips shall terminate six (6) inches below pavement finish grade.

3.02 FENCE ERECTION

A. Top and Bottom Rails

1. Top and bottom rails shall form a continuous brace from end to end of each fence run. In addition, all end and corner posts shall be braced to the nearest line post with center brace rails. Outside sleeve type top rail coupling shall be placed a maximum of twelve (12) inches from line posts.

B. Middle Rails

1. All chain link fencing ten (10) feet or more in height shall have a continuous middle rail.

C. Brace Assemblies

1. Furnish and install braces and appurtenances so posts are plumb when diagonal rod is under proper tension. All "tension" assemblies shall conform to ASTM 567 and the MASS DPW Standard Specifications Section M.8.09

D. Fabric

1. The fabric shall be installed on the "public" or "sports field" side of the fence.

2. All fabric shall be aligned so that the top row of the fabric mesh is tied to the top rail, and so that the bottom selvage of fabric mesh stands one (1)

inches above the finish grade of the lawns, pavements or concrete wall grade and that the bottom row of the fabric mesh is tied to the bottom rail.

3. Fabric shall be properly stretched and securely fastened to the posts and rails, and between posts the top and bottom of the fabric shall be fastened to the horizontal braces as herein specified, and approved by the Landscape Architect. Fabric shall be stretched uniformly taut and as tight as possible, true to line and grade and complete in all details. Install tension bars at corners.

4. The fabric shall be fastened to end and corner posts with tension bars and stretcher bar bands spaced at one (1) foot intervals.

E. Stretcher Bars

1. Thread through fabric and secure to posts with approved metal bands spaced not over twelve (12) inches O.C.

F. Fabric Bands

1. Fabric Bands shall be placed at the intervals indicated on the details and securely fastened to all fence posts.
2. All bands shall be pulled tight an raw ends of steel bands shall be secured in buckle by folding ear tabs around steel bands as per manufacturer's recommended installation procedure. No sharp edges shall protrude from band-it buckles. Band will be PVC coated, color to match fabric and framework.

G. Fasteners

1. Install nuts for tension band and hardware bolts on side of fence opposite fabric side unless directed otherwise by the Landscape Architect.

3.03 GATE FRAMES (WHERE APPLICABLE)

A. Gate frames shall be galvanized steel 1.90" O.D. standard weight pipe, 2.72 pounds per linear foot. Gates shall be fabricated using welded construction with all welds ground smooth and coated with 3.0 mil. thickness of cold galvanizing compound. Gates must be properly braced to eliminate any possible sagging condition. For gates over eight (8) feet in height, provide additional horizontal and vertical interior members to ensure proper strength.

B. Fabric shall be installed with hookbolts and tension bars on all four (4) sides and attached to gate frame at twelve (12) inches on center.

C. Hardware materials shall be hot dipped galvanized steel. All moveable parts (e.g., hinges, latch, keeper, and drop bar) shall be field coated with PVC touch-up paint, provided by the manufacturer.

D. Hinges shall be of sufficient structural strength and design to support gate leaf and to permit easy and trouble free operation. Non-lift-off type hinge design shall permit the gate to swing 180 degrees inward or outward in accordance with the Contract Drawings

E. All gates shall be equipped with a positive type latching device capable of retaining the gate in a closed position and have provision for padlock. Latches shall permit operation from either side of gate and must be approved by the Landscape Architect prior to the installation. Refer to details for latch device.

F. Gate keepers shall be provided for each gate leaf over five (5) feet wide. Gate keeper shall consist of mechanical device for securing free end of gate when in full open position.

G. Double gates: Provide drop rod to hold inactive leaf. Provide gate stop pipe to engage center drop rod. Provide locking device and padlock eyes as an integral part of the latch, requiring one padlock for locking both gate leaves.

H. Gate Installation

1. Check gate posts for vertical alignment and maintain in position during placement and finishing operations.

2. Set keeper, stops, sleeves into concrete.

3. Install gates plumb, level and secure for full opening without interference.

4. Attach hardware by means which will prevent unauthorized removal.

5. Adjust hardware for smooth operation.

3.03 FINISH PROTECTION

A. During the fence installation, care shall be taken to avoid damaging the vinyl clad or galvanized surfaces of the fence components. All scratches and abrasions shall be thoroughly corrected in a manner satisfactory to the Landscape Architect before final acceptance.

END OF SECTION

SECTION 02822

BALLFIELD BACKSTOP

PART I - GENERAL

1.01 SCOPE OF WORK

A. Under this Section the Contractor shall furnish all labor, materials, equipment and transportation required to furnish and install protective netting in compliance with the contract drawings and all requirements described herein.

B. In general, the protective netting is incorporated directly above the backstop on all sides.

1.02 REFERENCE STANDARDS AND SPECIFICATIONS

A. References herein to any technical society, organization, group or body are made in accordance with the following abbreviations:

1. ASTM American Society for Testing Materials

2. AWS American Welding Society

B. See the following sections for related work:

1. Section 02350 EXCAVATION BORROW AND BACKFILL
2. Section 02820 BVC CHAINLINK FENCING
3. Section 03300 CAST IN PLACE CONCRETE

1.03 QUALITY ASSURANCE

A. All fencing shall conform to the specifications of the Chain Link Fence Manufacturer’s Institute and as specified herein.

1.04 SHOP DRAWINGS

A. Shop drawings or manufacturer's specifications shall be submitted in accordance with the provisions of the Special Conditions Section of the Contract Specifications.

B. The Contractor shall submit complete manufacturer's shop drawings to the Owner’s Representative for approval. Such drawings shall show details for posts, rails, fabric, fittings, attaching hardware and all other necessary appurtenances.

C. No backstop fencing materials shall be procured by the Contractor until written approval is received from the Owner's Representative.

1.04 SAMPLES

A. Samples of all fence materials furnished under this Section shall be submitted for approval prior to the start of construction.

B. Samples of the cold galvanizing compound shall be submitted for approval in factory-sealed containers.

C. Submit the following samples in accordance with the provisions of the SPECIAL CONDITIONS.

1. Submit samples and descriptive literature of all items specified by the Engineer.

PART II - MATERIALS

2.01 POSTS, RAILS AND FRAMEWORK

A. All backstop pipe shall be black vinyl clad steel conforming to ASTM Designation A120, Schedule 40. All members shall be furnished in one-piece lengths for each section of backstop fencing.

B. Member sizes are as follows:

1. Posts shall be 4.00" O. D. pipe, weighing 9.11 lbs. per linear foot.

2. Rails for the backstop section shall be 1.66" O. D. pipe, weighing 2.27 lbs. per linear foot

3. Canopy frame shall be 1.90" O. D. pipe, weighing 2.72 lbs. per linear foot.

4. Truss rods shall be provided as required to support the structure and submitted via shop drawing from fence manufacturer for approval by Owner's Representative.

2.02 FENCE FABRIC

A. The fabric shall be woven black vinyl coated steel chain link conforming to ASTM Designation A491-63T in its entirety.

B. The fabric shall be supplied in the following sizes:

1. 6 gauge (0.192"), 1.5 inch mesh for general vertical uses

2. 9 gauge (0.148"), 1.5 inch mesh for canopy sections

C. All fabric shall be furnished with top and bottom selvage knuckled.

D. After fabrication, the fabric shall be thoroughly cleaned and given a clean organic coating by the complete immersion process. The coating shall be a minimum of 0.40 ounces per square foot of wire fabric with the weight of coating determined by the strip test specified in ASTM Designation A428-58T.

2.03 FENCE ACCESSORIES

A. Tension Bars and Bands

1. Tension bars shall be three-sixteenth (3/16) inch by three-quarter (3/4) inch galvanized steel conforming to ASTM Designation A123. 2.Tension bands shall be 7/8" x 12 gauge beveled, galvanized, sized to fit the backstop posts and framework and furnished with galvanized fasteners. Galvanizing shall conform to ASTM Designations A123 or A153 as they pertain.

3. Tension cables shall be 3/8" diameter galvanized 7-strand steel cable conforming to ASTM Designation A475, Common Grade. Accessories such as turnbuckles, thimbles, hooks, eyes and other fasteners shall be compatible for the required use per ASTM 567.

B. Fittings, Rail Clamps and Fabric Bands

1. Fittings, lugs, clamps and other accessories shall be steel conforming to ASTM Designation F626 and galvanized in conformance with ASTM Designation A153.

2. Rail clamps shall be standard clamps (boulevard clamps) furnished complete with fasteners, all conforming to the same requirements as for fittings above.

3. Fabric shall be attached using A-58 self-locking fabric bands as manufactured by Band-It Ties, or an approved equal.

C. Post Caps

1. Furnish and install tight fitting pressed steel or malleable iron caps, designed as a weather tight closure cap. Provide one (1) pass-through

looped cap for each line post, and one (1) acorn style cape for each end or corner post. Where top rail is used, provide looped cap tops to permit passage of top rail.

2.04 COLD GALVANIZING COMPOUND

A. Cold galvanizing compound shall be a single component zinc rich compound yielding a dry film of at least eighty-five percent (85%) pure zinc. Galvanizing compound shall meet or exceed the requirements of Federal Specifications MIL-P-21035, TT-P-641d primer for zinc rich compounds.

2.05 CEMENT CONCRETE

A. Cement concrete for post footings shall conform to Section 03300 of these Specifications.

2.06 EXCAVATION AND BACKFILL

A. Excavation and backfill for post footings shall conform to Section 02350 of these Specifications.

PART III – EXECUTION

3.01 LAYOUT

A. The Contractor shall layout the backstop and place wood stakes as required at post locations and then notify the Owner's Representative that the unit has been laid out. It shall be the Contractor's responsibility to offset the stakes installed by his Engineer and take extreme care not to disturb these stakes before incorporating them into his work. Layout shall include setting of wood stakes at 1st, 2nd, and 3rd base and home plate.

3.02 POSTS

A. The Contractor shall excavate for proposed reinforced foundations and post footings and shall inspect the excavation to ensure that surrounding areas of footing are stable and holding vertically.

B. Pour footings against undisturbed subsoil and onto compacted bottom of void. Set posts plumb and to the proper heights for assembly and place foundations.

C. Allow footings to cure sufficiently prior to assembly of backstops, and brace and stay all posts sufficiently until curing is adequate.

D. Under bituminous pavements, pitch tops of foundations one (1) inch away from posts.

E. Backfill and compact in no greater than eight (8) inch layers around foundations.

3.03 POSTS AND RAILS

A. All framework, rails, posts, shall be joined as detailed on the drawings, as specified under Section 7.01 of these Specifications, and as modified herein.

B. Rails at the front of canopy shall be fastened to the framework with fittings and ornamental post caps. At end and corner posts, the Contractor shall install three-quarter (3/4) inch by three sixteenth (3/16) inch galvanized steel tension bars to hold wire to tension bands or ties.

C. At all end, corner and line posts, the Contractor shall furnish and install 1/4" galvanized steel lugs welded to the pipe frame, as shown on the plans. These steel lugs shall be attached to receive collar ends bolted onto braces, struts, and rails and shall be bolted to the framework as indicated on the plans. All bolt ends shall be peened or prick-punched after tightening.

D. At existing backstops, after existing fabric has been removed, install another intermediate rail in the bottom panel. Tie at twelve (12) inches on center typically.

3.04 WELDING

A. Hood framing shall be strongly welded at all joints shown on the plans. Struts shall be welded to post and hood frame.

B. After the welding has been completed, the surfaces of all welds shall be thoroughly cleaned, wire brushed and coated with two (2) coats of liquid galvanize.

3.05 WIRE TENSION CABLES

A. The backstops shall be properly stayed horizontally, as shown on plan, with three-eighths (3/8) inch galvanized steel wire tension cables complete with necessary galvanized turnbuckles, hooks, eyes, bolts, etc. Cable to be fastened around galvanized malleable iron thimbles and wire rope clamps.

3.06 FABRIC

A. All fabric shall be installed by means of standard chain link stretching equipment.

The finished backstop shall be plumb, taut, true to line and grade and complete in every detail.

B. The fabric shall be fastened to all intermediate posts, all rails, and backstop framework with Band-It Ties, spaced every twelve (12) inches, with ties bent inward to prevent injury.

C. Tops and bottoms of fabric shall have knuckled selvages; and no twisted, knurled, exposed or cut metal wire fabric ends shall be permitted. Fabric sections shall be jointed as directed by the Owner's Representative, so that no selvages protrude out towards the playing field.

END OF SECTION

SECTION 02825

STEEL PICKET FENCE & GATES

PART 1 - GENERAL

1.01 SCOPE OF WORK

a. The work under this Section consists of furnishing and installing steel picket fence and steel picket gates with posts, sleeves and appurtenances, as shown on the drawings and as specified herein including all labor, materials and equipment necessary to finish the work complete in place.

b. Fence must meet all playground code requirements for picket spacing, etc.

1.02 REFERENCE STANDARDS

a. References herein to any technical society, organization, group or body are made in accordance with the following abbreviations:

ASTM American Society for Testing Materials

AWS American Welding Society

CPSC Consumer Product Safety Commission

1.03 SHOP DRAWINGS

a. The Contractor shall submit complete manufacturer's shop drawings which shall include the horizontal layout and vertical alignment for the proposed installation to the Engineer for approval. Field verify all post sleeve spacings prior to fabrication. No material may be ordered prior to receiving written approval from the Engineer.

1.04 SAMPLES

a. The Contractor shall supply representative samples, in factory-sealed containers, of the cold galvanizing compound (for touch up ONLY) and the finish paint and primer, if necessary. Also, provide samples of other fencing materials and hardware as the Engineer directs.

b. The Contractor shall submit finished samples of all parts of the fences for the Engineer's review and approval. The workmanship and finish of the completed fences shall equal the approved samples.

PART II - MATERIALS

2.01 STEEL MEMBERS

a. Posts shall be carbon steel structural tubing conforming to ASTM Designation A500.

1. Line posts shall be 2.5" x 2.5" x 1/4" thick steel tubing, weighing 5.40 lbs./ft.

2. End posts and corner posts shall be 3" x 3", 17 ga. steel tubing.

3. Gate posts shall be 3" x 3", 1/4" thick wall steel tubing.

4. Sleeves for fence posts shall be 3" x 3" x 1/2" thickness steel square tube weighing 20.88 lbs./ft.

5. Pickets shall be ¾" pickets.

b. Galvanizing:

1. Hot-dip galvanize all items under this section in compliance with ASTM A 123, ASTM A 153, or ASTM A 386. Provide minimum 1.5 oz./ft.^{2} zinc coating. Galvanize after fabrication.

2. Following galvanizing, each item shall receive surface grinding to remove lumps, sags or spikes resulting from the galvanizing process. The finished surface following grinding shall be hand smooth and without irregularities. Take care not to damage the galvanized surface coating.

c. Pickets, top and bottom rails and crossbars and hinge assemblies, called for on the drawings, shall conform to ASTM Designation A36.

d. Bolts, nuts, washers and any other fasteners shall conform to ASTM Designation A307.

e. Post caps shall be cast iron or steel in the sizes required, finished in conformance with all other fence elements. Caps shall be as manufactured by Julius Blum & Co., Inc., Carlstadt, New Jersey; Boundary Fence and Railing Systems, Inc. Richmond Hill New York; Monumental Iron Works, Inc., Baltimore, Maryland; or approved equal. All caps are to be coated with a minimum 3.0 mil thickness of liquid galvanizing compound by dipping.

f. All gates shall be equipped with a positive type latching device capable of retaining the gate in a closed position and have provision for padlock. Latches

shall permit operation from either side of gate and must be approved by the Landscape Architect prior to the installation

g. Double gates: Provide locking cane-bolt style drop rod to hold inactive leaf. Provide gate stop pipe to engage center drop rod. Provide locking device and padlock eyes as an integral part of the latch, requiring one padlock for locking both gate leaves.

2.02 FINISH

a. Cold galvanizing compound shall be a single component zinc rich compound yielding a dry film of at least 85% pure zinc. Galvanizing compound shall meet or exceed the requirements of Federal Specification MIL-P-21035, TT-P-641d primer for zinc rich compounds.

b. Finish color coating shall be Color Galvanized Black as provided by Duncan Galvanizing, Inc., or approved equal.

2.03 CEMENT CONCRETE

a. Cement concrete for footings and edgings shall conform with Section 03300 of these Specifications.

PART III - EXECUTION

3.01 FENCE FABRICATION, GALVANIZING FINISHING AND ERECTION

a. The fence sections shall be shop fabricated in strict conformance to the sizes and dimensions called for on the approved shop drawings and in accordance with these specifications, all as field verified by the Contractor.

b. All welding shall be by arc welding process conforming to the latest AWS Specifications. All welds shall be as designated on the drawings, shall be ground smooth to a neat finish and shall be watertight with care to minimize locked-up stresses and distortion due to hear. All welds shall be made on bare, clean metal equal to "white" metal.

c. After fabrications, all steel surfaces shall be thoroughly cleaned of all mill scale, rust, dirt, weld flux, weld splatter and other foreign matter by power wire brushing or sand blasting.

d. Prime and finish all materials in accordance with industry requirements. Galvanizing shall provide a visually acceptable substrate for applied coatings, and be free of lumps, globules, or heavy deposits which will interfere with intended use or esthetic appearance of materials.

e. Field erection of the fabricated fence sections shall be as called for on the drawings. Excavation for post footings shall conform to Section 2.04 of these Specifications. Fence posts shall be set plumb in cement concrete footings which shall be mixed and placed in accordance with Section 9.01 of these Specifications. The fence rails shall be parallel to the walk and the fence posts and pickets shall be set plumb, when the fence is erected into its final position.

g. Surfaces that are abraded or damaged during field erection or from which galvanizing compound has been damaged shall be thoroughly wire brushed and cleaned, removing all loose and cracked coating, after which the surface shall be painted with two (2) coats of the approved cold galvanizing compound.

3.02 TOUCHUP PAINTING

a. After erection, all rust spots, scratches or abrasions in the galvanized surface shall be repaired with finish surfacing treatments that are compatible with factory applied color galvanizing applications and satisfactory in all regards to the Engineer.

- - - END OF SECTION - - -

SECTION 02833

CAST-IN-PLACE CONCRETE RETAINING WALL

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This section covers design and construction of the cast-in-place concrete retaining wall complete, as shown on the drawings and as specified herein.

B. The Contractor shall furnish all labor, materials, tools and equipment and shall do all work to satisfactorily construct the cast-in-place concrete retaining wall, including foundation and bedding, supervision of backfill and compaction, clean-up and all incidentals necessary to complete the work.

1.02 RELATED WORK:

A. Section 01330, SUBMITTALS

B. Section 01570, ENVIRONMENTAL PROTECTION

C. Section 02350, EXCAVATION BORROW AND BACKFILL

D. Section 03100, CONCRETE FORMS

E. Section 03200, CONCRETE REINFORCEMENT

F. Section 03300, CAST-IN-PLACE CONCRETE

1.03 QUALITY ASSURANCE:

A. The quality of materials and the finished sections shall be subject to inspection by the Engineer. Walls shall be subject to rejection at any time if they fail to meet any of the specification requirements. Any sections, which are rejected, shall be promptly removed from the job site by the Contractor.

1.04 REFERENCES:

A. The following standards form a part of this specification, as referenced:

American Society for Testing and Materials (ASTM)

All standards included in Section 03200 Concrete Reinforcement

All standards included in Section 03300 Cast-in-Place Concrete

American Concrete Institute (ACI)

All standards included in Section 03200 Concrete Reinforcement

All standards included in Section 03300 Cast-in-Place Concrete

1.05 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

A. Six sets of shop drawings of the materials specified herein shall be submitted to the Engineer for review.

B. Six copies of the statement of materials constituting the design of mixes which satisfy the specified strength for each size aggregate as required by ASTM C94 shall be submitted to the Engineer within one week following award of the contract.

C. Provide one copy of the "Certificate of Delivery" for each load of concrete as it arrives on the site, under the provisions of ASTM C94.

PART 2 - PRODUCTS

2.01 CONCRETE:

A. Concrete shall have a minimum 28-day strength of 4000 psi.

B. Type II cement shall be used except as otherwise approved.

C. Aggregate shall be ¾-inch for walls less than 18-inches thick and 1-1/2-inch for walls greater than 18-inches thick.

2.02 STEEL REINFORCEMENT:

A. Steel reinforcement shall be Grade 60 and conform to ASTM A615 with a minimum of 2-inches of concrete cover over steel unless otherwise noted on the Drawings.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. The retaining wall shall be constructed to the lines and grades indicated on the drawings. .

B. Weep holes shall be provided as shown on the drawings to prevent build-up of hydrostatic pressure behind the wall.

C. All exposed surfaces shall be smooth and free of voids. Where boardform or formliners are required, contractor shall follow manufacturer's requirements.

END OF SECTION

SECTION 02850

STEEL HANDRAILS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. All of the Contract Documents, including the General and Supplementary Conditions and Division 0 – Bidding Documents, Contract Forms, and Conditions of the Contract and Division 1 – General Requirements, apply to the work of this Section.

B. Carefully examine all the Contract Documents for requirements which affect the work of this Section. The exact scope of this Section cannot be determined without a thorough review of all specification sections and other Contract Documents.

1.1 REFERENCES

A. The General Documents, as listed on the Table of Contents, and applicable parts of Division 1, GENERAL REQUIREMENTS, shall be included in and made a part of this Section.

B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this trade.

1.2 WORK INCLUDED

A. The work of this Section consists of all miscellaneous site metals and related items as indicated on the Drawings and/or as specified herein and includes, but is not limited to, the following:

1. Steel pipe handrails

B. Under work of this Section provide color finish for material items furnished under SITE IMPROVEMENTS Section.

1.3 RELATED WORK UNDER OTHER SECTIONS

A. The following items of related work are specified and included in other Sections of the Specifications:

1. Paving and Curbing

2. Site Improvements
3. Concrete

1.4 STANDARDS

A. The following standards including all current amendments form a part of these Specifications:

1. American Society for Testing and Materials (ASTM):

A36	Structural Steel
A53	Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless
A120	Pipe, Steel, Black and Hot-Dipped Zinc Coated (Galvanized), Welded and Seamless, for Ordinary Uses
A307	Carbon Steel Externally and Internally Threaded Standard Fasteners
A325	High Strength Bolts for Structural Steel Joints
A500	Cold Formed Welded and Seamless Carbon Steel Structural Tubing Rounds and Shapes

2. American Welding Society (AWS):
D1.1 Structural Welding Code

3. Steel Structures Painting Council (SSPC):
SSPC Surface Preparation Specifications

1.5 SAMPLES AND SUBMITTALS

A. At least thirty days prior to intended use, the Contractor shall provide the following samples and submittals for approval in conformance with requirements this specification. Do not order materials until Landscape Architect's approval of samples, certifications or test results have been attained. Delivered materials shall closely match the approved samples.

1. Shop Drawings: Submit three (3) copies of each detailed shop drawings for each item required to be fabricated or installed under work of this Section. Include plans, sections, and details as required to show completely materials, layout, jointing, clearances and connections for all items required. Shop drawings for handrails at stairs and at other site conditions requiring accurate dimensional relationships to as-built construction shall be prepared following a review and confirmation of as-built measurements and conditions for areas scheduled to receive miscellaneous metal items. Submit

shop drawings for the following:

a. All metal handrails and guardrails

2. Material Samples: Submit samples for each material for the following:

a. Railing tube material and finishes – submit one (1) sample

3. Manufacturer's Literature: Submit three (3) copies each of manufacturer's material descriptions and installation instructions for the following:

a. Non-shrink cement grout,
b. Sealant.

4. Finishing Schedule: Submit a complete schedule outlining all items to be color finished under work of this Section together with a breakdown of surface preparation techniques and primer and color finish materials to be applied.

PART 2 - PRODUCTS

2.1 STEEL PIPE HANDRAILS

A. Steel pipe for straight sections and for pipe sleeves shall be schedule 40 circular seamless steel pipe in accordance with ASTM A120.

B. Steel pipe for all railings with curved sections shall be Schedule 40, circular, seamless steel pipe in accordance with ASTM A53 requirements. Curves shall be formed to maintain uniform cross-section of pipe and to produce smooth and continuous alignments.

C. Square or rectangular steel tubing as required, shall conform to requirements for ASTM A500, Grade B, structural steel tubing. Wall thickness shall be one-eighth inch (1/8") or as detailed.

D. Steel hardware for designated structural purposes shall conform to ASTM A325 requirements for galvanized hardware.

E. Handrail steel pipe size shall be one and one-half inches (1.5") O.D. unless designated otherwise on the details.

F. Fabrication: Steel railings shall be fabricated in accordance with details, specifications and approved shop drawings. Steel fabrication shall be accomplished

using the highest standards of workmanship. Individual steel pieces shall be saw-cut, formed with "fish-mouth" joints, and shall be full seam welded, ground smooth and sanded to produce a high standard of surface smoothness. No grinding marks shall be visible in the finished work.

G. Welding shall be in conformance to AWS code.

H. Following fabrication, pipe rails shall be painted in accordance with metal finishing in Section 09900 PAINTING.

I. Cement grout for anchoring of railings shall be a pourable, quick-setting, non-metallic and non-shrinking hydraulic cement grout equal to "Por-Rok Cement" supplied by Waldo Bros., Roslindale, MA, "Rockite" as manufactured by Hartline Co., Cleveland, OH, "Wedj-Rok" as manufactured by Metalcrete Manufacturing Co., Cleveland, OH, or approved equal.

J. Sealants shall be polyurethane-based, one component, elastomeric sealants complying with Fed. Spec. TT-S-00230C, Class A, Type 2. Color to be selected by Landscape Architect. Sealants shall be non-sag, gun-grade type, equal to the following:

a. Vulkem 116, as manufactured by Mameko International, Cleveland, OH.

b. Sikaflex 1-a, as manufactured by Sika Corp., East Hartford, CT.

c. Dynatrol 1, as manufactured by Pecora Corporation and supplied by Waldo Brothers, Boston, MA.

K. Poured-in-place concrete footings, where required, shall conform to requirements for twenty-eight (28) day compressive strength 3,000 psi, three-quarter inch (3/4") aggregate concrete, in accordance with requirements of Section 03300, CAST-IN-PLACE CONCRETE.

PART 3 - EXECUTION

3.1 STEEL PIPE HANDRAILS

A. Fabricate and install steel pipe handrails in conformance to details, and approved shop drawings. Measure on-site conditions to receive rails prior to preparing shop drawings.

B. For railings longer than twenty feet (20'), provide an internal sleeved expansion coupling joint at approximately fifteen foot on center (15' o.c.) intervals, using a six inch (6") length of internally sleeved pipe welded to one side of joint.

C. At stairways and at other locations as directed, install railings within cored holes. Grout rails to within one-half inch (1/2") of top surface and provide a sealant joint to finished grade. Sealant color to be approved by Landscape Architect.

3.4 COLOR FINISHING

A. Color finishing as referenced shall include surface preparation, sanding, and color finishing system as outlined in Section 09900 PAINTING.

END OF SECTION

SECTION 02885

WATER SPRAY FEATURES

PART 1 - GENERAL

1.01 SCOPE OF WORK

a. Under this Section, the Contractor shall be responsible for the installation of a series of water play features, water piping, and associated with the construction of the "Water Play Area". All work shall be performed as indicated on the Contract Drawings and Specifications and include every aspect of work as obvious or implied and necessary to make the work complete and fully operational.

b. The water play features and equipment vault with mechanical controls shall be as manufactured by **Vortex Aquatic Structures International Inc.** 328 Avro St. Montreal, Quebec H9R 5W5, 1-877-5VORTEX, or approved equal that meets the construction material and warranty conditions offered by Vortex. The backflow preventer shall be furnished and installed as stipulated in Section 02510 of the Contract Documents.

c. The Contractor shall be required to install all of the manufactured equipment and water play features, all water piping and the independent features, and all footings/foundations associated with the work.

d. The Contractor performing all of the plumbing related work of this Section shall be a MA Licensed Master Plumber.

e. Contractor shall laminate a system start-up and shutdown instruction sheet and mount inside the door of the controller cabinet.

1.02 RELATED WORK

a. As specified under Section 02510 of these Specifications, the Contractor shall be responsible for the installation of an extended 3" water services to be connected to the equipment vault referenced above.

b. For the requirements of the above ground backflow cabinet, refer to Section 02515 of these Specifications.

PART II - MATERIALS

2.01 MATERIALS

a. Manufactured Equipment and Features

The following items shall be as manufactured by Vortex or approved equal. Approved equal shall have stainless steel manifold, stainless steel nozzles and spray heads and components with brass fittings and a 25 year warranty on all stainless steel parts.

ZONE	KEY ID	SPRAY FEATURE NAME	QTY	GPM (EACH)	TYPE
1(3), 3(1)	A	Jet Stream VOR-7512	4	2-3	Family
1,2,3	B	Activator	3	N/A	N/A
1,2,3	C	Magic Mist No. 2 VOR-8099	3	6-9	Toddler
1	D	Ground Geyser VOR-301	1	5-10	Family
2	E	Rooster Tail VOR-303	1	10-15	Toddler
2	F	Ground Gusher VOR-0300	1	12-35	Family
2	G	Water Tunnel No. 1 VOR-304	1	25-40	Family
3	H	Water Jelly No. 3 VOR-7032	1	12-35	Family
	TOTAL GALLONS PER MINUTE (GPM)			17-174	

b. Piping

1. CLDI pipe shall be as sized on the drawings and details, refer to Section 02080.

c. Cement Concrete

1. Cement concrete for use in water play feature foundations and footings shall conform to Section 03300 of the Contract Specifications.

d. Sand

1. Sand Borrow shall conform to Section 02350 of the Contract Specifications.

e. Thrust Blocks

1. Concrete thrust blocks shall be installed in locations as indicated or as ordered by the Engineer. Installation of thrust blocks shall include furnishing and placing the concrete and any additional excavation as required. Straps in conjunction with thrust blocks shall be furnished and installed where shown on the plans or directed by the Engineer.

PART III - EXECUTION

3.01 PIPE AND FITTINGS

a. The installation and backfilling of all pipe, fittings and other related items shall be installed and tested in conformance with the requirements set forth in these specifications. Pipe shall be set with a minimum cover of 24" above the invert of the pipe. All pipe shall be pitched to drain by gravity back to the equipment vault.

b. Pour all concrete foundations and footings to the dimensions indicated on the attached manufacturer's details and in conformance with Section 03300 of these Specifications.

c. Install all manufactured items in strict conformance with the requirements of the manufacturer and as directed by the City Representative.

d. The installation of the primary water service to the equipment vault shall be performed in strict conformance with Specifications.

3.02 TRAINING

a. Representatives of the water play equipment manufacturer shall be required to present a seminar to City representatives for the purposes of explaining operation, maintenance and troubleshooting techniques.

b. At project completion, provide complete operations and maintenance manuals for all water spray components to the City Representative.

c. The Contractor is responsible for laminating and mounting a start-up and shutdown instructions sheet for all controls inside the control cabinet.

3.03 SYSTEM START-UP AND SHUT DOWN

a. The General Contractor shall be responsible for the start-up and shut down of the water spray park system during the calendar years 2013 and 2014. To this end, the system must be successfully started up upon completion of the work of this contract and then again during the spring of 2014 for summer operation. Any items not functioning properly shall be repaired or replaced to the satisfaction of the City. The Contractor shall also be responsible for the complete winterization of the system in 2013.

- - - END OF SECTION - - -

0300.4000

Please refer to PART 1: VORTEX GENERAL CLAUSES for all Play Product construction and installation information.

1.0 Play Product Specifications:

1.1. **Play Product Structure:** The Ground Gusher VOR-300.4000 shall be constructed of 304/304L stainless steel with an outside diameter of 4□" (11.4cm). The brass spray cap shall be fastened to the gusher body using tamper-resistant fasteners. Tamper resistant PVC winter cap shall be included. The anchoring system shall have an integrated levelling system facillitating installation and a plumb finished to the activity deck surface. Ground Sprays can be fitted with several interchangeable compatible spray head styles however, The spray zone layouts between the different products must be similar or must be planned to accommodate the various spray effects. When multiple ground sprays are plumbed together on a single water line, the connected ground sprays must have similar hydraulic requirements.

1.2. **Overall play product dimensions:** The overall height of the Play Product shall be 0" (0 cm) above ground.

1.3. **Play Product Interactivity:** Users can feel the more powerful water spray near the ground, and lighter pressure near the top of the gusher.

1.4. **Hydraulic Activity/Components:** The spray cap shall have a thirty-six (36)-hole spray pattern angled at 5□from vertical so that multiple streams spray water straight up from a concentrated circle.

1.5. **Hydraulic Requirements:** The hydraulic requirements shall be 12-35 gpm (45-132 lpm) @ 5-15 psi (0.3 – 1 bar).

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0301.4000

Please refer to PART 1: VORTEX GENERAL CLAUSES for all Play Product construction and installation information.

2.0 Play Product Specifications:

2.1. **Play Product Structure:** The Ground Geyser VOR-301.4000 shall be constructed of 304/304L with an outside diameter of 3" (7.62cm). The brass spray cap shall be threaded into the geyser body using a tamper-resistant tool. Tamper resistant PVC winter cap shall be included. The anchoring system shall have an integrated levelling system facillitating installation and a plumb finished to the activity deck surface.

2.2. **Overall play product dimensions:** The overall height of the Play Product shall be 0" (0 cm) above ground.

2.3. **Play Product Interactivity:** Users can touch the soft frothy water falling down in contrast to the more powerful streams spraying up from the centre.

2.4. **Hydraulic Activity/Components:** The spray cap shall have a ten (10)-hole spray pattern angled at 5□(degrees) from vertical so that multiple streams spray water out at symmetrical angles forming an elegant fountain effect.

2.5. **Hydraulic Requirements:** The hydraulic requirements shall be 5-10 gpm (19 – 38 lpm) @ 5-10 psi (0.3 – 0.7 bar). Low consumption nozzles that minimize water usage while maximizing spray effects are also available.

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0303.4000

Please refer to PART 1: VORTEX GENERAL CLAUSES for all Play Product construction and installation information.

3.0 Play Product Specifications:

3.1. **Play Product Structure:** The Rooster Tail VOR-303.4000 shall be constructed of 304/304L stainless steel with an outside diameter of 4□" (11.4cm). The brass spray cap shall be fastened to the body using tamper-resistant fasteners. Tamper resistant PVC winter cap shall be included. The anchoring system shall have an integrated levelling system facillitating installation and a plumb finished to the activity deck surface. Ground Sprays can be fitted with several interchangeable compatible spray head styles However, the spray zone layouts between the different products must be similar or must be planned to accommodate the various spray effects. When multiple ground sprays are plumbed together on a single water line, the connected ground sprays must have similar hydraulic requirements.

3.2. **Overall play product dimensions:** The overall height of the Play Product shall be 0" (0 cm) above ground.

3.3. **Play Product Interactivity:** Users can enjoy the far-reaching double-fan spray effect of the rooster tail.

3.4. **Hydraulic Activity/Components:** The spray cap shall have a thirteen (13) hole- pattern angled at 33□and 45□from the vertical divided into two (2) rows. The upper row shall consist of seven (7) holes equally spaced and angled at 33□ The lower row shall consist of six (6) holes equality spaced and angled at 45□, thus creating a fan-like spray pattern.

3.5. **Hydraulic Requirements:** The hydraulic requirements shall be 10-15 gpm (38-57 lpm) @ 5-10 psi (0.3 – 0.7 bar).

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0304.0000

Please refer to PART 1: VORTEX GENERAL CLAUSES for all Play Product construction and installation information.

4.0 Play Product Specifications:

4.1. **Play Product Structure:** The Water Tunnel No.1 VOR-304.0000 shall be constructed of 304/304L stainless steel structural tubing with an outside diameter of 1.9" (4.8cm) and a wall thickness of .109" (.28cm). It shall have eight (8) equally spaced 3" (7.6cm) diameter stainless steel spray head housings welded to it. Each spray head housing shall be fitted with a spray cap assembly consisting of a brass locking ring and an adjustable brass spray sphere. All nozzle systems shall be free of finger entrapment hazards. The Embedded anchoring and leveling system shall be used.

4.2. **Overall play product dimensions:** The overall height of the Play Product shall be 0" (0 cm) above ground.

4.3. **Play Product Interactivity:** Users can run under the arch created by the water sprays to enjoy the mist and experience the feeling from the powerful water jets spraying up compared to the softer sprays falling down.

4.4. **Hydraulic Activity/Components:** The water effect from each spray head shall produce a single soft stream adjustable from the vertical position to a maximum of 25□from vertical. Rotating the adjustable spray nozzle 90□from the vertical position sets the spray head to its water-tight winterized position.

4.5. **Hydraulic Requirements:** The combined hydraulic requirements of all eight (8) spray nozzles shall be 15-25 gpm (57– 95 lpm) @ 5-10 psi (0.3 – 0.7 bar). Low consumption nozzles that minimize water usage while maximizing spray effects are also available.

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0611.2008

Please refer to PART 1: VORTEX GENERAL CLAUSES for all Play Product construction and installation information.

5.0 Play Product Specifications:

5.1. **Play Product Structure:** The Bollard Activator VOR-611.2008 shall be constructed of 304/304L stainless steel structural tubing with an outside diameter of 4□" (11.4cm) and a wall thickness of 0.120" (3mm). The activator shall have no moving parts and run on a low voltage electrical supply. A Piezo Electronic Module to be used as interface for processing user input activation. The activation cap shall consist of a high impact-resistant protective cap. The protective cap shall be constructed of Aluminum Powder Coated Body with a 316 Stainless Steel Button integrated and shall be secured in place using tamper-resistant fasteners. The SAFESWAP™ anchoring and leveling system shall be used.

5.2. **Overall play product dimensions:** The Bollard Activator shall have an overall height of 39” (99cm) above the final grade.

5.3. **Play Product Interactivity:** The Bollard Activator shall be the direct interface between the users of the aquatic play area and the aquatic Play Products. The pre-programmed sequences of the aquatic Play Products shall be activated only when the touch-activated sensor cap on the Bollard Activator is touched by the user. The Bollard Activator has a sound and an led light activation signal.

5.4. **Hydraulic Activity/Components:** not applicable

5.5. **Hydraulic Requirements:** not applicable

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7032.4000

Please refer to PART 1: VORTEX GENERAL CLAUSES for all Play Product construction and installation information.

6.0 Play Product Specifications:

6.1. **Play Product Structure:** The Water Jelly No. 3 VOR-7032.4000 shall consist of three (3) Water Jelly spray head bodies hydraulically connected together with a stainless steel distribution manifold centered with the array of spray heads. Each spray head body shall be constructed of 304/304L stainless steel structural tubing with an outside diameter of 3□" (8.9cm) and a wall thickness of .216" (5.4mm). The brass spray head shall be threaded into the spray head body using a tamper-resistant tool. Tamper resistant PVC winter caps shall be included. The Embedded anchoring and leveling system shall be used.

6.2. **Overall play product dimensions:** The overall height of the structure shall be 12.2" (31cm)

6.3. **Play Product Interactivity:** Creates soft, laminar sprays with a unique texture that even young users can touch. Cones of water start small and gently grow out and flows over in soft, inviting cascades.

6.4. **Hydraulic Activity/Components:** Each spray head shall produce an inverted laminar bell spray effect.

6.5. **Hydraulic Requirements:** The hydraulic requirements shall be 30-35 gpm (114 – 132 lpm) @ 1-2 psi (0.07 – 0.14 bar).

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7512.0000

Please refer to PART 1: VORTEX GENERAL CLAUSES for all Play Product construction and installation information.

7.0 Play Product Specifications:

7.1. **Play Product Structure:** The Jet Stream VOR-7512.0000 shall be constructed of 304/304L stainless steel structural tubing with an outside diameter of 3" (7.6cm). The lead-free brass spray cap shall be threaded into the stainless steel spray head housing using a tamper-resistant tool. Tamper resistant PVC winter cap shall be included. The Embedded anchoring and leveling system shall be used.

7.2. **Overall play product dimensions:** The overall height of the Play Product shall be 0" (0 cm) above ground.

7.3. **Play Product Interactivity:** Creates visual interest as a concentrated jet of water sprays up in a sleek Jet Stream.

7.4. **Hydraulic Activity/Components:** The lead-free brass spray cap shall have a single ¼" (6mm) spray hole projecting a vertical stream.

7.5. **Hydraulic Requirements:** The hydraulic requirements shall be 2-3 gpm (7.6 – 11.3 lpm) @ 5-10 psi (0.4 – 0.7 bar).

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8099.4000

Please refer to PART 1: VORTEX GENERAL CLAUSES for all Play Product construction and installation information.

8.0 Play Product Specifications:

8.1. **Play Product Structure:** The Magic Mist No 2 VOR-8099.4000 shall be constructed of 304/304L stainless steel with an outside diameter of 4□" (11.4cm). The lead free brass spray cap shall be fastened to the body using tamper-resistant fasteners. The anchoring system shall have an integrated levelling system facilitating installation and a plumb finished to the activity deck surface. The Magic Mist No 2 shall have three (3) nozzles inserts spaced equidistant across the diameter. All nozzles are to be flush with the surface to eliminate finger entrapment and protrusion hazards. Tamper resistant winter cap shall be included. Ground Sprays can be fitted with several interchangeable compatible spray head styles However, the spray zone layouts between the different products must be similar or must be planned to accommodate the various spray effects. When multiple ground sprays are plumbed together on a single water line, the connected ground sprays must have similar hydraulic requirements.

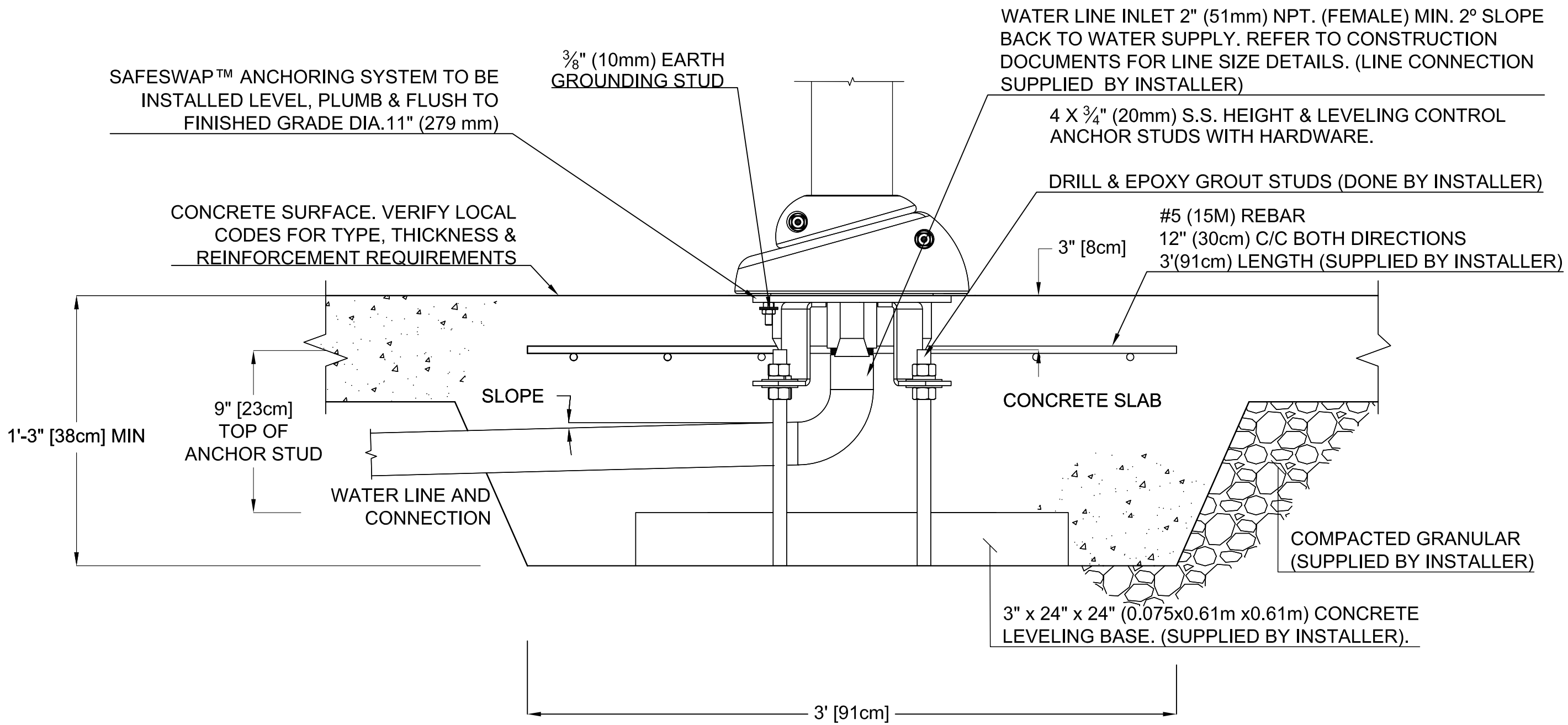
8.2. **Overall play product dimensions:** The overall height of the Magic Mist No 2 body shall be 6" (15cm).

8.3. **Play Product Interactivity:** Users can enjoy the refreshing, breezy sensation from the soft, fine sprays of the Magic Mist.

8.4. **Hydraulic Activity/Components:** Each nozzle shall produce a particularized mist effect.

8.5. **Hydraulic Requirements:** The combined hydraulic requirements of all three (3) spray nozzles shall be 3-6 gpm (11-23 lpm) @ 10-25 psi (0.7 – 1.7 bar).

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SAFESWAP N° 1 (Construction Detail)
LARGE

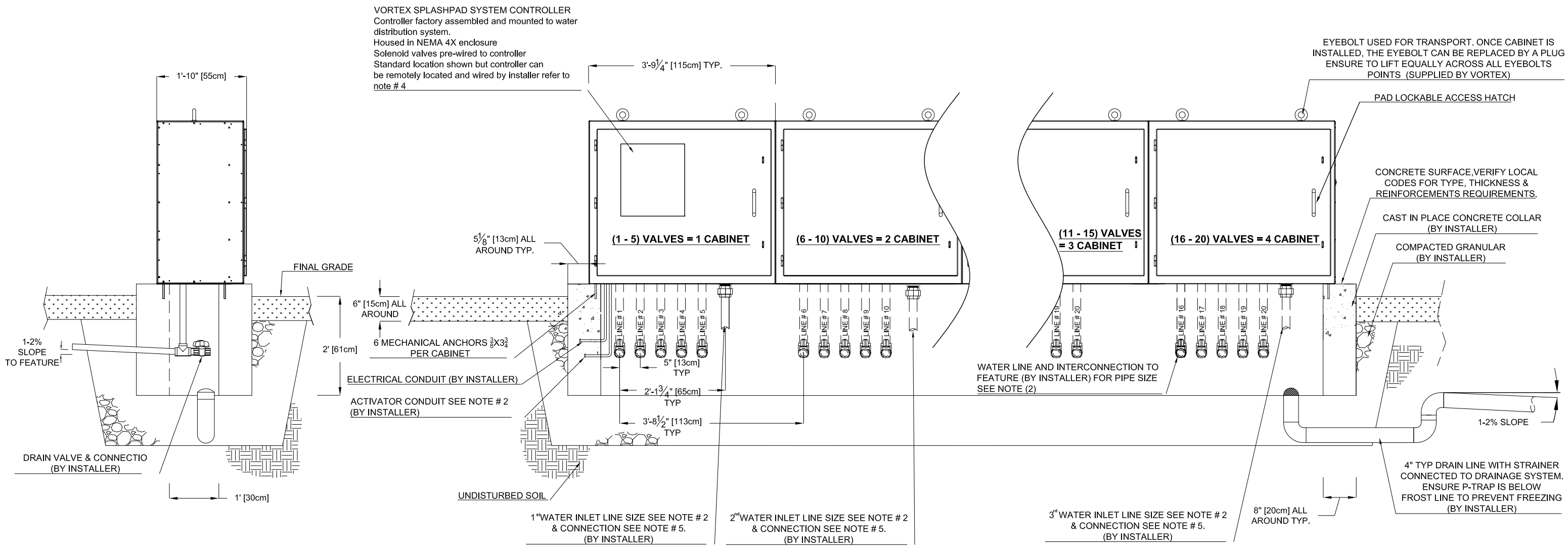
PRODUCT NAME: SAFESWAP Nº1	PRODUCT INFORMATION		
PRODUCT NUMBER: 55000.0430	DATE: 04/06/12	SHEET NO: 1/1	11"x17" SHEET SIZE

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NOTE:

1. A COMMON NEUTRAL MAY BE USED FOR UP TO TEN ELECTRIC VALVES FOR REMOTE LOCATION CONTROLLER.
2. SEE PIPING AND ELECTRICAL SCHEMATIC DETAIL.
3. REFER TO SPECIFICATION FOR ADDITIONAL INFORMATION.
4. IF CONTROLLER IS REMOTE LOCATED, CONDUCTORS # 18 AWG AT 10' LONG PROVIDED FOR THE CONTROLLER AND JUNCTION BOX BY VORTEX. FOR QUANTITY SEE PIPING AND ELECTRICAL SCHEMATIC DETAIL. GROUNDING OF JUNCTION BOX DONE BY INSTALLER.
5. WATER INLET CAN BE 1x2" ON FIRST CABINET, 2x2" WITH 1 ON FIRST AND 1 ON SECOND CABINET OR 1x3" ON LAST CABINET. 2" FEMALE NPT CONNECTION OR 3" FLANGE CONNECTION INSIDE COMMAND CENTER IS PROVIDED BY VORTEX.
6. WATER OUTLETS ARE FEMALE NPT CONNECTIONS INSIDE THE COMMAND CENTER.
7. BY INSTALLER/BY CONTRACTOR MAY REFER TO SERVICE PROVIDERS OTHER THAN THE EQUIPMENT MANUFACTURER.PLEASE REFER TO PROJECT SPECIFICATION FOR DETAILS OF RESPONSIBILITY.

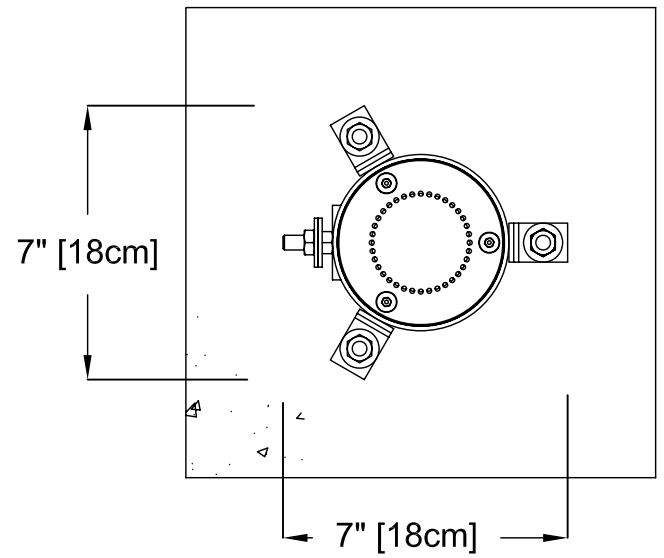


PRODUCT NAME: ABOVE GRADE CARBON STEEL COMMAND CENTER WITH INTERVALS 1-5 POSITIONS			
PRODUCT NUMBER: D1700.0000R01	DATE: 12/14/15	SHEET NO: 1/1	11"x17" SHEET SIZE

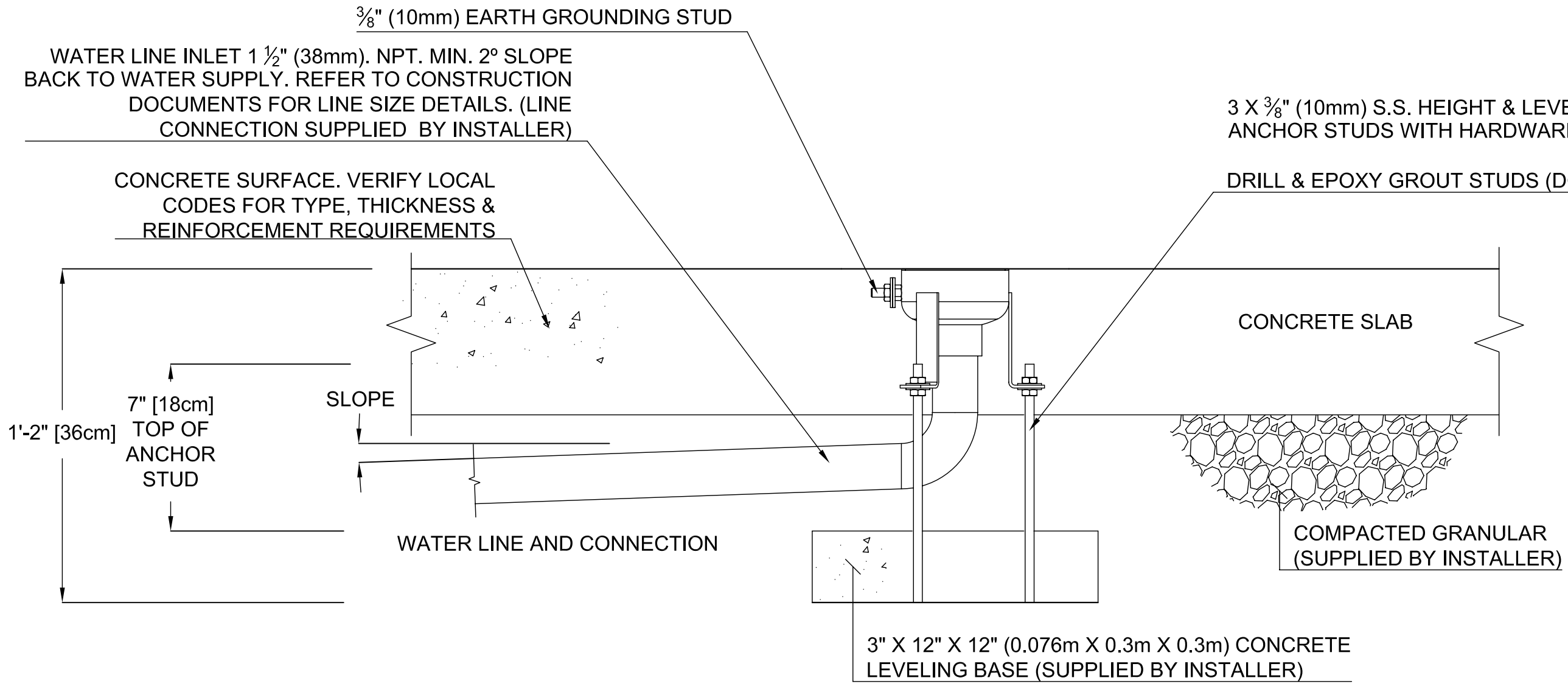
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PLAN VIEW



FRONT ELEVATION VIEW



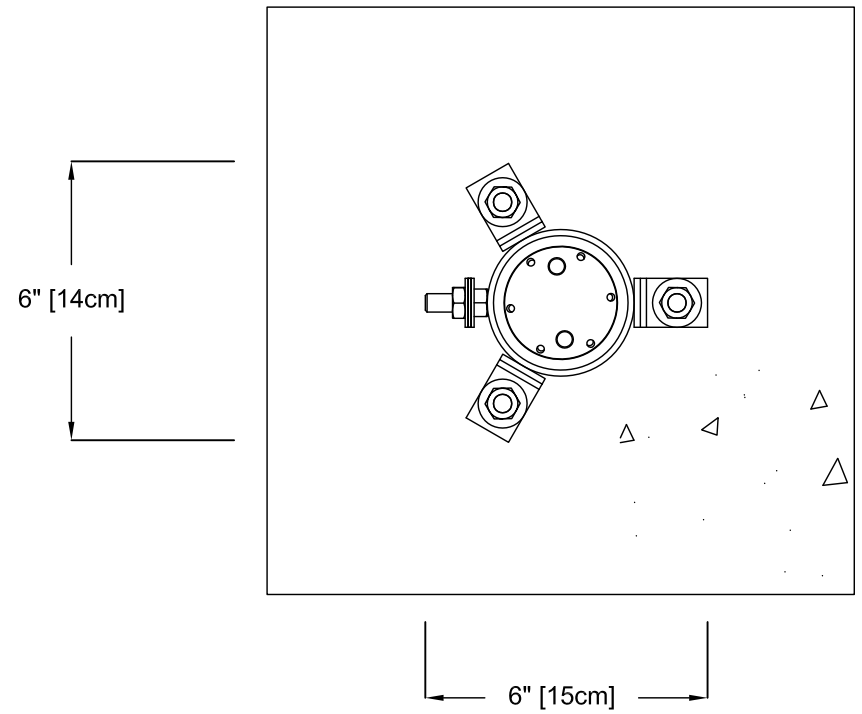
VOR-0300.4XXX GROUND GUSHER (Construction Detail)

PRODUCT NAME: GROUND GUSHER	PRODUCT INFORMATION		
PRODUCT NUMBER: VOR-0300.4XXX	DATE: 06/18/09	SHEET NO: 1/1	11"x17" SHEET SIZE

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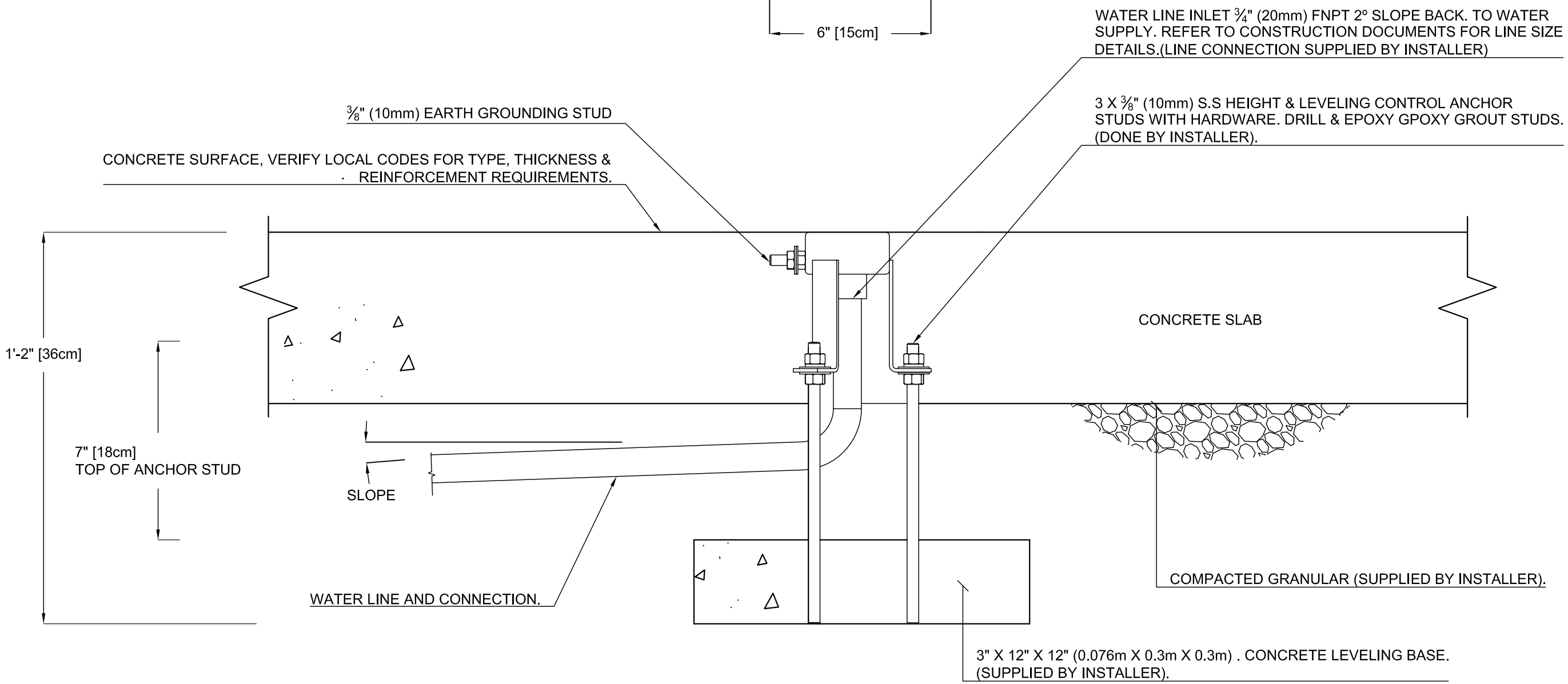
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PLAN VIEW



NOTE:
"BY INSTALLER/BY CONTRACTOR "MAY REFER TO SERVICE PROVIDERS OTHER THAN THE EQUIPMENT MANUFACTURER. PLEASE REFER TO PROJECT SPECIFICATION FOR DETAILS OF RESPONSIBILITY.

FRONT ELEVATION VIEW

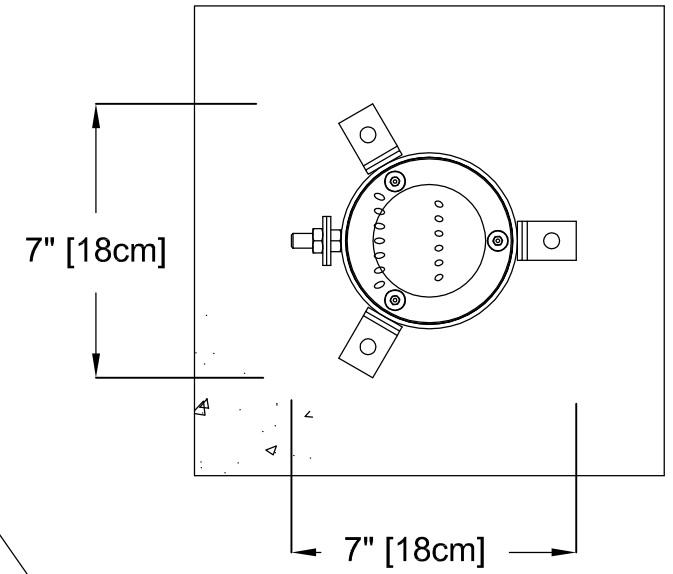


PRODUCT NAME: GROUND GEYSER		PRODUCT INFORMATION	
PRODUCT NUMBER: VOR-0301.4XXX	DATE: 03/08/14	SHEET NO: 1/1	11"x17" SHEET SIZE

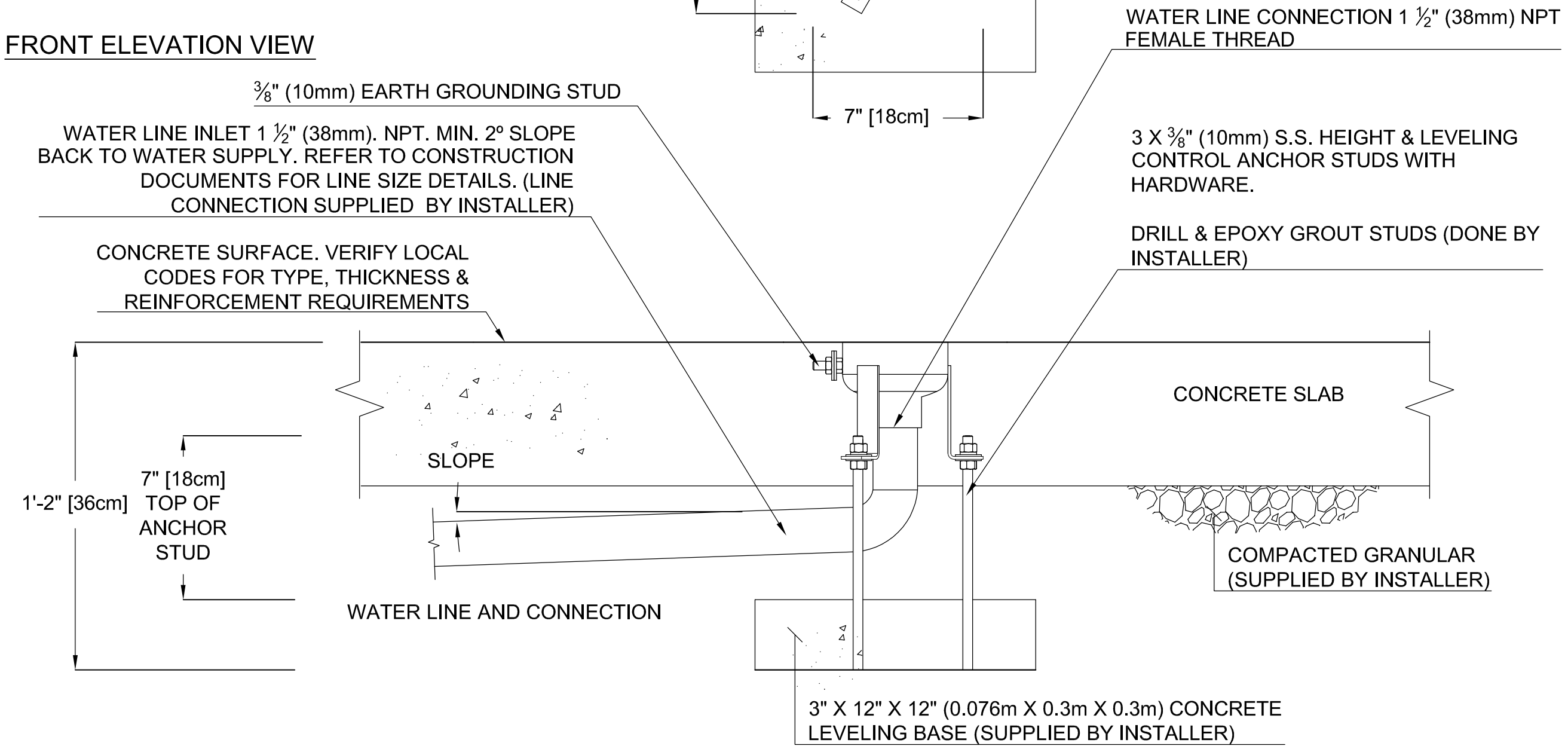
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PLAN VIEW



FRONT ELEVATION VIEW



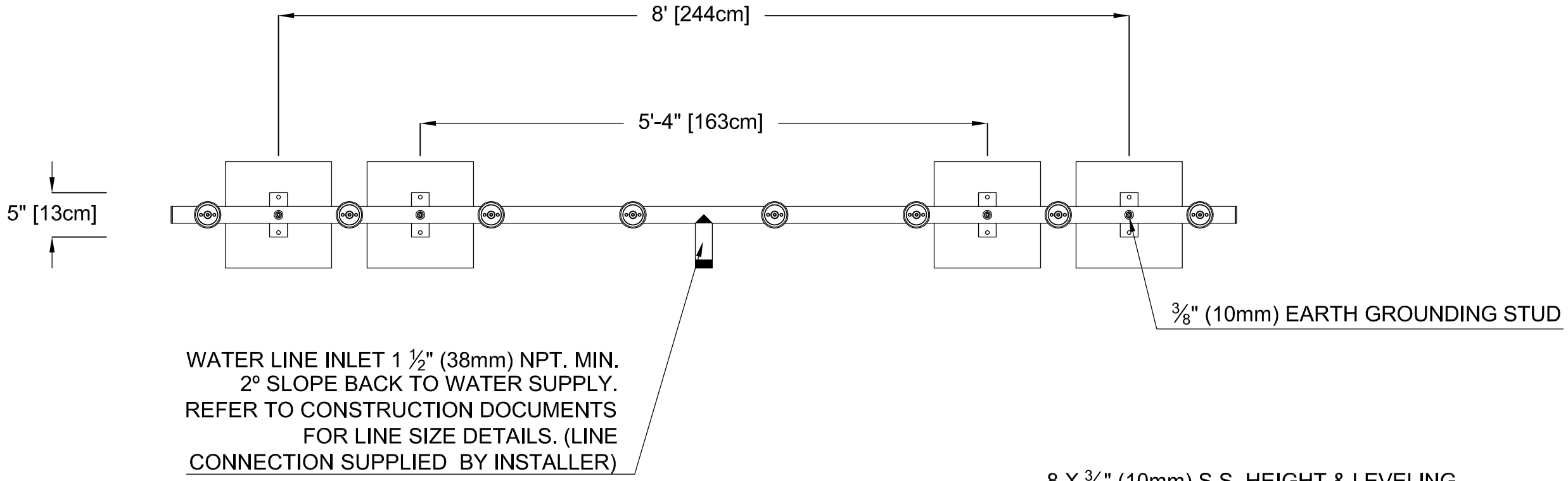
VOR-0303.4XXX ROOSTER TAIL (Construction Detail)

PRODUCT NAME: ROOSTER TAIL	PRODUCT INFORMATION		
PRODUCT NUMBER: VOR-0303.4XXX	DATE: 04/17/12	SHEET NO: 1/1	11"x17" SHEET SIZE

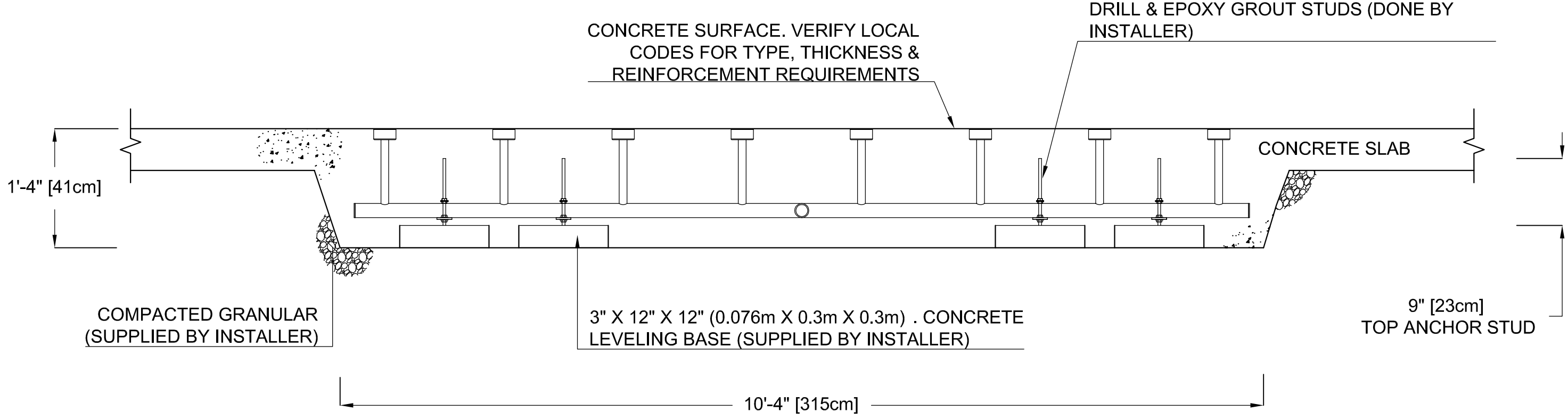
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PLAN VIEW



FRONT ELEVATION VIEW



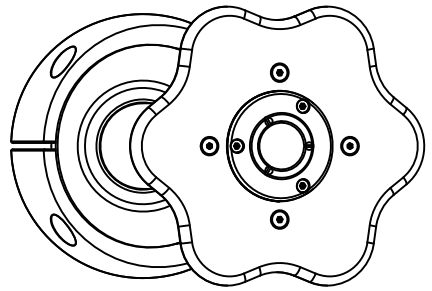
VOR-304.0XXX WATER TUNNEL N°1 (Construction Detail)

PRODUCT NAME: WATER TUNNEL N°1	PRODUCT INFORMATION		
PRODUCT NUMBER: VOR-304.0XXX	DATE: 08/06/12	SHEET NO: 1/1	11"x17" SHEET SIZE

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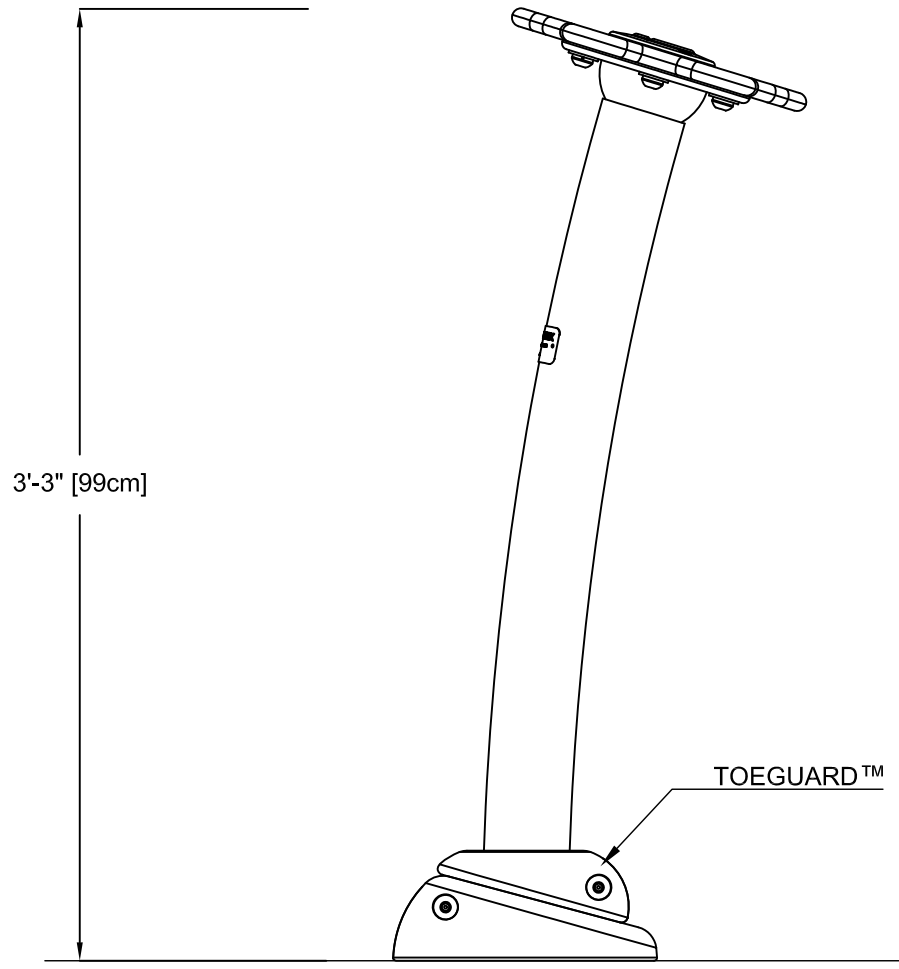
PLAN VIEW



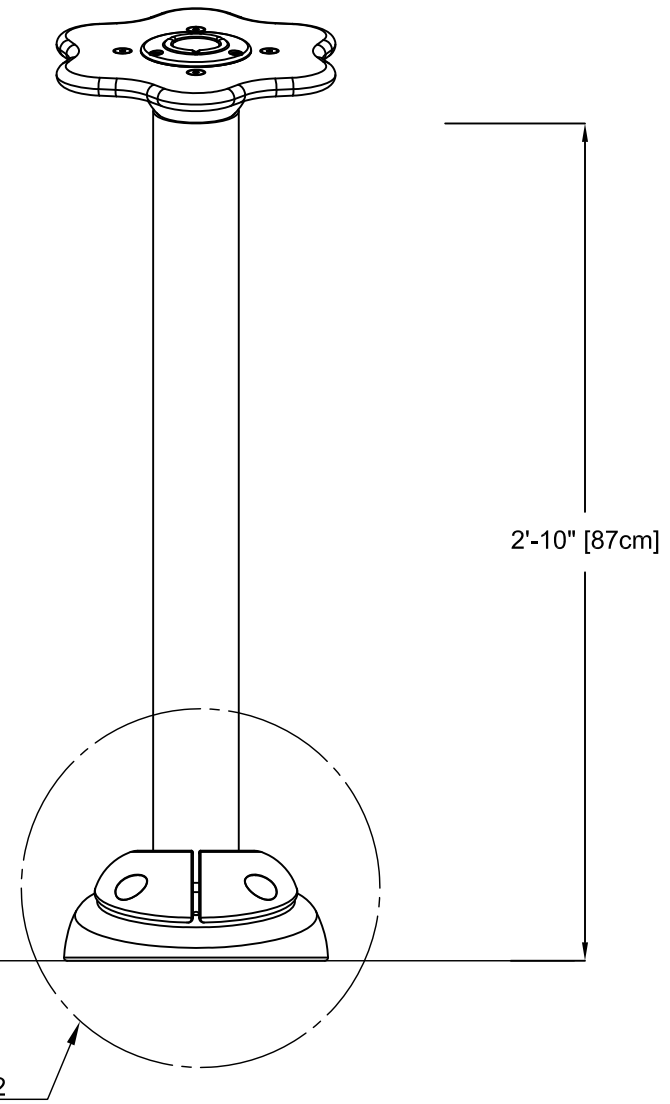
11" [29cm]

1'-5" [43cm]

FRONT ELEVATION VIEW



SIDE ELEVATION VIEW



TYPICAL ANCHORING SAFESWAP Nº2

WATER LINE CONNECTION REPLACED BY ELECTRICAL LINE CONNECTION.
14 AWG (2,5mm²)-2 WIRE CONDUCTOR TO BE USED FOR ELECTRICAL CONNECTION. (SUPPLIED BY INSTALLER)

PRODUCT NAME: ACTIVATOR N°1		PRODUCT INFORMATION	
PRODUCT NUMBER: VOR-0612.2XXX	DATE: 01/26/15	SHEET NO: 1/1	11"x17" SHEET SIZE

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Vortex Aquatic Structures International
328 Avro St., Pointe Claire (Montreal), Quebec, H9R 5W5
Phone 514.694.3868 1.877.5VORTEX Fax 514.335.5414 www.vortex-intl.com

1.0 General Materials Specifications:

1.1. **Stainless Steel Structural Tubing:** Shall be type 304/304L, structurally strong, durable, and resistant to corrosive environments. Rigid centricast fiber reinforced (FRP) and/or moulded fiberglass, PVC, filament wound tubing, Galvanized Steel, or Aluminium shall not be utilized for any distribution systems manifolds.

1.2. **Bronze:** All Backflow devices and Pressure Regulators shall be manufactured from this copper-rich alloy which is corrosion resistance and stronger than brass.

1.3. **Painted Finish**: Shall be a polyester smooth glossy heat-cured powder coat that is UV and chemical resistant and suitable for public spaces.

1.4. **Mounting and Assembly Hardware:** Shall be 304/304L stainless steel. Exposed and accessible hardware shall be tamper resistant, requiring a special tool for removal to deter vandalism and theft.

1.5. **Safety & Craftsmanship:** All edges shall be machined to a rounded edge. All welds shall be watertight, buffed smooth, or polished to a non-visible finish and factory pressure tested. Accessibility to the water distribution systems shall be such that no permit for confined spaces would be required as per OSHA Standards.

2.0 Above Grade Carbon Steel Cabinet Command Centers:

The Above Grade Carbon Steel Cabinet Command Center shall be a pre-fabricated water distribution system containing piping, valves and electrical wiring. They shall be factory assembled; water pressure tested; and shall be delivered from the Splashpad equipment manufacturers facilities. They shall be equipped with threaded connections for the water inlet and slip-on for water outlets. The solenoid valves shall be pre-wired to the controller or to a junction box (when the controller is placed in a remote location). The installer shall provide the plumbing equipment required from the water source to the water inlet or backflow device and Pressure regulator if so configured. The installer shall provide the plumbing equipment required from the water outlets to the Splashpad Play Products, as well as adequate drainage ball valves at the low point of each of the Play Product's water distribution lines (if applicable). Should the controller be located remotely, the installer shall supply the electrical equipment required from the junction box to the controller.

2.1. **Above Grade Carbon Steel Cabinet Command Centers:** Shall be manufactured from welded and reinforced 14 gauge steel. The enclosure shall be powder coat painted and suitable for use in public spaces. All applicable water line inlets and outlets are to be plumbed into the enclosure from the bottom face of the enclosure. The access doors shall be constructed of heavy gauge steel and shall be lockable. Service access shall be such that each door can swing open exposing all internal equipment. All hardware shall be stainless steel. Backflow and Pressure regulating equipment, when supplied by Vortex, is to be installed within the enclosure (Verify local codes).

2.2. **Water Distribution Manifolds:** Shall be constructed of 3 ½" outside diameter stainless steel structural tubing with a power coat painted finish. Each water distribution port shall be a 1-1/2" NPT connection. The manifold shall be equipped with a pressure gauge. All welded joints shall be watertight and pressure tested to 150 psi.

2.3. **Solenoid Valves:** There shall be one (1) solenoid valve installed on each of the water distribution ports for the Play Products. They shall be a normally closed 24 VAC 50/60 cycle solenoid actuated globe/angle pattern design. The valve pressure rating shall not be less than 150 psi. The valve body and bonnet shall be constructed of PVC with stainless steel fasteners. The valve shall have a manual override capability (manual open/close control). It shall house a fully encapsulated, one-piece solenoid. Each Solenoid valve shall have in integrated flow control adjustment valve stem for fine tuning of spray effects.

2.4. **Piping and Fittings:** All piping and fittings shall be at least schedule 40 PVC. All factory-assembled components, fitting and connections shall be water pressure tested prior to delivery.

2.5. **Electrical Enclosures, Conduit, Wiring and Connections:** All electrical wiring shall be # 16 AWG with a 600V rating. All electrical connections, enclosures, and conduit shall be Nema 4x watertight.

See the codification on the last page to be more specific.

When configured with:

3.0 FT MAESTRO™ Controller (33907.0XXX) :

3.1. The Maestro Controller shall be sized according to the number of I/O it is required to control. The Maestro Controller shall be factory programmed with spray sequences designed according to the requirements of the project. It shall have the flexibility to user modify the sequences using either a transportable USB Key, with an internet connection or via the Touch screen user interface.

3.2. A 24hr/7day user programmable agenda, which shall allow the user to set the operational hours of the facility, shall be incorporated into the Maestro Controller. For any further details about user interface, please refer to the User Guide Manual provided by Vortex.

3.3. The operating system shall contain a 120V AC and 100VA to 350VA primary / 24 VAC secondary or 240V AC and 100VA to 350VA primary / 24 VAC secondary transformers with built- in electrostatic shield protection. Transformer's power capacity shall vary according to the Splashpad size.

3.4. The operating system shall also contain a universal input 85-264 VAC primary / 12 VDC and 12.5A secondary power supplies with built-in electrostatic shield protection.

3.5. The operating system shall be housed in a corrosion resistant NEMA 4X rated enclosure.

3.6. The operating system shall have the capacity to receive signals from activation devices, operating on 3 to 24VDC/VAC.

3.7. The operating systems shall have the ability to provide a 24VAC auxiliary signal. This signal can be used to trigger a relay for Pumps, Chemical, UV system, or any other item following electrical specification.

3.8. The operating system shall have the capacity to operate based on a programmed sequence or based on a randomly generated sequence. In random mode each touch of the activator will generate a new unique sequence.

3.9. The operating system shall have the ability to soft-start ramp up the Splashpad to minimize potential water hammer.

3.10. The operating system shall have the capacity to operate a Rain Diverter Valve with a 24V AC max 250mA signal to prevent rain water to go into the sewer network when the Splashpad is not in function.

3.11. The operating system shall have the ability to control fast acting valves supplied by 24V AC max 1.5A each. For this, reference 33907.X1XX has to be chosen.

3.12. The operating system shall have the ability to automatically purge all water lines based on the user selected time and duration (i.e. every day at 5 am). It shall also, be configured to purge all lines after a user defined period of inactivity (i.e. after 4 hours of inactivity).

3.13. The operating system shall be supplied with a 10'' touch screen user interface with controls for each output, activation device(s), and agenda. These selector settings allow the user to select the operational mode of the components (i.e. Manual, Off and Automatic).

3.14. The operating system operates only in English for the moment.

4.0 **Remote connection:** if remote connection ability is required, the operating system shall be connected to internet. If there is no way to make a hard connection to an existing network, then Vortex can provide a pre-set 3G Cellular Router (sold separately) for any 3G covered location.

4.1. With additional connectivity kit (44900.0007R01), Maestro Controller shall have the ability to be controlled remotely through internet thanks to a 3G Cellular router. To perform this type of connection the area where the Splashpad™ and Maestro controller needs to be covered by a local mobile phone network.

The operating system shall have capability to be interconnected with any Maestro Expansion (33907.2XXX) or Maestro Light controller (33908.0XXX) or 3G Cellular Router (44900.0007) by using Ethernet RJ45 Cat6 cables. A maximum of 4 connections can be done in standard.

When configured with:

5.0 FT SmartFlow Logics™ Controller:

5.1. The Splashpad programmable logic controller shall be sized according to the number of outputs it is required to control. The programmable logic controller shall be factory programmed with a variety of spray sequence designed according to the requirements of the project. It shall have the flexibility to user modify the sequences using a Key Pad user interface. A battery backup and low battery alarm shall protect the system memory.

5.2. A 24hr/7day user programmable time switch, which shall allow the user to set the operational hours of the facility, shall be incorporated into the operating system. The time switch shall have the ability to be programmed with a different time schedule for each day of the week, and up to 2 time schedules per day.

5.3. The operating system shall be supplied with a key pad user interface with controls for each output, activation device(s), and time switch. The 2 line 20 character display screen shall be visible to 3ft, and with a 45 degree viewing angle.

5.4. The operating system shall be housed in a corrosion resistant NEMA 4X rated enclosure, complete with stainless steel lockable latches.

5.5. The operating system shall have the capacity to receive signals from activation devices, operating on 24VDC.

5.6. The operating system shall have the capacity to operate based on a programmed sequence or based on a randomly generated sequence. In random mode each touch of the activator will generate a new unique sequence.

5.7. The operating system shall have the capacity to accept an entry for a fixed run time interval. (i.e. run for x hrs, regardless of the operation time clock settings.)

5.8. The operating system shall have the ability to soft-start ramp up and ramp down the Splashpad to minimize potential water hammer.

5.9. The operating system shall have the ability to automatically purge all water lines based on the user selected time and duration (i.e. every day at 5 am). It shall also, be configured to purge all lines after a user defined period of inactivity (i.e. after 4 hours of inactivity).

5.10. The operating system shall have the ability to be upgraded using DataKey memory stick.

5.11. The operating system shall have the option of using a membrane keypad locking mechanism, requiring a user configurable password to access the Controller functions.

5.12. The operating system shall have the ability to automatically purge all water lines based on the user selected time and duration (i.e. every day at 5 am). It shall also, be configured to purge all lines after a user defined period of inactivity (i.e. after 4 hours of inactivity.

When configured with:

6.0 WR MAESTRO™ Controller (33907.1XXX):

6.1. The Maestro Main Controller shall be sized according to the number of I/O it is required to control. The Maestro Main Controller shall be factory programmed with spray sequences designed according to the requirements of the project. It shall have the flexibility to user modify the sequences using either a transportable USB Key, with an internet connection or via the Touch screen user interface.

6.2. A 24hr/7day user programmable Agenda, which shall allow the user to set the operational hours of the facility, shall be incorporated into the Maestro Main Controller. For any further details about user interface, please refer to the User Guide Manual provided by Vortex.

6.3. The operating system shall contain a 120V AC and 100VA to 350VA primary / 24 VAC secondary or 240V AC and 100VA to 350VA primary / 24 VAC secondary transformers with built- in electrostatic shield protection. Transformer's power capacity shall vary according to the Splashpad size.

6.4. The operating system shall also contain a universal input 85-264 VAC primary / 12 VDC and 12.5A secondary power supplies with built-in electrostatic shield protection.

6.5. The operating system shall be housed in a corrosion resistant NEMA 4X rated enclosure.

6.6. The operating system shall have the capacity to receive signals from activation devices, operating on 3 to 24VDC/VAC.

6.7. The operating systems shall have the ability to provide a 24VAC auxiliary signal. This signal can be used to trigger a relay for Pumps, Chemical, UV system, or any other item following electrical specification.

6.8. The operating system shall have the capacity to operate based on a programmed sequence or based on a randomly generated sequence. In random mode each touch of the activator will generate a new unique sequence.

6.9. The operating system shall have the ability to soft-start ramp up the Splashpad to minimize potential water hammer.

6.10. The operating system shall have the capacity to operate a Rain Diverter Valve with a 24V AC max 250mA signal to prevent rain water to go into the sewer network when the Splashpad is not in function.

6.11. The operating system shall have the ability to control fast acting valves supplied by 24V AC max 1.5A each. For this, an additional slave module with reference 33907.2XXX has to be chosen.

6.12. The operating system shall have the ability to automatically purge all water lines based on the user selected time and duration (i.e. every day at 5 am). It shall also, be configured to purge all lines after a user defined period of inactivity (i.e. after 4 hours of inactivity).

6.13. The operating system shall be supplied with a 10'' touch screen user interface with controls for each output, activation device(s), and agenda. These selector settings allow the user to select the operational mode of the components (i.e. Manual, Off and Automatic).

6.14. The operating system operates only in English for the moment.

7.0 **Remote connection:** if remote connection ability is required, the operating system shall be connected to internet. If there is no way to make a hard connection to an existing network, then Vortex can provide a pre-set 3G Cellular Router (sold separately) for any 3G covered location.

7.1. With additional connectivity kit (44900.0007R01), Maestro Controller shall have the ability to be controlled remotely through internet thanks to a 3G Cellular router. To perform this type of connection the area where the Splashpad™ and Maestro controller needs to be covered by a local mobile phone network.

7.2. The operating system shall have capability to be interconnected with any Maestro Expansion (33907.2XXX) or Maestro Light controller (33908.0XXX) or 3G Cellular Router (44900.0007) by using Ethernet RJ45 Cat6 cables. A maximum of 4 connections can be done in standard.

8.0 Installation Characteristics:

8.1. **Electrical Connections:** All main power electrical connections to the Splashpad Controller are to be preformed per local codes.

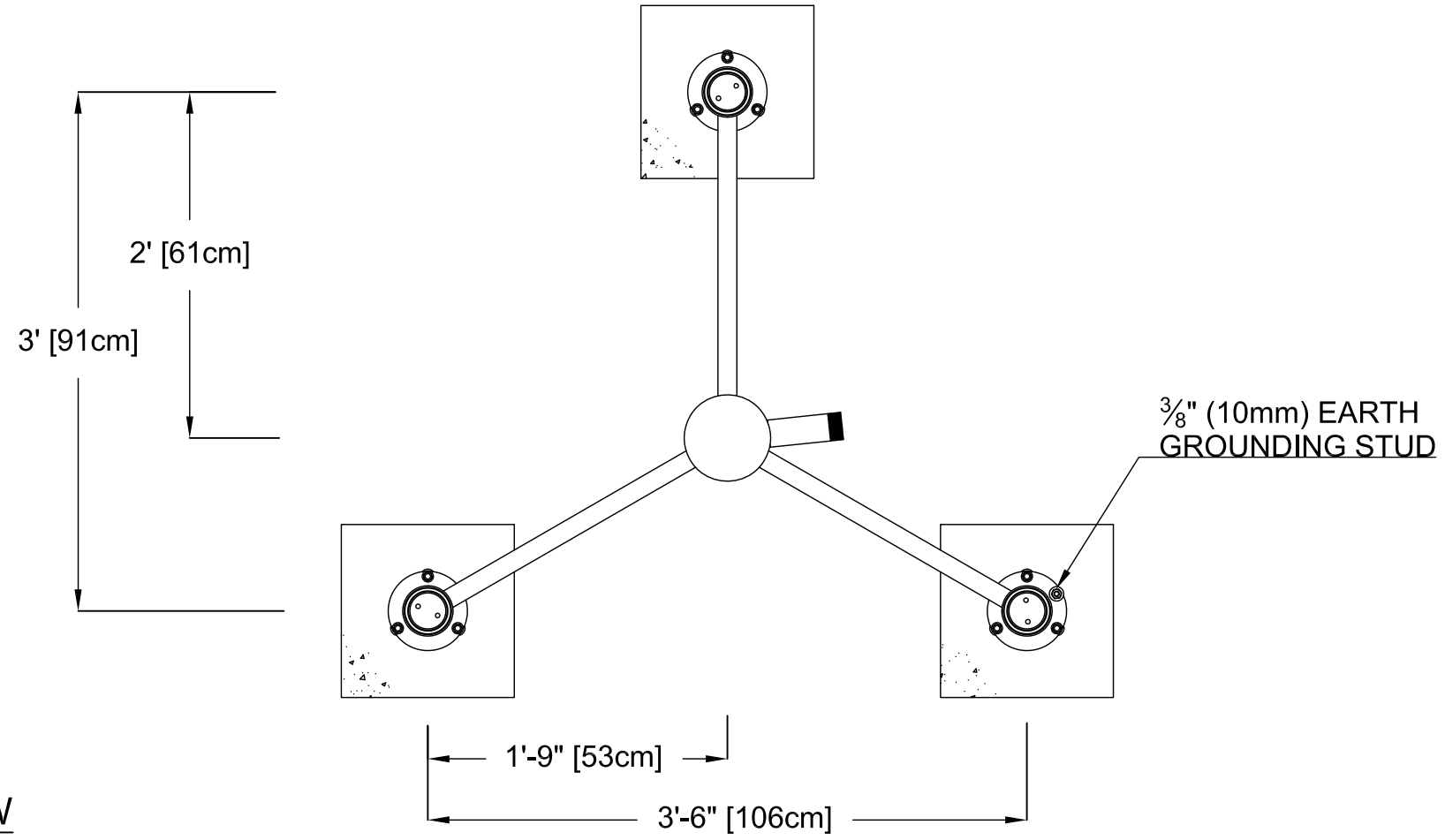
8.2. **Drawings and Instructions:** Product drawings and installation manuals shall be supplied by the manufacturer for ease of installation.

9.0 Available confiigurations:

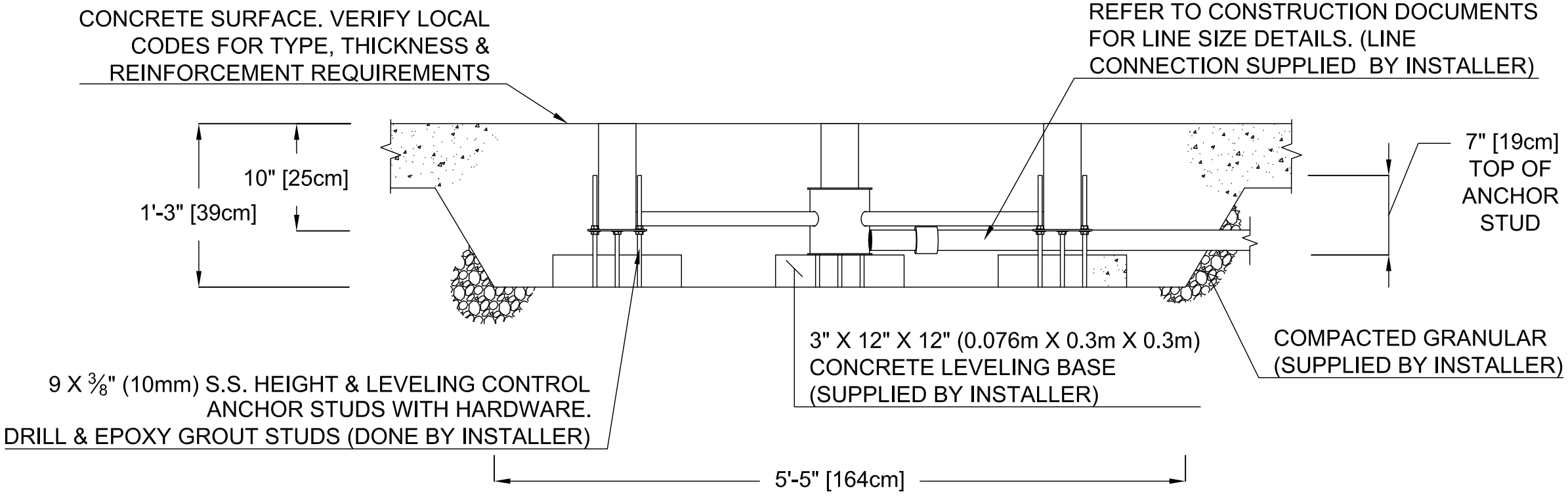
Quantity of valves	Components:	Inlet details:	Controllers:	Valve type:
1 to 25 valves	• BFP, PR • No BFP, No PR • BFP out, PR • No BFP, PR • Custom system	• 1 x 2” inlet • 1 x 2” inlet with junction box • 2 x 2” inlets • 1 x 3” inlet • 2 x 3” inlets • 2 x 2” inlets with junction box • 1 x 3” inlet with junction box • 2 x 3” inlets with junction box • Custom system	• No controller • FT MAESTRO Controller 120V • WR MAESTRO Controller 120V • FT MAESTRO Controller 240V • WR SmartTouch Controller 240V • FT MAESTRO Logics Controller 120V • FT SmartFlow Logics Controller 240V	• Standard Solenoid Valve • Brass Solenoid valve • Standard Solenoid Valve with Ball Valve • Custom system

FT : Flow trough
WR : Water reuse
BFR : Back flow preventer
PR : Pressure regulator

PLAN VIEW



FRONT ELEVATION VIEW

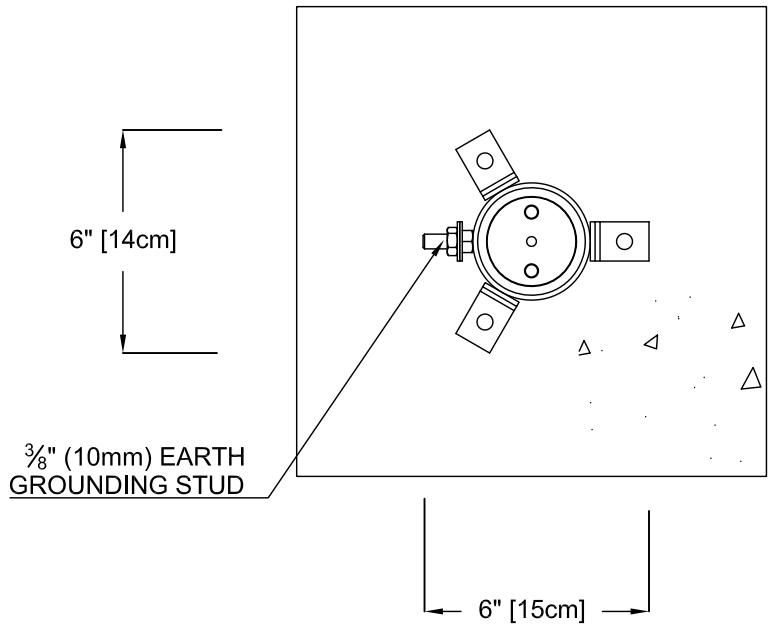


PRODUCT NAME: WATER JELLY N°3		PRODUCT INFORMATION	
PRODUCT NUMBER: VOR-7032.4XXX	DATE: 02/02/15	SHEET NO: 1/1	11"x17" SHEET SIZE

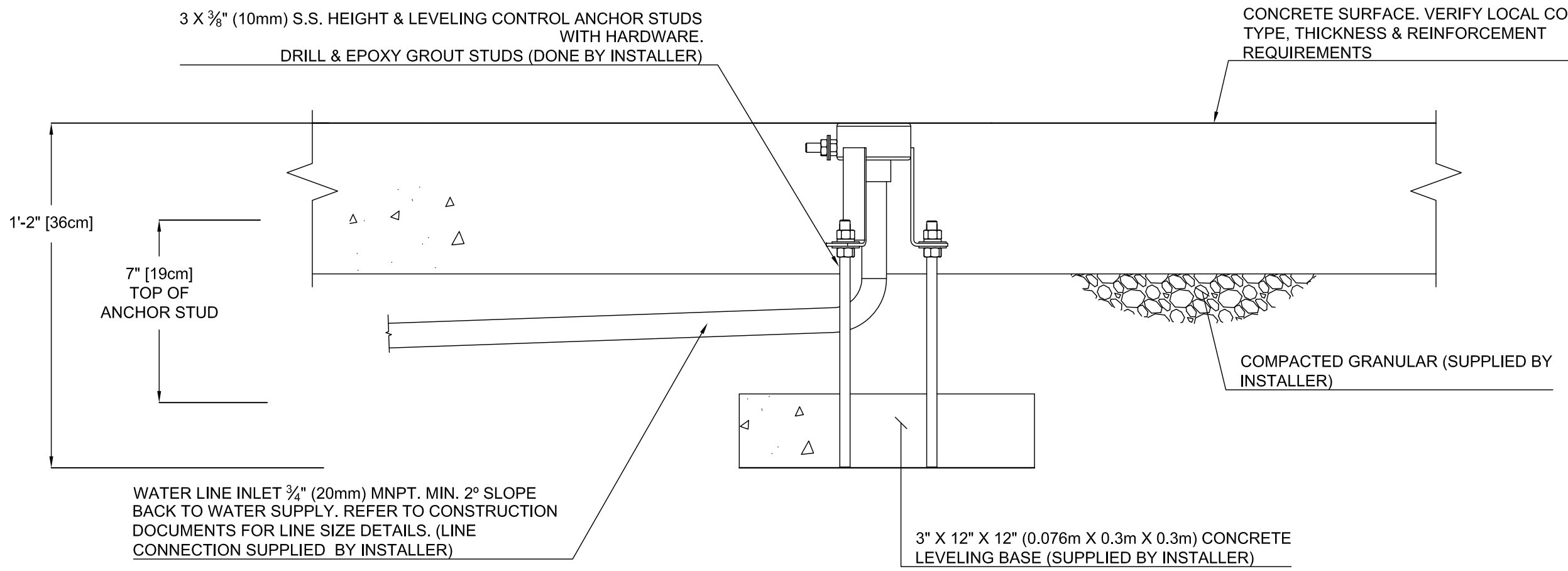
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PLAN VIEW



FRONT ELEVATION VIEW

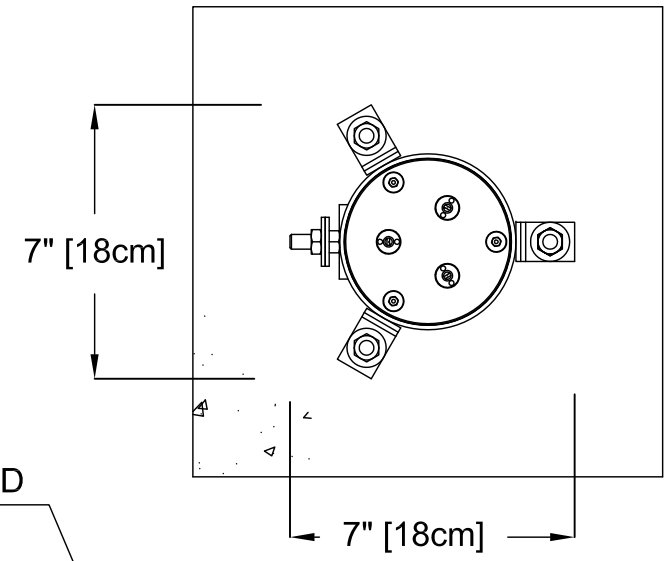


PRODUCT NAME: JET STREAM		PRODUCT INFORMATION	
PRODUCT NUMBER: VOR-7512.0XXX	DATE: 03/24/14	SHEET NO: 1/1	11"x17" SHEET SIZE

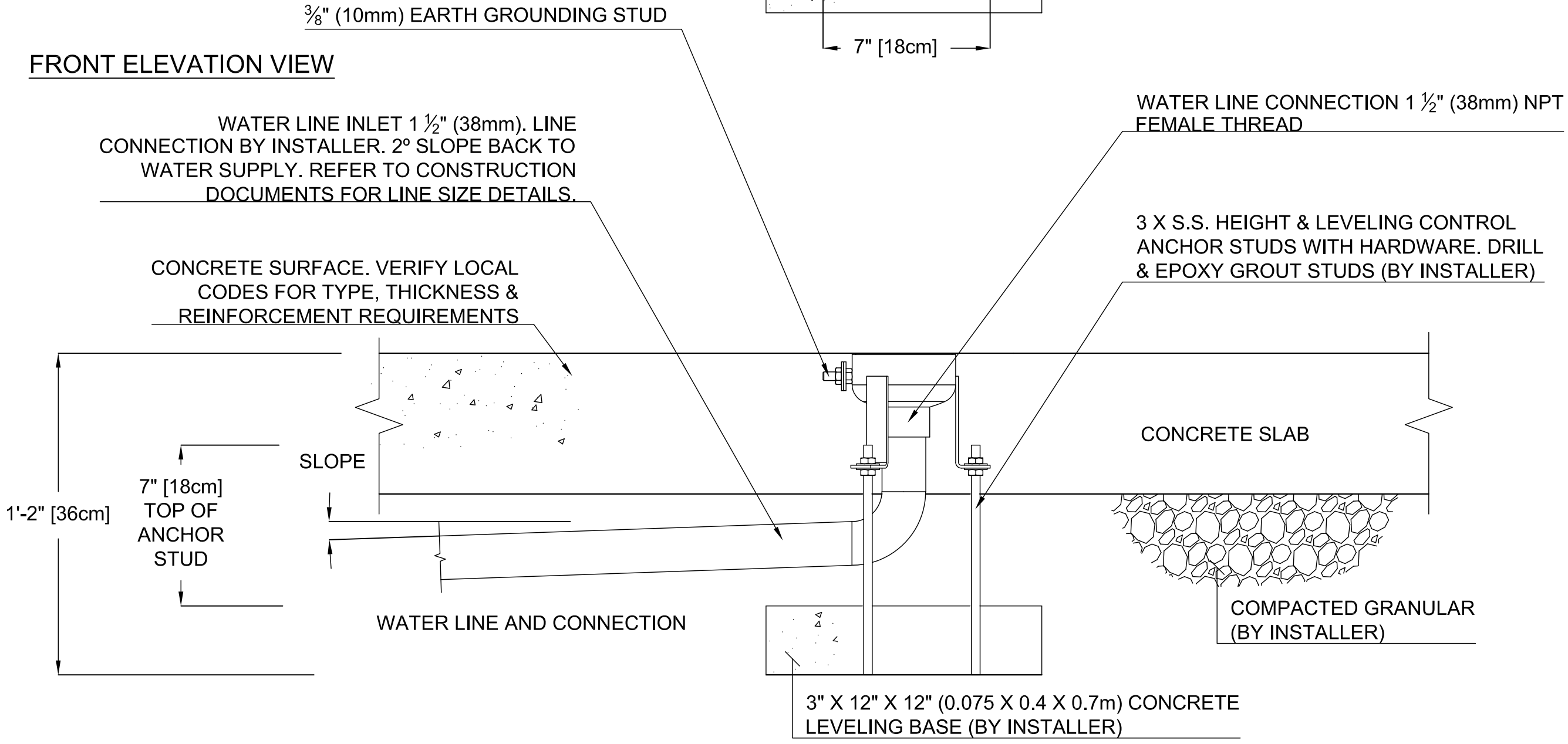
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PLAN VIEW



FRONT ELEVATION VIEW

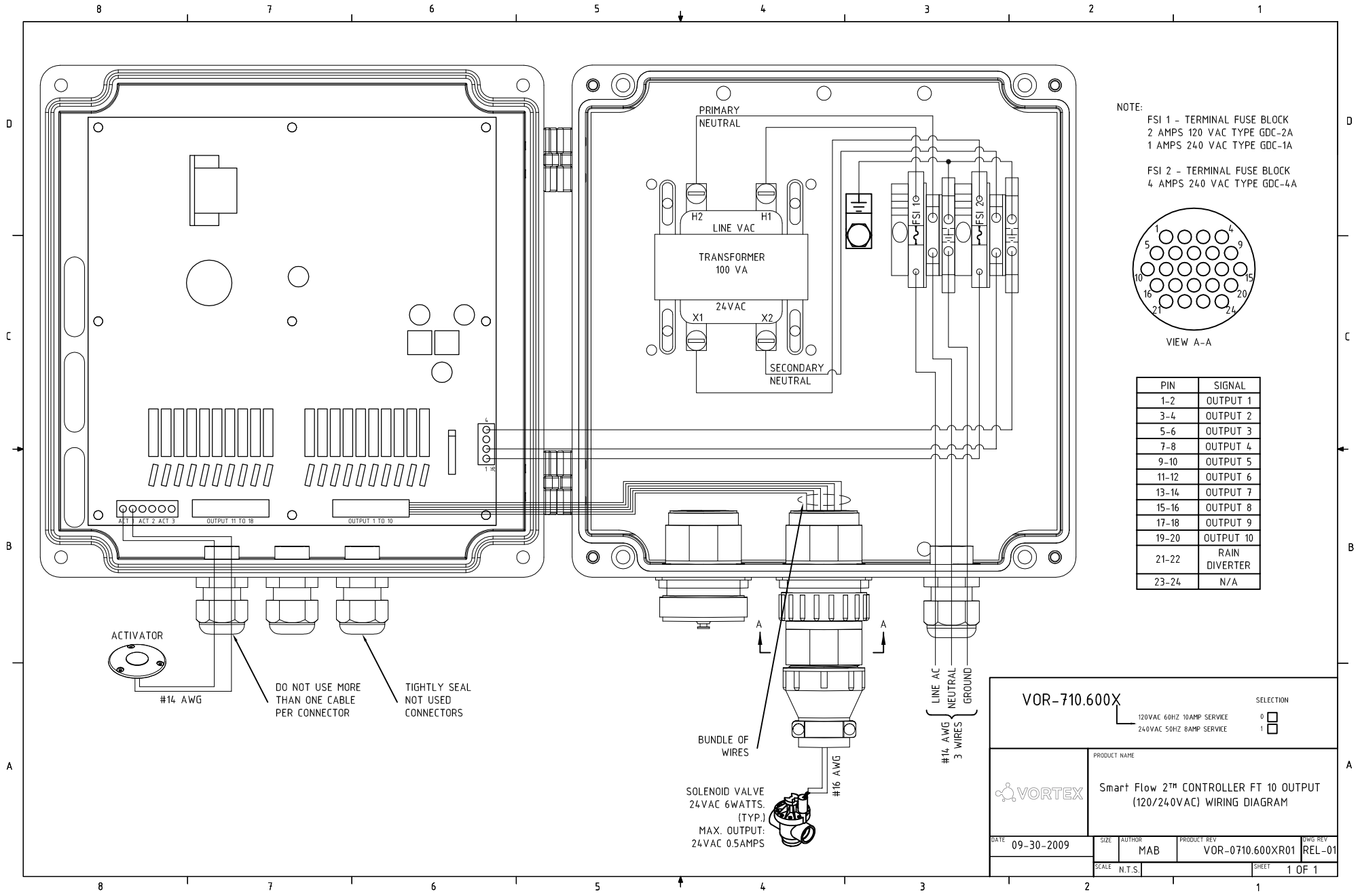


VOR-8099.4000 MAGIC MIST N°2 (Construction Detail)

PRODUCT NAME: MAGIC MIST N°2	PRODUCT INFORMATION		
PRODUCT NUMBER: VOR-8099.4000	DATE: 05/16/11	SHEET NO: 1/1	11"x17" SHEET SIZE

VORTEX

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NOTE:

FSI 1 - TERMINAL FUSE BLOCK
2 AMPS 120 VAC TYPE GDC-2A
1 AMPS 240 VAC TYPE GDC-1A

FSI 2 - TERMINAL FUSE BLOCK
4 AMPS 240 VAC TYPE GDC-4A

VIEW A-A

PIN	SIGNAL
1-2	OUTPUT 1
3-4	OUTPUT 2
5-6	OUTPUT 3
7-8	OUTPUT 4
9-10	OUTPUT 5
11-12	OUTPUT 6
13-14	OUTPUT 7
15-16	OUTPUT 8
17-18	OUTPUT 9
19-20	OUTPUT 10
21-22	RAIN DIVERTER
23-24	N/A

VOR-710.600X

SELECTION

120VAC 60HZ 10AMP SERVICE 0

240VAC 50HZ 8AMP SERVICE 1

VORTEX

PRODUCT NAME

Smart Flow 2™ CONTROLLER FT 10 OUTPUT
(120/240VAC) WIRING DIAGRAM

DATE	SIZE	AUTHOR	PRODUCT REV	DWG REV
09-30-2009		MAB	VOR-0710.600XR01	REL-01

SCALE N.T.S. SHEET 1 OF 1

SECTION 02886

PLAY EQUIPMENT

PART I - GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment and transportation required furnish and install/assemble the play equipment as located, described and set forth in the contract plans, specifications and details and in accordance with manufacturer's requirements and recommendations, and as specified herein.

1.02 REFERENCE STANDARDS AND SPECIFICATIONS

A. Playground equipment design, layout, and installation shall comply with the following standards and guidelines as applicable.

1. CPSC - Consumer Product Safety Commission Guidelines for Playground Safety, latest edition.

2. ASTM - American Society for Testing and Materials, Designation: F 1487, Standard Consumer Safety Performance Specification for Playground Equipment for Public Use, latest edition.

3. ANSI - American National Standards Institute.

4. AASHTO - American Association of State Highway and Transportation Officials (tests of specifications).

5. MassDOT. - Latest edition of the Standard Specifications for Highways, Bridges and Waterways,

6. MAAB - Massachusetts Architectural Access Board

B. Requirements not specifically set forth herein, but required by the agencies listed in above shall be understood to be a requirement of this contract since these standards of quality and safety are established as the industry standard(s). Any conflicts between the agency standards and the contract documents shall be brought to the attention of the Engineer, and unless otherwise directed in writing, the agency standards shall be the minimum requirement to be followed.

1.03 SHOP DRAWINGS

A. Prior to disassembling the play equipment as required by the Contract Documents, the following shall be submitted to the Project Representative for review and approval:

1. Shop drawings showing all important details of construction and dimensions showing the equipment, arrangement, footing spacing and lengths. Shop drawings shall stipulate and certify to compliance with all CPSC and ASTM standards and guidelines as applicable. Colors shall be selected by the Engineer and indicated on the shop drawings

1.04 QUALIFICATIONS

A. Installer shall have a minimum of five (5) years experience with a minimum of fifteen (15) playground installations. References will be required.

PART II - MATERIALS

2.01 PLAY EQUIPMENT

A. The play equipment for this park is as follows is listed in a spreadsheet appended to this section.

B. The play structures shall also comply with the technical specifications included within this Specification section.

2.02 RESILIENT SAFETY SURFACE

A. The resilient safety surface shall meet the requirements as specified in Section 02887 of the Specifications and include rubber PIP tiles under the swings and at the end of slides and FIBAR engineered wood mulch where shown on plans.

2.03 CAST IN PLACE CONCRETE

A. Concrete for the footings will be cast in place cement concrete as specified in Section 03300 of the Specifications. Top of concrete footings shall be twelve (12) inches minimum below finished grade.

2.04 MAINTENANCE KIT

A. The Contractor shall provide the City with a maintenance kit that is to include twenty (20) replacement hardware covers / caps for each play structure, one (1) gallon of graffiti removal / cleaning solutions as recommended by the manufacturer, a manual that includes all installation and maintenance instruction provided by the manufacturer.

B. The Contractor shall provide 10 spare pieces of each type of hardware / fastener

used on the structure and the appropriate tools delivered to the Brookline DPW Maintenance Yard.

PART III - EXECUTION

3.01 The Contractor shall assemble the specified equipment under the supervision of an approved Supervisor according to the manufacturer's instructions, the contract drawings and these Specifications.

3.02 The Contractor shall locate the structures to the lines and grades specified in the drawings in these Specifications and according to the specifications of the manufacturer of the equipment. Adjust all equipment to suit site gradients; no sloping platforms, tracks, or members intended to be horizontal shall be accepted.

3.03 The excavation for the footings shall be done as specified in Section 02350 of these Specifications and according to the Contract Drawing details.

3.04 The equipment shall be located and brought to the heights as shown in the drawings and as recommended by the manufacturer with vertical and horizontal members set plumb and then braced to be held in place.

3.05 The concrete shall be poured around the supporting pieces of the equipment to the grades detailed. The concrete shall be poured and cured according to Section 03300 of these Specifications. Slope tops of footings to drain; set bottom of vertical members into gravel base to ensure drainage; do not encase bottom in concrete.

3.06 After the specified cure period of the concrete has passed the bracing may be removed.

3.07 The fills and surfaces shall then be placed and brought to the grades shown in the Contract Drawings and in accordance with Section 02350 of these Specifications.

3.08 The contractor shall refer to information appended to this section for additional information on the play equipment.

PART IV - GUARANTEE AND ACCEPTANCE/LIABILITY

4.01 All operating parts and structural elements of the play equipment and safety surface shall be guaranteed against failure or defect during normal use and operation for the entire warrantee period of one year or as established by the manufacturer, whichever is longer.

4.02 Any defective elements shall be replaced in part or whole by the Contractor at no cost to the Owner.

4.03 The Contractor and the manufacturer shall hold the Owner and Engineer harmless from any and all damages or liability resulting from negligent acts and omissions on the part of the Contractor or manufacturer, or resulting from defective parts, or improperly

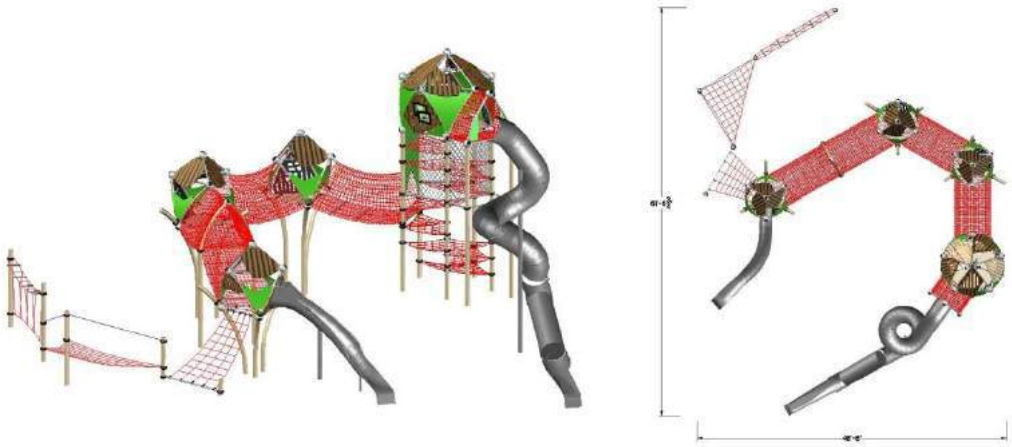
assembled equipment. Contractor shall provide secure storage for all equipment on job site.

4.04 The Contractor is responsible for securing a Certified Playground Safety Inspector to ensure ASTM and SPSC compliance. A certificate of compliance will be issued to the Owner prior to final inspection.

- - - END OF SECTION - - -

Product Specification

Product Family	:	Greenville Tree house
Project Name	:	Somerville Park, MA.
Project Number	:	USP.01744-3
Children's Age	:	5+
Fall Height	:	9'-10"
Dimensions: Length x Width x Height	:	46'-6" x 61'-6" x 24'-3"
Protective Surfacing Area required	:	58'-4" x 75'-3"
Minimum space required	:	2802sf
Number of Foundations	:	19 pc.
Concrete Volume C20/C25	:	17,81m³
Number of skilled installers required	:	4
Installation Time without foundation	:	24h
Spare part guarantee		Lifelong



Product description (also available as a doc-file upon request): (2) Greenville tree house TRII 3, (1) Greenville tree house TRII 2 connected via (4) Small mesh tunnels. Connected at ground level by (1) access net, Structure terminates on via (1) Tower 5 with (1) spiral stainless slide.

Terranos components:

(1) Triangular Net

(1) Layaway Walk

Steel posts:

Bend steel posts ∅ 133 mm (5 ¼''), minimum wall thickness 5.0mm (3/16''), with a rounded cast aluminum post top; anticorrosion treatment and color finish: sandblasting and zinc-/ epoxy-/ polyester-process.

Tube framework:

A combination of straight and bended stainless steel Frameworx-®tubes, ∅ 60,3 m(2 3/8''), material AISI304 (DIN 1.4301). The tubes are connected to build a space framework with a triangular footprint.

Steel Posts:

Steel pipes ∅ 133 mm (5 ¼'') with a rounded cast aluminum post top, minimum wall thickness 7,1mm (1/4''); anticorrosion treatment and color finish: sandblasting and zinc-/ epoxy-/ polyester-process.

Connecting parts:

Frameworx-aluminum ball connectors, ∅ 250mm (9 13/16''), securely closed with durable EPDM-caps & two-part cast aluminum connecting Terranos-clamps; anti-corrosion treatment and color finish: sandblasting and solvent-free epoxy-/ polyester-process. All bolts and nuts which are exposed to the elements are made out of stainless steel.

Bamboo panels:

Bamboo strips 90mm, (3 1/2'') mounted at a particle board made from polyethylene plastic 19mm (3/4") thickness, rounded edges, mounted with aluminium plate clamps to the tubes of the framework.

Stainless Steel Slide:

(2) Misc slides: made of stainless steel AISI304 (DIN 1.4301), the cheeks are welded with stainless steel handrails, afterwards smoothed and polished. Connected to the tube at the framework with BSF-aluminum-slide clamps. The gap between the slide and the spatial net is bypassed with a flat net.

Planar Nets:

Rope crossing points localized by durable, drop forged aluminum-ballknots (no plastic).

Stainless Steel Slide:

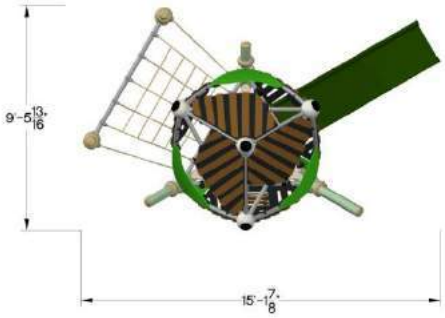
(2) Misc slides: made of stainless steel AISI304 (DIN 1.4301), the cheeks are welded with stainless steel handrails, afterwards smoothed and polished. Connected to the tube at the framework with BSF-aluminum-slide clamps. The gap between the slide and the spatial net is bypassed with a flat net.

Rope Tunnel:

Close meshed tunnel, allows users to cross between towers at higher levels. No climbing out of the tunnel is possible.

Product Family	:	Greenville tree house
Product Name	:	TRII 1 w/Plastic Slide
Item Number	:	USP.01130
Children's Age	:	3+
Fall Height	:	3'-3"
Dimensions: Length x Width x Height	:	9'-5" x 15'-1" x 10'-4"
Protective Surfacing Area required	:	21'-5" x 27'-0"
Minimum space required	:	445sf
Number of Foundations	:	2 pc.
Concrete Volume C20/C25	:	3,0m³
Number of skilled installers required	:	3
Installation Time without foundation	:	10h
Spare part guarantee		Lifelong





Product description (also available as a doc-file upon request): Greenville tree house TRII 1 with a ladder, access net as an entrance possibility, (1) Plastic slide.

Steel posts:

Bend steel posts ∅ 133 mm (5 ¼''), minimum wall thickness 5.0mm (3/16''), with a rounded cast aluminum post top; anticorrosion treatment and color finish: sandblasting and zinc-/ epoxy-/ polyester-process.

Tube framework:

A combination of straight and bended stainless steel Frameworx-®tubes, ∅ 60,3 m(2 3/8''), material AISI304 (DIN 1.4301). The tubes are connected to build a space framework with a triangular footprint.

Connecting parts:

Frameworx-aluminum ball connectors, ∅ 250mm (9 13/16''), securely closed with durable EPDM-caps & two-part cast aluminum connecting Terranos-clamps; anti-corrosion treatment and color finish: sandblasting and solvent-free epoxy-/ polyester-process. All bolts and nuts which are exposed to the elements are made out of stainless steel.

Bamboo panels:

Bamboo strips 90mm, (3 1/2'') mounted at a particle board made from polyethylene plastic 19mm (3/4") thickness, rounded edges, mounted with aluminium plate clamps to the tubes of the framework.

Ladder:

Ladder flange made out of stainless steel profile 60x20mm (2-3/8''x 3/4''), steps made out of Bamboo strips 90mm, (3 1/2'').

Access Net:

Rope ∅ 16 mm (5/8"), mesh size 300 x 300mm (11-13/16''x11-13/16''), rope crossing points localized by durable, drop forged aluminum-ballknots (no plastic).

Plastic Slide:

Roto-molded slide made from medium-density polyethylene with anti-static guard and UV-stabilized color pigments. 100% recyclable

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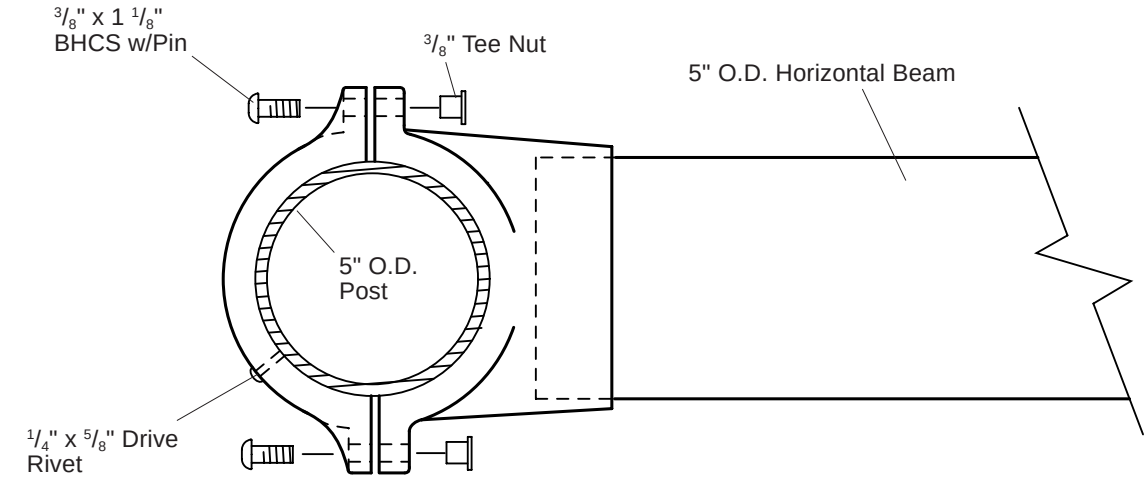
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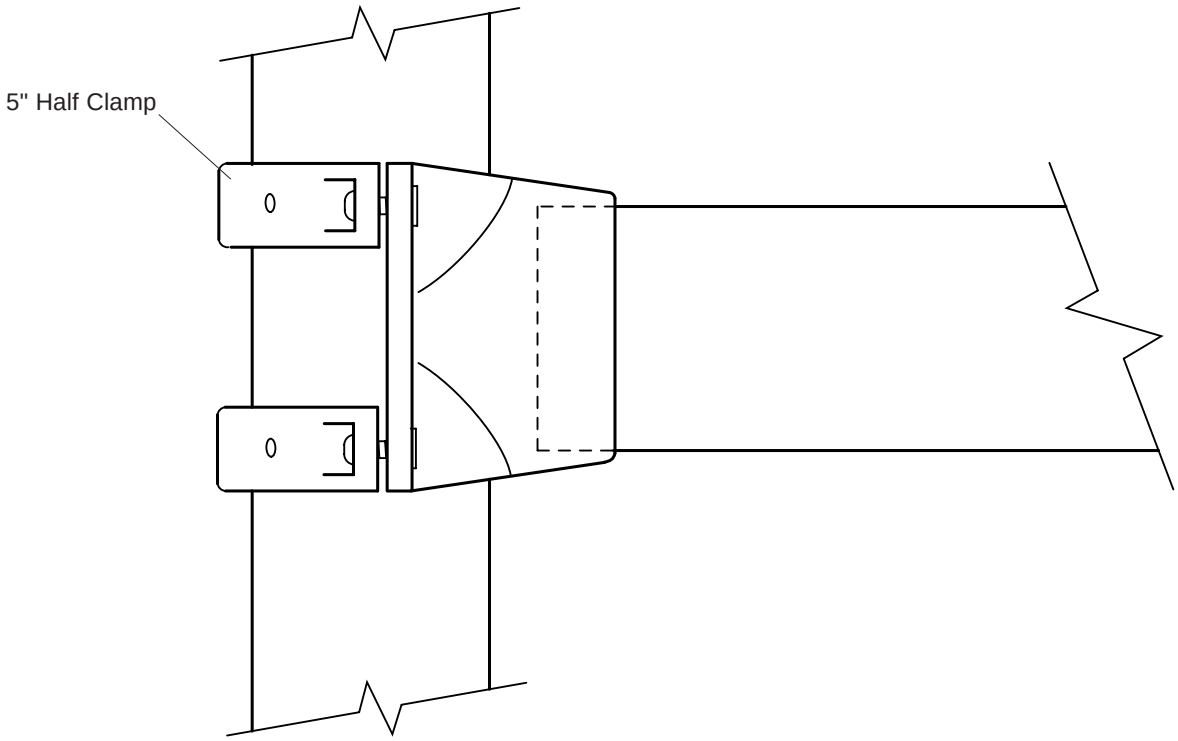
ISO 9001 Certified

SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

3-1-94
11002200





Tee Clamp Assembly

601 7TH STREET SOUTH, DELANO, MINNESOTA 55328-8605 (763) 972-3391 1-888-LSI-INST (1-888-574-4678) FAX (763) 972-3185

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PlayBooster® Tee Clamp Assembly

landscape structures®

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Parts List

Part#	Description	Qty
105327-01	5" Half Clamp, Specify Color	2
100198-00	3/8" x 1 1/8" BHCS w/Pin, SST	4
100351-00	3/8" Tee Nut, SST	4
100610-00	1/4" x 5/8" Drive Rivet, SST	2

Specifications

Tee/Beam: 356 alloy treated to T-6 hardness and welded to 5" aluminum beams or mechanically fastened to 5" steel beams. Finish: Powdercoat, color specified.

Half Clamps: Cast aluminum. Finish: Powdercoat, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: Approx. 1/2 man hour

Weight: 2 lbs.

Installation Instructions

1) Locate and mark center of clamp location on 5" pipe.

2) With beam in position, fasten 5" half clamps to tee clamp using 3/8" x 1 1/8" BHCS w/Pin and tee nuts as shown. Tighten cap screws evenly.

3) **IMPORTANT:** *Install drive rivets in half clamps by drilling holes in clamps and into 5" pipe using a 1/4" or "F"(only) drill bit. Insert rivet in hole, and hammer rivet pin in until it is flush with head.*

Specifications are subject to change without notice.

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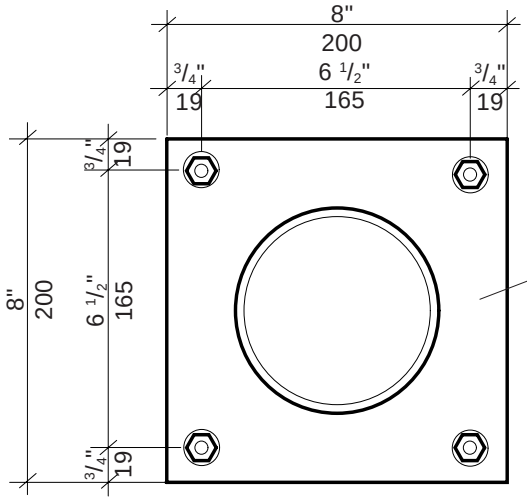
ISO 14001 CERTIFIED

ISO 9001 Certified

SAFETY NOTE
Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*)

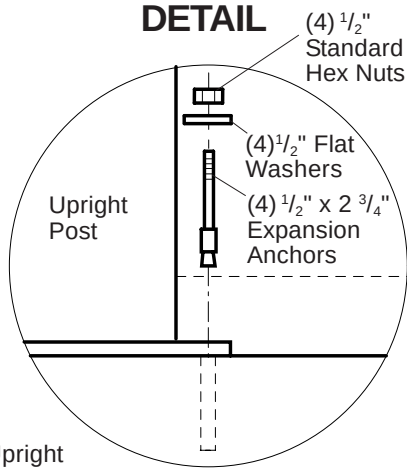
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NOTE:
Surface mounting will not work in all applications. Consult Landscape Structures Inc. for your particular requirements.

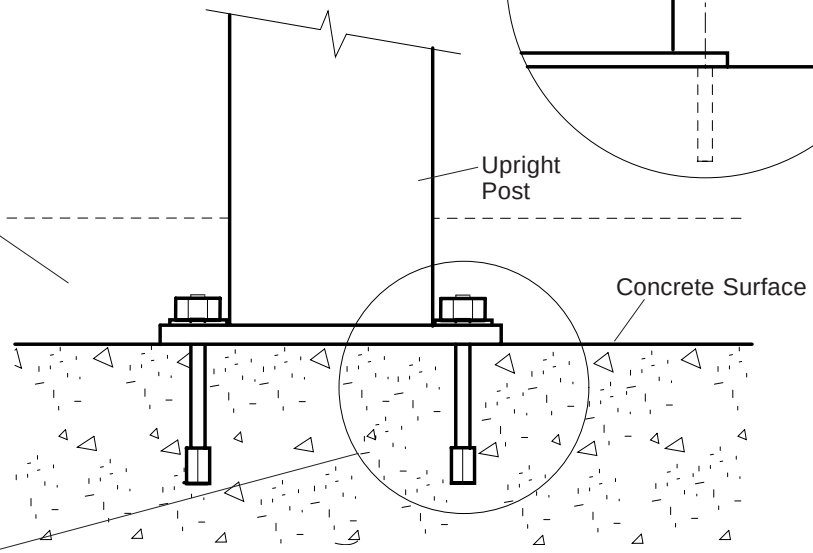


CONCRETE SLAB SPECS

- Base under slab to be 4" - 6" of sand over a stable subgrade.
- Depth of concrete slab to be 4" - 6" with a wire mesh support.
- Minimum of 7 days curing time full cure after 30 days.
- Surface of concrete to be trowled smooth and acid etched.
- Concrete: 3000 PSI (Min)
  30 Days 3500 PSI
  3/4 Minus Crushed Rock



NOTE: Sufficient protective surfacing must cover hardware to satisfy fall height requirements.



NOTE:
Drill 3" deep hole using hammer drill and 1/2"masonry bit. Tap anchors into concrete and secure with 1/2" standard hex nuts and 1/2" flat washers.

PlayBooster® Concrete Specs, Surface Mount

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1-30-97 Document #12194700 replaces #10971000. Updated notes.

Document #12194700

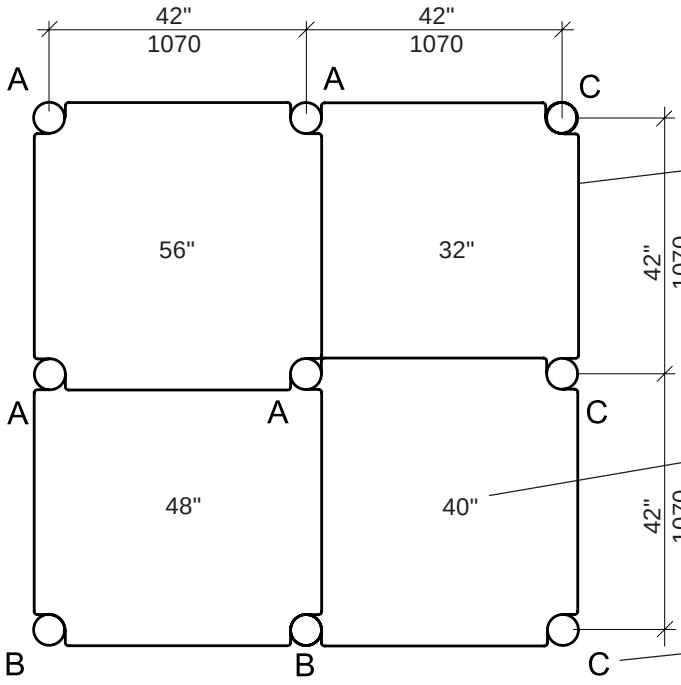
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SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487, SECTION 9.*)

ISO 9001:2000 Certified

6-1-95

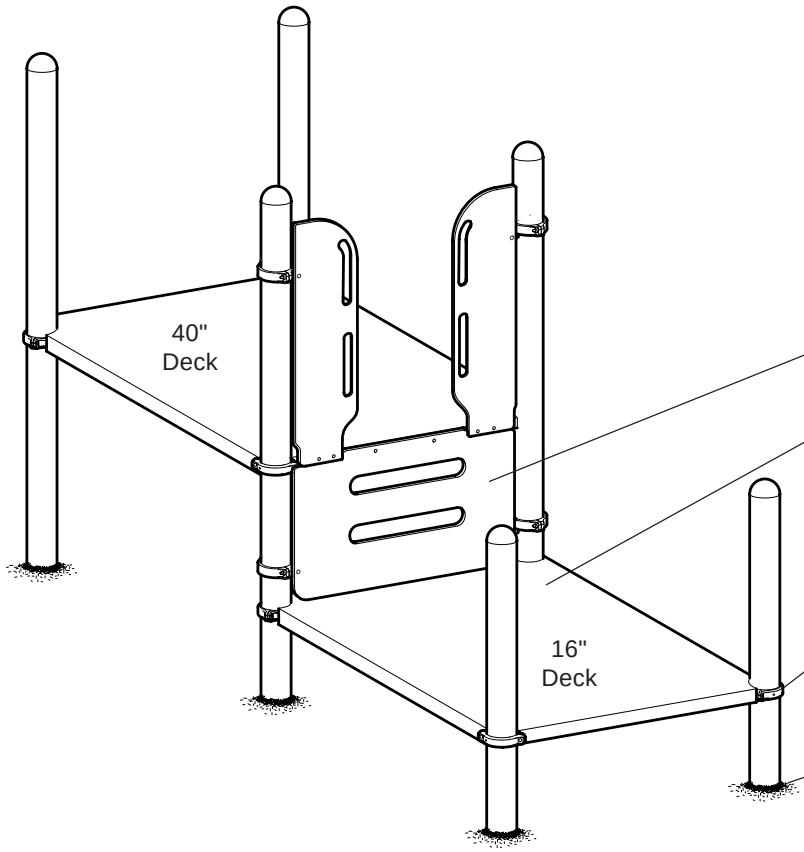


Enclosures or components are required on any decks higher than 28" as indicated on your plan drawing.

Dimension indicates center to center spacing of concrete footings.

Number indicates height of deck above finished grade.

Letter indicates post length as indicated on your plan drawing.



Enclosures/ Components - Refer to your plan drawing for locations and their respective spec sheets for installation.

Vertical Ladders - Refer to your plan drawing for locations and the Vertical Ladder spec sheet for installation.

Decks - Refer to your plan drawing for heights and orientation. Refer to the appropriate deck spec sheet for installation.

Deck Hanger Clamp Assembly - Refer to the appropriate Deck Assembly spec sheet for installation.“

Concrete Footings - Refer to the Typical Concrete Footing spec sheet for installation.

Kick Plates - Refer to your plan drawing for locations and the Kick Plate spec sheet for installation.

PlayBooster General Post/Tenderdeck Information

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PlayBooster General Post/Tenderdeck Information

Installation Instructions

Before Starting, Read the General Construction Guidelines, Installation Hints, All Typical Detail Sheets and Specific Installation Instructions for Each Component Labeled on Your Plan.

1) Dig footing holes spaced as shown on the plan and spec sheets. Refer to the Typical Concrete Footing Spec Sheet.

2) Note the post lengths as shown on the plan and set in their appropriate footing holes. The post length is indicated on the finished grade sticker on each post.

3) Mark the appropriate posts for the deck heights you are installing and attach decks to posts at marked height. Refer to the appropriate deck spec sheet for installation.

4) After all the posts are at proper heights and plumb, and the decks are at proper height and level, pour the concrete footings per the Typical Concrete Footing Spec Sheet.

5) Continue installing enclosures and components and pour concrete footings as you progress, making sure everything is plumb and level.

6) When installation is complete, install Drive Rivets in all clamps per the Typical Offset Hanger Clamp Spec Sheet.

7) Install protective surfacing under and around all equipment before users are allowed to play on the structure.

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SAFETY NOTE

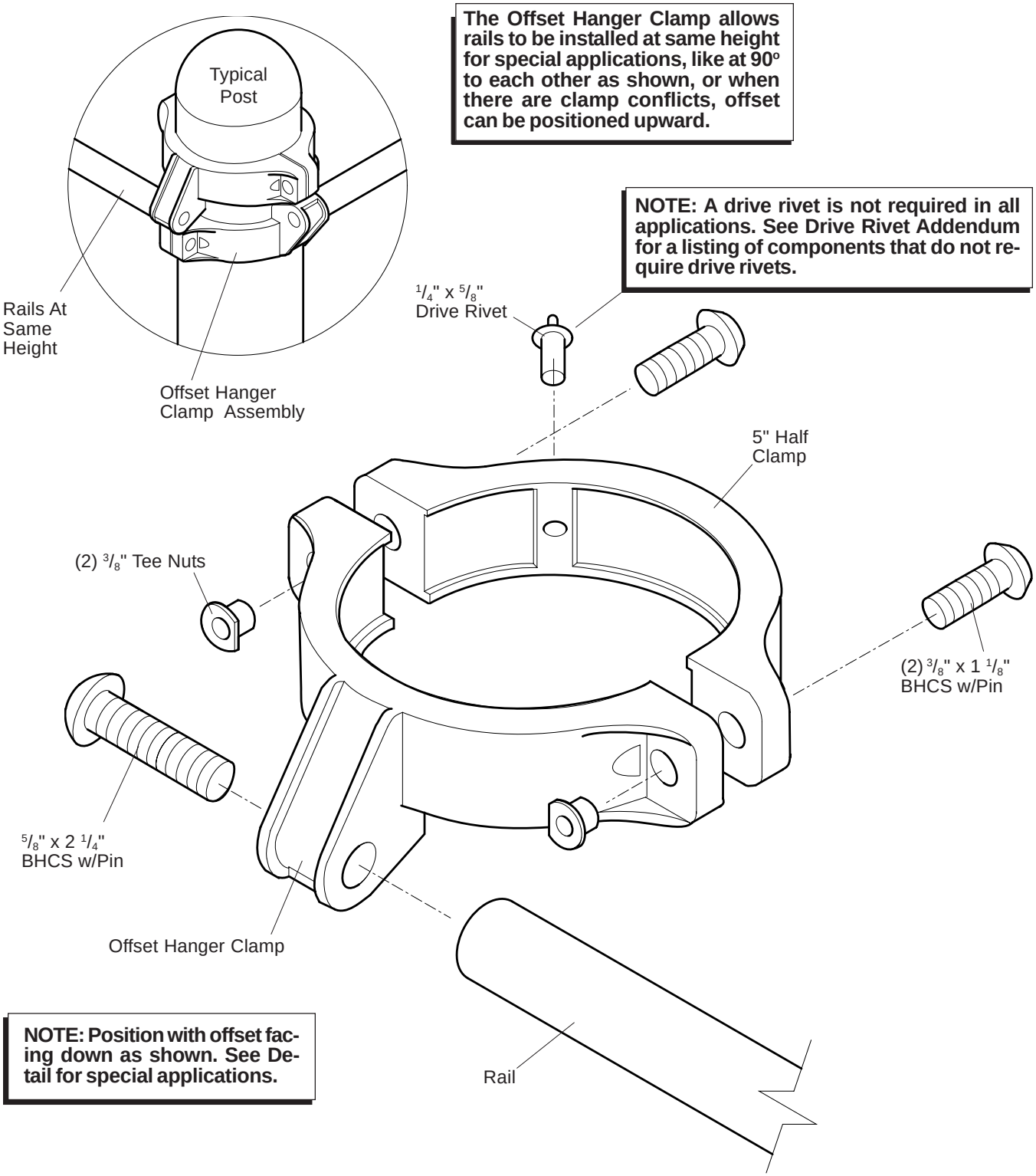
Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

10-3-97
12382100

DETAIL
ASSEMBLED CLAMP

The Offset Hanger Clamp allows rails to be installed at same height for special applications, like at 90° to each other as shown, or when there are clamp conflicts, offset can be positioned upward.

NOTE: A drive rivet is not required in all applications. See Drive Rivet Addendum for a listing of components that do not require drive rivets.



NOTE: Position with offset facing down as shown. See Detail for special applications.

PlayBooster® 114261 Offset Hanger Clamp Assembly

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PlayBooster® 114261 Offset Hanger Clamp Assembly

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J:\SPECS\123\12382100.P65

Parts List

Part#	Description	Qty
100198-00	3/8" x 1 1/8" BHCS w/Pin, SST	2
100351-00	3/8" Tee Nut, SST	2
100610-00	1/4" x 5/8" Drive Rivet, AL/SST	1
105327-01	5" Half Clamp, Specify Color	1
113729-00	Offset Hanger Clamp, Specify Color	1
100203-00	5/8" x 2 1/4" BHCS w/Pin, SST	1

Specifications

Clamp: Cast aluminum. Finish: Powdercoat, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: Approx. 1/4 man hour
Weight: 3 lbs.

Installation Instructions

1) Locate and mark position of clamp on 5" post.

2) Position clamp in proper direction and assemble with 3/8" x 1 1/8" BHCS w/pin and 3/8" tee nuts as shown and lightly tighten. Position rail against clamp and screw in 5/8" x 2 1/4" BHCS w/pin until rail bottoms out on clamp. Final tighten all fasteners.

3) **IMPORTANT:** *Drill through hole in 5" half clamp and into 5" post with a 1/4" or "F" (only) drill bit, insert rivet in hole and hammer rivet pin in until it is flush with head.*

Specifications are subject to change without notice.

10-3-97 Document #123821-00 replaces #114666-00. Added Drive Rivet NOTE:

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SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

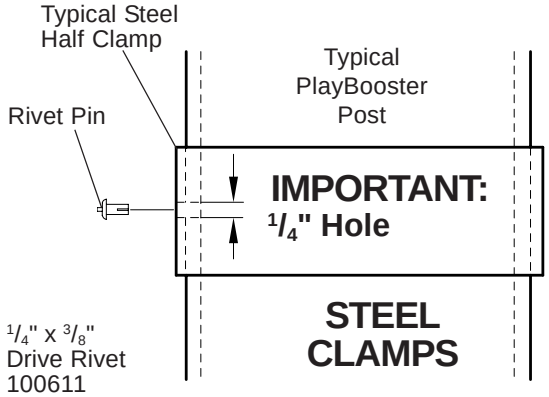
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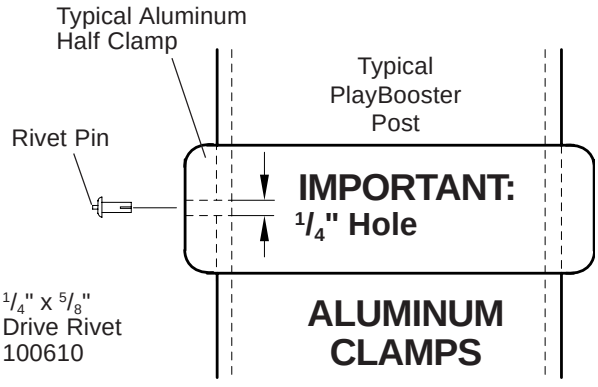


General Rules For Use Of Drive Rivets

- Rivets are used as "Insurance" to keep clamps from sliding down the posts. In many cases this "Insurance" is achieved in other ways; i.e. Panels that attach to the deck face.
- Refer to the Spec Sheet Parts List and follow Installation Instructions for each component.
- Decks and Overhead Events always need rivets.
- Any component fastened to the Deck does not need rivets.

  Benefits of not installing unnecessary rivets: saves time, it makes clamp adjustments as well as the removal of clamps for replacement or adding phases much easier, and you will have fewer damaged clamps or posts due to poor installation techniques.





INSTRUCTIONS:

NOTE: Use Only Bit Size "F" or 1/4" Drill Bit.

After Play Component Assembly is Complete, Drill Hole into Post Through Half Clamp, Insert Rivet in Hole, and Hammer Rivet Pin in Until it is Flush with Head.

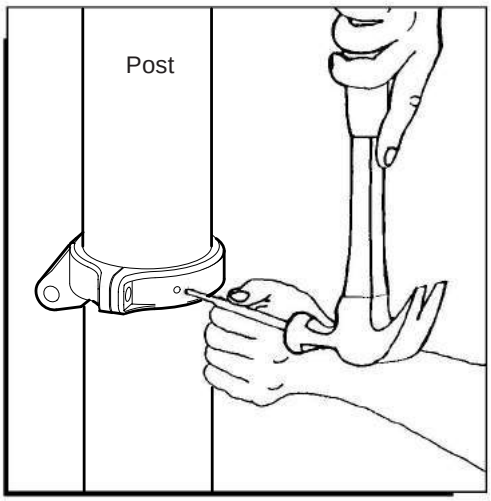
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11-22-99 Document #12984700 replaces #10972900. Added general rules for use of drive rivets.

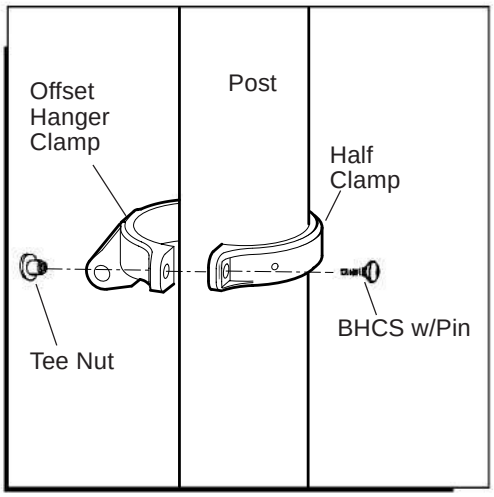
Document #12984700

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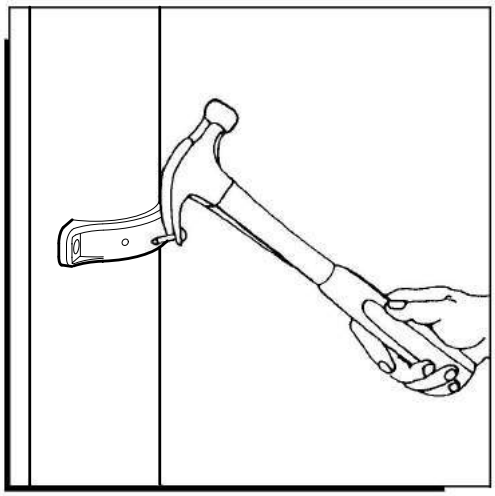
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1) Drive Center Pin of Rivet Straight into Post Using $^1/_8$" Diameter Punch and Hammer.



2) Unbolt BHCS w/Pin and Tee Nuts from Clamp Using Tamperproof Hex Wrench. Remove Offset Hanger Clamp. Lightly Tap on Half Clamp with Hammer Until Head of Drive Rivet Pulls Away From Half Clamp.



3) Pull Out Drive Rivet Using Claw End of Hammer.

Tools Needed:

- Claw Hammer
- $^1/_8$" Diameter Steel Punch
- Tamperproof Hex Wrench

Drive Rivet Removal

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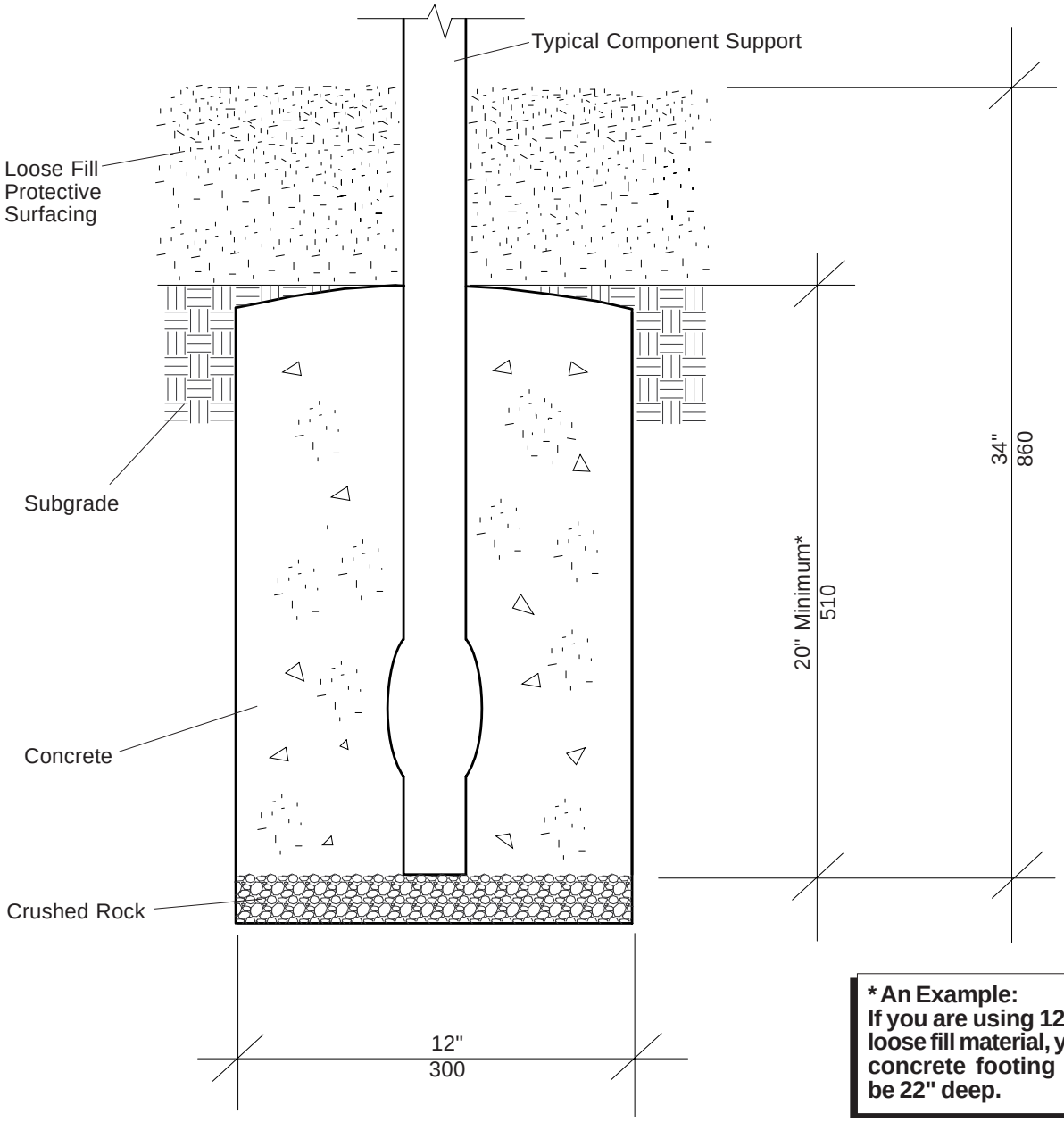
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SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*)

8-25-00
10970900



*** An Example:**
If you are using 12" of loose fill material, your concrete footing will be 22" deep.

Minimum 1.2 Cubic Feet of Concrete Required per Support.

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8-25-00 Document #13237300 replaces #10970900. Added concrete footing note.

Document #13237300

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SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

1-1-01

PlayBooster Installation

1) Before starting installation, study your *PlayBooster* plan drawing and all installation instructions carefully for location of posts, deck heights, components and safety enclosures. Make sure slides are oriented away from the afternoon sun and that the structure is visible (easily supervised) and accessible.

2) Clear an area large enough for your *PlayBooster* and at least the required minimum use zone around it, as shown on your plan drawing. The subsurface must be well drained. If the soil does not drain naturally it must be tiled or sloped at $^1/_8$" to $^1/_4$" per foot to a storm sewer or a "French Drain". If your *PlayBooster* is over 30' in length it is recommended to install more than one "French Drain" or similar system to allow drainage from the center of the play area and decrease the overall slope. If this is not possible, the structure may need to be "stepped" to take up the grade change.

3) Overhead Obstructions: Overhead obstructions within the use zones of playground equipment that are not part of the play structure (for example, tree limbs) shall be at least 84 in. (2130 mm) above each designated play surface or 84 in. (2130 mm) above the pivot point of swings. All overhead utility line clearances above the use zone areas shall comply with all local, state, and national codes, such as the National Electical Safety Code.

4) Locate all mainstructure post footing holes according to the dimensions shown on your *PlayBooster* plan. This can be accomplished by laying a deck on the ground and measuring from it; by laying out a base line string grid or using a builders transit. This step is very important and worth taking extra time to be precise. Location of component footings such as slide supports can be done at a later time.

5) Refer to the Typical Concrete Footing installation sheet. Dig holes to the proper width and depth as shown. (Only dig enough holes for one day's construction. Do not leave holes open over night.) Pour crushed rock in each hole ***level with each other*** and at least 4" deep as shown. This can be easily accomplished either with a builders transit or by laying out hole locations with a string grid, leveling the grid, and measuring down from the grid for each footing. Tamp the crushed rock down until compacted and at proper level. This step is important to ensure all posts will be at the proper height relative to each other, and it greatly simplifies installation. If the soils are loose or unstable, larger diameter holes may be necessary. Check with a local engineer if in doubt.

6) Start with the lowest deck and work your way to the highest deck following instructions on the installation sheets for typical post/deck assembly. Install barriers and roofs as located on the plan for stability.

7) After the posts are at proper heights and plumb, and the decks are at proper height and level, pour the concrete footings per the Typical Concrete Footing Detail.

8) During construction, the site and all the material on it must be secured when unattended to prevent children from playing on them. Do not leave decks with unprotected openings when unattended-use temporary barricades if necessary.

9) Install all other play components per the installation instructions. After all components and enclosures are properly attached, pour the remaining concrete footings per the Typical Concrete Footing Detail.

10) Install protective surfacing material.

11) Attach play hardware such as 'D' rings and swing seats last, ***after*** protective surfacing is in place and footings have cured at least 3 days.

12) Carefully and thoroughly inspect the entire *PlayBooster* to be sure all fastening hardware is tight. According to ASTM F1487, section 6.2 sharp points, edges and protrusions; any exposed bolt ends should not protrude beyond the face of the nut more than two (2) threads. This condition is not planned, but may exist in some applications because materials and finishes will vary. To remedy this situation, add a second nut or washer(s), extras have been added to the spare parts kit. See illustrations on reverse side of this sheet. Children should not be allowed on the structure until this inspection is complete.

13) Before children are allowed on the structure, the site must be cleaned and free of all construction debris and packaging material. Do not burn on the site.

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Tools Required

Tools required for installation are an auger, or other equipment for digging 14" diameter footing holes; shovels, rubber mallet, drill (with $^{1}/_{4}$", $^{7}/_{16}$", $^{9}/_{16}$", $^{11}/_{16}$" and $^{3}/_{8}$" drill bits), tape measure, hex keys or allen wrenches, level, $^{3}/_{8}$" socket set, hammer, open end wrench set, screw driver, for surface mount a hammer drill, $^{3}/_{8}$" and $^{1}/_{2}$" masonry bits and transit or string line to aid in layout. Some washable felt tip pens are also useful for marking clamp locations.

Materials Required

All *PlayBooster* materials are supplied except concrete for footings, protective surfacing material, and curbing or edging material. With the exception of the special wrenches required (for the pinned hex fasteners) no other tools are supplied.

Recycling

Many of our packaging materials can be recycled, please take the time to separate and deliver them to a recycler. Thank You.

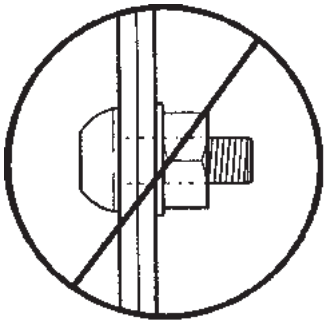
Installation Times

Installation times, as noted on the back of the installation sheets, are ***approximate*** and will vary depending on soil conditions, installer's equipment and ability. Times indicated ***do not*** include unloading or unpacking equipment. The man hours given are for one person installing (unless otherwise noted). Cut time in half for two people.

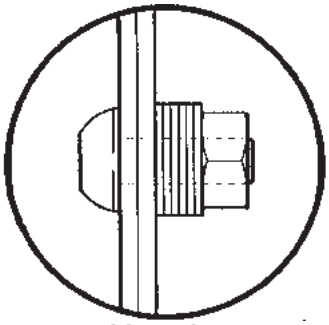
Technical Services

If you have any questions or concerns about the installation of your structure, call our Technical Services Department at: ***1-800-328-0035*** (7:30 - 5:30p.m. CST/M-F).

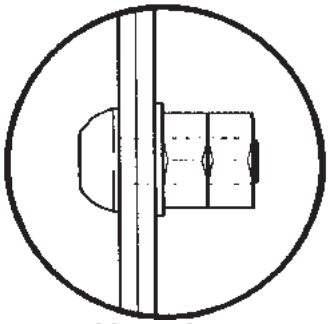
Illustrations For Note 10, (Reverse Side Of This Sheet)



More Than Two (2) Threads Exposed



Add Washers



Add Another Nut (Align Flat Area)

PlayBooster® **Installation**

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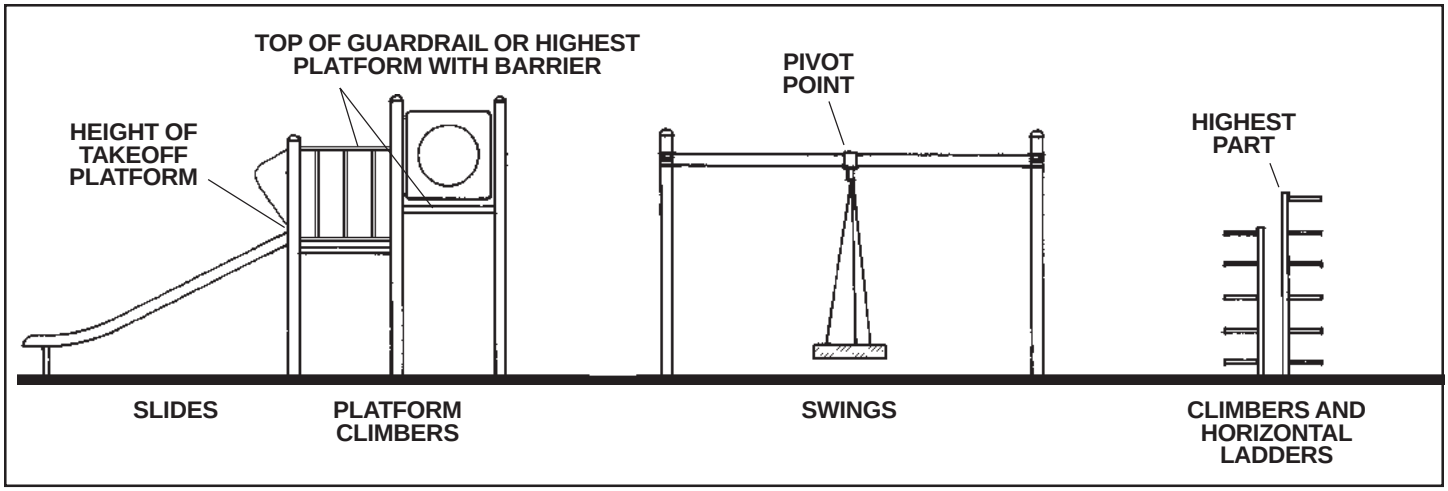
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1-1-01 Document #13412800 Replaces #12809900. Udated Installations Instructions.

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SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)



1.) Determine the highest accessible part - by definition.

2.) Determine the type of surfacing material desired:
- *Unitary* - Bound rubber type materials for the accessible areas.
- *Loose-fill* - Sand, wood chips, etc. for non-accessible areas.

3.) Select a material that has a Critical Height value of at least the height of the highest accessible part.
- According to the CPSC, Critical Height is defined as the maximum height from which the instrumented metal headform, upon impact, yields both a peak deceleration of no more than 200 G's and a HIC value of no more than 1,000 when tested in accordance with the procedure described in the ASTM Test Method F1292.
- Request independent laboratory test results showing the critical height of each product per the above procedures for commercially available products. The CPSC has tested some common loose-fill materials that are commonly not tested as a protective surfacing. (See back page.)

4.) Cover the designated use zone with the desired materials. If a different type of material is used for the accessible route of travel, make sure the surfaces are maintained flush.

Selecting Protective Surfacing for Your Playground

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Document #13412800

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SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

Critical Heights (in Feet)

	Uncompressed Depth			Compressed Depth *
Material	**6"**	**9"**	**12"**	**9"**
* Wood Mulch	7'	10'	11'	**10'**
* Double Shredded Bark Mulch	6'	10'	11'	**7'**
* Uniform Wood Chips	6'	7'	12'	**6'**
* Fine Sand	5'	5'	9'	**5'**
* Coarse Sand	5'	5'	6'	**4'**
* Fine Gravel	6'	7'	10'	**6'**
* Medium Gravel	5'	5'	6'	**5'**

NA = Not Available

* **NOTE:** Compressed depths most accurately depict conditions on a playground.
* An approximation of the maximum fall height from which a life-threatening head injury would not be expected to occur, based on tests in which a headform yielded both a peak deceleration of less than 200 G's and a HIC of less than 1000 upon impact.

* Handbook for *Public Playground Safety*, published by the U.S. Consumer Products Safety Commission, Section 10, Table 2, page 21.

Critical Heights

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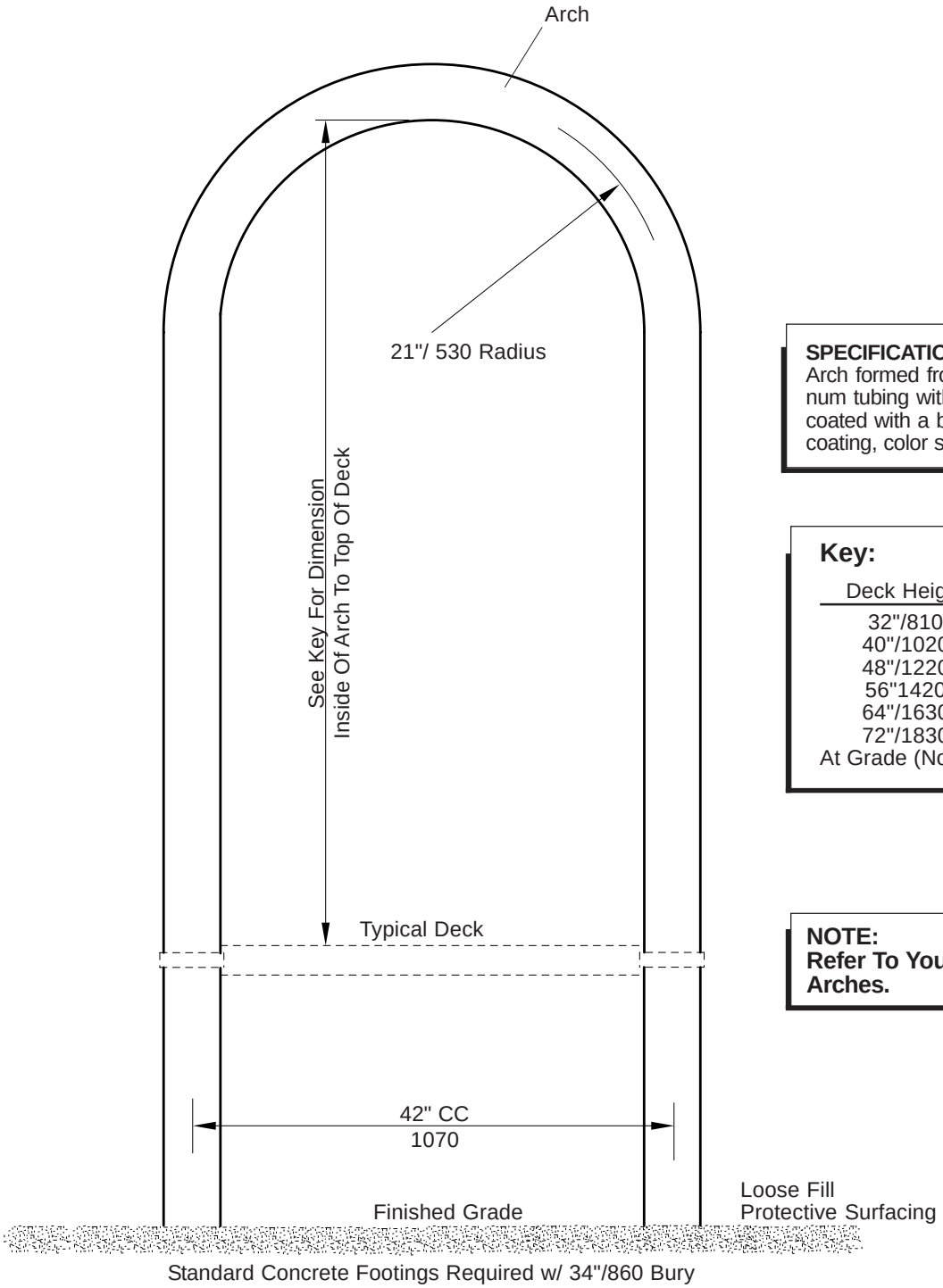
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SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*)

3-14-01
12026200



Standard Concrete Footings Required w/ 34"/860 Bury

SPECIFICATIONS:
Arch formed from 5" O.D. 6005-T5 aluminum tubing with $^1/_8$" wall thickness. Unit is coated with a baked-on polyester powder-coating, color specified.

Key:

Deck Height	Dimension
32"/810	92 $^1/_2$"/2350
40"/1020	98 $^1/_2$"/2502
48"/1220	90 $^1/_2$"/2299
56"1420	98 $^1/_2$"/2502
64"/1630	90 $^1/_2$"/2299
72"/1830	90 $^1/_2$"/2299
At Grade (No Deck)...	97 $^1/_4$"/2470

NOTE:
Refer To Your Plan For Location Of Arches.

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3-14-01 Document #13433600 replaces #13317700. Changed tubing to 6005-T5.

Document #13433600

"How to distribute your hardware *Headache Free*"



We have received feedback from you, our customers, that the most common delay in completing your playground installation is lost or misplaced hardware.

Some of our most successful installations have used a *"check-out"* system with one person appointed to distribute the various hardware packages. Installation sheets are provided for each component that indicate hardware packages/items required to assemble that component. Refer to these sheets to determine which hardware items to request from the designated *"check-out"* person.

HELPFUL HINTS:

Read installation sheets.

Be sure to use the correct length hardware as specified on the installation sheets.

Be sure to use clamps in the correct location as indicated on the installation sheets.

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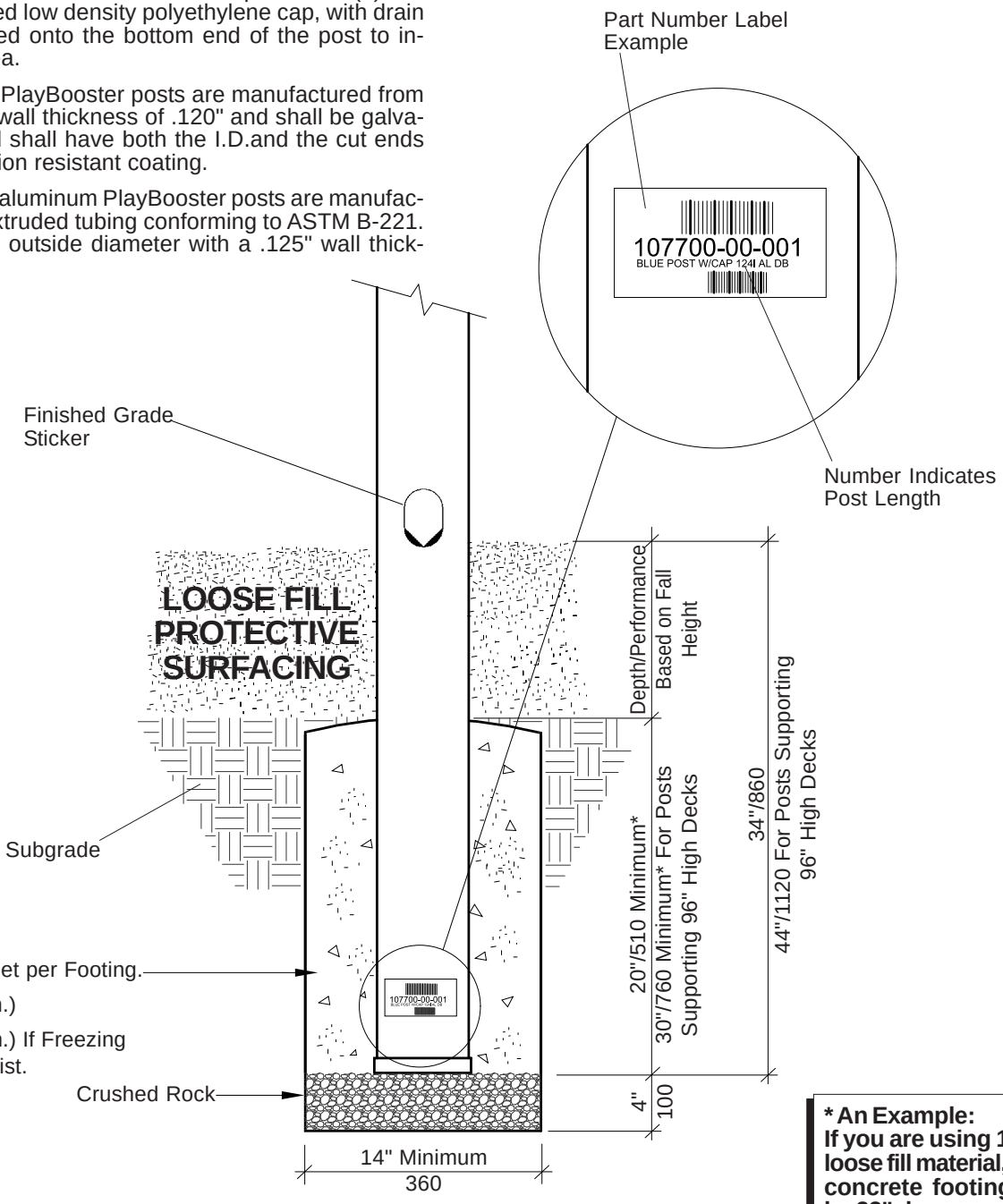
Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*)

13871600

Post Specifications: Post length shall vary depending upon the intended use and shall be a minimum of 42" above the deck height. All posts shall be powdercoated to specified color. All posts shall have a “finished grade marker” positioned on the post identifying the 34" bury line (or 44" bury line for posts for 96" decks) required for correct installation and the top of the loose fill protective surfacing. Top caps for posts shall be aluminum die cast from 369.1 alloy and powdercoated to match the post color. All caps shall be factory installed and secured in place with (3) self sealing rivets. A molded low density polyethylene cap, with drain holes, shall be pressed onto the bottom end of the post to increase the footing area.

Steel Posts: All steel PlayBooster posts are manufactured from 5" O.D. tubing with a wall thickness of .120" and shall be galvanized after rolling and shall have both the I.D.and the cut ends sprayed with a corrosion resistant coating.

Aluminum Posts: All aluminum PlayBooster posts are manufactured from 6005-T5 extruded tubing conforming to ASTM B-221. Posts shall have a 5" outside diameter with a .125" wall thickness.



CONCRETE

- 1.87 Cubic Feet per Footing.
- 2000 PSI (Min.)
- 3000 PSI (Min.) If Freezing Conditions Exist.

*** An Example:**
If you are using 12" of loose fill material, your concrete footing will be 22" deep.

PlayBooster® Concrete Footings, 5" Posts

601 7TH STREET SOUTH, DELANO, MINNESOTA 55328-8605 888-574-4678 LSI Install Help 888-438-6574 LSI Direct 763-972-5200 Int. FAX (763) 972-3185

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Eco #51014 Document #13871600 replaces #13433700. Removed Post Length Sticker.

Document #13871600

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Warning

Your playground may include equipment containing moving parts. Moving parts are more vulnerable to wear, mis-use and abuse than other non-moving parts. It is critical these parts be inspected and maintained according to our recommendations.

As the owner, it is your responsibility to perform preventative maintenance and record your findings. Failure to do so may create a hazard and cause serious injury or death.

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As the owner, it is your responsibility to perform preventative maintenance and record your findings. Failure to do so may create a hazard and cause serious injury or death.

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Document #14916800

IMPORTANT SAFETY NOTES!

According to the U.S. Consumer Product Safety Commission (CPSC) nearly 70% of all playground injuries are caused by falls to the surface.

PLEASE INSTALL AND MAINTAIN ADEQUATE PROTECTIVE SURFACING UNDER AND AROUND YOUR PLAYSTRUCTURE!

Never let children play on the equipment before protective surfacing is installed.

Consult the CPSC's Handbook for Public Playground Safety, the ASTM F1487 Standard or your Landscape Structures representative for more information.

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2006 Document #15745100

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2006 Document #15745100

"How to distribute your hardware *Headache Free*"



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HELPFUL HINTS:

Read installation sheets.

Be sure to use the correct length hardware as specified on the installation sheets.

Be sure to use clamps in the correct location as indicated on the installation sheets.

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Warning

Your playground may include equipment containing moving parts. Moving parts are more vulnerable to wear, mis-use and abuse than other non-moving parts. It is critical these parts be inspected and maintained according to our recommendations.

As the owner, it is your responsibility to perform preventative maintenance and record your findings. Failure to do so may create a hazard and cause serious injury or death.

601 7TH STREET SOUTH , P.O. BOX 198 DELANO, MINNESOTA 55328-0198 (763) 972-3391 1-888-LSI-INST (1-888-574-4678) FAX (763) 972-3185

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Document #14916800

IMPORTANT SAFETY NOTES!

According to the U.S. Consumer Product Safety Commission (CPSC) nearly 70% of all playground injuries are caused by falls to the surface.

PLEASE INSTALL AND MAINTAIN ADEQUATE PROTECTIVE SURFACING UNDER AND AROUND YOUR PLAYSTRUCTURE!

Never let children play on the equipment before protective surfacing is installed.

Consult the CPSC's Handbook for Public Playground Safety, the ASTM F1487 Standard or your Landscape Structures representative for more information.

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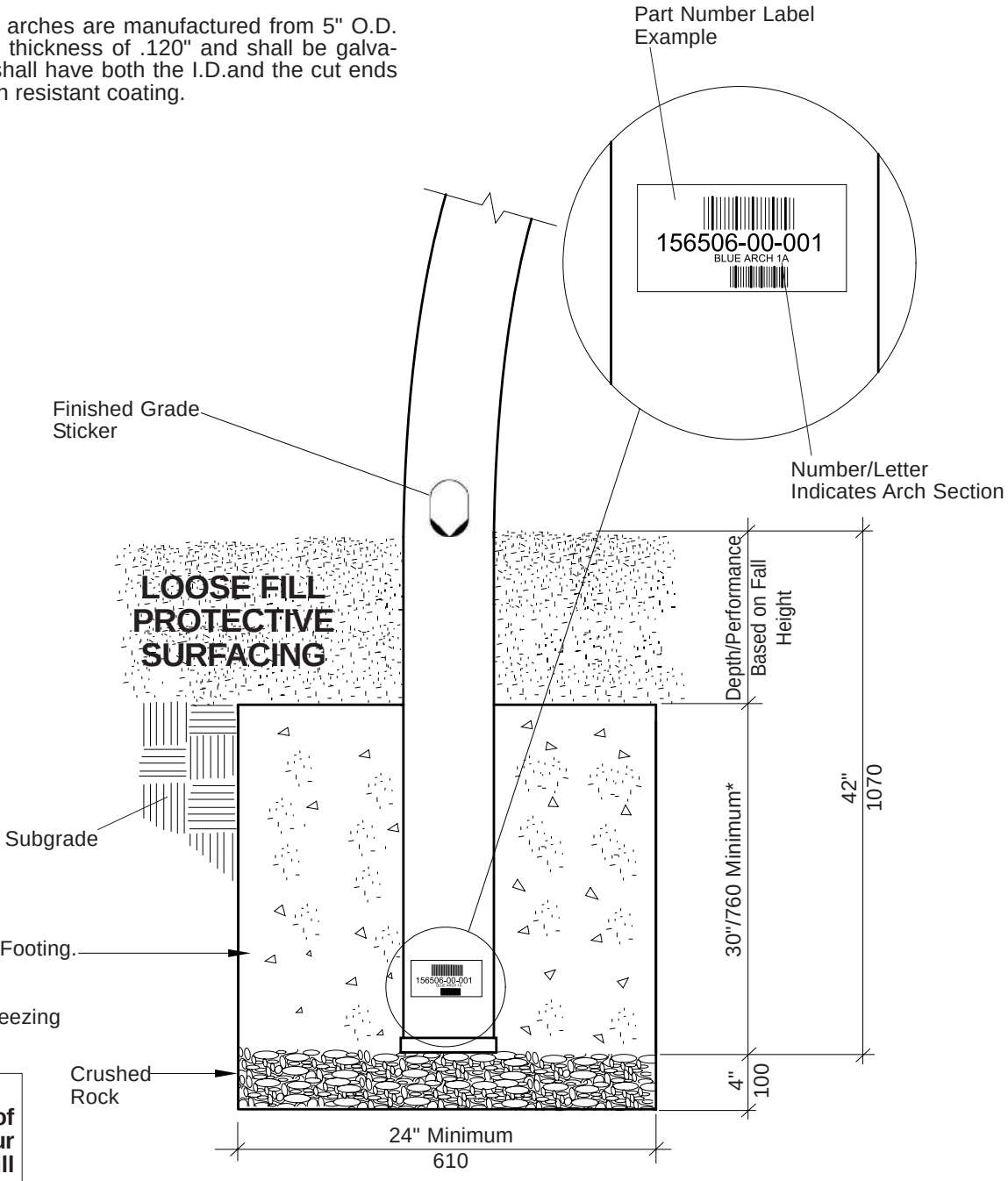
SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

15889500

Arch Specifications: Arch height and width shall vary depending upon the intended use and shall be shipped in 4 sections for each arch. All arch sections shall be powdercoated to specified color. All arches shall have a “finished grade marker” positioned on the arches identifying the 42" bury line required for correct installation and the top of the loose fill protective surfacing. A molded low density polyethylene cap, with drain holes, shall be pressed onto the bottom end of the lower arch section to increase the footing area.

Steel Arches: All *Evos* arches are manufactured from 5" O.D. steel tubing with a wall thickness of .120" and shall be galvanized after rolling and shall have both the I.D.and the cut ends sprayed with a corrosion resistant coating.



CONCRETE

- 7.51 Cubic Feet per Footing.
- 2000 PSI (Min.)
- 3000 PSI (Min.) If Freezing Conditions Exist.

*** An Example:**
If you are using 12" of loose fill material, your concrete footing will be 30" deep.

Concrete Footings, 5" Arches

Evos™

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SAFETY NOTE

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Evos™ Installation

1) Before starting installation, study your *Evos* plan drawing and all installation instructions carefully for location of arches, outriggers and components. Make sure gliders are oriented away from the afternoon sun and that the structure is visible (easily supervised) and accessible.

2) Clear an area large enough for your *Evos* and at least the required minimum use zone around it, as shown on your plan drawing. The subsurface must be well drained. If the soil does not drain naturally it must be tiled or sloped at $^1/_8$" to $^1/_4$" per foot to a storm sewer or a "French Drain". If your *Evos* is over 30' in length it is recommended to install more than one "French Drain" or similar system to allow drainage from the center of the play area and decrease the overall slope.

3) Overhead Obstructions: Overhead obstructions within the use zones of playground equipment that are not part of the play structure (for example, tree limbs) shall be at least 84 in. (2130 mm) above each designated play surface or 84 in. (2130 mm) above the pivot point of swings. All overhead utility line clearances above the use zone areas shall comply with all local, state, and national codes, such as the National Electical Safety Code.

4) Locate all mainstructure arch footing holes according to the dimensions shown on your *Evos* plan. This can be accomplished by laying out a base line string grid or using a builders transit. This step is very important and worth taking extra time to be precise. Location of outrigger footings such as glider supports can be done at a later time.

5) Refer to the *Evos* Typical Concrete Footing installation sheet. Dig holes to the proper width and depth as shown. (Only dig enough holes for one day's construction. Do not leave holes open over night.) Pour crushed rock in each hole ***level with each other*** and at least 4" deep as shown. This can be easily accomplished either with a builders transit or by laying out hole locations with a string grid, leveling the grid, and measuring down from the grid for each footing. Tamp the crushed rock down until compacted and at proper level. This step is important to ensure all arches will be at the proper height relative to each other, and it greatly simplifies installation. If the soils are loose or unstable, larger diameter holes may be necessary. Check with a local engineer if in doubt.

6) Start with arches 1 & 2, then arch 4, followed by arch 3, following instructions on the installation sheet. Install outriggers and components as located on the plan for stability.

7) After the arches, outriggers and components are at proper heights and plumb, pour the concrete footings per the *Evos* Typical Concrete Footing Detail.

8) During construction, the site and all the material on it must be secured when unattended to prevent children from playing on them. When unattended, use temporary barricades if necessary.

9) Install protective surfacing material.

10) Carefully and thoroughly inspect the entire *Evos* to be sure all fastening hardware is tight. According to ASTM F1487, section 6.2 sharp points, edges and protrusions; any exposed bolt ends should not protrude beyond the face of the nut more than two (2) threads. This condition is not planned, but may exist in some applications because materials and finishes will vary. To remedy this situation, add a second nut or washer(s), extras have been added to the spare parts kit. See illustrations on reverse side of this sheet. Children should not be allowed on the structure until this inspection is complete.

11) Before children are allowed on the structure, the site must be cleaned and free of all construction debris and packaging material. Do not burn on the site.

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Tools Required

Tools required for installation are an auger, or other equipment for digging 14", 18" and 24" diameter footing holes; shovels, rubber mallet, drill (with $^{1}/_{4}$" drill bits), tape measure, hex keys or allen wrenches, level, $^{3}/_{8}$" socket set, hammer, open end wrench set, screw driver, and transit or string line to aid in layout. Some washable felt tip pens are also useful for marking clamp locations.

Materials Required

All *Evos* materials are supplied except concrete for footings, protective surfacing material, and curbing or edging material. With the exception of the special wrenches required (for the pinned hex fasteners) no other tools are supplied.

Recycling

Many of our packaging materials can be recycled, please take the time to separate and deliver them to a recycler. Thank You.

Installation Times

Installation times, as noted on the back of the installation sheets, are ***approximate*** and will vary depending on soil conditions, installer's equipment and ability. Times indicated ***do not*** include unloading or unpacking equipment. The man hours given are for one person installing (unless otherwise noted). Cut time in half for two people.

Technical Services

If you have any questions or concerns about the installation of your structure, call our Technical Services Department at: ***1-800-328-0035*** (7:30 - 5:30p.m. CST/M-F).

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SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

SELECTING PROTECTIVE SURFACING FOR YOUR PLAYGROUND

1.) Determine the highest accessible part - by definition.

2.) Determine the type of surfacing material desired:

- *Unitary* - Bound rubber type materials for the accessible areas.
- *Loose-fill* - Sand, wood chips, etc. for non-accessible areas.

3.) Select a material that has a Critical Height value of at least the height of the highest accessible part.

- According to the CPSC, Critical Height is defined as the maximum height from which the instrumented metal headform, upon impact, yields both a peak deceleration of no more than 200 G's and a HIC value of no more than 1,000 when tested in accordance with the procedure described in the ASTM Test Method F1292.
- Request independent laboratory test results showing the critical height of each product per the above procedures for commercially available products. The CPSC has tested some common loose-fill materials that are commonly not tested as a protective surfacing. (See back page.)

4.) Cover the designated use zone with the desired materials. If a different type of material is used for the accessible route of travel, make sure the surfaces are maintained flush.

Critical Heights (in Feet)

	Uncompressed Depth			Compressed Depth *
Material	**6"**	**9"**	**12"**	**9"**
* Wood Mulch	7'	10'	11'	**10'**
* Double Shredded Bark Mulch	6'	10'	11'	**7'**
* Uniform Wood Chips	6'	7'	12'	**6'**
* Fine Sand	5'	5'	9'	**5'**
* Coarse Sand	5'	5'	6'	**4'**
* Fine Gravel	6'	7'	10'	**6'**
* Medium Gravel	5'	5'	6'	**5'**

NA = Not Available

* **NOTE:** Compressed depths most accurately depict conditions on a playground.
* An approximation of the maximum fall height from which a life-threatening head injury would not be expected to occur, based on tests in which a headform yielded both a peak deceleration of less than 200 G's and a HIC of less than 1000 upon impact.

* Handbook for *Public Playground Safety*, published by the U.S. Consumer Products Safety Commission, Section 10, Table 2, page 21.

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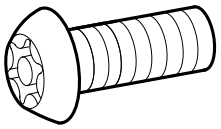
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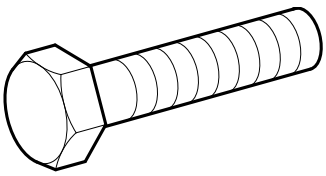
Common Parts & Fasteners

Button Head Cap Screws BHCS w/Pin



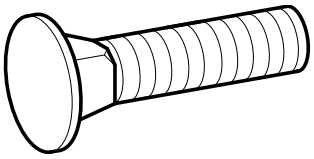
Part #	Sizes Inches	Sizes mm	Mat'l or Grade	Recommended Torque Ft./lbs	Recommended Torque Kgm
137277-00	1/4" x 3/8"	(6,4 x 9,5)	SST-PAT	10	1.4
131849-00	5/16" x 1/2"	(7,9 x 12,7)	SST-PAT	10	1.4
132626-00	5/16" x 7/8"	(7,9 x 22,2)	SST-PAT	10	1.4
192071-00		M8 x 24 mm	SST-PAT	10	1.4
100195-00	3/8" x 5/8"	(9,5 x 15,9)	SST-PAT	15	2
100196-00	3/8" x 7/8"	(9,5 x 22,2)	SST-PAT	15	2
100198-00	3/8" x 1 1/8"	(9,5 x 28,6)	SST-PAT	15	2
113027-00	3/8" x 1 3/8"	(9,5 x 34,9)	SST-PAT	15	2
100171-00	3/8" x 1 1/2"	(9,5 x 38,1)	SST-PAT	15	2
123224-00	3/8" x 1 11/16"	(9,5 x 42,9)	SST-PAT	15	2
100173-00	3/8" x 2"	(9,5 x 50,8)	SST-PAT	15	2
100199-00	3/8" x 2 1/4"	(9,5 x 57,2)	SST-PAT	15	2
100174-00	3/8" x 2 1/2"	(9,5 x 63,5)	SST-PAT	15	2
100175-00	3/8" x 2 3/4"	(9,5 x 69,9)	SST-PAT	15	2
100176-00	3/8" x 3"	(9,5 x 76,2)	SST-PAT	15	2
100168-00	3/8" x 3 1/4"	(9,5 x 82,6)	SST-PAT	15	2
100200-00	3/8" x 3 1/2"	(9,5 x 88,9)	SST-PAT	15	2
124460-00	3/8" x 3 3/4"	(9,5 x 95,2)	SST-PAT	15	2
100201-00	5/8" x 1 1/2"	(15,9 x 38,1)	SST-PAT	50	7
127551-00	5/8" x 1 1/2"	(15,9 x 38,1)	SST-ANTI-SIEZE	50	7
100203-00	5/8" x 2 1/4"	(15,9 x 57,2)	SST-PAT	50	7

Hex Cap Screws



Part #	Sizes Inches	Sizes mm	Mat'l or Grade	Recommended Torque Ft./lbs	Recommended Torque Kgm
100206-00	3/8" x 1"	(9,5 x 25,4)	SST-PAT	15	2
100208-00	3/8" x 1 1/2"	(9,5 x 38,1)	SST-PAT	15	2
100209-00	3/8" x 1 3/4"	(9,5 x 44,4)	SST-PAT	15	2
135682-00	3/8" x 3 1/8"	(9,5 x 79,3)	SST-PAT	15	2
135683-00	3/8" x 4 5/8"	(9,5 x 117,5)	SST	15	2
100214-00	3/8" x 5"	(9,5 x 127)	SST-PAT	15	2
121499-00	7/16" x 1 3/4"	(11,1 x 114,3)	SST-PAT	15	2
100216-00	1/2" x 1 1/4"	(12,7 x 31,7)	SST	15	2
131862-00	1/2" x 2 1/4"	(12,7 x 57,1)	SST-PAT	20	2.8

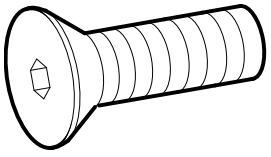
Carriage Bolts



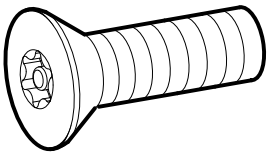
Part #	Sizes Inches	Sizes mm	Mat'l or Grade	Recommended Torque Ft./lbs	Recommended Torque Kgm
100135-00	5/16" x 1 1/4"	(7,9 x 31,8)	SST-PAT	5	0.7
100147-00	3/8" x 1 1/4"	(9,5 x 31,8)	SST-PAT	15	2
116017-00	3/8" x 1 1/2"	(9,5 x 38,1)	SST-PAT	15	2
100148-00	3/8" x 1 3/4"	(9,5 x 44,5)	SST-PAT	15	2

Flat Head Cap Screws (FHCS)

No Pin*



With Pin



Part #	Sizes Inches	Sizes mm	Mat'l or Grade	Recommended Torque Ft./lbs	Recommended Torque Kgm
148686-00	3/8" x 3/4"	(9,5 x 19,05)	SST-PAT	13	1.8
100252-00*	3/8" x 1 1/4"	(9,5 x 31,8)	SST-PAT	13	1.8
151421-00	3/8" x 1 1/2"	(9,5 x 38,1)	SST-PAT	13	1.8
148765-00	3/8" x 3 1/2"	(9,5 x 88,9)	SST-PAT	13	1.8
130824-00*	1/2" x 2 1/4"	(12,5 x 57,2)	SST	20	2.8

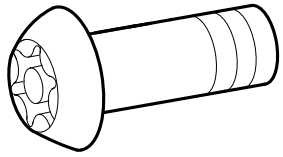
NOTE: These are recommended torque applications per fastener size. When fasteners are used with plastic or wood products, the torque specifications will be excessive and we recommend that the installer apply some caution when tightening the fasteners. Plastic or wood products should begin to deform slightly. Fasteners indicated with -"Pat" includes a locking patch type material and should cure for 72 hours for maximum strength.

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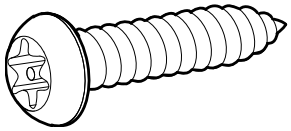
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BHCS w/Pin Limited Thread Bolts



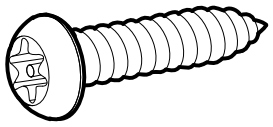
Part #	Sizes Inches	Sizes mm	Mat'l or Grade	Recommended Torque Ft./lbs	Recommended Torque Kgm
100290-00	3/8" x 7/8"	(9,5 x 22,2)	SST-PAT	21	3
100292-00	3/8" x 1 1/4"	(9,5 x 31,8)	SST-PAT	21	3
157704-00	7/16" x 2"	(11,11x 51)	SST-PAT	40	5.5
127068-00	7/16" x 2 7/16"	(11,11x61,91)	SST-PAT	40	5.5

Lag Screws



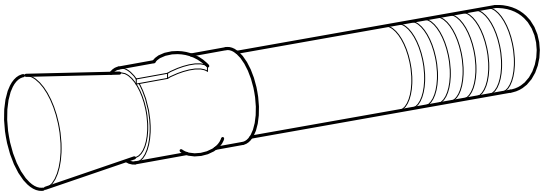
Part #	Sizes Inches	Sizes mm	Mat'l or Grade	Head Type
100127-00	5/16" x 1 1/4"	(7,9 x 31,8)	SST	Hex Head
168198-00	3/8" x 1 1/2"	(9,5 x 38,1)	SST	Button Head (Shown)
139039-00	3/8" x 2"	(9,5 x 50,8)	SST	Button Head (Shown)

Screw, Type AB Thread BHCS w/Pin



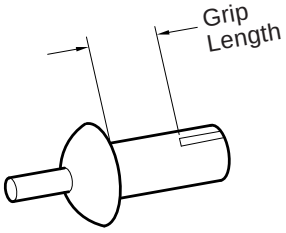
Part #	Size	Mat'l or Grade
129671-00	#14 x 1/2"	SST
127872-00	#14 x 3/4"	SST
136232-00	#14 x 1"	SST
129672-00	#14 x 1 1/4"	SST

Expansion Anchors (Used To Secure Components To Concrete Slabs)



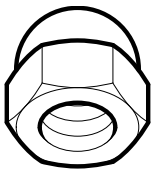
Part #	Sizes Inches	Sizes mm	Mat'l or Grade	Recommended Torque Ft./lbs	Recommended Torque Kgm
100263-00	3/8" x 2 3/4"	(9,5 x 69,9)	Alloy Steel	15	2
100266-00	1/2" x 2 3/4"	(12,7 x 69,9)	Alloy Steel	20	2.8

Drive Rivets



Part #	Sizes Inches	Sizes mm	Mat'l
100609-00	1/4" x 3/16"	(6,4 x 4,8)	Alum Rivet/Alum Pin
100611-00	1/4" x 3/8"	(6,4 x 9,5)	Alum Rivet/SST Pin
113300-00	1/4" x 1/2"	(6,4 x 12,7)	Alum Rivet/Alum Pin
100610-00	1/4" x 5/8"	(6,4 x 15,9)	Alum Rivet/SST Pin
139152-00	1/4" x 3/4"	(6,4 x 19,05)	Alum Rivet/Alum Pin
100613-00	1/4" x 7/8"	(6,4 x 22,2)	Alum Rivet/Alum Pin
118158-00	1/4" x 1"	(6,4 x 25,4)	Alum Rivet/Alum Pin

Low Crown Cap Nut



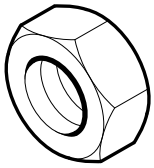
Part #	Size Inches	Mat'l
100349-00	3/8"-16 UNC	SST

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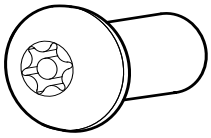
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Standard Hex Nuts



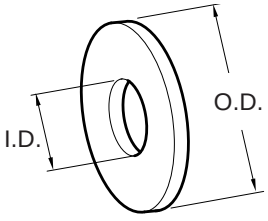
Part #	Sizes Inches	Mat'l or Grade
100326-00	5/16-18 UNC	SST
100321-00	3/8-16 UNC	SST-Pat
100327-00	3/8-16 UNC	SST
128296-00	3/8-16 UNC (Jam Nut)	SST
100328-00	7/16-14 UNC	SST
145021-00	7/16-14 UNC (Jam Nut)	SST
100322-00	1/2-13 UNC	SST
129692-00	1/2-13 UNC	SST-Pat
129693-00	1/2-13 UNC (Jam Nut)	SST
100323-00	5/8-11 UNC	SST

Flange Nut w/Pin



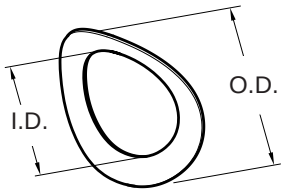
Part #	Sizes Inches	Mat'l or Grade
192064-00	M8 x 24 mm	SST
100353-00	3/8-16 UNC	SST

Flat Washers



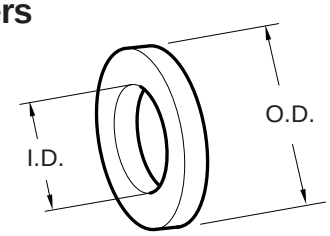
Part #	Sizes Inches	mm	Mat'l or Grade	I.D.	O.D.
122039-00	1/4"	(6,3)	SST	0.312	.734
100362-00	3/8"	(9,5)	SST	0.406	1.002
112793-00	7/16"	(11,1)	SST	0.505	1.262
100363-00	1/2"	(12,7)	SST	0.536	1.262
100366-00	5/8"	(15,9)	SST	0.688	1.750
123737-00	1 1/8"	(28,6)	SST	1.140	1.750

Curved Spring Washer



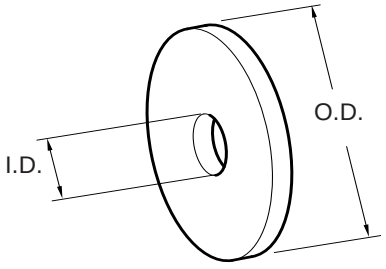
Part #	Sizes Inches	mm	Mat'l or Grade	I.D.	O.D.
100380-00	1/2"	(12,7)	SST	0.531	0.795

SAE Flat Washers



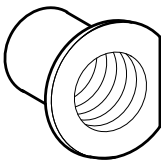
Part #	Sizes Inches	mm	Mat'l or Grade	I.D.	O.D.
100364-00	1/4"	(6,35)	SST	0.281	0.625
100365-00	3/8"	(9,5)	SST	0.411	0.816
113550-00	1/2"	(12,7)	SST	0.531	1.062
129500-00	5/8"	(15,9)	SST	0.686	1.342

Fender Washers



Part #	Sizes Inches	mm	Mat'l or Grade	I.D.	O.D.
100378-00	3/8" x 1 1/2"	(9,53 x 38,1)	SST	0.406	1.500
100379-00	1/2" x 2"	(12,7 x 50,8)	SST	0.531	2.000

Tee Nut (PlayBooster Clamps)



Part #	Sizes Inches	Mat'l or Grade
100351-00	3/8-16 UNC	SST

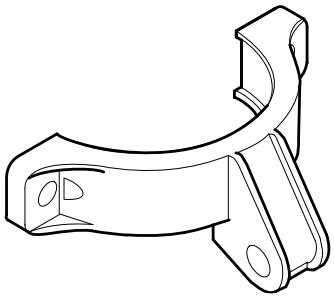
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Set Screw



Part #	Sizes Inches	Sizes mm	Mat'l or Grade
100298-00	3/8" x 7/16"	(9,5 x 11,1)	SST

Offset Hanger Clamp (PlayBooster)



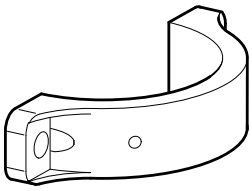
Part #	Mat'l
113729-00	CastAluminum

Bolt Link



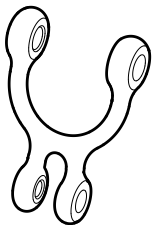
Part #	Mat'l or Grade
138915-00	SST

Half Clamp (PlayBooster)



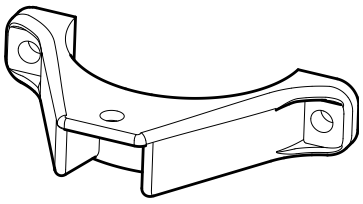
Part #	Mat'l
105327-01	CastAluminum

Double Clevis



Part #	Mat'l or Grade
138917-00	SST

Deck Hanger Clamp (PlayBooster)



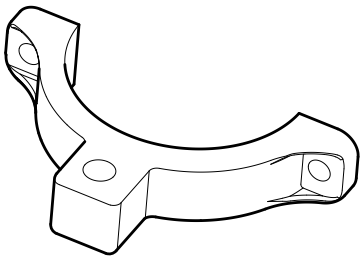
Part #	Mat'l
106022-00	CastAluminum

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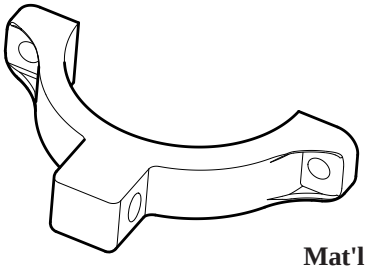
ISO 9001 Certified

Swing Hanger Clamp



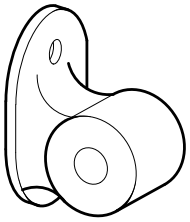
Part #	Mat'l
121289-00	CastAluminum

Ring/Rail Hanger Clamp (PlayBooster)



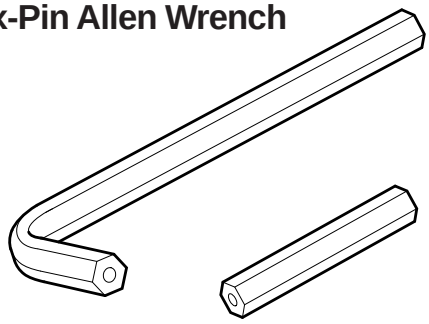
Part #	Mat'l
105330-00	CastAluminum

Offset Bolt Bracket (PlayShaper)



Part #	Mat'l
113895-00	CastAluminum

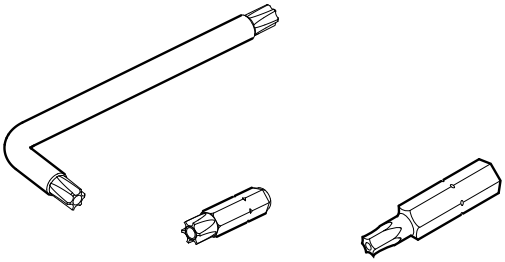
Hex-Pin Allen Wrench



Hex-Pin Driver

Part #	Description
100685-00	Hex-Pin Allen Wrench
100686-00	Hex-Pin Driver (Used With A $^{5}/_{16}$" Socket)

6-Lobe Wrench



6-Lobe Driver

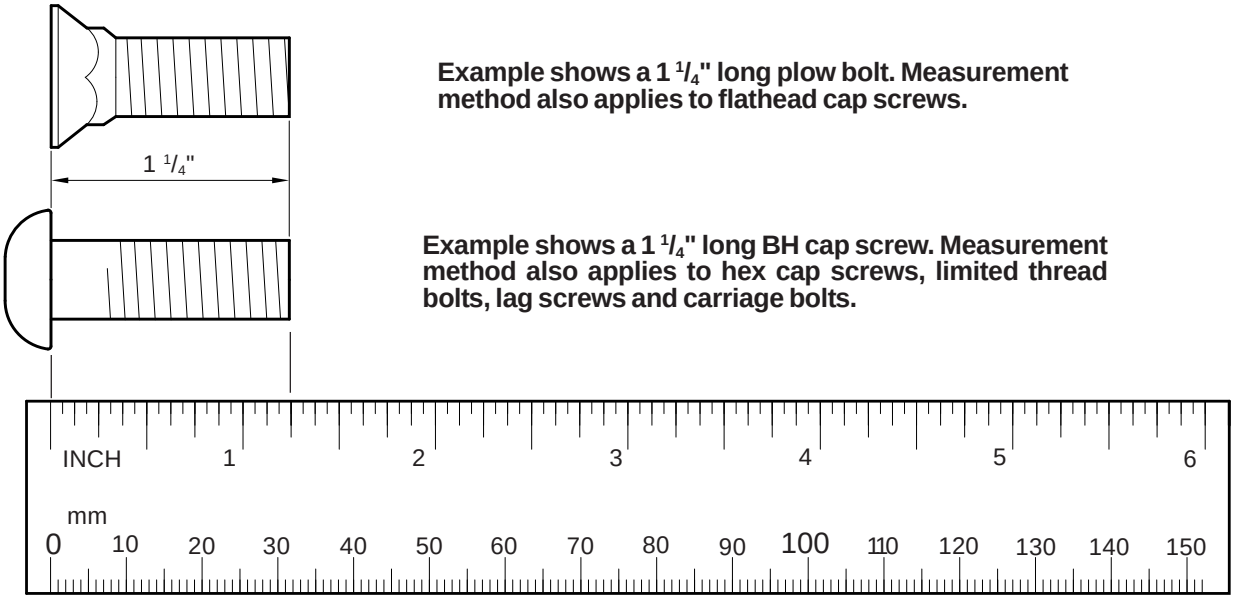
Torx-Pin Driver

Part #	Description
146017-00	6-Lobe Wrench (T-45)
146007-00	6-Lobe Driver (T-45) (Used With A $^{5}/_{16}$" Socket)
127463-00	Torx-Pin Driver (T-27) (Used With A $^{1}/_{4}$" Socket)

Eco #53704 Document #16338900 replaces #15436400. Udated Fasteners.

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HOW TO DETERMINE BOLT LENGTHS



Example shows a 1 1/4" long plow bolt. Measurement method also applies to flathead cap screws.

Example shows a 1 1/4" long BH cap screw. Measurement method also applies to hex cap screws, limited thread bolts, lag screws and carriage bolts.

Rule: Measurements should be based on the part of the screw that penetrates the surface.

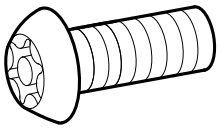
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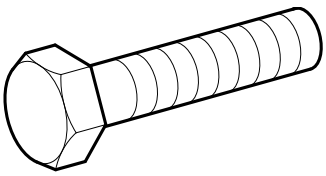
Common Parts & Fasteners

Button Head Cap Screws BHCS w/Pin



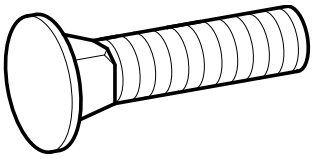
Part #	Sizes Inches	Sizes mm	Mat'l or Grade	Recommended Torque Ft./lbs	Recommended Torque Kgm
137277-00	1/4" x 3/8"	(6,4 x 9,5)	SST-PAT	10	1.4
131849-00	5/16" x 1/2"	(7,9 x 12,7)	SST-PAT	10	1.4
132626-00	5/16" x 7/8"	(7,9 x 22,2)	SST-PAT	10	1.4
192071-00		M8 x 24 mm	SST-PAT	10	1.4
100195-00	3/8" x 5/8"	(9,5 x 15,9)	SST-PAT	15	2
100196-00	3/8" x 7/8"	(9,5 x 22,2)	SST-PAT	15	2
100198-00	3/8" x 1 1/8"	(9,5 x 28,6)	SST-PAT	15	2
113027-00	3/8" x 1 3/8"	(9,5 x 34,9)	SST-PAT	15	2
100171-00	3/8" x 1 1/2"	(9,5 x 38,1)	SST-PAT	15	2
123224-00	3/8" x 1 11/16"	(9,5 x 42,9)	SST-PAT	15	2
100173-00	3/8" x 2"	(9,5 x 50,8)	SST-PAT	15	2
100199-00	3/8" x 2 1/4"	(9,5 x 57,2)	SST-PAT	15	2
100174-00	3/8" x 2 1/2"	(9,5 x 63,5)	SST-PAT	15	2
100175-00	3/8" x 2 3/4"	(9,5 x 69,9)	SST-PAT	15	2
100176-00	3/8" x 3"	(9,5 x 76,2)	SST-PAT	15	2
100168-00	3/8" x 3 1/4"	(9,5 x 82,6)	SST-PAT	15	2
100200-00	3/8" x 3 1/2"	(9,5 x 88,9)	SST-PAT	15	2
124460-00	3/8" x 3 3/4"	(9,5 x 95,2)	SST-PAT	15	2
100201-00	5/8" x 1 1/2"	(15,9 x 38,1)	SST-PAT	50	7
127551-00	5/8" x 1 1/2"	(15,9 x 38,1)	SST-ANTI-SIEZE	50	7
100203-00	5/8" x 2 1/4"	(15,9 x 57,2)	SST-PAT	50	7

Hex Cap Screws



Part #	Sizes Inches	Sizes mm	Mat'l or Grade	Recommended Torque Ft./lbs	Recommended Torque Kgm
100206-00	3/8" x 1"	(9,5 x 25,4)	SST-PAT	15	2
100208-00	3/8" x 1 1/2"	(9,5 x 38,1)	SST-PAT	15	2
100209-00	3/8" x 1 3/4"	(9,5 x 44,4)	SST-PAT	15	2
135682-00	3/8" x 3 1/8"	(9,5 x 79,3)	SST-PAT	15	2
135683-00	3/8" x 4 5/8"	(9,5 x 117,5)	SST	15	2
100214-00	3/8" x 5"	(9,5 x 127)	SST-PAT	15	2
121499-00	7/16" x 1 3/4"	(11,1 x 114,3)	SST-PAT	15	2
100216-00	1/2" x 1 1/4"	(12,7 x 31,7)	SST	15	2
131862-00	1/2" x 2 1/4"	(12,7 x 57,1)	SST-PAT	20	2.8

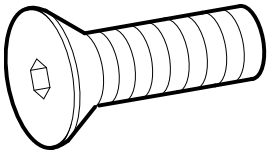
Carriage Bolts



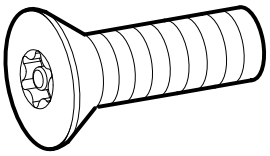
Part #	Sizes Inches	Sizes mm	Mat'l or Grade	Recommended Torque Ft./lbs	Recommended Torque Kgm
100135-00	5/16" x 1 1/4"	(7,9 x 31,8)	SST-PAT	5	0.7
100147-00	3/8" x 1 1/4"	(9,5 x 31,8)	SST-PAT	15	2
116017-00	3/8" x 1 1/2"	(9,5 x 38,1)	SST-PAT	15	2
100148-00	3/8" x 1 3/4"	(9,5 x 44,5)	SST-PAT	15	2

Flat Head Cap Screws (FHCS)

No Pin*



With Pin



Part #	Sizes Inches	Sizes mm	Mat'l or Grade	Recommended Torque Ft./lbs	Recommended Torque Kgm
148686-00	3/8" x 3/4"	(9,5 x 19,05)	SST-PAT	13	1.8
100252-00*	3/8" x 1 1/4"	(9,5 x 31,8)	SST-PAT	13	1.8
151421-00	3/8" x 1 1/2"	(9,5 x 38,1)	SST-PAT	13	1.8
148765-00	3/8" x 3 1/2"	(9,5 x 88,9)	SST-PAT	13	1.8
130824-00*	1/2" x 2 1/4"	(12,5 x 57,2)	SST	20	2.8

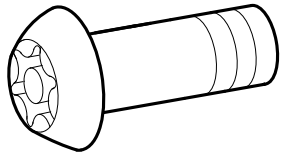
NOTE: These are recommended torque applications per fastener size. When fasteners are used with plastic or wood products, the torque specifications will be excessive and we recommend that the installer apply some caution when tightening the fasteners. Plastic or wood products should begin to deform slightly. Fasteners indicated with -"Pat" includes a locking patch type material and should cure for 72 hours for maximum strength.

601 7TH STREET SOUTH, DELANO, MINNESOTA 55328-8605 888-574-4678 LSI Install Help 888-438-6574 LSI Direct 763-972-5200 Int. FAX (763) 972-3185

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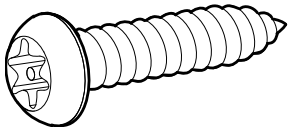
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BHCS w/Pin Limited Thread Bolts



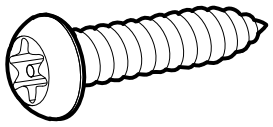
Part #	Sizes Inches	Sizes mm	Mat'l or Grade	Recommended Torque Ft./lbs	Recommended Torque Kgm
100290-00	3/8" x 7/8"	(9,5 x 22,2)	SST-PAT	21	3
100292-00	3/8" x 1 1/4"	(9,5 x 31,8)	SST-PAT	21	3
157704-00	7/16" x 2"	(11,11x 51)	SST-PAT	40	5.5
127068-00	7/16" x 2 7/16"	(11,11x61,91)	SST-PAT	40	5.5

Lag Screws



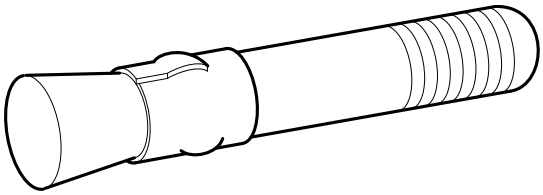
Part #	Sizes Inches	Sizes mm	Mat'l or Grade	Head Type
100127-00	5/16" x 1 1/4"	(7,9 x 31,8)	SST	Hex Head
168198-00	3/8" x 1 1/2"	(9,5 x 38,1)	SST	Button Head (Shown)
139039-00	3/8" x 2"	(9,5 x 50,8)	SST	Button Head (Shown)

Screw, Type AB Thread BHCS w/Pin



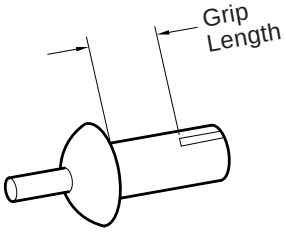
Part #	Size	Mat'l or Grade
129671-00	#14 x 1/2"	SST
127872-00	#14 x 3/4"	SST
136232-00	#14 x 1"	SST
129672-00	#14 x 1 1/4"	SST

Expansion Anchors (Used To Secure Components To Concrete Slabs)



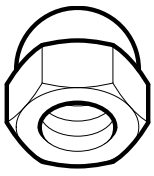
Part #	Sizes Inches	Sizes mm	Mat'l or Grade	Recommended Torque Ft./lbs	Recommended Torque Kgm
100263-00	3/8" x 2 3/4"	(9,5 x 69,9)	Alloy Steel	15	2
100266-00	1/2" x 2 3/4"	(12,7 x 69,9)	Alloy Steel	20	2.8

Drive Rivets



Part #	Sizes Inches	Sizes mm	Mat'l
100609-00	1/4" x 3/16"	(6,4 x 4,8)	Alum Rivet/Alum Pin
100611-00	1/4" x 3/8"	(6,4 x 9,5)	Alum Rivet/SST Pin
113300-00	1/4" x 1/2"	(6,4 x 12,7)	Alum Rivet/Alum Pin
100610-00	1/4" x 5/8"	(6,4 x 15,9)	Alum Rivet/SST Pin
139152-00	1/4" x 3/4"	(6,4 x 19,05)	Alum Rivet/Alum Pin
100613-00	1/4" x 7/8"	(6,4 x 22,2)	Alum Rivet/Alum Pin
118158-00	1/4" x 1"	(6,4 x 25,4)	Alum Rivet/Alum Pin

Low Crown Cap Nut



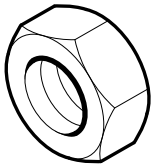
Part #	Size Inches	Mat'l
100349-00	3/8"-16 UNC	SST

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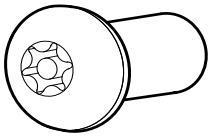
ISO 9001 Certified

Standard Hex Nuts



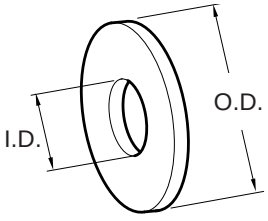
Part #	Sizes Inches	Mat'l or Grade
100326-00	5/16-18 UNC	SST
100321-00	3/8-16 UNC	SST-Pat
100327-00	3/8-16 UNC	SST
128296-00	3/8-16 UNC (Jam Nut)	SST
100328-00	7/16-14 UNC	SST
145021-00	7/16-14 UNC (Jam Nut)	SST
100322-00	1/2-13 UNC	SST
129692-00	1/2-13 UNC	SST-Pat
129693-00	1/2-13 UNC (Jam Nut)	SST
100323-00	5/8-11 UNC	SST

Flange Nut w/Pin



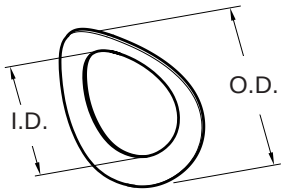
Part #	Sizes Inches	Mat'l or Grade
192064-00	M8 x 24 mm	SST
100353-00	3/8-16 UNC	SST

Flat Washers



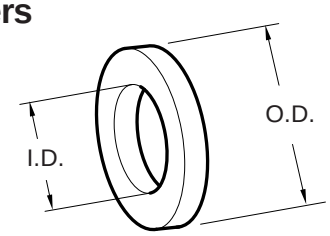
Part #	Sizes Inches	mm	Mat'l or Grade	I.D.	O.D.
122039-00	1/4"	(6,3)	SST	0.312	.734
100362-00	3/8"	(9,5)	SST	0.406	1.002
112793-00	7/16"	(11,1)	SST	0.505	1.262
100363-00	1/2"	(12,7)	SST	0.536	1.262
100366-00	5/8"	(15,9)	SST	0.688	1.750
123737-00	1 1/8"	(28,6)	SST	1.140	1.750

Curved Spring Washer



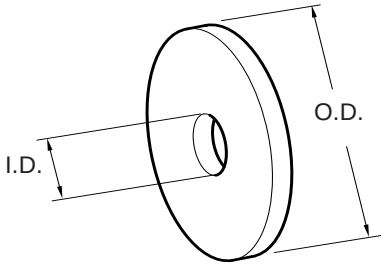
Part #	Sizes Inches	mm	Mat'l or Grade	I.D.	O.D.
100380-00	1/2"	(12,7)	SST	0.531	0.795

SAE Flat Washers



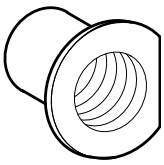
Part #	Sizes Inches	mm	Mat'l or Grade	I.D.	O.D.
100364-00	1/4"	(6,35)	SST	0.281	0.625
100365-00	3/8"	(9,5)	SST	0.411	0.816
113550-00	1/2"	(12,7)	SST	0.531	1.062
129500-00	5/8"	(15,9)	SST	0.686	1.342

Fender Washers



Part #	Sizes Inches	mm	Mat'l or Grade	I.D.	O.D.
100378-00	3/8" x 1 1/2"	(9,53 x 38,1)	SST	0.406	1.500
100379-00	1/2" x 2"	(12,7 x 50,8)	SST	0.531	2.000

Tee Nut (PlayBooster Clamps)



Part #	Sizes Inches	Mat'l or Grade
100351-00	3/8-16 UNC	SST

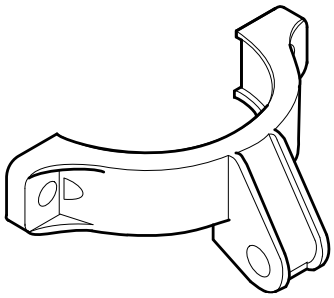
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Set Screw



Part #	Sizes Inches	Sizes mm	Mat'l or Grade
100298-00	3/8" x 7/16"	(9,5 x 11,1)	SST

Offset Hanger Clamp (PlayBooster)



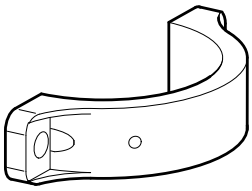
Part #	Mat'l
113729-00	CastAluminum

Bolt Link



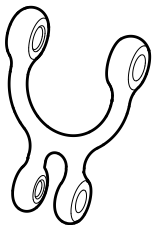
Part #	Mat'l or Grade
138915-00	SST

Half Clamp (PlayBooster)



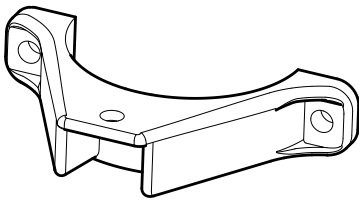
Part #	Mat'l
105327-01	CastAluminum

Double Clevis



Part #	Mat'l or Grade
138917-00	SST

Deck Hanger Clamp (PlayBooster)



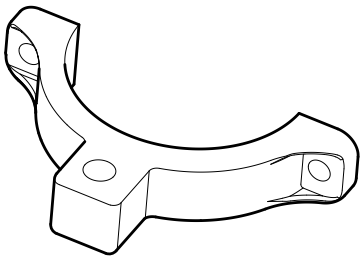
Part #	Mat'l
106022-00	CastAluminum

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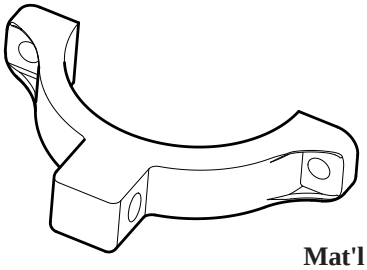
ISO 9001 Certified

Swing Hanger Clamp



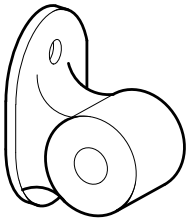
Part #	Mat'l
121289-00	CastAluminum

Ring/Rail Hanger Clamp (PlayBooster)



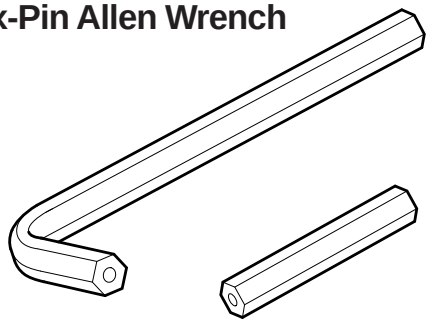
Part #	Mat'l
105330-00	CastAluminum

Offset Bolt Bracket (PlayShaper)



Part #	Mat'l
113895-00	CastAluminum

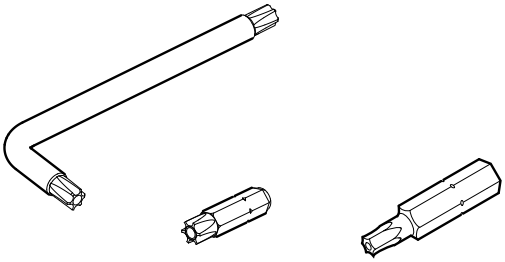
Hex-Pin Allen Wrench



Hex-Pin Driver

Part #	Description
100685-00	Hex-Pin Allen Wrench
100686-00	Hex-Pin Driver (Used With A $^{5}/_{16}$" Socket)

6-Lobe Wrench



6-Lobe Driver

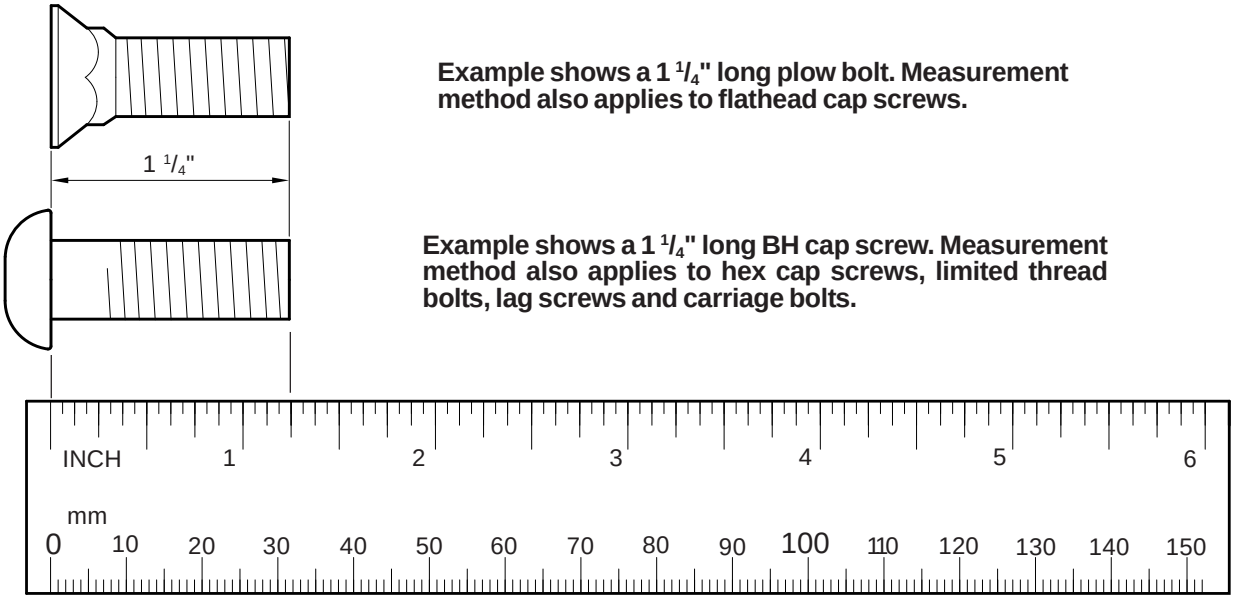
Torx-Pin Driver

Part #	Description
146017-00	6-Lobe Wrench (T-45)
146007-00	6-Lobe Driver (T-45) (Used With A $^{5}/_{16}$" Socket)
127463-00	Torx-Pin Driver (T-27) (Used With A $^{1}/_{4}$" Socket)

Eco #53704 Document #16338900 replaces #15436400. Udated Fasteners.

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HOW TO DETERMINE BOLT LENGTHS



Example shows a 1 1/4" long plow bolt. Measurement method also applies to flathead cap screws.

Example shows a 1 1/4" long BH cap screw. Measurement method also applies to hex cap screws, limited thread bolts, lag screws and carriage bolts.

Rule: Measurements should be based on the part of the screw that penetrates the surface.

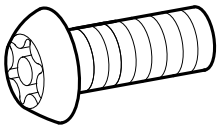
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ISO 9001 Certified

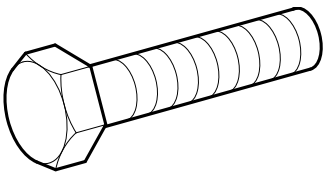
Common Parts & Fasteners

Button Head Cap Screws BHCS w/Pin



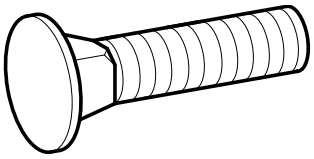
Part #	Sizes Inches	Sizes mm	Mat'l or Grade	Recommended Torque Ft./lbs	Recommended Torque Kgm
137277-00	1/4" x 3/8"	(6,4 x 9,5)	SST-PAT	10	1.4
131849-00	5/16" x 1/2"	(7,9 x 12,7)	SST-PAT	10	1.4
132626-00	5/16" x 7/8"	(7,9 x 22,2)	SST-PAT	10	1.4
192071-00		M8 x 24 mm	SST-PAT	10	1.4
100195-00	3/8" x 5/8"	(9,5 x 15,9)	SST-PAT	15	2
100196-00	3/8" x 7/8"	(9,5 x 22,2)	SST-PAT	15	2
100198-00	3/8" x 1 1/8"	(9,5 x 28,6)	SST-PAT	15	2
113027-00	3/8" x 1 3/8"	(9,5 x 34,9)	SST-PAT	15	2
100171-00	3/8" x 1 1/2"	(9,5 x 38,1)	SST-PAT	15	2
123224-00	3/8" x 1 11/16"	(9,5 x 42,9)	SST-PAT	15	2
100173-00	3/8" x 2"	(9,5 x 50,8)	SST-PAT	15	2
100199-00	3/8" x 2 1/4"	(9,5 x 57,2)	SST-PAT	15	2
100174-00	3/8" x 2 1/2"	(9,5 x 63,5)	SST-PAT	15	2
100175-00	3/8" x 2 3/4"	(9,5 x 69,9)	SST-PAT	15	2
100176-00	3/8" x 3"	(9,5 x 76,2)	SST-PAT	15	2
100168-00	3/8" x 3 1/4"	(9,5 x 82,6)	SST-PAT	15	2
100200-00	3/8" x 3 1/2"	(9,5 x 88,9)	SST-PAT	15	2
124460-00	3/8" x 3 3/4"	(9,5 x 95,2)	SST-PAT	15	2
100201-00	5/8" x 1 1/2"	(15,9 x 38,1)	SST-PAT	50	7
127551-00	5/8" x 1 1/2"	(15,9 x 38,1)	SST-ANTI-SIEZE	50	7
100203-00	5/8" x 2 1/4"	(15,9 x 57,2)	SST-PAT	50	7

Hex Cap Screws



Part #	Sizes Inches	Sizes mm	Mat'l or Grade	Recommended Torque Ft./lbs	Recommended Torque Kgm
100206-00	3/8" x 1"	(9,5 x 25,4)	SST-PAT	15	2
100208-00	3/8" x 1 1/2"	(9,5 x 38,1)	SST-PAT	15	2
100209-00	3/8" x 1 3/4"	(9,5 x 44,4)	SST-PAT	15	2
135682-00	3/8" x 3 1/8"	(9,5 x 79,3)	SST-PAT	15	2
135683-00	3/8" x 4 5/8"	(9,5 x 117,5)	SST	15	2
100214-00	3/8" x 5"	(9,5 x 127)	SST-PAT	15	2
121499-00	7/16" x 1 3/4"	(11,1 x 114,3)	SST-PAT	15	2
100216-00	1/2" x 1 1/4"	(12,7 x 31,7)	SST	15	2
131862-00	1/2" x 2 1/4"	(12,7 x 57,1)	SST-PAT	20	2.8

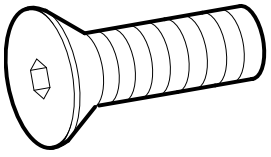
Carriage Bolts



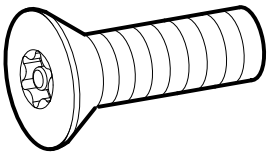
Part #	Sizes Inches	Sizes mm	Mat'l or Grade	Recommended Torque Ft./lbs	Recommended Torque Kgm
100135-00	5/16" x 1 1/4"	(7,9 x 31,8)	SST-PAT	5	0.7
100147-00	3/8" x 1 1/4"	(9,5 x 31,8)	SST-PAT	15	2
116017-00	3/8" x 1 1/2"	(9,5 x 38,1)	SST-PAT	15	2
100148-00	3/8" x 1 3/4"	(9,5 x 44,5)	SST-PAT	15	2

Flat Head Cap Screws (FHCS)

No Pin*



With Pin



Part #	Sizes Inches	Sizes mm	Mat'l or Grade	Recommended Torque Ft./lbs	Recommended Torque Kgm
148686-00	3/8" x 3/4"	(9,5 x 19,05)	SST-PAT	13	1.8
100252-00*	3/8" x 1 1/4"	(9,5 x 31,8)	SST-PAT	13	1.8
151421-00	3/8" x 1 1/2"	(9,5 x 38,1)	SST-PAT	13	1.8
148765-00	3/8" x 3 1/2"	(9,5 x 88,9)	SST-PAT	13	1.8
130824-00*	1/2" x 2 1/4"	(12,5 x 57,2)	SST	20	2.8

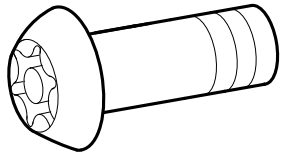
NOTE: These are recommended torque applications per fastener size. When fasteners are used with plastic or wood products, the torque specifications will be excessive and we recommend that the installer apply some caution when tightening the fasteners. Plastic or wood products should begin to deform slightly. Fasteners indicated with -"Pat" includes a locking patch type material and should cure for 72 hours for maximum strength.

601 7TH STREET SOUTH, DELANO, MINNESOTA 55328-8605 888-574-4678 LSI Install Help 888-438-6574 LSI Direct 763-972-5200 Int. FAX (763) 972-3185

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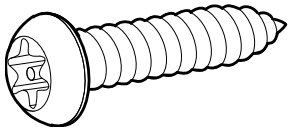
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BHCS w/Pin Limited Thread Bolts



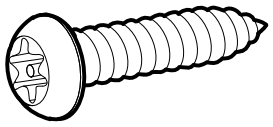
Part #	Sizes Inches	Sizes mm	Mat'l or Grade	Recommended Torque Ft./lbs	Recommended Torque Kgm
100290-00	3/8" x 7/8"	(9,5 x 22,2)	SST-PAT	21	3
100292-00	3/8" x 1 1/4"	(9,5 x 31,8)	SST-PAT	21	3
157704-00	7/16" x 2"	(11,11x 51)	SST-PAT	40	5.5
127068-00	7/16" x 2 7/16"	(11,11x61,91)	SST-PAT	40	5.5

Lag Screws



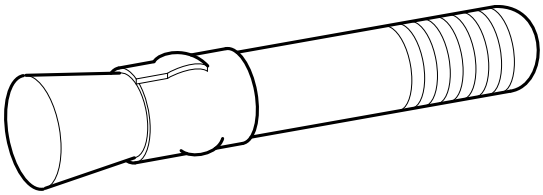
Part #	Sizes Inches	Sizes mm	Mat'l or Grade	Head Type
100127-00	5/16" x 1 1/4"	(7,9 x 31,8)	SST	Hex Head
168198-00	3/8" x 1 1/2"	(9,5 x 38,1)	SST	Button Head (Shown)
139039-00	3/8" x 2"	(9,5 x 50,8)	SST	Button Head (Shown)

Screw, Type AB Thread BHCS w/Pin



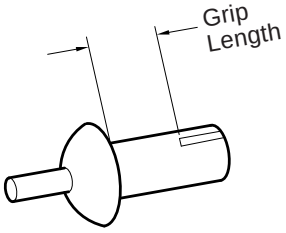
Part #	Size	Mat'l or Grade
129671-00	#14 x 1/2"	SST
127872-00	#14 x 3/4"	SST
136232-00	#14 x 1"	SST
129672-00	#14 x 1 1/4"	SST

Expansion Anchors (Used To Secure Components To Concrete Slabs)



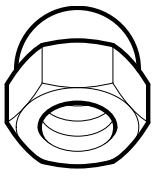
Part #	Sizes Inches	Sizes mm	Mat'l or Grade	Recommended Torque Ft./lbs	Recommended Torque Kgm
100263-00	3/8" x 2 3/4"	(9,5 x 69,9)	Alloy Steel	15	2
100266-00	1/2" x 2 3/4"	(12,7 x 69,9)	Alloy Steel	20	2.8

Drive Rivets



Part #	Sizes Inches	Sizes mm	Mat'l
100609-00	1/4" x 3/16"	(6,4 x 4,8)	Alum Rivet/Alum Pin
100611-00	1/4" x 3/8"	(6,4 x 9,5)	Alum Rivet/SST Pin
113300-00	1/4" x 1/2"	(6,4 x 12,7)	Alum Rivet/Alum Pin
100610-00	1/4" x 5/8"	(6,4 x 15,9)	Alum Rivet/SST Pin
139152-00	1/4" x 3/4"	(6,4 x 19,05)	Alum Rivet/Alum Pin
100613-00	1/4" x 7/8"	(6,4 x 22,2)	Alum Rivet/Alum Pin
118158-00	1/4" x 1"	(6,4 x 25,4)	Alum Rivet/Alum Pin

Low Crown Cap Nut



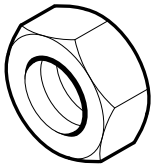
Part #	Size Inches	Mat'l
100349-00	3/8"-16 UNC	SST

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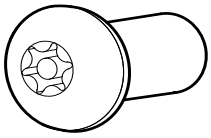
ISO 9001 Certified

Standard Hex Nuts



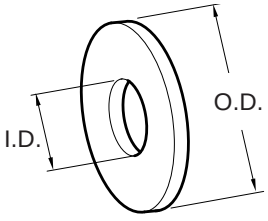
Part #	Sizes Inches	Mat'l or Grade
100326-00	5/16-18 UNC	SST
100321-00	3/8-16 UNC	SST-Pat
100327-00	3/8-16 UNC	SST
128296-00	3/8-16 UNC (Jam Nut)	SST
100328-00	7/16-14 UNC	SST
145021-00	7/16-14 UNC (Jam Nut)	SST
100322-00	1/2-13 UNC	SST
129692-00	1/2-13 UNC	SST-Pat
129693-00	1/2-13 UNC (Jam Nut)	SST
100323-00	5/8-11 UNC	SST

Flange Nut w/Pin



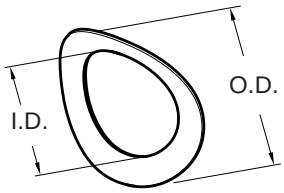
Part #	Sizes Inches	Mat'l or Grade
192064-00	M8 x 24 mm	SST
100353-00	3/8-16 UNC	SST

Flat Washers



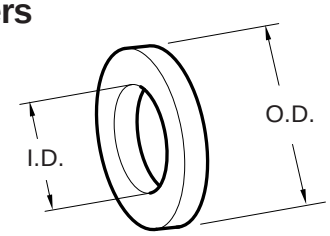
Part #	Sizes Inches	mm	Mat'l or Grade	I.D.	O.D.
122039-00	1/4"	(6,3)	SST	0.312	.734
100362-00	3/8"	(9,5)	SST	0.406	1.002
112793-00	7/16"	(11,1)	SST	0.505	1.262
100363-00	1/2"	(12,7)	SST	0.536	1.262
100366-00	5/8"	(15,9)	SST	0.688	1.750
123737-00	1 1/8"	(28,6)	SST	1.140	1.750

Curved Spring Washer



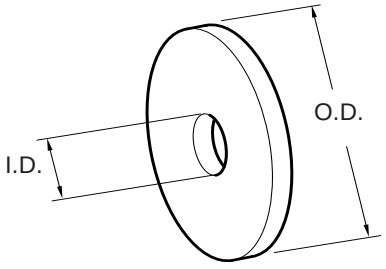
Part #	Sizes Inches	mm	Mat'l or Grade	I.D.	O.D.
100380-00	1/2"	(12,7)	SST	0.531	0.795

SAE Flat Washers



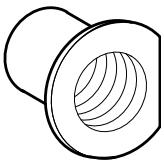
Part #	Sizes Inches	mm	Mat'l or Grade	I.D.	O.D.
100364-00	1/4"	(6,35)	SST	0.281	0.625
100365-00	3/8"	(9,5)	SST	0.411	0.816
113550-00	1/2"	(12,7)	SST	0.531	1.062
129500-00	5/8"	(15,9)	SST	0.686	1.342

Fender Washers



Part #	Sizes Inches	mm	Mat'l or Grade	I.D.	O.D.
100378-00	3/8" x 1 1/2"	(9,53 x 38,1)	SST	0.406	1.500
100379-00	1/2" x 2"	(12,7 x 50,8)	SST	0.531	2.000

Tee Nut (PlayBooster Clamps)



Part #	Sizes Inches	Mat'l or Grade
100351-00	3/8-16 UNC	SST

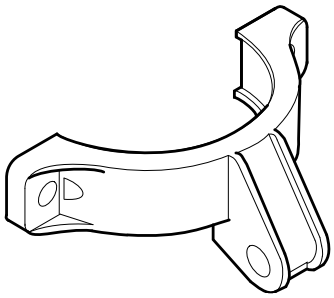
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Set Screw



Part #	Sizes Inches	Sizes mm	Mat'l or Grade
100298-00	3/8" x 7/16"	(9,5 x 11,1)	SST

Offset Hanger Clamp (PlayBooster)



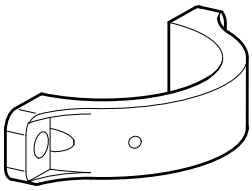
Part #	Mat'l
113729-00	CastAluminum

Bolt Link



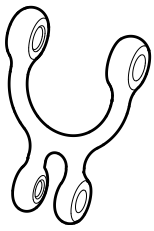
Part #	Mat'l or Grade
138915-00	SST

Half Clamp (PlayBooster)



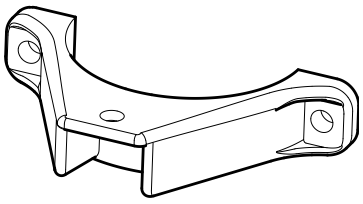
Part #	Mat'l
105327-01	CastAluminum

Double Clevis



Part #	Mat'l or Grade
138917-00	SST

Deck Hanger Clamp (PlayBooster)



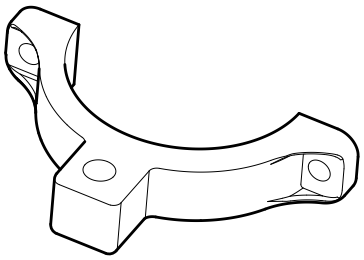
Part #	Mat'l
106022-00	CastAluminum

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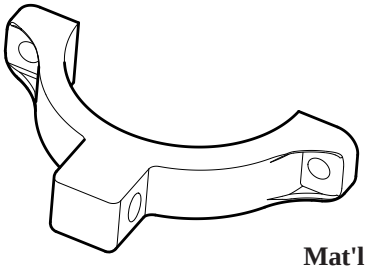
ISO 9001 Certified

Swing Hanger Clamp



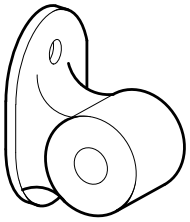
Part #	Mat'l
121289-00	CastAluminum

Ring/Rail Hanger Clamp (PlayBooster)



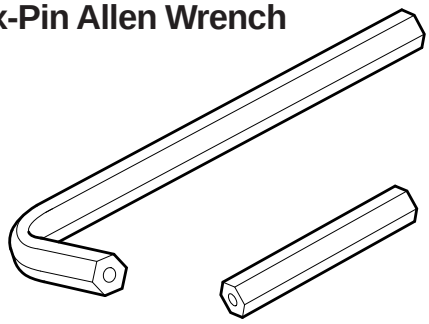
Part #	Mat'l
105330-00	CastAluminum

Offset Bolt Bracket (PlayShaper)



Part #	Mat'l
113895-00	CastAluminum

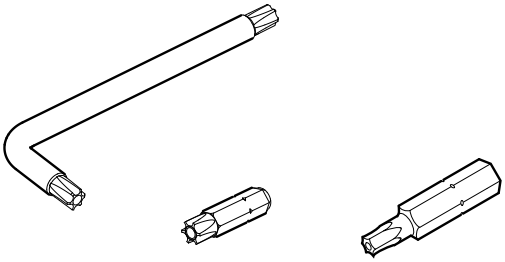
Hex-Pin Allen Wrench



Hex-Pin Driver

Part #	Description
100685-00	Hex-Pin Allen Wrench
100686-00	Hex-Pin Driver (Used With A $^{5}/_{16}$" Socket)

6-Lobe Wrench



6-Lobe Driver

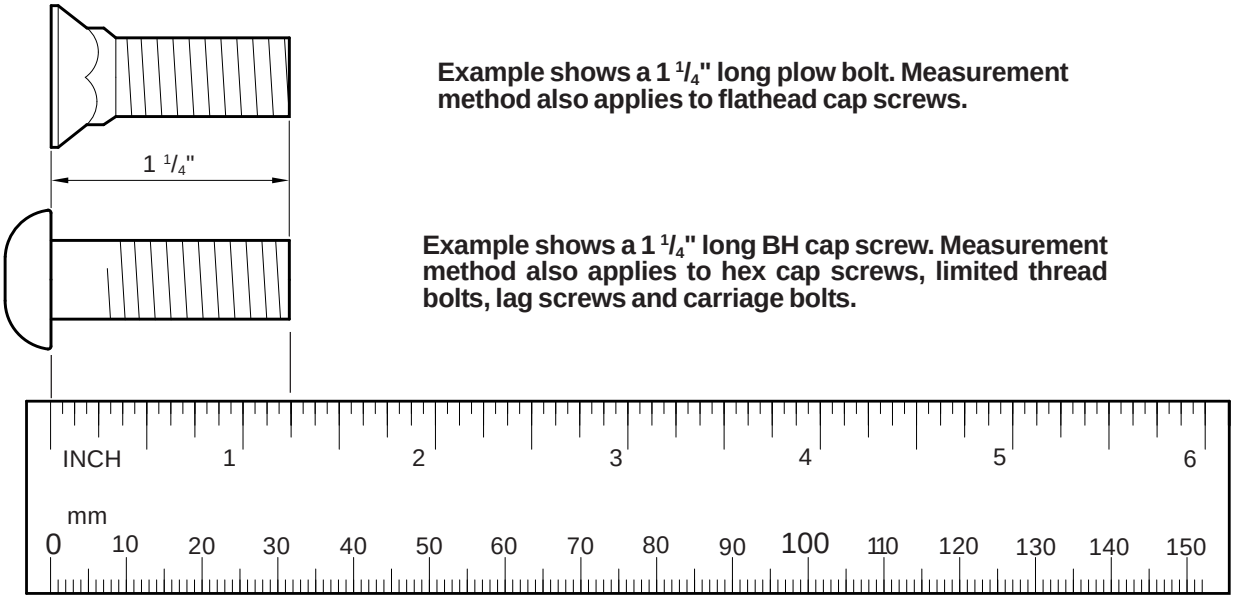
Torx-Pin Driver

Part #	Description
146017-00	6-Lobe Wrench (T-45)
146007-00	6-Lobe Driver (T-45) (Used With A $^{5}/_{16}$" Socket)
127463-00	Torx-Pin Driver (T-27) (Used With A $^{1}/_{4}$" Socket)

Eco #53704 Document #16338900 replaces #15436400. Udated Fasteners.

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HOW TO DETERMINE BOLT LENGTHS



Example shows a 1 1/4" long plow bolt. Measurement method also applies to flathead cap screws.

Example shows a 1 1/4" long BH cap screw. Measurement method also applies to hex cap screws, limited thread bolts, lag screws and carriage bolts.

Rule: Measurements should be based on the part of the screw that penetrates the surface.

Recycling of packaging materials

Did you know that most of the packaging materials you receive on a Landscape Structures order are recyclable? Do you reuse or recycle everything you can from your playground sites? We're making it easier for you to do the right thing and keep these materials out of landfills!

FOAM/SCRIM SHEETS

Landscape Structures has partnered with our supplier to recycle foam/scrim material, the grey and white sheets that are layered between the large painted parts. This material is not usually accepted at general recycling facilities but this supplier will re-use it in their manufacturing of new packaging materials. It's easy! Just put the foam/scrim from your installation site in a box and ship it to the facility closest to you.

Here is a list of participating facilities throughout the U.S.:

Foam/Scrim Products Only

Pregis Plant
159 N San Antonio Ave.
Pomona, CA 91767

Pregis Plant
8201 W Elowin Ct.
Visalia, CA 93291

Pregis Plant
7574 Presidents Dr.
Orlando, FL 32809

Pregis Plant
1411 Pidco Dr.
Plymouth, IN 46563

Pregis Plant
300 Harris Rd.
Wurtland, KY 41144

Pregis Plant
3825 N Main St.
Granite Falls, NC 28630

Pregis Plant
18 Peck Ave.
Glens Falls, NY 12801

Pregis Plant
3500 S Highway 287
Corsicana, TX 75109

Pregis Plant
310 Old Station Rd.
Wenatchee, WA 98801

Foam/Scrim, Plastic Banding, Shrink Wrap

Anchor Facility
480 Broadway St.
St Paul, MN 55101

Anchor Facility
1501 Swasey Rd.
Hudson, WI 54016

Don't stop here! Most of the other packaging materials can also be recycled, reused or repurposed.

- **CORRUGATED CARDBOARD: Boxes can be broken down and recycled at a local recycler, or reused for other storage.**
- **SHRINK WRAP: Contact your local plastic recycler and ask if they accept polyethylene plastic.**
- **PLASTIC BANDING: Contact your local plastic recycler and ask if they accept polypropylene.**

If you have suggestions for recycling, reusing or repurposing other materials, please email them to: info@playlsi.com. Just one more way Landscape Structures is building healthy, sustainable communities.

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182212 is an entanglement label

Not an Install doc.

182213 is a hot surface label

Not an Install doc.

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Look for compliance to the following guidelines and standards whenever you install playground equipment. It's your assurance that the products you install meet the most rigorous safety and quality assurance standards.

Landscape Structures is a member in good standing of **IPEMA**, the **International Play Equipment Manufacturers Association.** IPEMA is a member-driven, international trade organization that represents and promotes an open market for manufacturers of play equipment.

In the interest of playground safety, IPEMA provides a Third Party Certification Service whereby a designated independent laboratory validates a participant's certification of conformance to ASTM F1487, Standard Consumer Safety Performance Specification for Playground Equipment for Public Use, except sections 7.1.1, 10 and 12.6.1; CAN/CSA Z614, Children's Playspaces and Equipment Standards, except clauses 9.8, 10 and 11; or both. The use of the corresponding logo in the Landscape Structures Inc. catalog signifies that Landscape Structures Inc. has received written validation from the independent laboratory that the product(s) associated with the use of the logo conforms with the requirements of the indicated standards. Check the IPEMA website (www.ipema.org) to confirm product certification. The use zone and fall height requirements in this publication are shown to ASTM standards. The requirements for other standards may be different. According to the CSA, playground maintenance and inspection is a continuous and integral part of budgetary costs. The cost of inspection and maintenance shall be considered and incorporated into the budget at the time of design, purchase equipment and installation (11.1.1 Budgeting).

International Play Equipment Manufacturers Association
4305 N. Sixth St. Suite A
Harrisburg, PA 17110
www.ipema.org

The Consumer Product Safety Commission (CPSC) is a governmental organization that provides technical safety guidelines for designing, constructing, operating and maintaining public playgrounds.

U.S. Consumer Product Safety Commission
4330 East West Hwy.
Bethesda, MD 20814
www.cpsc.gov

The American Society for Testing and Materials (ASTM) is a scientific and technical organization that is a major developer of standards for testing different types of materials. In 1993, the ASTM published "Standard Consumer Safety Performance Specifications for Playground Equipment for Public Use," designation F1487-93. ASTM is more technical than the CPSC. ASTM revised its old standard and published a new standard in 1995, 1998, 2001, 2005, 2007 and again in 2011.

American Society for Testing and Materials
100 Barr Harbor Dr.
P.O. Box C700
West Conshohocken, PA 19428
www.astm.org

The Canadian Standards Association
Nearly all equipment developed by Landscape Structures is certified to meet CAN/CSA-Z614-07, the Children's Playspaces and Equipment Standard, through IPEMA.

The European Standard was developed by the European Committee for Standardization. The majority of Landscape Structures products have been designed to be TUV certified by a third-party validator to EN 1176: 2008, the European Standard for Playground Equipment.

ISO 9001:2008 has a process-orientated structure, is customer focused and emphasizes continuous improvement in quality.

ISO 14001:2004 drives us toward operating in a manner that is environmentally conscious.

PS/PB/FP/Evos/Weevos Guidelines & Standards

601 7TH STREET SOUTH, DELANO, MINNESOTA 55328-8605 (763) 972-3391 1-888-LSI-INST (1-888-574-4678) FAX (763) 972-3185

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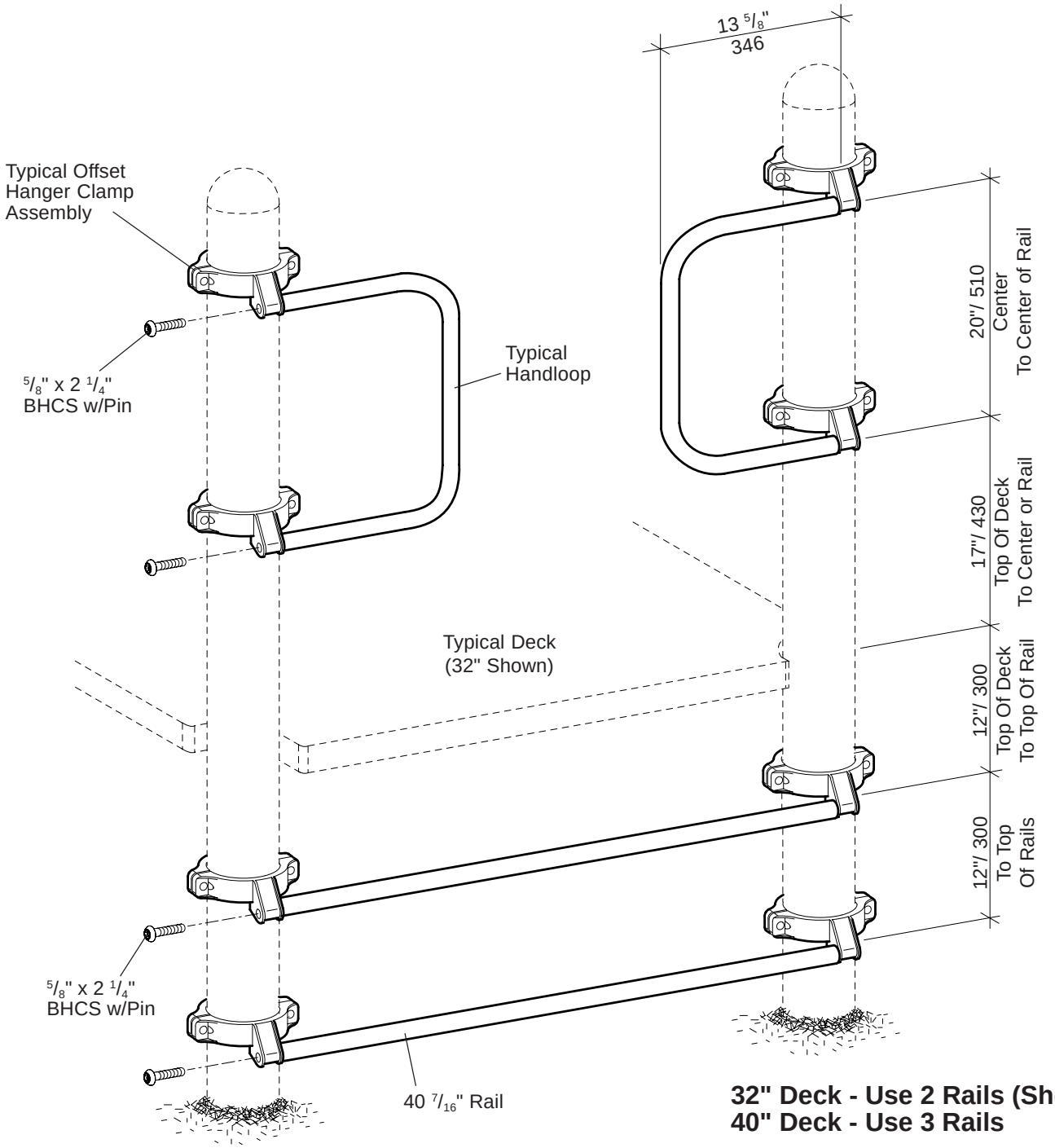
ISO 14001 CERTIFIED

ISO 9001 Certified

SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

10971300



32" Deck - Use 2 Rails (Shown)
40" Deck - Use 3 Rails

PlayBooster®

Rail/Handloop Assembly

601 7TH STREET SOUTH, DELANO, MINNESOTA 55328-8605 888-574-4678 LSI Install Help 888-438-6574 LSI Direct 763-972-5200 Int. FAX (763) 972-3185

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PlayBooster® Rail/Handloop Assembly

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J:\SPECS\194\19437600.P65

Parts List

Part#	Description	Qty.
111275-00	**Handloop Assembly**	1
108542-00	Handloop, Specify Color	1
100198-00	3/8" x 1 1/8" BHCS w/Pin, SST	4
100203-00	5/8" x 2 1/4" BHCS w/Pin, SST	2
100351-00	3/8" Tee Nut, SST	4
100610-00	1/4" x 5/8" Drive Rivet, SST	2
105327-01	5" Half Clamp, Specify Color	2
113729-00	Offset Hanger Clamp, Specify Color	2
111276-00	**Rail Assembly**	1
108569-00	Rail, Specify Color	1
100198-00	3/8" x 1 1/8" BHCS w/Pin, SST	4
100203-00	5/8" x 2 1/4" BHCS w/Pin, SST	2
100351-00	3/8" Tee Nut, SST	4
100610-00	1/4" x 5/8" Drive Rivet, SST	2
105327-01	5" Half Clamp, Specify Color	2
113729-00	Offset Hanger Clamp, Specify Color	2

Specifications

Handloop: Weldment comprised of 1.125" O.D. 11 GA (.120") steel tubing with 203 or 303 stainless steel inserts, with 5/8" internal thread. Finish: TenderTuff™, color specified.

Rail: Weldment comprised of 1.125" O.D. 11 GA (.120") steel tubing with 203 or 303 stainless steel inserts, with 5/8" internal thread. Finish: TenderTuff™, color specified.

Offset Hanger Clamp Assembly: Cast aluminum. Finish: ProShield®, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: Approx. 3/4 man hour

Weight: 111275-00 (One) 11 lbs.
111276-00 (One) 11 lbs.

Installation Instructions

1) Mark locations of clamps on posts per dimensions on front of sheet.
2) Attach offset clamps to ends of rails/handloops using 5/8" x 2 1/4" BHCS w/pin.
3) Position rail/handloop on marked position on posts and attach using 5" half clamps and 3/8" x 1 1/8" BHCS w/pin with 3/8" tee nuts. Refer to the Typical Offset Hanger Clamp Assembly Sheet.
4) Install drive rivets in half clamps per the Typical Offset Hanger Clamp Assembly Sheet.
5) Install protective surfacing before users are allowed to play on the structure.

Specifications are subject to change without notice.

Eco #54867 Document #19437600 replaces #14249300. Added rail assembly specifications.

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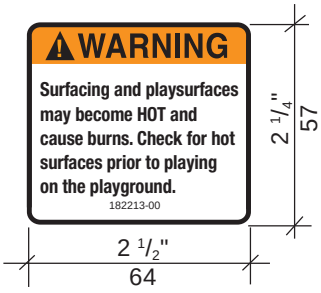
ISO 9001 Certified

SAFETY NOTE

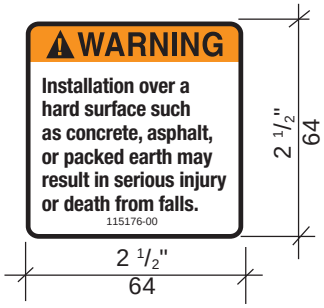
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Part No. 156844-00-000



Part No. 182213-00-000



Part No. 115176-00-000



Part No. 156846-00-000



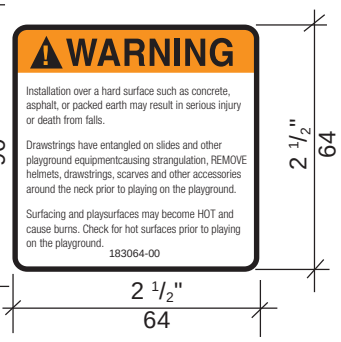
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Part No. 166751-00-000



Part No. 182212-00-000



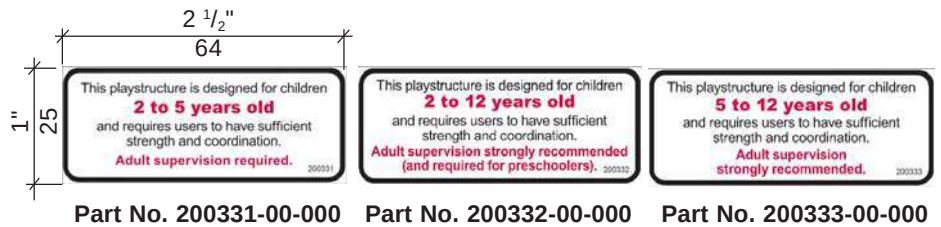
Part No. 183064-00-000



Part No. 156850-00-000



Part No. 166815-00-000



Part No. 200331-00-000 **Part No. 200332-00-000** **Part No. 200333-00-000**

NOTE: The Playstructure design will determine which *Play It Safe* sticker will be supplied.



Part No. 156847-00-000



Part No. 156845-00-000

INSTRUCTIONS:

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PB/PS/FP/Evos®/Weevos®

Warning Labels

601 7TH STREET SOUTH, DELANO, MINNESOTA 55328-8605 888-574-4678 LSI Install Help 888-438-6574 LSI Direct 763-972-5200 Int. FAX (763) 972-3185

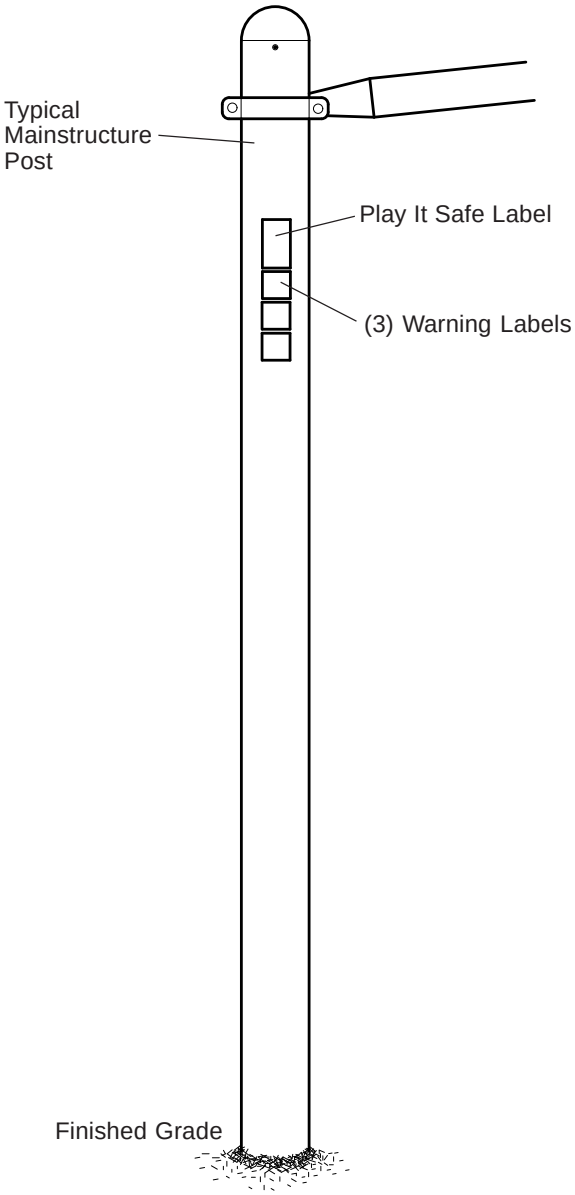
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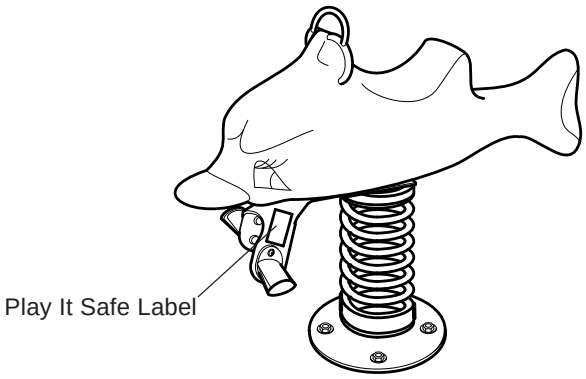
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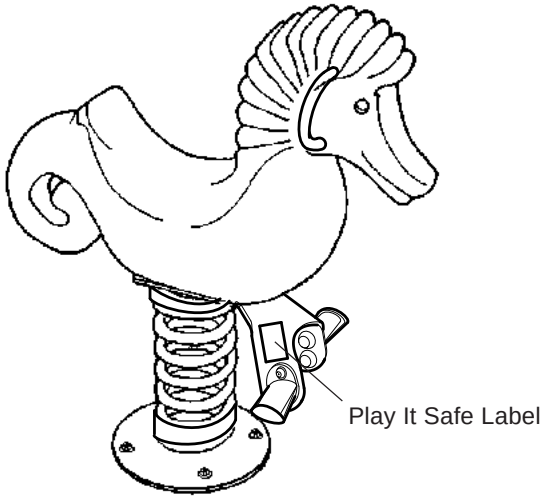
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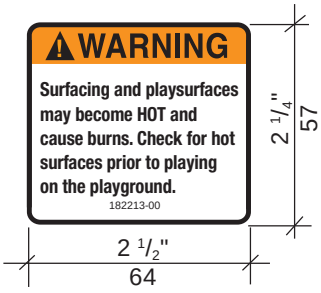
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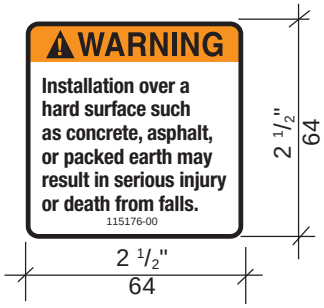
Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)



Part No. 156844-00-000



Part No. 182213-00-000



Part No. 115176-00-000



Part No. 156846-00-000



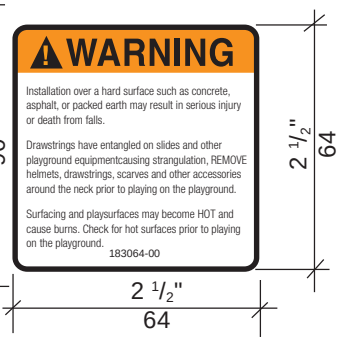
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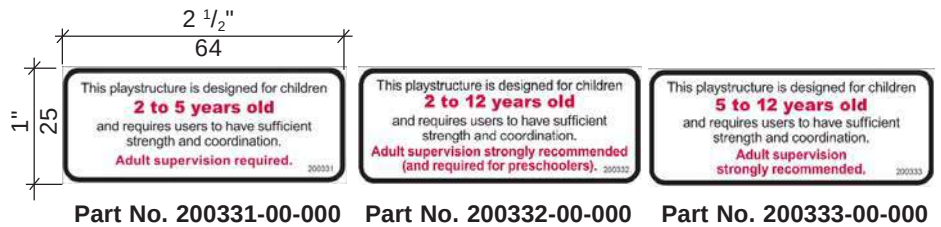
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Part No. 156850-00-000



Part No. 166815-00-000



Part No. 200331-00-000 **Part No. 200332-00-000** **Part No. 200333-00-000**

NOTE: The Playstructure design will determine which *Play It Safe* sticker will be supplied.



Part No. 156847-00-000



Part No. 156845-00-000

INSTRUCTIONS:

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Warning Labels

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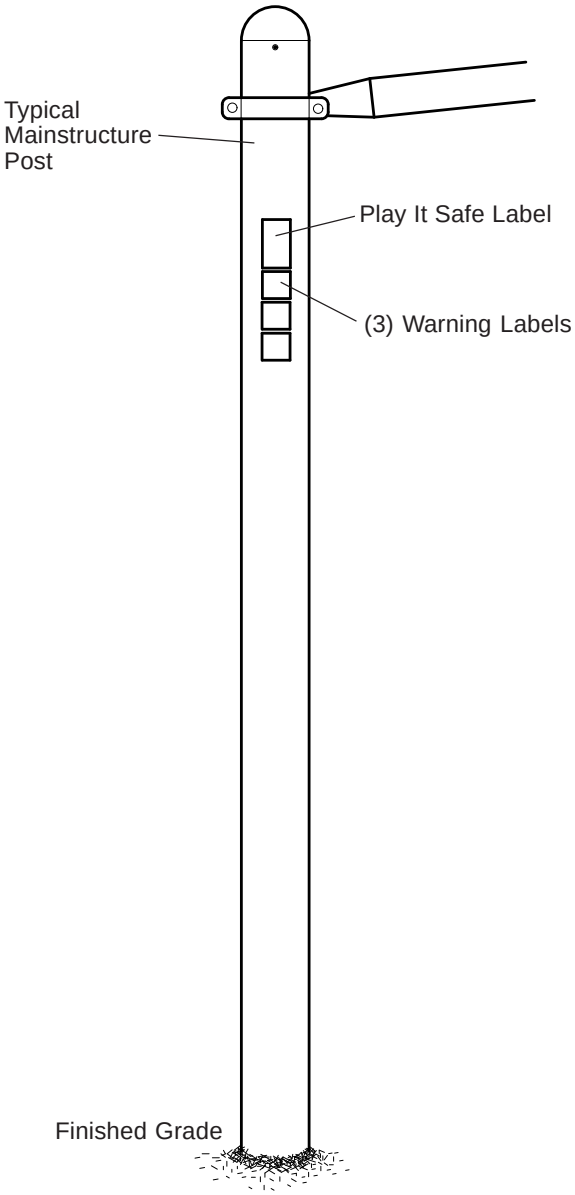
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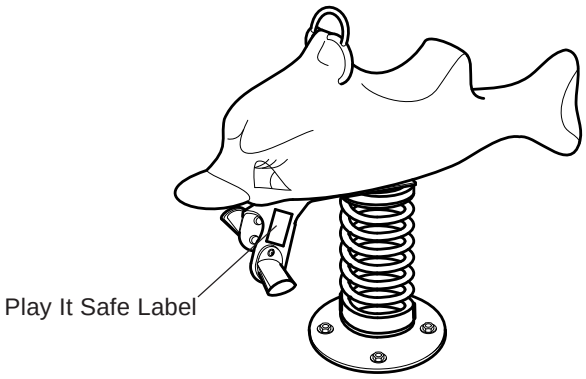
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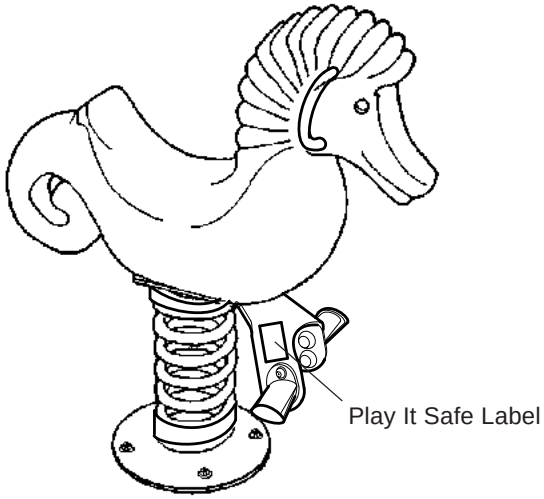
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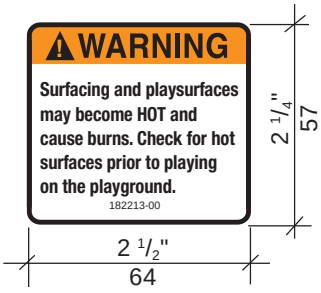
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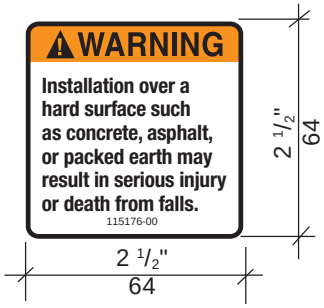
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Part No. 182213-00-000



Part No. 115176-00-000



Part No. 156846-00-000



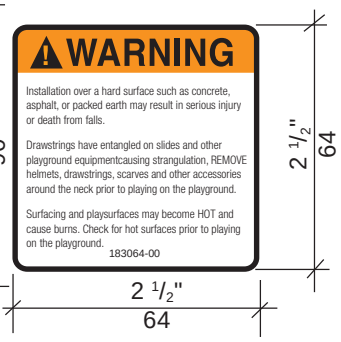
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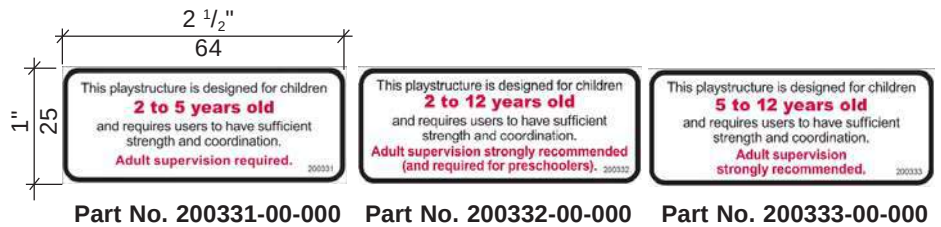
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Part No. 156850-00-000



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Part No. 200331-00-000 **Part No. 200332-00-000** **Part No. 200333-00-000**

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Part No. 156847-00-000



Part No. 156845-00-000

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Warning Labels

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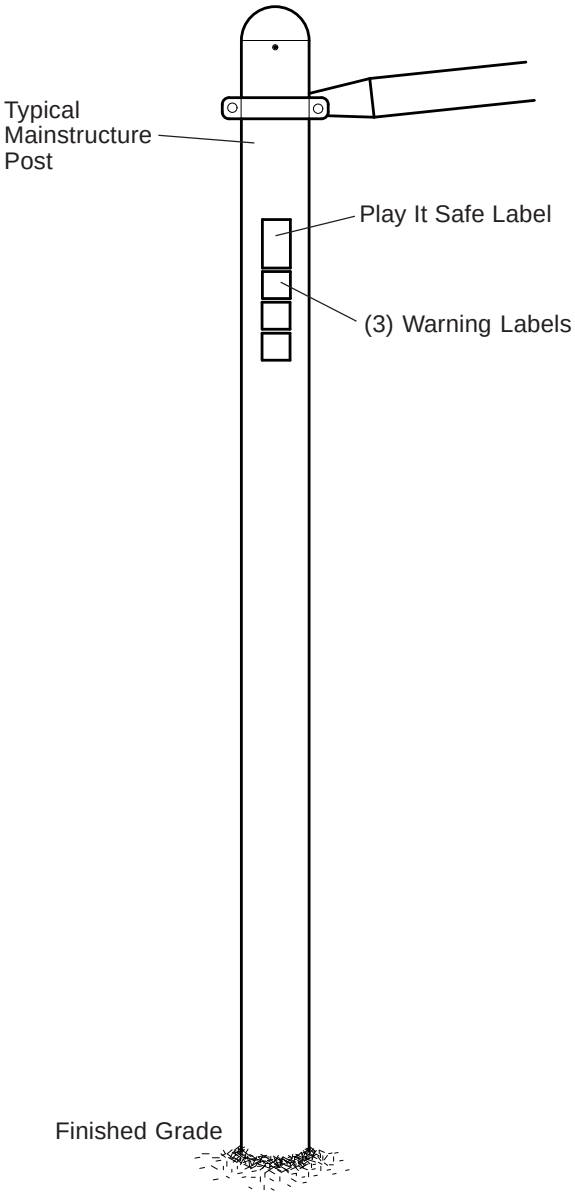
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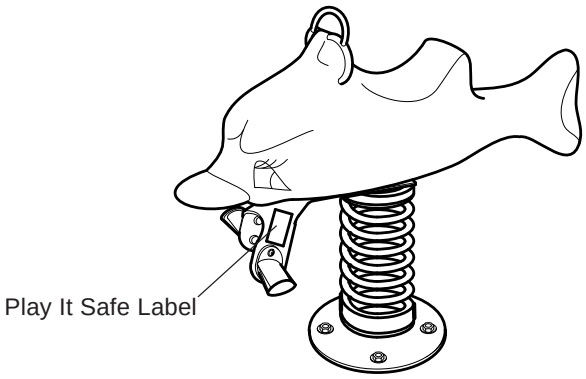
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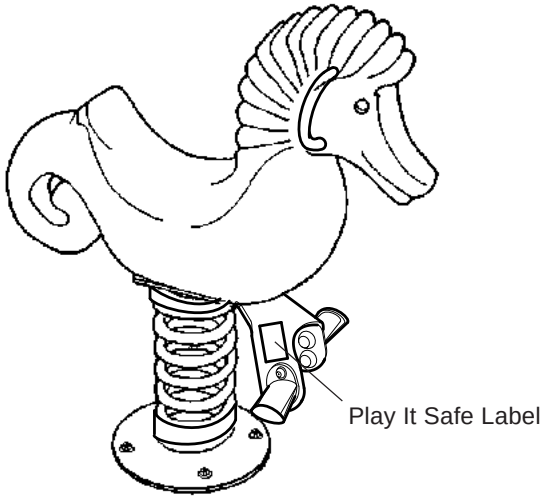
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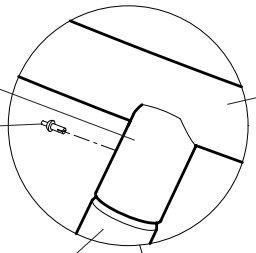
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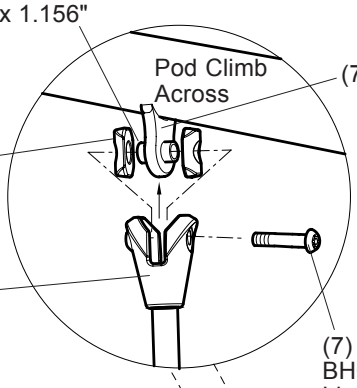
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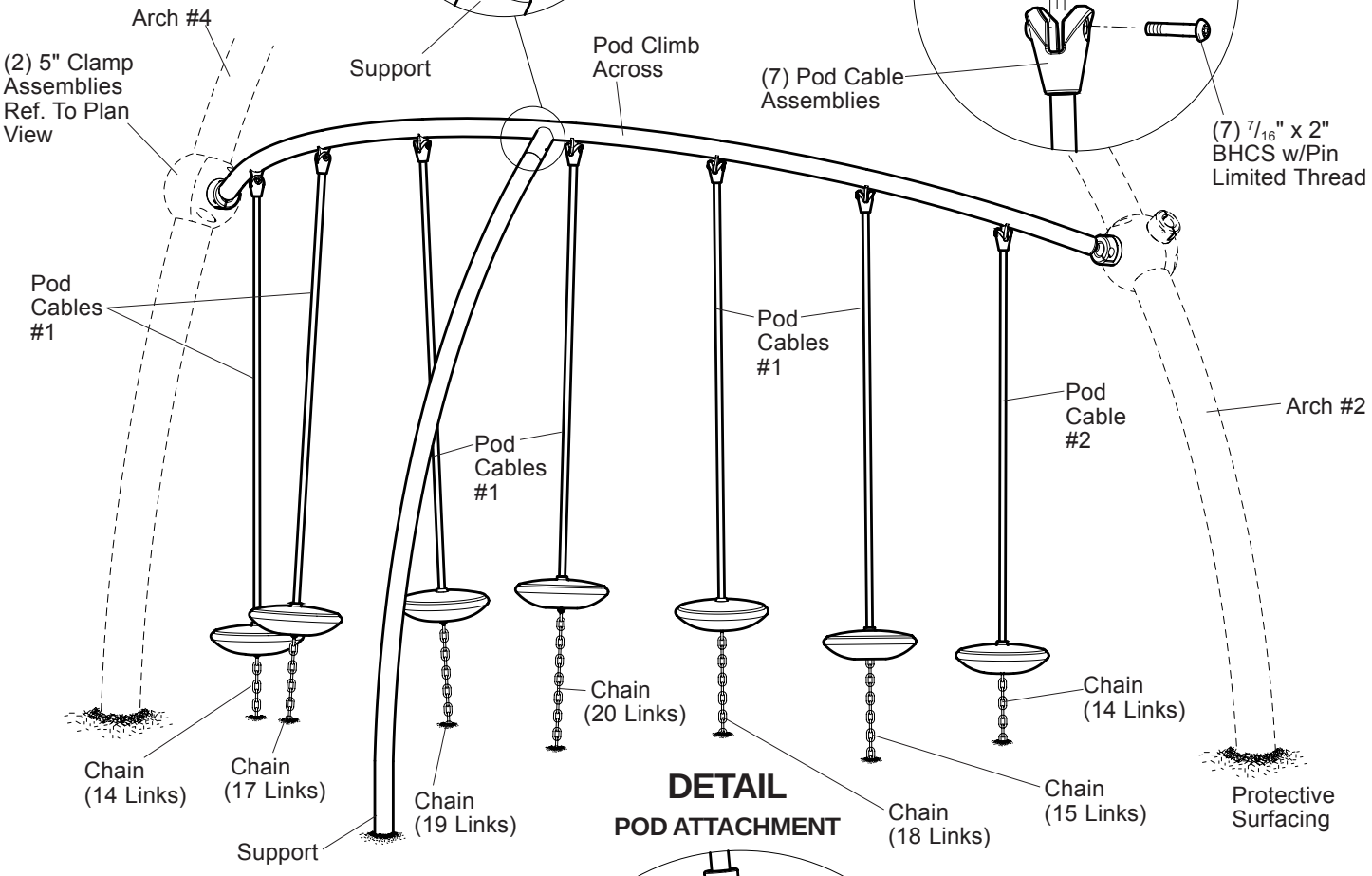
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DETAIL
SUPPORT ATTACHMENT

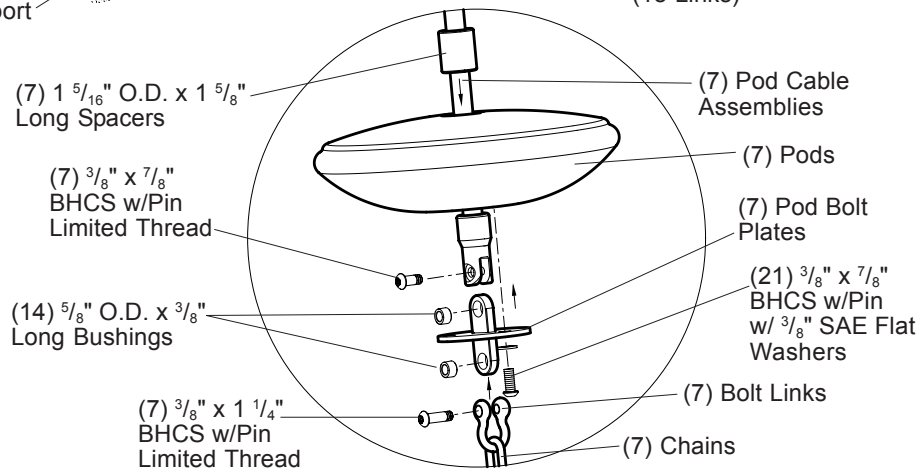


DETAIL
POD CABLE ATTACHMENT





DETAIL
POD ATTACHMENT



156450 Swiggle Stix® Bridge

Evos®

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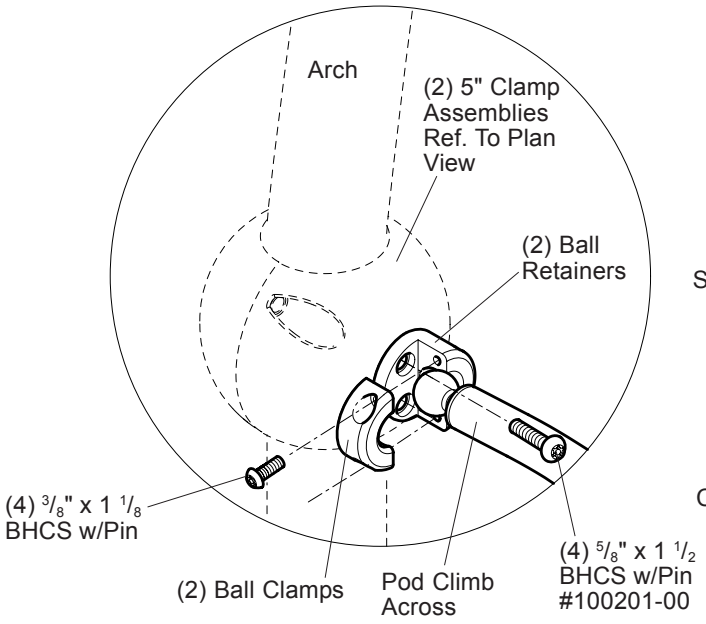
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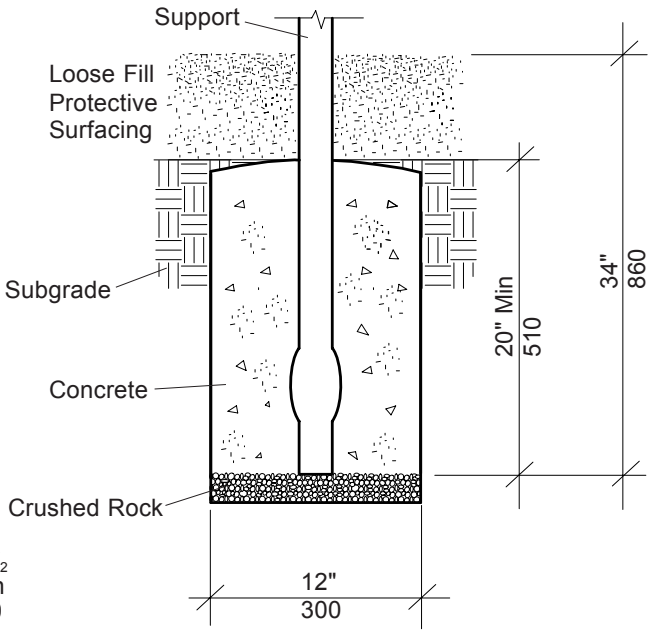
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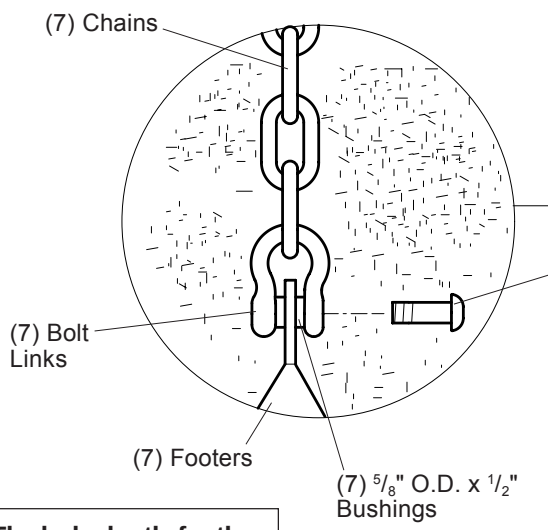
DETAIL
BALL CLAMP ATTACHMENT



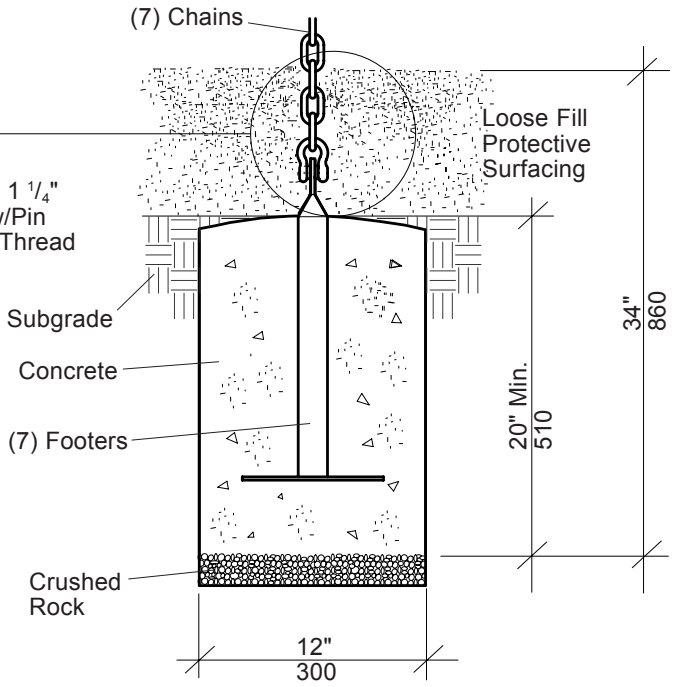
DETAIL
DIRECT BURY



DETAIL



DETAIL
FOOTER ATTACHMENT



NOTE: The hole depth for the footer needs to be deep enough, so the footer plate doesn't contact the bottom of the hole. The weight of the concrete will force the footer plate down, tightening the cable.

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156450 Swiggle Stix® Bridge

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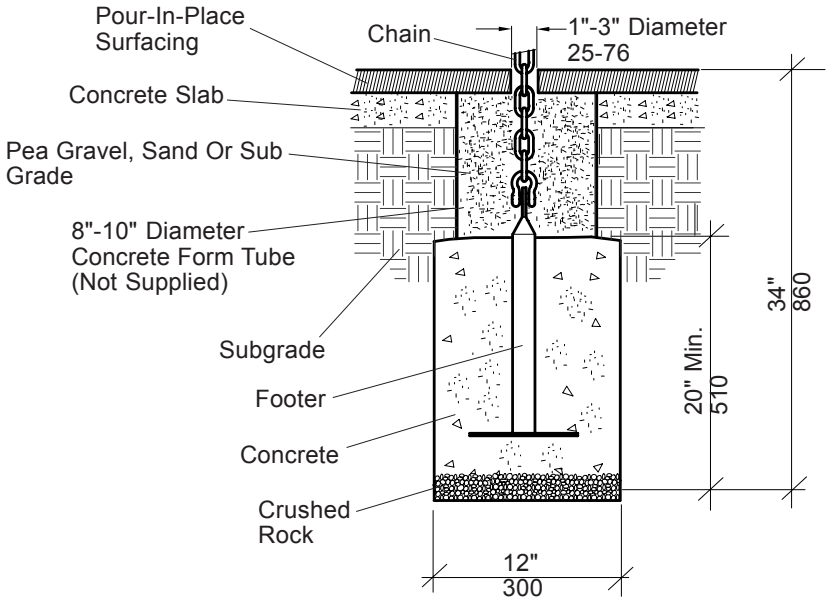
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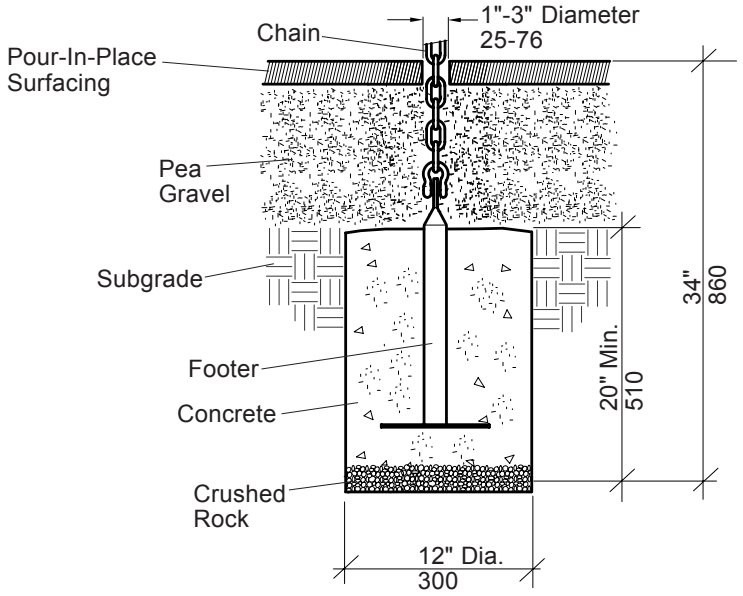
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DETAIL
DIRECT BURY WITH POUR-IN-PLACE SURFACING



DETAIL
DIRECT BURY WITH POUR-IN-PLACE SURFACING (PEA GRAVEL)



156450 Swiggle Stix® Bridge

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Parts List

Part#	Description	Qty.
155157	Pod Climb Across, Specify Color	1
177938	60 7/8" Long Pod Cable #1 Assembly	6
178984	56 7/8" Long Pod Cable #2 Assembly	1
177932	Pod Bolt Plate, Specify Color	7
178586	1 5/16" O.D. x 1 5/8" Long AL. Spacer	7
196886	18" Long (14 Links) Chain	2
196887	19 1/4" Long (15 Links) Chain	1
196888	21 3/4" Long (17 Links) Chain	1
196889	23" Long (18 Links) Chain	1
196890	24 1/4" Long (19 Links) Chain	1
196891	25 1/2" Long (20 Links) Chain	1
156203	Pod Climb Across Support, Specify Color	1
164367	Footer, Specify Color	7
156699	Ball Clamp, Specify Color	2
156700	Ball Retainer, Specify Color	2
154460	Pod, Specify Color	7
180147	**Swiggle Stix Hardware Package**	1
100196	3/8" x 7/8" BHCS w/Pin, SST	21
100198	3/8" x 1 1/8" BHCS w/Pin, SST	4
100201	5/8" x 1 1/2" BHCS w/Pin, SST	4
100292	3/8" x 1 1/4" BHCS w/Pin Limited Thread, SST	14
100365	3/8" SAE Flat Washer, SST	21
100611	1/4" x 3/8" Drive Rivet, AL/SST	1
157704	7/16" x 2" BHCS w/Pin Limited Thread, SST	7
138915	Bolt Link, SST	14
157224	.439" I.D. x 1.156" Bushing, SST	7
156962	5/8" O.D. x 1/2" Bushing, SST	7
127179	5/8" O.D. x 3/8" Bushing, SST	14
162729	Connecting Plug	14
100290	3/8" x 7/8" BHCS w/Pin Limited Thread, SST	7

Specifications

Cable Assembly: **(Cable)** Made of tightly woven polyester-wrapped, six-stranded galvanized-steel cable with a polypropylene core. **(Cable Connectors)** 6061-T6 aluminum.

Pod: Rotationally molded from U.V. stabilized linear low density polyethylene, color specified.

Chain: Steel 1/4" (6,35 mm) straight link chain, 3,150 lb (1428,82 kilograms) working load limit. Finish: ProGuard.

Pod Bolt Plate: Weldment consists of 3/16" (4,75 mm) HRPO steel plate and 3/8" (9,53 mm) thick HRPO steel plate. Finish: ProShield®, color specified.

Ball Clamp/ Ball Retainer: Cast from 356-T6 aluminum. Finish: ProShield, color specified.

Pod Climb Across: Weldment comprised of 2.375" (60,33 mm) O.D. RS20 (.095"-.105") (2,41 mm-2,67 mm) wall galvanized steel tubing, 3/8" (9,53 mm) thick stainless steel plate, and 1 7/8" (47,63 mm) steel ball. Finish: ProShield, color specified.

Support: Fabricated from 2.375" (60,33 mm) O.D. RS20 (.095"-.105") (2,41 mm-2,67 mm) wall galvanized steel tubing. Finish: ProShield, color specified.

Footer: Weldment comprised of 1.660" (42,16 mm) O.D. RS20 (.120" - .130") (3,05 mm-3,30 mm) wall galvanized steel tubing and 3/16" (4,75 mm) HRPO sheet steel. ProShield, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: Approx. 4 1/2 man hours
Concrete Req.: Approx. 10.25 cu. ft.
Area Req.: 6' (1,83 m) minimum use zone
Weight: 151 lbs.
Fall Height: 36" (910 mm)

Installation Instructions

1) **(Direct Bury) Refer to the Site Plan for footing locations.**

2) Attach ball retainers to 5" clamps using 5/8" x 1 1/2" BHCS w/pin. Fasten pod climb across to ball retainers using, ball clamps and 3/8" x 1 1/8" BHCS w/pin. Refer to the Ball Clamp Attachment Detail. **NOTE:** *5" Clamps may need to be turned, or moved up or down to connect and position pod climb across properly. Check to make sure pod climb across is level, if not adjust 5" clamps. Retighten 5" clamp fasteners when pod climb across is in proper position.*

3) Slide support into pod climb across sleeve. Drill through hole in sleeve and into support with a 1/4" or "F" (only) drill bit. Insert 1/4" x 3/8" rivet into hole and hammer rivet pin in until it is flush with head. Refer to the Support Attachment Detail.

4) Attach pod cable assemblies to pod climb across tabs using .439" I.D. x 1.156" bushings, connecting plugs and 7/16" x 2" BHCS w/pin limited thread bolts. Refer to the Pod Cable Attachment Detail. **NOTE:** *Pod cable assemblies are numbered #1 and #2, and must be attached to pod climb across as shown.*

5) Feed cables through 1 5/16" O.D. x 1 5/8" long spacers and holes in pods. Attach pod bolt plates to cables, using 3/8" x 7/8" BHCS w/pin limited thread bolts and 5/8" O.D. x 3/8" bushings. Refer to the Pod Attachment Detail.

6) Attach pod bolt plates to pods, using 3/8" x 7/8" BHCS w/pin with 3/8" SAE flat washers. Refer to the Pod Attachment Detail.

7) Attach chains to pod bolt plates, using bolt links, 3/8" x 1 1/4" BHCS w/pin limited thread bolts and 5/8" O.D. x 3/8" bushings. Refer to the Pod Attachment Detail. **NOTE:** *Chains are different lengths, and must be attached to pod bolt plates as shown.*

8) Attach footers to chains, using bolt links, 5/8" O.D. x 1/2" bushings, and 3/8" x 1 1/4" BHCS w/pin limited thread bolts, as shown. Refer to the Footer Attachment Detail.

9) With support plumb and pod cable assemblies positioned properly, pour concrete footings. Allow concrete footings to cure for a minimum of 72 hours before users are allowed to play on the structure.

   (Direct Bury With Pour-In Place Surfacing) Cut 7 lengths of concrete form tubes (not supplied) long enough to set on top of concrete footings and be level with top of concrete slab. Concrete form tubes should be 8"-10" in diameter. Disconnect bolt links from pod bolt plates. Place concrete form tubes over chains and footers. Connect bolt links to pod bolt paltes. Fill concrete form tubes with pea gravel, sand or sub grade. Pour concrete slab. After concrete slab has cured, pour surfacing. **NOTE:** *When pouring surfacing leave a 1"-3" diameter opening around chains. Refer to the DirectBury Pour-In-Place Surfacing Detail.*

10) Install protective surfacing before users are allowed to play on the structure.

Specifications are subject to change without notice.

Eco #0100338 Document20991000 replaces 19689200. Changed beam tabs to stainless steel.

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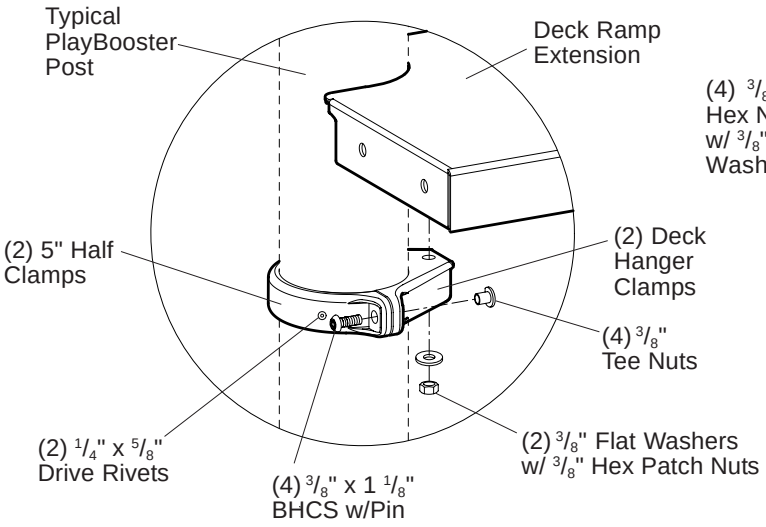
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SAFETY NOTE

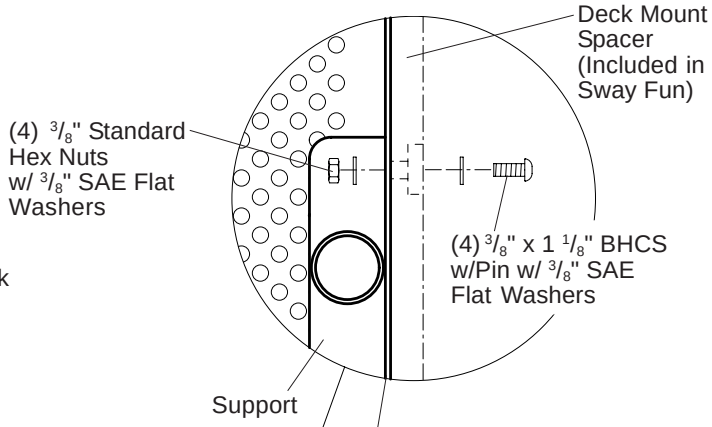
Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

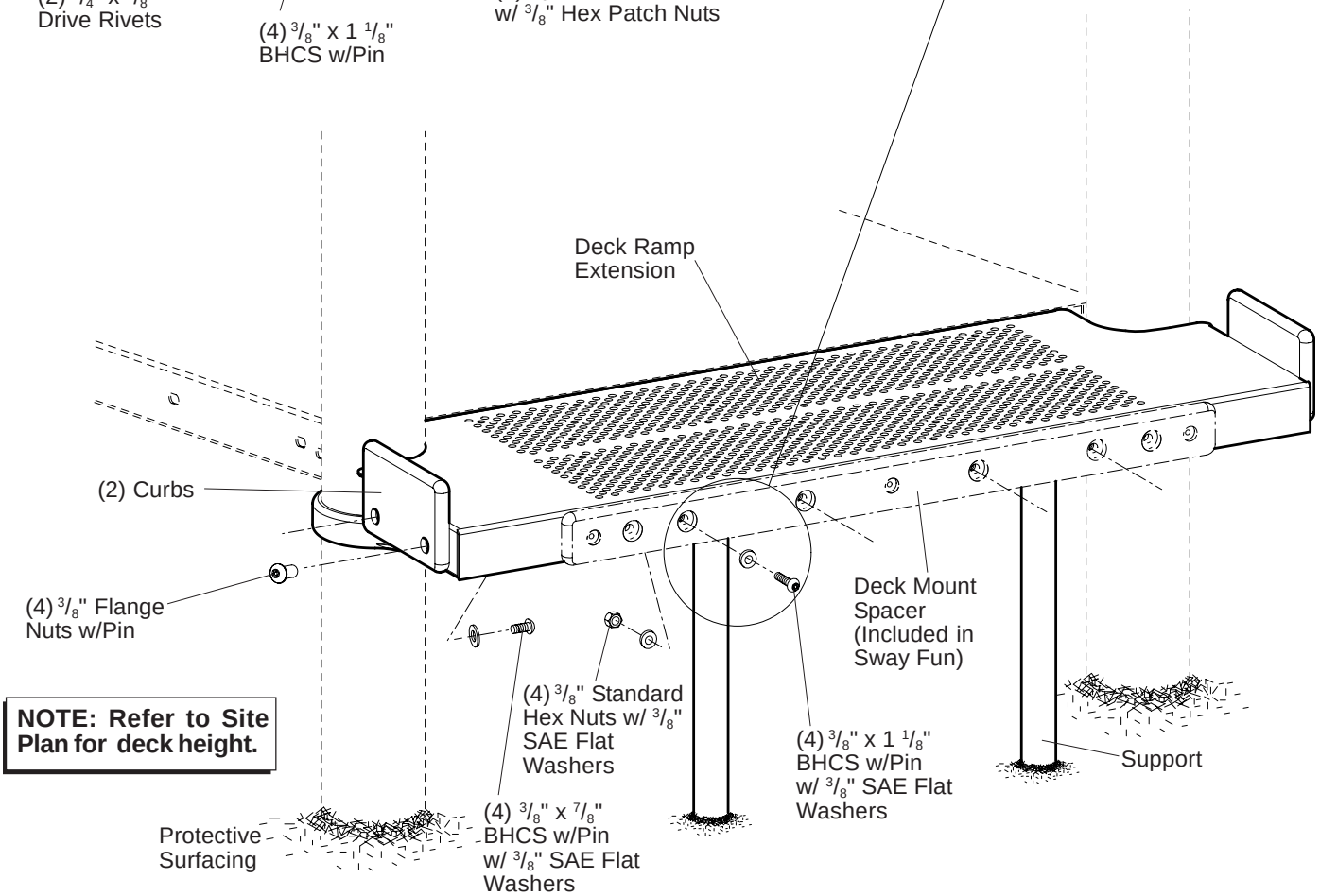
18278300

DETAIL
DECK ATTACHMENT



DETAIL
(BOTTOM VIEW)





NOTE: Refer to Site Plan for deck height.

PlayBooster® 171539 Deck Ramp Extension

601 7TH STREET SOUTH, DELANO, MINNESOTA 55328-8605 (763) 972-3391 1-888-LSI-INST (1-888-574-4678) FAX (763) 972-3185

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PlayBooster® 171539 Deck Ramp Extension

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Parts

Part#	Description	Qty.
105327-01	5" Half Clamp, Specify Color	2
106022-00	Deck Hanger Clamp, Specify Color	2
182781-00	Curb, Specify Color	2
163641-00	Deck Ramp Extension, Specify Color	1
181399-00	Support, DB, Specify Color	1
181402-00	Support, 2" SM (12" Deck), Specify Color	1
181400-00	Support, 2" SM (16" Deck), Specify Color	1
100610-00	1/4" x 5/8" Drive Rivet, AL/SST	2
182782-00	**Deck Ramp Extension Hardware Package**	1
100198-00	3/8" x 1 1/8" BHCS w/Pin, SST	8
100321-00	3/8" Hex Patch Nut, SST	2
100327-00	3/8" Standard Hex Nut, SST	4
100351-00	3/8" Tee Nut, SST	4
100362-00	3/8" Flat Washer, SST	2
100362-00	3/8" SAE Flat Washer, SST	12
100196-00	3/8" x 7/8" BHCS w/Pin, SST	4
100353-00	3/8" Flange Nuts w/Pin, SST	4
111394-00	**4 Hole (SM) Hardware Package**	1
100263-00	3/8" x 2 3/4" Expansion Anchor	4
100327-00	3/8" Standard Hex Nut, SST	4
100362-00	3/8" Flat Washer, SST	4

SM = Surface Mount
DB = Direct Bury

Specifications

Deck Ramp Ext.: Flange formed from 11 GA (.120") sheet steel conforming to ASTM A1011. Standing surface is perforated with 5/16" diameter holes. Deck face has (4) slotted holes for face mounting components. The finished size measures 2 5/8" x 15 3/4" x 47". Finish: TenderTuff, color specified.

Support (DB): Weldment comprised of 1.660" O.D. RS20 (.085"-.095" wall) galvanized steel tubing and 1 3/4" x 1 3/4" x 1/8" HR angle. Finish: ProShield, color specified.

Curb: Permalene, color specified.

Clamps: Cast aluminum. Finish: ProShield, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: Approx. 1 3/4 man hours (DB)
Approx. 1 1/2 man hours (SM)

Weight: 50 lbs. (DB)
44 lbs. (SM) 12" Deck
45 lbs. (SM) 16" Deck

Concrete: 2.62 cu. ft. (DB)

Fall Height: Deck Height

Installation Instructions

1) **(Direct Bury)** Dig footings as shown. Refer to the Plan View/Footing Layout.

2) Fasten hanger clamp assemblies to posts. Refer to Site Plan for deck height.

3) Lift deck ramp extension into position, lining up studs underneath deck ramp extension with deck hanger clamps as shown. Attach with 3/8" flat washers and 3/8" hex patch nuts.

4) Attach curbs to deck ramp extension, using 3/8" x 7/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" flange nuts w/pin.

5) Attach deck mount spacer and support to deck ramp extension, using 3/8" x 1 1/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" standard hex nuts with 3/8" SAE flat washers. Refer to Detail.

6) Level deck and plumb posts. Install 1/4" x 5/8" drive rivets in all 5" half clamps. Refer to the Typical Offset Hanger Clamp Spec Sheet.

7) **(Direct Bury)** Pour concrete footings per the Direct Bury Detail. Allow concrete footings to cure a minimum of 72 hours before users are allowed to play on the structure.

   (Surface Mount) With support plumb, drill 3" deep holes into concrete slab through holes in support plates, use a 3/8" masonry bit and 3/8" hammer drill. Tap 3/8" x 2 3/4" expansion anchors into holes and secure using 3/8" standard hex nuts with 3/8" flat washers. Refer to the Surface Mount Detail.

8) Install protective surfacing before users are allowed to play on the structure.

Specifications are subject to change without notice.

Eco #54456 Document 18278300 replaces 18140400. Replaced curb and hardware package.

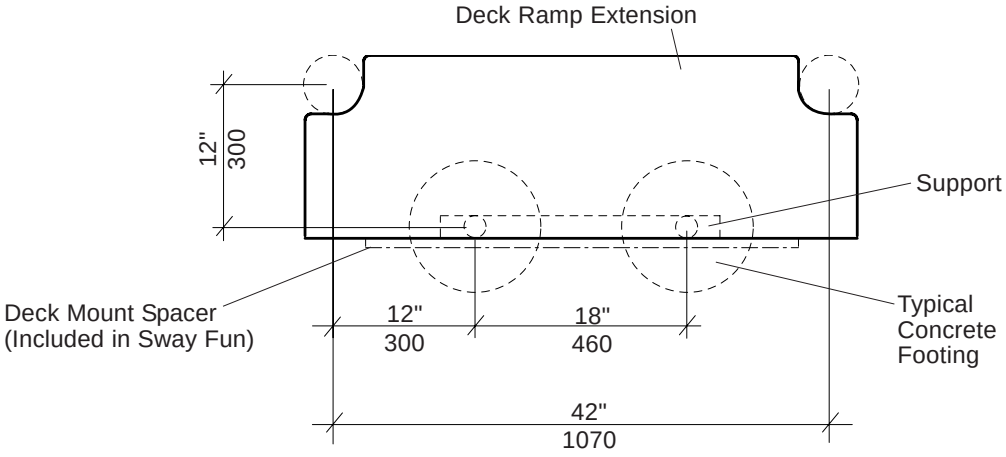
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SAFETY NOTE

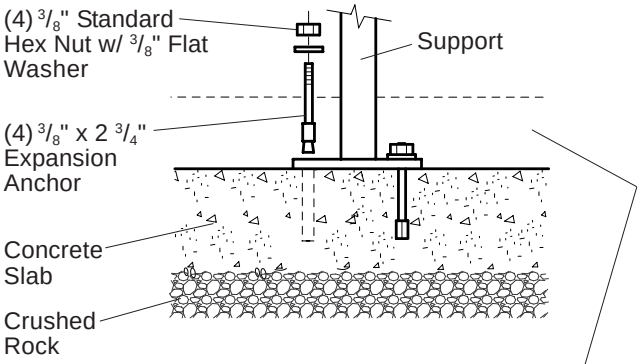
Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

171541a

PLAN VIEW/FOOTING LAYOUT

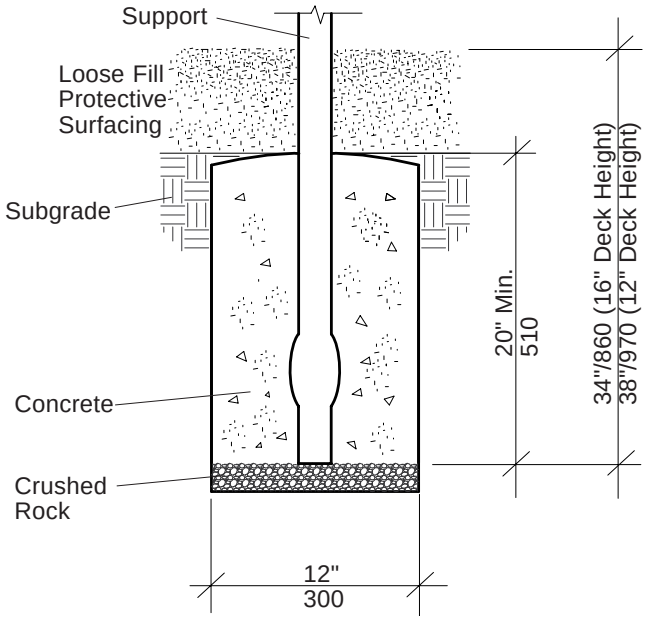


DETAIL
SURFACE MOUNT



NOTE: Sufficient protective surfacing must cover hardware to satisfy fall height requirements.

DETAIL
DIRECT BURY



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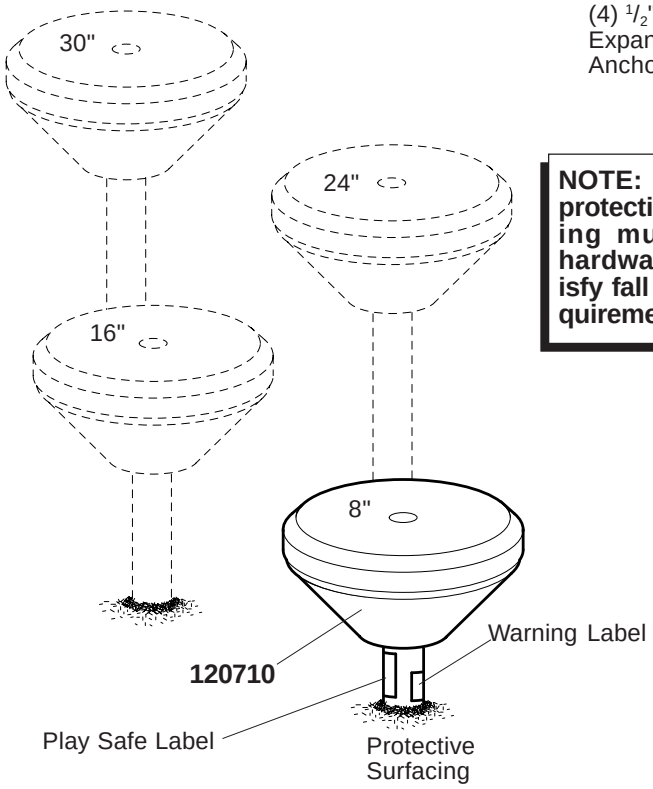
ISO 14001 CERTIFIED

ISO 9001 Certified

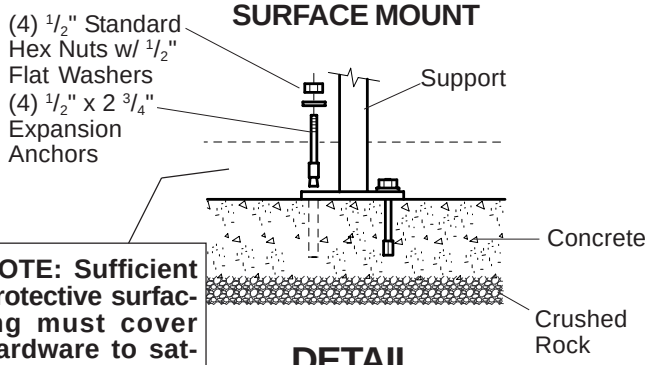
SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

18381300

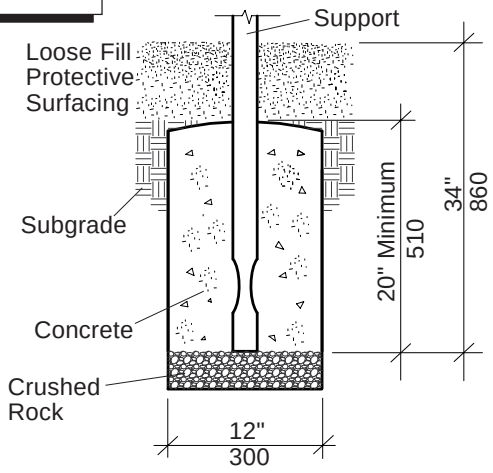


DETAIL
SURFACE MOUNT

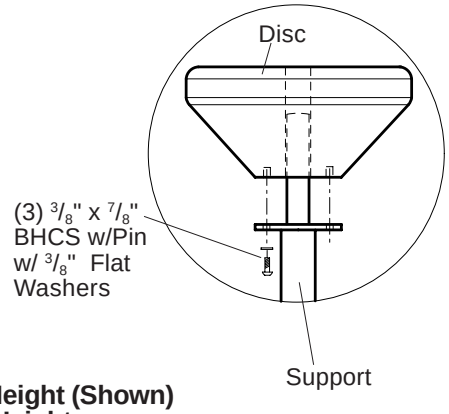


NOTE: Sufficient protective surfacing must cover hardware to satisfy fall height requirements.

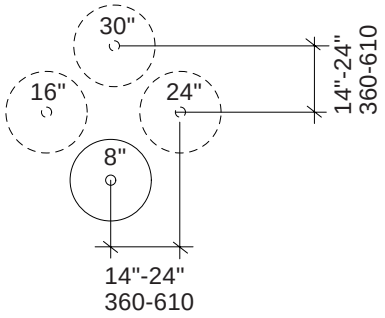
DETAIL
DIRECT BURY



DETAIL
DISC ATTACHMENT



PLAN VIEW/FOOTING LAYOUT
(Layout Varies - See Your Plan)



120710 8" Height (Shown)
158997 10" Height
120711 16" Height
158998 20" Height
120712 24" Height
120713 30" Height

Climbers

Pod Climbers

601 7TH STREET SOUTH, DELANO, MINNESOTA 55328-8605 888-574-4678 LSI Install Help 888-438-6574 LSI Direct 763-972-5200 Int. FAX (763) 972-3185

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Climbers Pod Climbers

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Parts List

Part#	Description	Qty.
126956-00	Disc, Specify Color	*
169340-00	Support 8" (SM), Specify Color	*
169339-00	Support 8" (DB), Specify Color	*
169342-00	Support 10" (SM), Specify Color	*
169341-00	Support 10" (DB), Specify Color	*
169344-00	Support 16" (SM), Specify Color	*
169343-00	Support 16" (DB), Specify Color	*
156625-00	Support 20" (SM), Specify Color	*
156627-00	Support 20" (DB), Specify Color	*
120605-00	Support 24" (SM), Specify Color	*
120601-00	Support 24" (DB), Specify Color	*
153987-00	Support 30" (SM), Specify Color	*
153988-00	Support 30" (DB), Specify Color	*
183871-00	**Disc Climber Hardware Package**	1
100196-00	3/8" x 7/8" BHCS w/Pin, SST	3
100365-00	3/8" Flat Washer, SST	3
156847-00	Play Safe Label, 5-12 Yrs.	1
183064-00	Warning Label	1
121348-00	**4 Hole (SM) Hardware Package**	1
100266-00	1/2" x 2 3/4" Expansion Anchor	4
100322-00	1/2" Standard Hex Nut, SST	4
100363-00	1/2" Flat Washer, SST	4

DB = Direct Bury
SM = Surface Mount
*** = Quantity Determined By Your Order**

Specifications

Disc: Rotationally molded from U.V. stabilized linear low density polyethylene, disc measures 14" in diameter x 7" high, color specified.

Support: Weldment comprised of 1.900" O.D. RS20 (.090" - .100" Wall), 1.315" O.D. RS20 (.080" - 090" Wall) and 3/16" x 5" diameter plate. Finish: ProShield®, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: **SM** - Approx. 1/2 man hour each
DB - Approx. 3/4 man hour each

Concrete Req.: Approx. 1.31 cu. ft. each

Weight:
8" - 12 lbs.
10" - 13 lbs.
16" - 14 lbs.
20" - 15 lbs.
24" - 15 lbs.
30" - 16 lbs.

Installation Instructions

1) **(Direct Bury)** Dig footing as shown. See your Plan View/Footing Layout.

2) Attach disc to support using 3/8" x 7/8" BHCS w/pin with 3/8" flat washers, as shown.

3) **(Direct Bury)** Position support in footing hole and pour concrete footing. With support post plumb, prop support to hold in position.

   (Surface Mount) Mark anchor bolt locations on concrete slab through holes in support plate. Remove disc climber. Drill 3" deep holes on marks into concrete slab using hammer drill and 1/2" masonry bit. Tap expansion anchors into holes and secure disc climber using 1/2" standard hex nuts with 1/2" flat washers.

4) Apply labels as shown.

5) Install protective surfacing before users are allowed to play on the structure.

Specifications are subject to change without notice.

Eco #54517 Document #18381300 replaces #16934500. Added warning label to hardware package.

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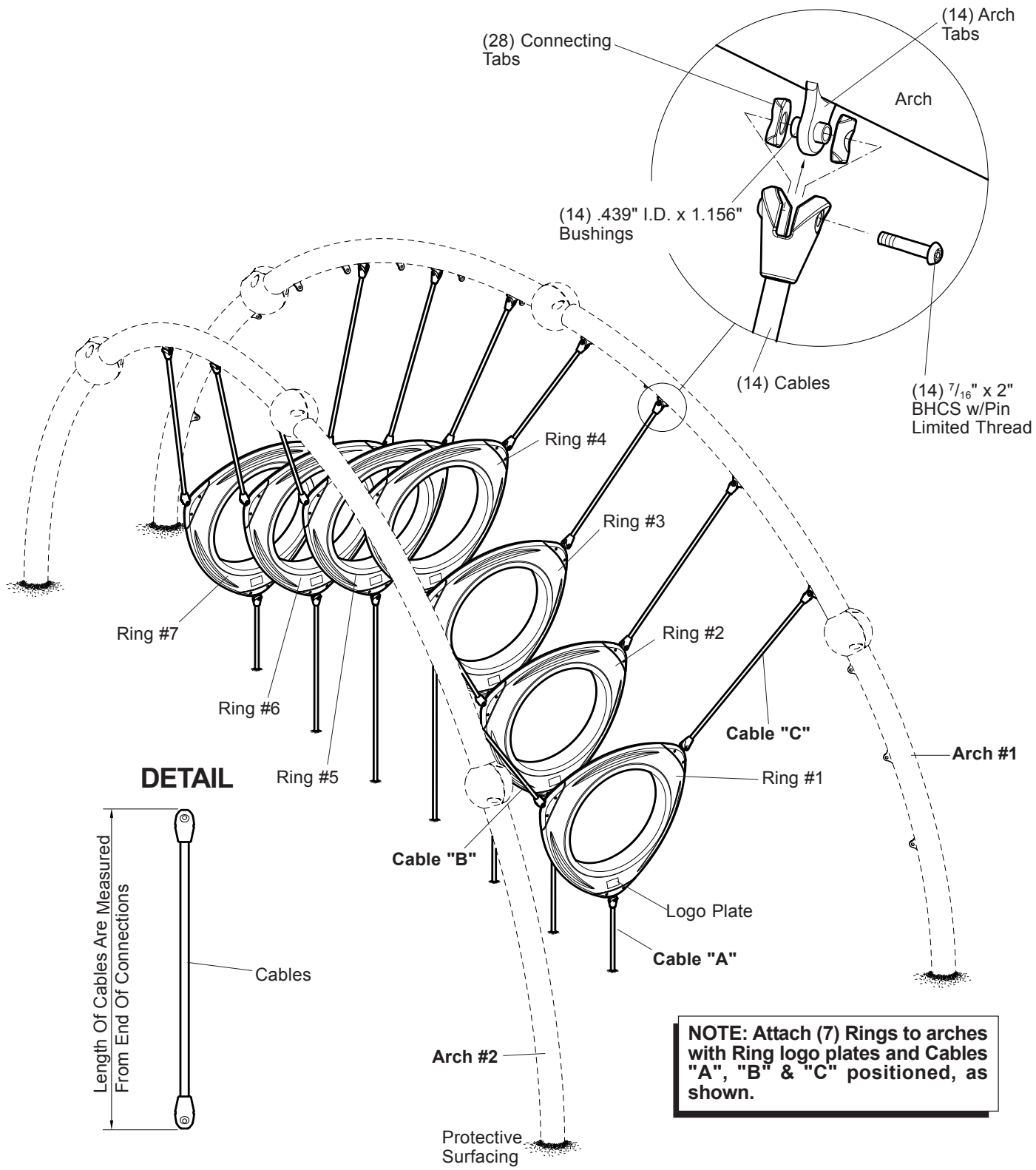
ISO 9001 Certified

SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

18930400

DETAIL
CABLE ATTACHMENT



NOTE: Attach (7) Rings to arches with Ring logo plates and Cables "A", "B" & "C" positioned, as shown.

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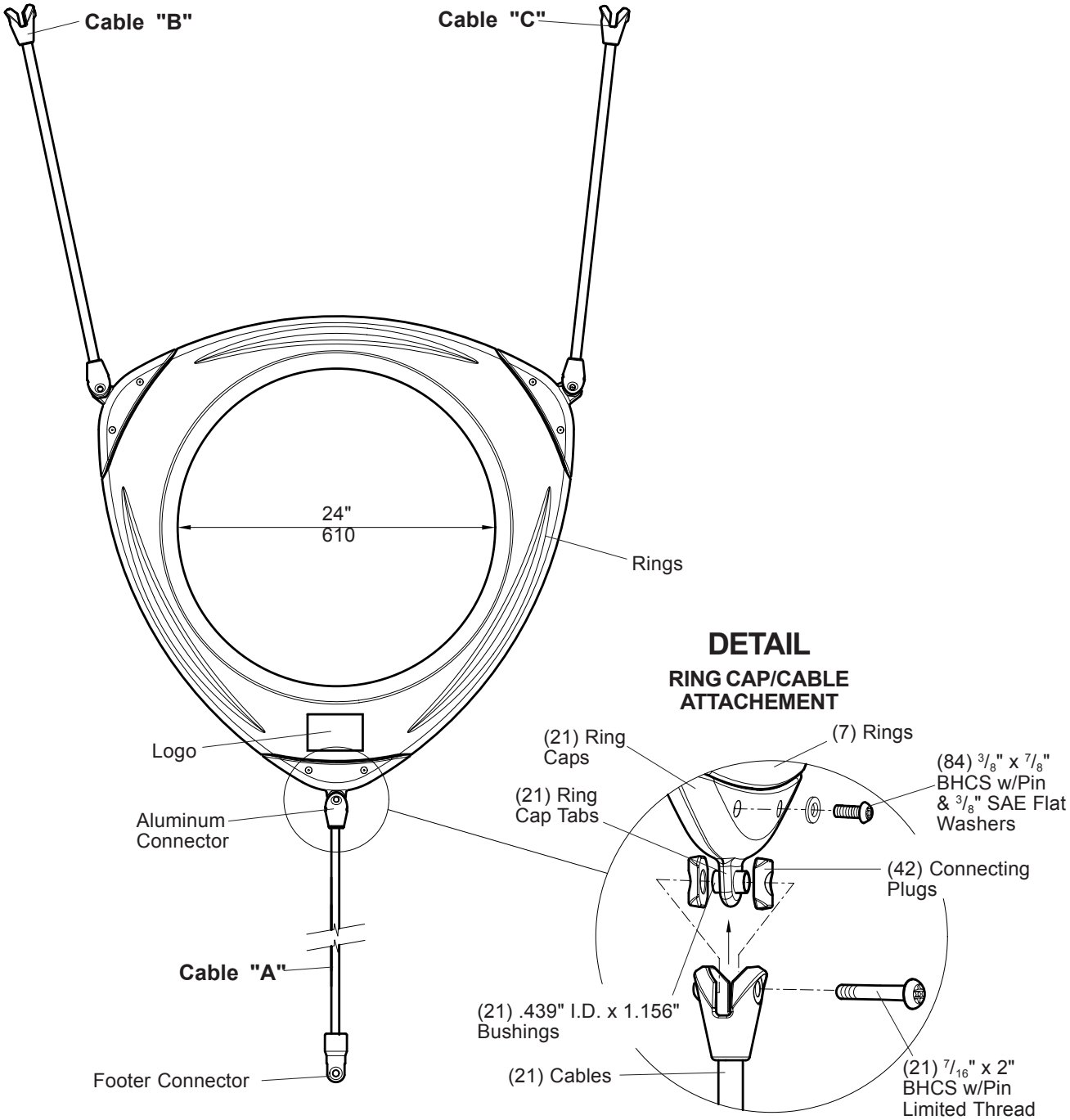
156448 O-Zone® Climber

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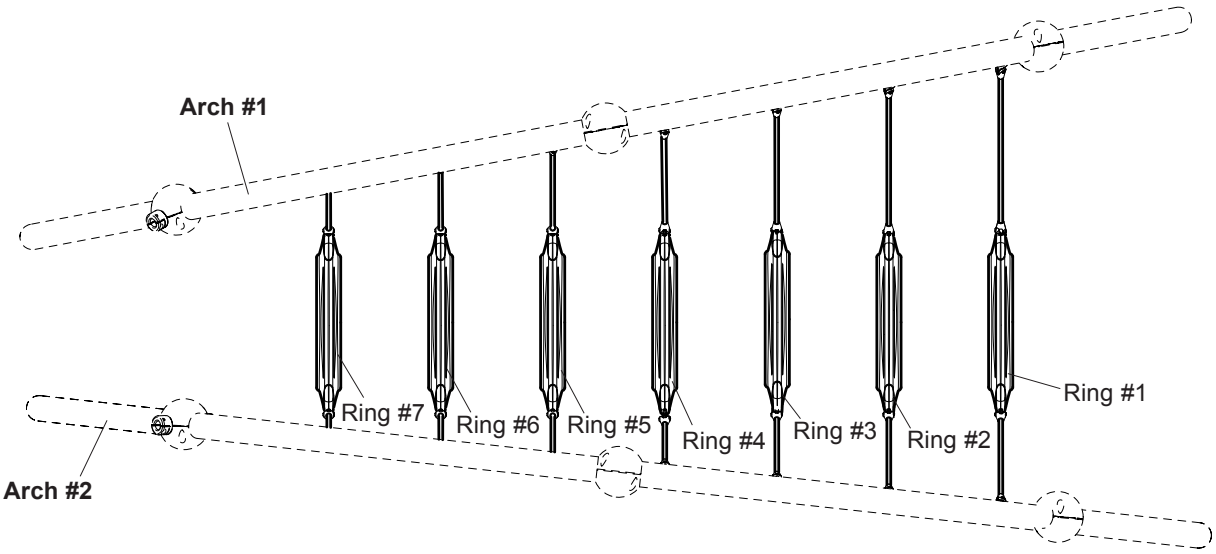
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SAFETY NOTE

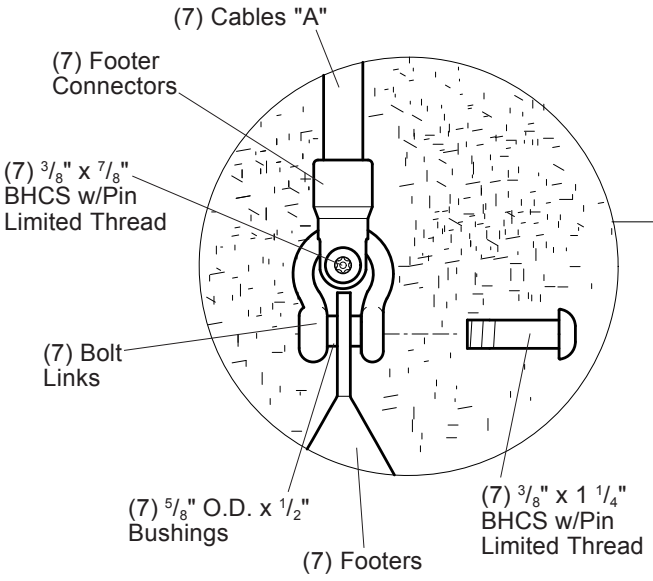
Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

161704b

PLAN VIEW

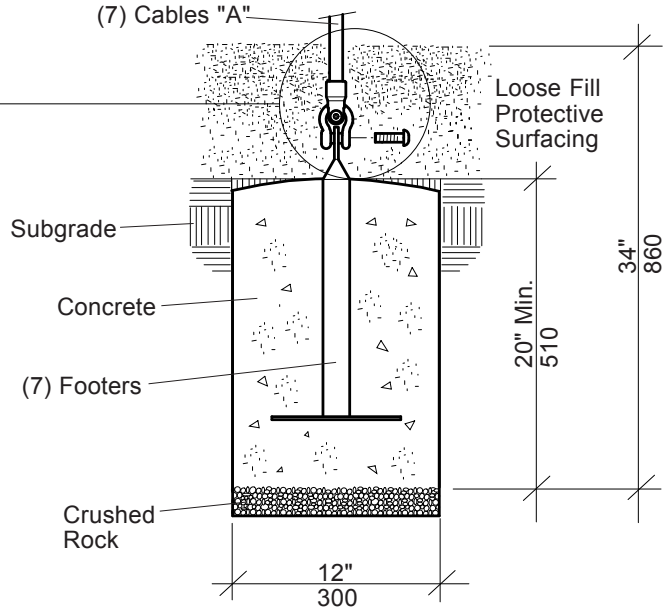


DETAIL



DETAIL

FOOTER ATTACHMENT



NOTE: The hole depth for the footer needs to be deep enough, so the footer plate doesn't contact the bottom of the hole. The weight of the concrete will force the footer plate down, tightening the cable.

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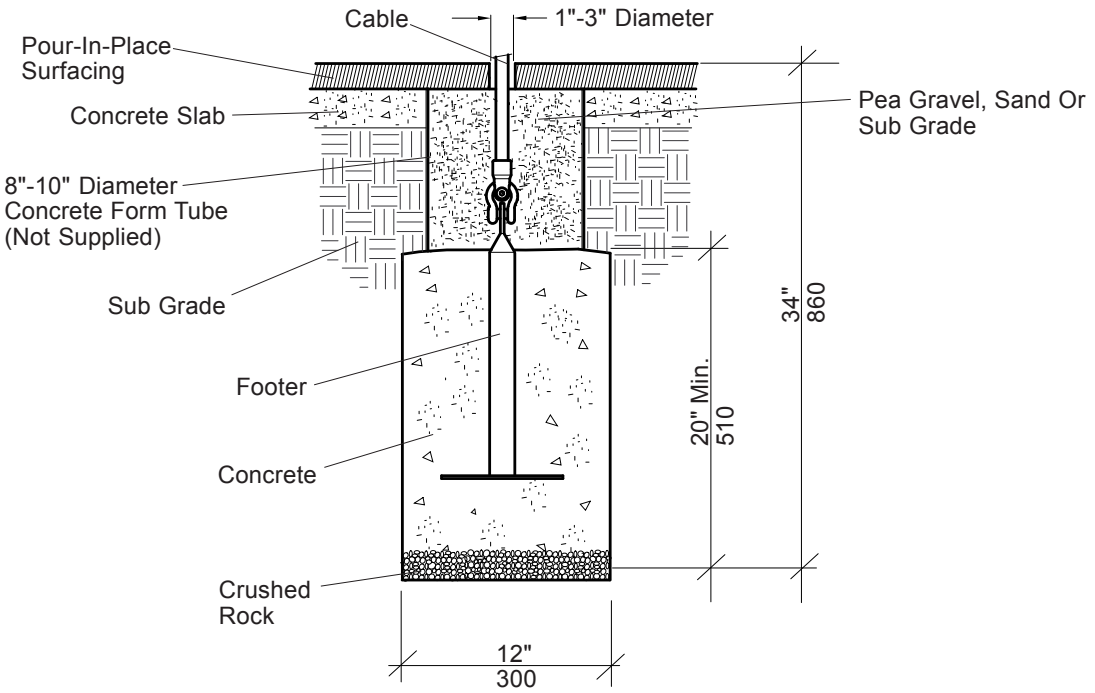
SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

161704c

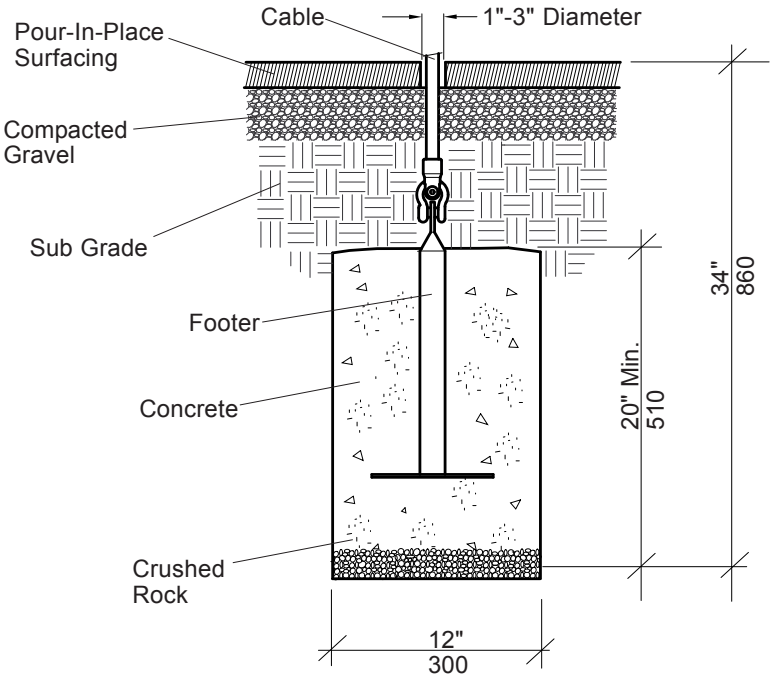
DETAIL

DIRECT BURY WITH POUR-IN-PLACE SURFACING



DETAIL

DIRECT BURY WITH POUR-IN-PLACE SURFACING (COMPACTED GRAVEL)



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156448 O-Zone® Climber

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Evos® 156448 O-Zone® Climber

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Parts List

Part#	Description	Qty.
154458-00	O-Zone Ring, Specify Color	7
176231-00	O-Zone Cable 1A & 7A, 20"	2
176232-00	O-Zone Cable 1B, 36 5/8"	1
176233-00	O-Zone Cable 1C, 2C & 7C, 44 5/8"	3
176234-00	O-Zone Cable 2A & 6A, 29"	2
176235-00	O-Zone Cable 2B & 5C, 38 7/8"	2
176236-00	O-Zone Cable 3A & 5A, 41"	2
176237-00	O-Zone Cable 3B, 34 1/4"	1
176238-00	O-Zone Cable 3C, 39 5/8"	1
176239-00	O-Zone Cable 4A, 53"	1
176240-00	O-Zone Cable 4B, 24 3/4"	1
176241-00	O-Zone Cable 4C, 30 5/16"	1
176243-00	O-Zone Cable 5B, 35 3/4"	1
176244-00	O-Zone Cable 6B, 43 1/2"	1
176245-00	O-Zone Cable 6C, 45 5/8"	1
176246-00	O-Zone Cable 7B, 42 7/8"	1
164367-00	Footer, Specify Color	7
164009-00	O-Zone Ring Cap, Specify Color	21
192515-00	**O-Zone Hardware Package**	1
100196-00	3/8" x 7/8" BHCS w/Pin, SST	84
100292-00	3/8" x 1 1/4" BHCS w/Pin Limited Thread, SST	7
157704-00	7/16" x 2" BHCS w/Pin Limited Thread, SST	35
138915-00	Bolt Link, SST	7
157224-00	.439" I.D. x 1.156" Bushing, SST	35
156962-00	5/8" O.D. x 1/2" Bushing, SST	7
100290-00	3/8" x 7/8" BHCS w/Pin Limited Thread, SST	7
162729-00	Connecting Plug	70
100365-00	3/8" SAE Flat Washer, SST	84

Specifications

Ring: Rotationally molded from U.V. stabilized linear low density polyethylene, color specified.

Cable A: Made of tightly woven polyester-wrapped, six-stranded galvanized-steel cable with a polypropylene core. **(Cable Connector)** 6061-T6 aluminum. Finish: ProShield®, black in color. **(Footing Connector)** Fabricated from 1.250" O.D. 6061-T6 aluminum.

Cable B & C: Made of tightly woven polyester-wrapped, six-stranded galvanized-steel cable with a polypropylene core. **(Cable Connector)** 6061-T6 aluminum. Finish: ProShield, black in color.

Ring Caps: Fabricated from sand-cast alloy 356. Finish: ProShield, color specified.

Footer: Weldment comprised of 1.660" O.D. RS20 (.085" - .095" Wall) galvanized steel tubing and 3/16" HRPO sheet steel. Finish: ProShield, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: Approx. 5 man hours
Concrete Req.: Approx. 9 cu. ft.
Area Req.: 6' (1830 mm) minimum use zone
Weight: 186 lbs.
Fall Height: 88" (2240 mm)

Specifications are subject to change without notice.

Installation Instructions

1) **(Direct Bury) Refer to the Site Plan for footing locations.**

2) Attach ring caps to rings, using 3/8" x 7/8" BHCS w/pin with 3/8" SAE flat washers. Refer to the Ring Cap/Cable Attachment Detail.

3) Attach Cable "A" with footing connector to ring cap tab located below logo, using .439" I.D. x 1.156" bushings, connecting plugs and 7/16" x 2" BHCS w/pin limited thread bolt. Attach cables "B" & "C" to remaining ring cap tabs as shown, using .439" I.D. x 1.156" bushings, connecting plugs and 7/16" x 2" BHCS w/pin limited thread bolts. Refer to the Ring Cap/Cable Attachment Detail. **NOTE:** *Cables are tagged 1A, 1B, 1C, 2A, 2B, 2C etc. Cable "A" is attached below logo, as shown.*

4) Starting at the wide end of the arches, attach ring #1 to arch tabs using .439" I.D. x 1.156" bushings, connecting plugs and 7/16" x 2" BHCS w/pin limited thread bolt. **NOTE:** *Make sure Cables "B" & "C" are attached to the correct arches. Cable "B" attaches to arch #2, Cable "C" attaches to arch #1.*

5) Attach bolt links to footer connectors, using 3/8" x 7/8" BHCS w/pin limited thread bolts.

6) Attach footers to footer connectors, using 5/8" O.D. x 1/2" bushings, and 3/8" x 1 1/4" BHCS w/pin limited thread bolts, as shown. Refer to Footer Attachment Details.

7) Pour concrete footings. Allow concrete footings to cure for a minimum of 72 hours before users are allowed to play on the structure. **NOTE:** *Cables attached to footers should be taut and plumb.*

   (Direct Bury With Pour-In Place Surfacing) Cut 7 lengths of concrete form tubes (not supplied) long enough to set on top of concrete footings and be level with top of concrete slab. Concrete form tubes should be 8"-10" in diameter. Disconnect cables from bolt links. Place concrete form tubes over cables and footers. Connect cables to bolt links. Fill concrete form tubes with pea gravel, sand or sub grade. Pour concrete slab. After concrete slab has cured, pour surfacing. **NOTE:** *When pouring surfacing leave a 1"-3" diameter opening around cables. Refer to the DirectBury Pour-In-Place Surfacing Detail.*

8) Install protective surfacing before users are allowed to play on the structure.

Eco #54811 Document 19251400 replaces 18930400. Added 3/8" SAE washers to O-Zone HDW. Package.

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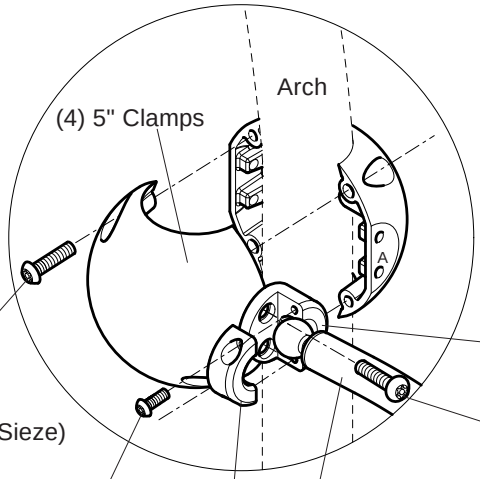
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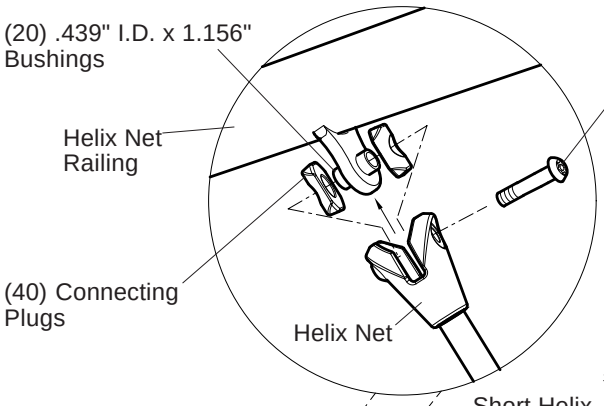
Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

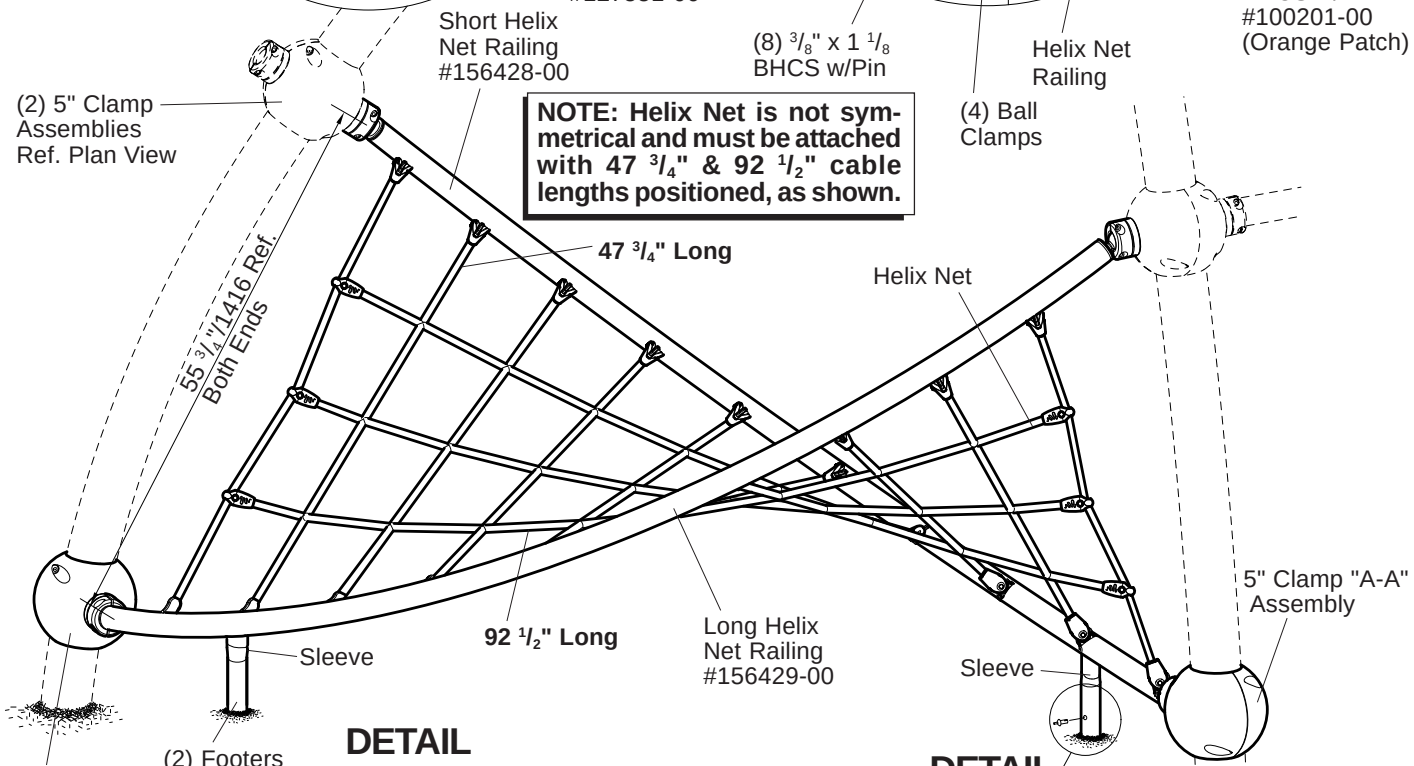
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DETAIL
HELIX NET ARCH/RAILING ATTACHMENT



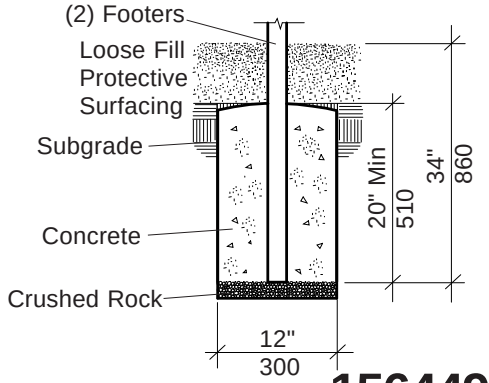
DETAIL
HELIX NET ATTACHMENT



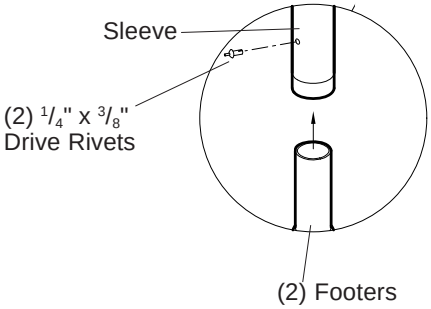


NOTE: Helix Net is not symmetrical and must be attached with 47 3/4" & 92 1/2" cable lengths positioned, as shown.

DETAIL
DIRECT BURY



DETAIL
SUPPORT ATTACHMENT



Evos®

156449 Helix Net® Climber

601 7TH STREET SOUTH, DELANO, MINNESOTA 55328-8605 888-574-4678 LSI Install Help 888-438-6574 LSI Direct 763-972-5200 Int. FAX (763) 972-3185

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Evos® 156449 Helix Net® Climber

Parts List

Part#	Description	Qty.
202572	Helix Net Assembly, Black	1
156213	Footer, Specify Color	2
166271	5" Clamp "A", Specify Color	2
166276	5" Clamp "O", Specify Color	1
166275	5" Clamp "E", Specify Color	1
156428	Short Helix Net Railing, Specify Color	1
156429	Long Helix Net Railing, Specify Color	1
156699	Ball Clamp, Specify Color	4
156700	Ball Retainer, Specify Color	4
127551	5/8" x 1 1/2" BHCS w/Pin, SST	8
156978	**Helix Net Hardware Package**	1
100198	3/8" x 1 1/8" BHCS w/Pin, SST	8
100201	5/8" x 1 1/2" BHCS w/Pin, SST	8
100611	1/4" x 3/8" Drive Rivet, AL/SST	2
157704	7/16" x 2" BHCS w/Pin Limited Thread, SST	20
157224	.439" I.D. x 1.156" Bushing, SST	20
162729	Connecting Plug	40

Specifications

5" Clamp: Cast from 356-T6 aluminum. Finish: ProShield, color specified.

Ball Clamp/ Ball Retainer: Cast from 356-T6 aluminum. Finish: ProShield®, color specified.

Helix Net Assy.: **(Net)** Made of tightly woven polyester-wrapped, six-stranded galvanized-steel cable with a polypropylene core. **(Swage)** 3/4" schedule 40 6061-T6 aluminum pipe. **(S-Hooks)** Fabricated from 5/16" diameter 316 stainless steel. **(Cable Connectors)** Fabricated from 6061-T6 aluminum.

Net Railing: Weldment comprised of 2.375" O.D. RS40 (.130"-.140" Wall) galvanized steel tubing, 1.900" O.D. RS20 (.090"-.100" Wall) galvanized steel tubing, 3/8" thick HRPO steel plate, and 1 7/8" steel ball. Finish: ProShield, color specified.

Helix Net Footer: Fabricated from 1.900" O.D. RS20 (.090"-.100" Wall) galvanized steel tubing. Finish: ProShield, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: Approx. 2 3/4 man hours
Concrete Req.: Approx. 2.5 cu. ft.
Area Req.: 6'/1830 mm minimum use zone
Weight: 165 lbs.
Fall Height: 48"

Installation Instructions

1) **(Direct Bury) Refer to the Site Plan for footing locations.**

2) Attach (2) 5" clamps to arches as shown, using 5/8" x 1 1/2" BHCS w/pin (with gray anti-sieze). Do not final tighten fasteners at this time, 5" round clamps will need to be adjusted to attach Helix net railings.

3) Attach ball retainers to 5" clamps using 5/8" x 1 1/2" BHCS w/pin. Place supports in footing holes. Attach long and short net railings to ball retainers using ball clamps and 3/8" x 1 1/8" BHCS w/pin. Refer to the Helix Net Railing Attachment Detail. **NOTE:** *Helix Net is not symmetrical and must be attached with 47 3/4" & 92 1/2" cable lengths positioned, as shown. 5" Clamps will need to be turned to connect, and position net railings properly.*

4) Attach helix net to long and short net railing tabs, using .439" I.D. x 1.156" bushings, connecting plugs and 7/16" x 2" BHCS w/pin limited thread bolts. Spread long and short railings apart as far as possible to tighten net. Railing sleeves should be plumb. Refer to the Helix Net Attachment Detail. **NOTE:** *When Helix net railings are in proper position, tighten 5" clamp fasteners.*

5) Insert supports into net railing sleeves. Drill through holes in sleeves and into supports with a 1/4" or "F" (only) drill bit. Insert 1/4" x 3/8" rivets into holes and hammer rivet pins in until it is flush with head.

6) Pour concrete footings. Allow concrete footings to cure for a minimum of 72 hours before users are allowed to play on the structure.

7) Install protective surfacing before users are allowed to play on the structure.

Specifications are subject to change without notice.

Eco #0100303 Document 20772000 replaces 17716800. Changed Helix Net Assembly part number.

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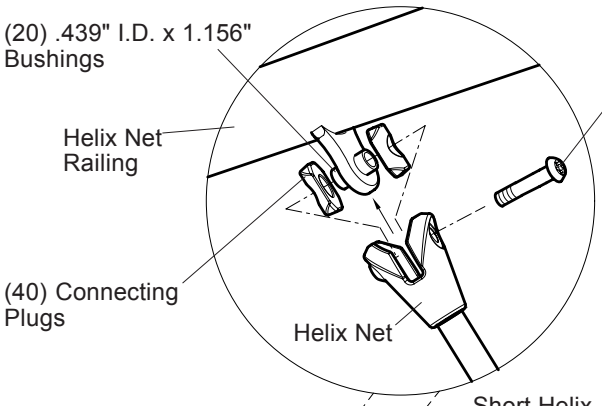
ISO 9001 Certified

SAFETY NOTE

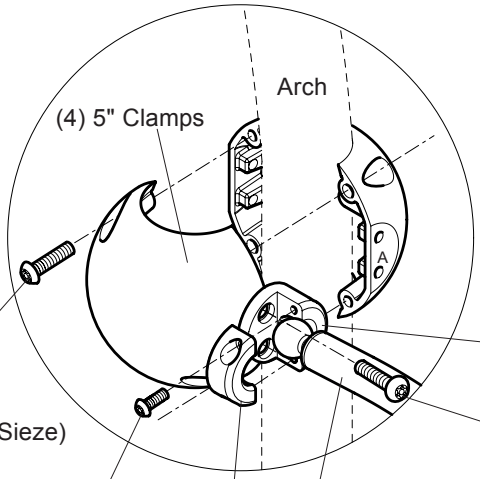
Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

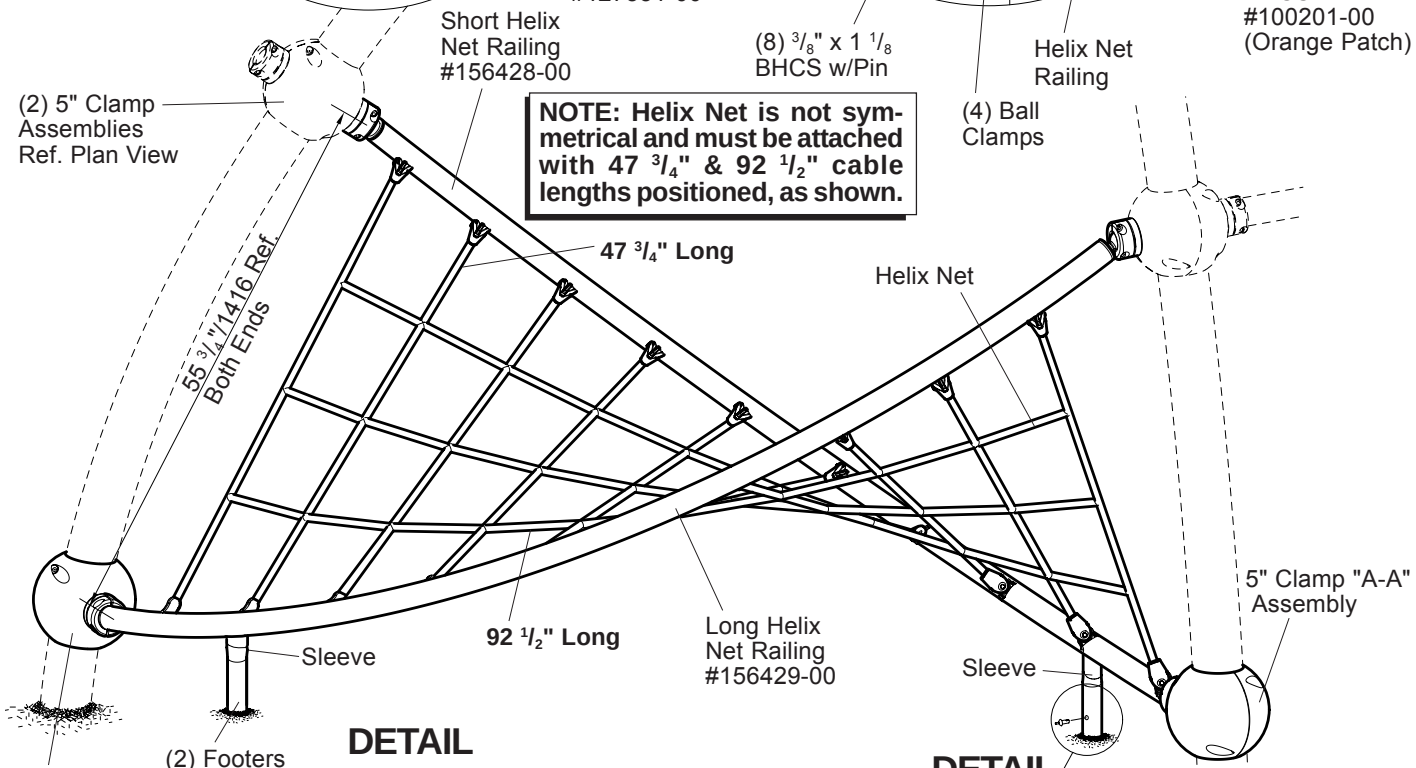
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DETAIL
HELIX NET ATTACHMENT



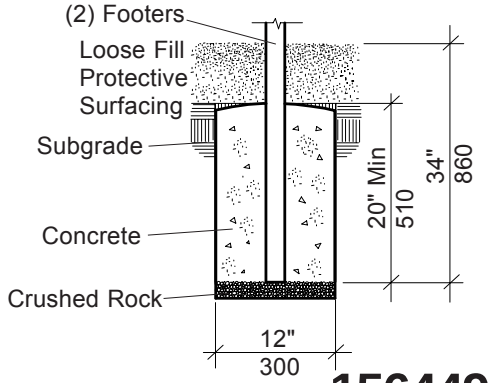
DETAIL
HELIX NET ARCH/RAILING ATTACHMENT



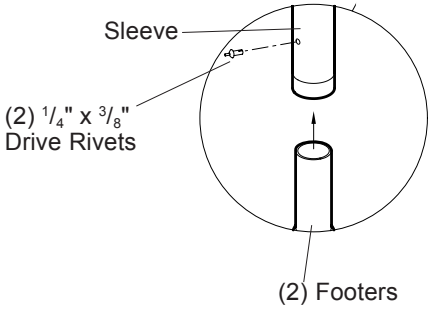


NOTE: Helix Net is not symmetrical and must be attached with 47 3/4" & 92 1/2" cable lengths positioned, as shown.

DETAIL
DIRECT BURY



DETAIL
SUPPORT ATTACHMENT



Evos®

156449 Helix Net® Climber

601 7TH STREET SOUTH, DELANO, MINNESOTA 55328-8605 888-574-4678 LSI Install Help 888-438-6574 LSI Direct 763-972-5200 Int. FAX (763) 972-3185

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Document #20989900

Evos® 156449 Helix Net® Climber

Parts List

Part#	Description	Qty.
176370	Helix Net Assembly, Black	1
156213	Footer, Specify Color	2
166271	5" Clamp "A", Specify Color	2
166276	5" Clamp "O", Specify Color	1
166275	5" Clamp "E", Specify Color	1
156428	Short Helix Net Railing, Specify Color	1
156429	Long Helix Net Railing, Specify Color	1
156699	Ball Clamp, Specify Color	4
156700	Ball Retainer, Specify Color	4
127551	5/8" x 1 1/2" BHCS w/Pin, SST	8
156978	**Helix Net Hardware Package**	1
100198	3/8" x 1 1/8" BHCS w/Pin, SST	8
100201	5/8" x 1 1/2" BHCS w/Pin, SST	8
100611	1/4" x 3/8" Drive Rivet, AL/SST	2
157704	7/16" x 2" BHCS w/Pin Limited Thread, SST	20
157224	.439" I.D. x 1.156" Bushing, SST	20
162729	Connecting Plug	40

Specifications

5" Clamp: Cast from 356-T6 aluminum. Finish: ProShield, color specified.

Ball Clamp/ Ball Retainer: Cast from 356-T6 aluminum. Finish: ProShield®, color specified.

Helix Net Assy.: **(Net)** Made of tightly woven polyester-wrapped, six-stranded galvanized-steel cable with a polypropylene core. **(Swage)** 3/4" schedule 40 6061-T6 aluminum pipe. **(S-Hooks)** Fabricated from 5/16" diameter 316 stainless steel. **(Cable Connectors)** Fabricated from 6061-T6 aluminum.

Net Railing: Weldment comprised of 2.375" O.D. RS40 (.130"-.140" Wall) galvanized steel tubing, 1.900" O.D. RS20 (.090"-.100" Wall) galvanized steel tubing, 3/8" thick stainless steel plate, and 1 7/8" steel ball. Finish: ProShield, color specified.

Helix Net Footer: Fabricated from 1.900" O.D. RS20 (.090"-.100" Wall) galvanized steel tubing. Finish: ProShield, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: Approx. 2 3/4 man hours
Concrete Req.: Approx. 2.5 cu. ft.
Area Req.: 6'/1830 mm minimum use zone
Weight: 165 lbs.
Fall Height: 48"

Installation Instructions

1) **(Direct Bury) Refer to the Site Plan for footing locations.**

2) Attach (2) 5" clamps to arches as shown, using 5/8" x 1 1/2" BHCS w/pin (with gray anti-sieze). Do not final tighten fasteners at this time, 5" round clamps will need to be adjusted to attach Helix net railings.

3) Attach ball retainers to 5" clamps using 5/8" x 1 1/2" BHCS w/pin. Place supports in footing holes. Attach long and short net railings to ball retainers using ball clamps and 3/8" x 1 1/8" BHCS w/pin. Refer to the Helix Net Railing Attachment Detail. **NOTE:** *Helix Net is not symmetrical and must be attached with 47 3/4" & 92 1/2" cable lengths positioned, as shown. 5" Clamps will need to be turned to connect, and position net railings properly.*

4) Attach helix net to long and short net railing tabs, using .439" I.D. x 1.156" bushings, connecting plugs and 7/16" x 2" BHCS w/pin limited thread bolts. Spread long and short railings apart as far as possible to tighten net. Railing sleeves should be plumb. Refer to the Helix Net Attachment Detail. **NOTE:** *When Helix net railings are in proper position, tighten 5" clamp fasteners.*

5) Insert supports into net railing sleeves. Drill through holes in sleeves and into supports with a 1/4" or "F" (only) drill bit. Insert 1/4" x 3/8" rivets into holes and hammer rivet pins in until it is flush with head.

6) Pour concrete footings. Allow concrete footings to cure for a minimum of 72 hours before users are allowed to play on the structure.

7) Install protective surfacing before users are allowed to play on the structure.

Specifications are subject to change without notice.

Eco #0100338 Document 20989900 replaces 17716800. Changed beam tabs to stainless steel.

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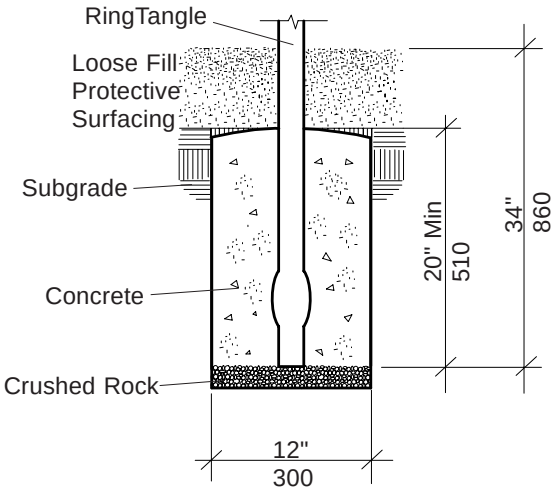
ISO 14001 CERTIFIED

ISO 9001 Certified

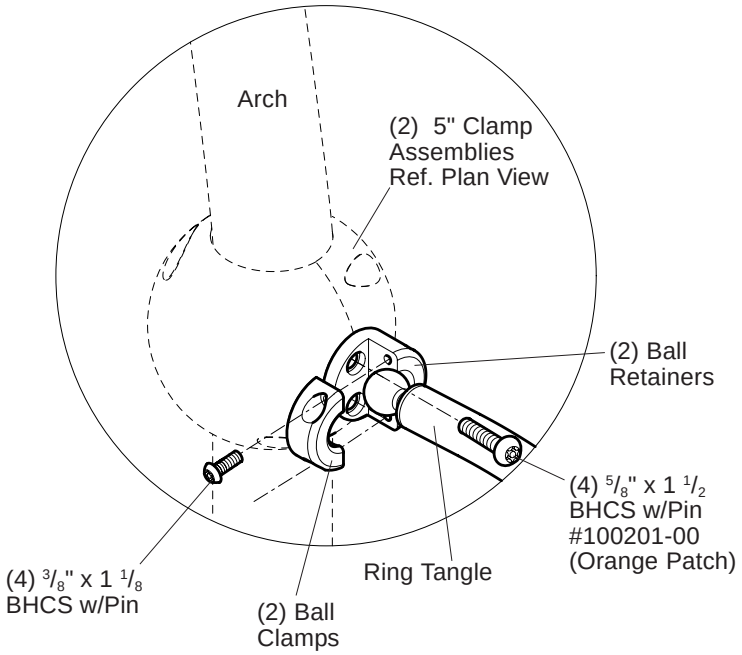
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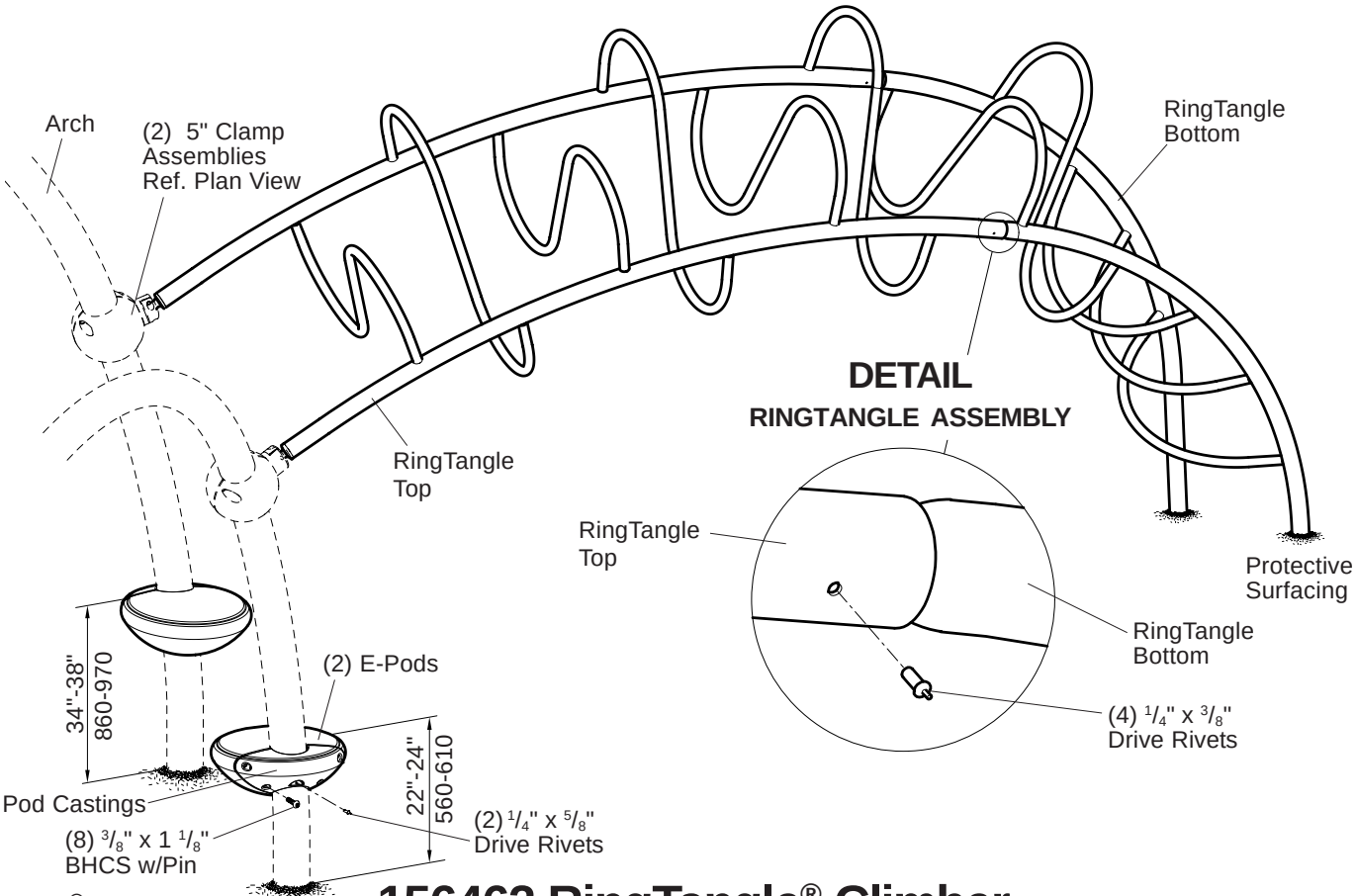
Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

DETAIL
DIRECT BURY



DETAIL
RINGTANGLE ATTACHMENT





DETAIL
RINGTANGLE ASSEMBLY

Evos® 156462 RingTangle® Climber

601 7TH STREET SOUTH, DELANO, MINNESOTA 55328-8605 888-574-4678 LSI Install Help 888-438-6574 LSI Direct 763-972-5200 Int. FAX (763) 972-3185

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Document #15746000

Evos® 156462 RingTangle® Climber

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Parts List

Part#	Description	Qty.
155304-00	RingTangle Top, Specify Color	1
155305-00	RingTangle Bottom, Specify Color	1
156699-00	Ball Clamp, Specify Color	2
156700-00	Ball Retainer, Specify Color	2
154461-00	E-Pod, Specify Color	2
156806-00	Pod Casting, Specify Color	2
156968-00	**Pod Hardware Package**	2
100198-00	3/8" x 1 1/8" BHCS w/Pin, SST	8
100610-00	1/4" x 5/8" Drive Rivet, AL/SST	2
156973-00	**RingTangle Hardware Package**	1
100198-00	3/8" x 1 1/8" BHCS w/Pin, SST	4
100201-00	5/8" x 1 1/2" BHCS w/Pin, SST	4
100611-00	1/4" x 3/8" Drive Rivet, AL/SST	4

Specifications

Ball Clamp/ Ball Retainer: Cast from 535 almag. Finish: ProShield®, color specified.

RingTangle Top: Weldment comprised of 1.315 O.D. RS20 (.080-.090 Wall) galvanized steel tubing, 2.375 O.D. RS20 (.095-.105 Wall) galvanized steel tubing, and 1 7/8" steel ball. Finish: ProShield, color specified.

RingTangle Bottom: Weldment comprised of 1.315 O.D. RS20 (.080-.090 Wall) galvanized steel tubing and 2.375 O.D. RS20 (.095-.105 Wall) galvanized steel tubing. Finish: ProShield, color specified.

E-Pod: Rotationally molded from U.V. stabilized linear low density polyethylene, color specified.

Pod Casting: Fabricated from sand cast alloy 356 in accordance with ASTM B26. Finish: ProShield, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: Approx. 2 1/2 man hours
Concrete Req.: Approx. 2.5 cu. ft.
Area Req.: 6' (1,83 m) minimum use zone
Weight: 198 lbs.
Fall Height: 66" (1,67 m)

Installation Instructions

1) **(Direct Bury) Refer to the Site Plan for footing locations.**

2) Insert RingTangle bottom into RingTangle top, as shown. Drill through holes in RingTangle top and into RingTangle bottom with a 1/4" or "F" (only) drill bit. Insert 1/4" x 3/8" rivets into holes and hammer rivet pins in until it is flush with head. Refer to the RingTangle Assembly Detail

3) Attach ball retainers to 5" clamps using 5/8" x 1 1/2" BHCS w/pin. Attach RingTangle to ball retainers using ball clamps and 3/8" x 1 1/8" BHCS w/pin. Refer to the RingTangle Attachment Detail. **NOTE:** *5" Clamps may need to be turned to connect RingTangle and position properly. Retighten 5" clamp fasteners when RingTangle is in proper position.*

4) Attach e-pods and pod castings to arches at dimensions shown, using 3/8" x 1 1/8" BHCS w/pin.

5) Drill through hole in pod casting and into noodle post with a 1/4" or "F" (only) drill bit. Insert 1/4" x 5/8" rivet in hole and hammer rivet pin in until it is flush with head.

6) Pour concrete footings. Allow concrete footings to cure for a minimum of 72 hours before users are allowed to play on the structure.

7) Install protective surfacing before users are allowed to play on the structure.

Specifications are subject to change without notice.

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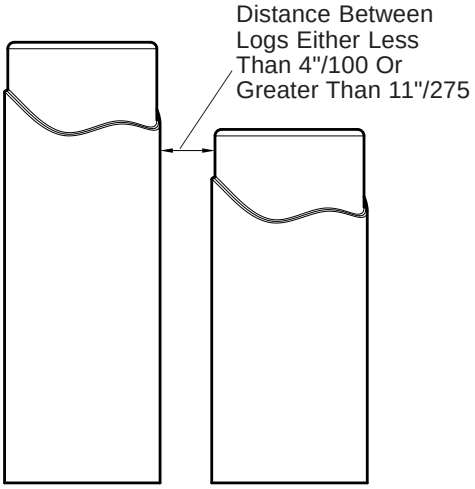
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SAFETY NOTE

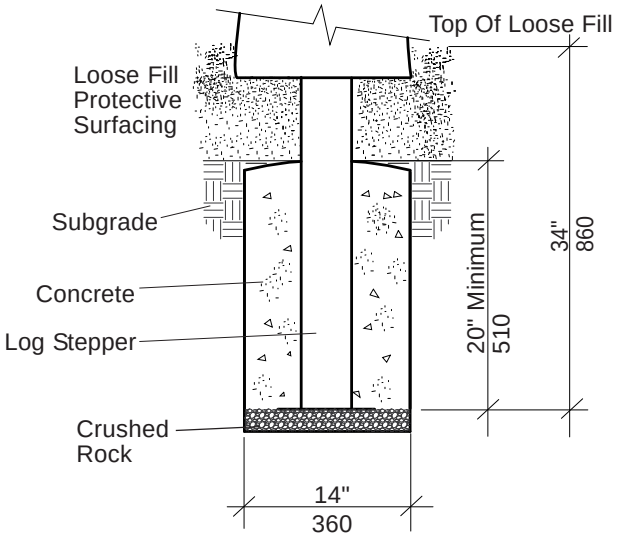
Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

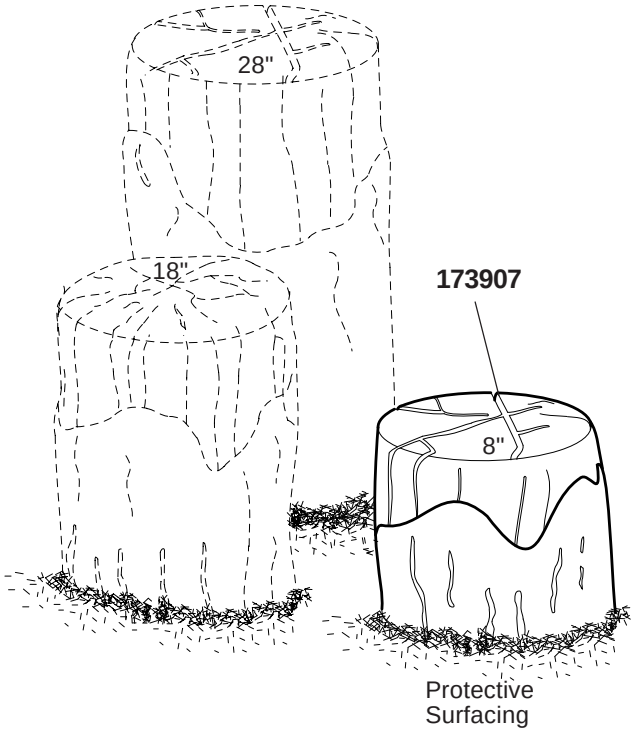
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DETAIL
LOG STEPPER SPACING

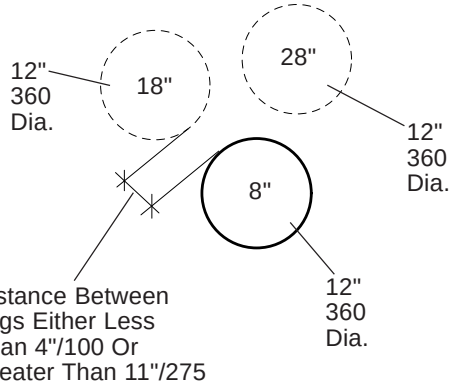


DETAIL
DIRECT BURY





PLAN VIEW/FOOTING LAYOUT
(Layout Varies - See Your Plan)



Play Naturally™

173907 8" Height (Shown)
173908 18" Height
173909 28" Height

Climbers

Log Steppers

601 7TH STREET SOUTH, DELANO, MINNESOTA 55328-8605 888-574-4678 LSI Install Help 888-438-6574 LSI Direct 763-972-5200 Int. FAX (763) 972-3185

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Climbers Log Steppers

Parts List

Part#	Description	Qty.
200691	8" Log Stepper (DB), Natural	*
200692	18" Log Stepper (DB), Natural	*
200693	28" Log Stepper (DB), Natural	*

DB = Direct Bury

*** = Qunatity Determined By Your Order**

Specifications

Log Stepper Assy.: **(Footer Post)** Weldment comprised of 5" O.D. x 11 GA. (.120") wall galvanized steel tubing and $^{3}/_{16}$" HRPO steel plate. Finish: ProShield, color specified. **(Log Stepper-fully assembled)** Glass reinforced wet cast solid pour concrete product. Finish: Latex paint made for concrete, natural colors.

Installation Time: Approx. $^{1}/_{2}$ man hour each
Concrete Req.: Approx. 1.78 cu. ft. each
Weight: 8" - 162 lbs.
18" - 230 lbs.
28" - 424 lbs.

Installation Instructions

1) **(Direct Bury)** Dig footing as shown. See your Plan View/Footing Layout.

2) To unload the log steppers and place in footing holes, a "Lull" type material handler and strap are recommended. Position log steppers in footing holes at dimensions shown, and prop in plumb position. With log steppers and handrail plumb, pour concrete footings. Allow concrete footings to cure for a minimum of 72 hours before users are allowed to play on the structure.

3) Install protective surfacing before users are allowed to play on the structure.

Specifications are subject to change without notice.

ECO #0100080 Document 20070000 replaces 17487900. Replaced log steppers.

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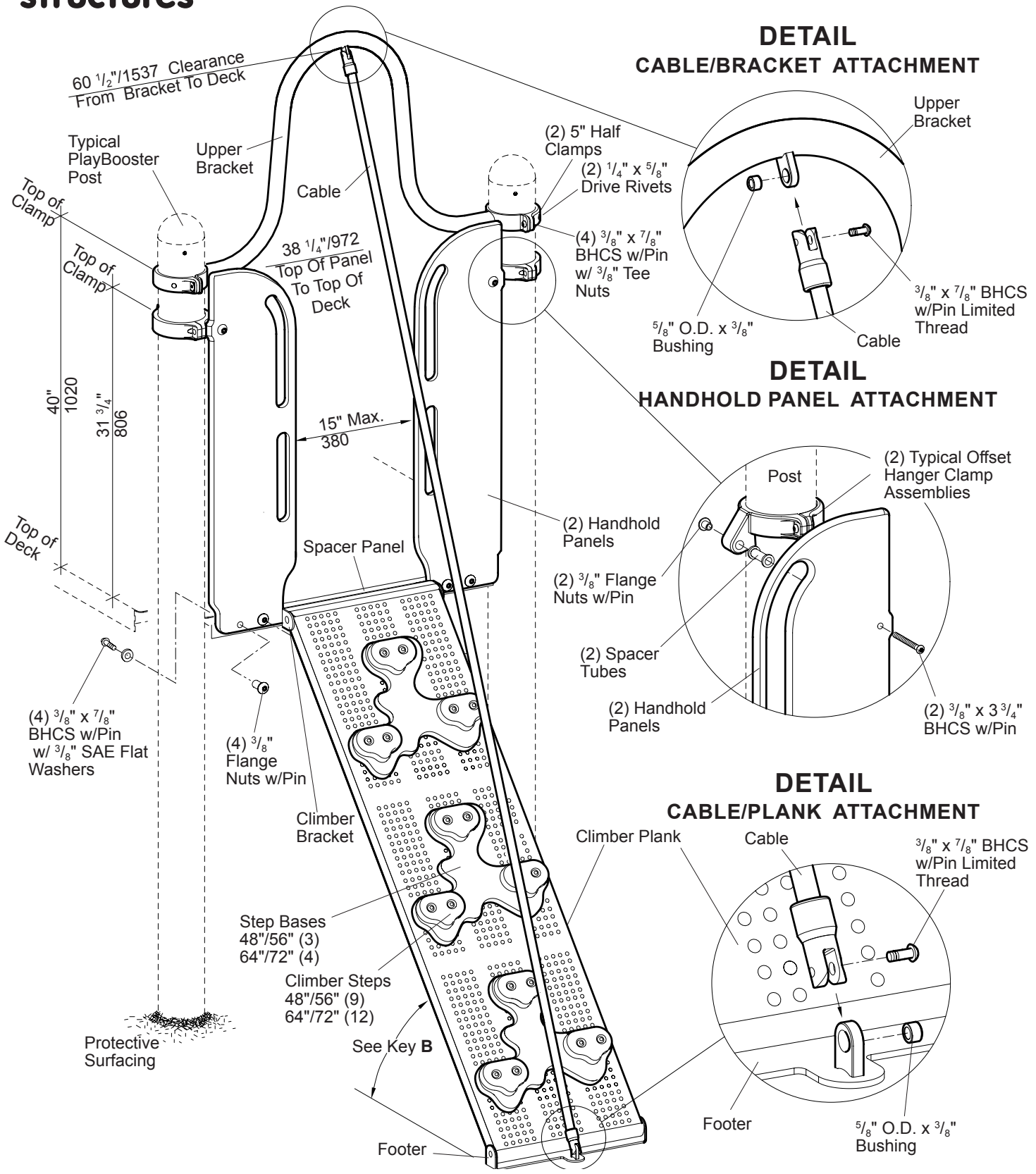
ISO 14001 CERTIFIED

ISO 9001 Certified

SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. ASTM F1487.)

17570000



PlayBooster® 122570 Cliff Climber

601 7TH STREET SOUTH, DELANO, MINNESOTA 55328-8605 888-574-4678 LSI Install Help 888-438-6574 LSI Direct 763-972-5200 Int. FAX (763) 972-3185

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PlayBooster® 122570 Cliff Climber

Parts List

Part#	Description	Qty.
152391	Climber Plank 48"/56", Specify Color	1
122130	Climber Plank 64"/72", Specify Color	1
165144	Upper Bracket, Specify Color	1
139563	Handhold Panel, Specify Color	2
122122	Climber Bracket, Specify Color	1
113729	Offset Hanger Clamp, Specify Color	2
105327	5" Half Clamp, Specify Color	4
122776	Spacer Panel, Specify Color	1
165147	121 1/4" Cable, (48" Deck)	1
165148	125" Cable, (56" Deck)	1
165149	140" Cable, (64" Deck)	1
165150	143" Cable, (72" Deck)	1
165145	Footer (DB), Specify Color	1
165146	Footer (SM), Specify Color	1
113468	Spacer Tube, Specify Color	2
Multiple *	**Climber Assembly 48"/56"**	1
122204	Climber Step, Specify Color	9
122595	Step Base, Specify Color	3
175695	**48"/56" Cliff Hardware Package**	1
123224	3/8" x 1 11/16" BHCS w/Pin, SST	2
100198	3/8" x 1 1/8" BHCS w/Pin, SST	4
113027	3/8" x 1 3/8" BHCS w/Pin, SST	18
100327	3/8" Standard Hex Nut, SST	6
100353	3/8" Flange Nut w/Pin, SST	18
100365	3/8" SAE Flat Washer, SST	28
Multiple *	**Climber Assembly 64"/72"**	1
122204	Climber Step, Specify Color	12
122595	Step Base, Specify Color	4
175696	**64"/72" Cliff Hardware Package**	1
123224	3/8" x 1 11/16" BHCS w/Pin, SST	2
100198	3/8" x 1 1/8" BHCS w/Pin, SST	4
113027	3/8" x 1 3/8" BHCS w/Pin, SST	24
100327	3/8" Standard Hex Nut, SST	6
100353	3/8" Flange Nut w/Pin, SST	24
100365	3/8" SAE Flat Washer, SST	34
175697	**Cliff Climber Hardware Package**	1
100198	3/8" x 1 1/8" BHCS w/Pin, SST	4
100290	3/8" x 7/8" BHCS w/Pin Ltd. Thread Bolt, SST	2
127179	5/8" O.D. x 3/8" Bushing, SST	2
124460	3/8" x 3 3/4" BHCS w/Pin, SST	2
100196	3/8" x 7/8" BHCS w/Pin, SST	8
100351	3/8" Tee Nut, SST	8
100353	3/8" Flange Nut w/Pin, SST	6
100365	3/8" SAE Flat Washer, SST	4
100610	1/4" x 5/8" Drive Rivet AL/SST	4
111392	**2 Hole (SM) Hardware Package**	1
100266	1/2" x 2 3/4" Expansion Anchor	2
100322	1/2" Standard Hex Nut, SST	2
100363	1/2" Flat Washer, SST	2

*** = See Your L.S.I. Representative For Part Number**
DB=Direct Bury
SM=Surface Mount

Specifications

Climber Bracket: Fabricated from formed 3/16" x 2" HR flat steel. Finish: ProShield®, color specified.

Climber Plank: Flange formed from 11 GA (.120") sheet steel conforming to ASTM A1011. Standing surface is perforated with 5/16"diameter holes. Finish: TenderTuff, color specified.

Footer: Weldment comprised of 1.660" O.D. RS-20 (.085"-.095") galvanized steel tubing and 3/16" x 2" HR flat steel. Finish: ProShield, color specified.

Upper Bracket: Weldment comprised of formed 1.660" O.D. RS-20 (.085"-.095"') galvanized steel tubing and 1/4" x 1 3/4" wide steel half clamps. Finish: ProShield, color specified.

Climber Step/ Step Base/Panels: Solid color Permalene®, color specified.

Cable: Made of tightly woven, polyester-wrapped, six stranded galvanized-steel cable with a polypropylene core. Connector fabricated from 1.250" O.D. 6061-T6 aluminum.

Offset Hanger Clamp Assembly: Cast aluminum. Finish: ProShield, color specified.

Fasteners: Primary fasteners are socketed and pinned tamper-proof in design, either stainless steel (SST) or carbon steel plated with zinc/nickel and iridescent chromate finish.

Installation Time: **SM** - Approx. 2 man hours
DB - Approx. 2 1/2 man hours

Concrete Req.: Approx. 2 cu. ft.

Area Req.: 6' /1.83 m minimum use zone at exit

Weight: 48" & 56" - 138 lbs.
64" & 72" - 155 lbs.

Fall Height: Deck Height

Installation Instructions

1) Dig footing holes spaced as shown.

2) Attach upper bracket to posts at height shown using 5" half clamps, 3/8" x 7/8" BHCS w/pin and 3/8" tee nuts.

3) Attach handhold panel to the face of the deck using 3/8" x 7/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" flange nuts w/pin. See Detail.

4) Attach offset hanger clamp assemblies to posts at height shown. Using half clamps and 3/8" x 1 1/8" BHCS w/pin with 3/8" tee nuts. Refer To The Typical Offset Hanger Clamp Spec Sheet.

5) Attach handhold panel to offset hanger clamp assemblies using 3/8" x 3 3/4" BHCS w/pin, spacer tubes and 3/8" flange nuts w/pin. See Panel Attachment Detail.

6) Attach step base and climber steps to the climber plank using 3/8" x 1 3/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" flange nuts w/pin. Refer to the Step Attachment Detail.

7) Attach footer to climber plank and climber plank to climber bracket using 3/8" x 1 1/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" standard hex nuts with 3/8" SAE flat washers. Refer to the Plank Attachment Detail.

8) Attach climber bracket to the face of the deck using spacer panel, 3/8" x 1 11/16" BHCS w/pin and 3/8" standard hex nuts with 3/8" SAE flat washers. Refer to the Plank Attachment Detail.

9) Attach cable to upper bracket, using 5/8" O.D. x 3/8" bushing and 3/8" x 7/8" BHCS w/pin limited thread. Refer to the Cable/Bracket Attachment Detail.

10) Attach cable to the bottom of the climber plank, using 5/8" O.D. x 3/8" bushing and 3/8" x 7/8" BHCS w/pin limited thread. Refer to the Cable/Plank Attachment Detail.

11) **(Direct Bury)** With cliff climber in final position, pour concrete footings. Allow concrete footings to cure a minimum of 72 hours before users are allowed to play on the structure.

(Surface Mount) Mark anchor bolt locations on concrete slab through holes in footer and remove challenge climber from climber bracket. Drill 1/2" x 3" deep holes on marks into concrete using hammer drill and 1/2" masonry bit. Tap expansion anchors into drilled holes. Reposition challenge climber and reattach to the climber bracket. Fasten footer to expansion anchors using 1/2" standard hex nuts with 1/2" flat washers.

12) Install 1/4" x 5/8" drive rivets in all 5" half clamps. Refer to the Typical Offset Hanger Clamp Spec Sheet.

13) Install protective surfacing before users are allowed to play on the structure.

Specifications are subject to change without notice.

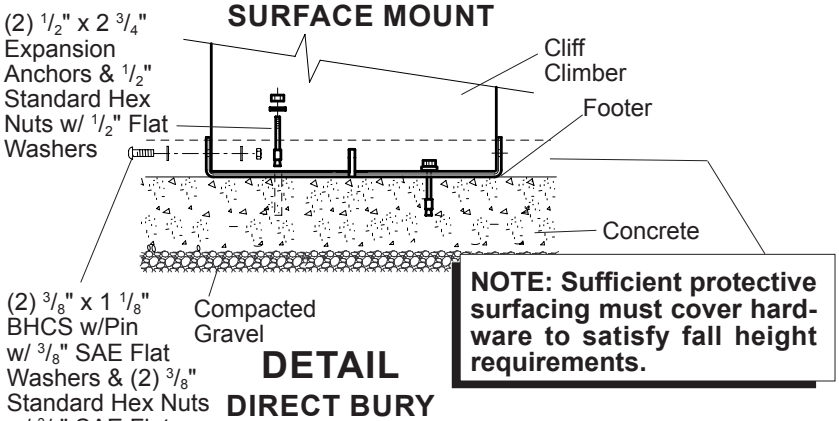
Eco #54167 Document #17570000 replaces #15969600. Replaced chain, upper bracket and footer.

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SAFETY NOTE
Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. ASTM F1487.)

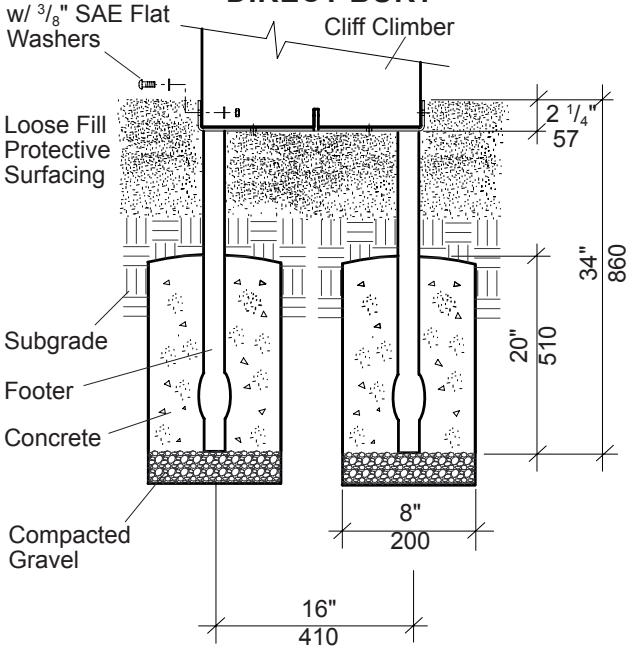
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DETAIL
SURFACE MOUNT

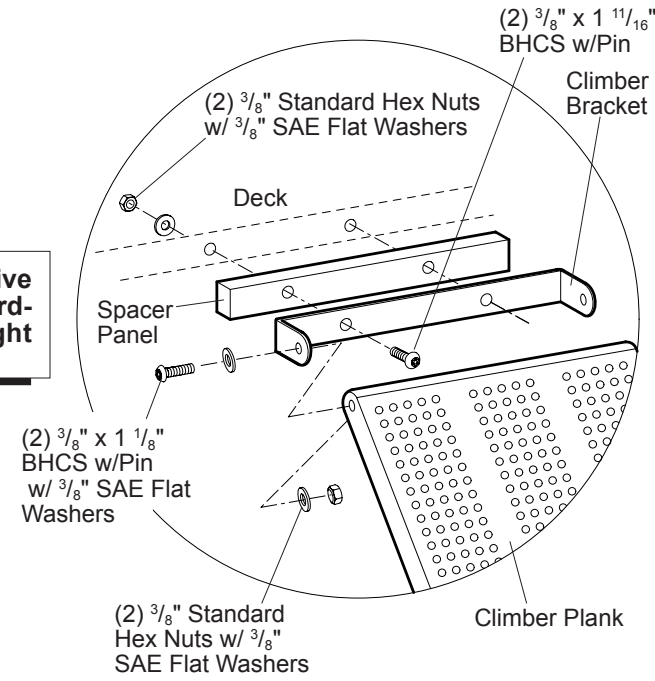


NOTE: Sufficient protective surfacing must cover hardware to satisfy fall height requirements.

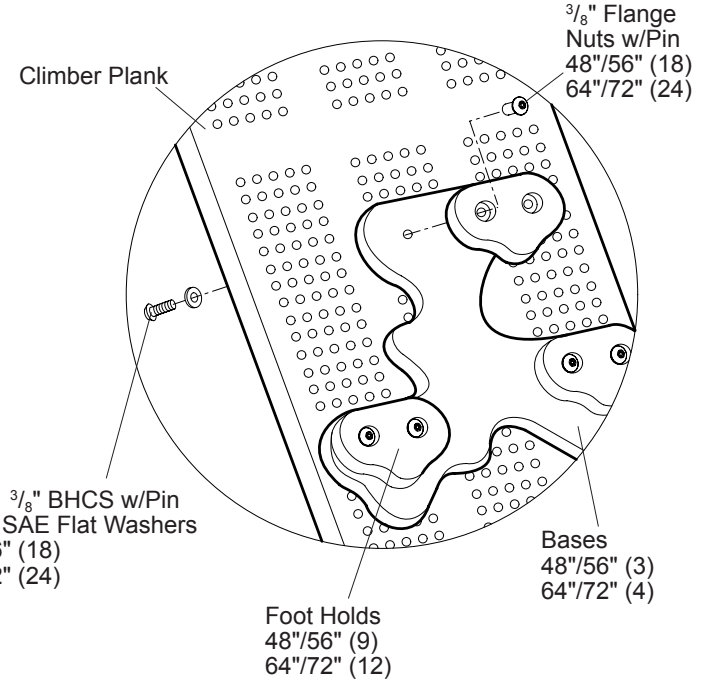
DETAIL
DIRECT BURY



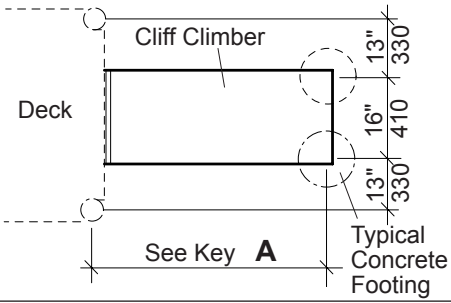
DETAIL
PLANK ATTACHMENT



DETAIL
FOOT HOLD ATTACHMENT



PLAN VIEW/DB FOOTING LAYOUT



KEY Height	Dimension "A"	Angle "B"
Off 48" / 1220 Deck	48" / 1220	50°
Off 56" / 1490 Deck	37" / 940	60°
Off 64" / 1630 Deck	58" / 1470	50°
Off 72" / 1830 Deck	47" / 1190	60°

PlayBooster®

122570 Cliff Climber

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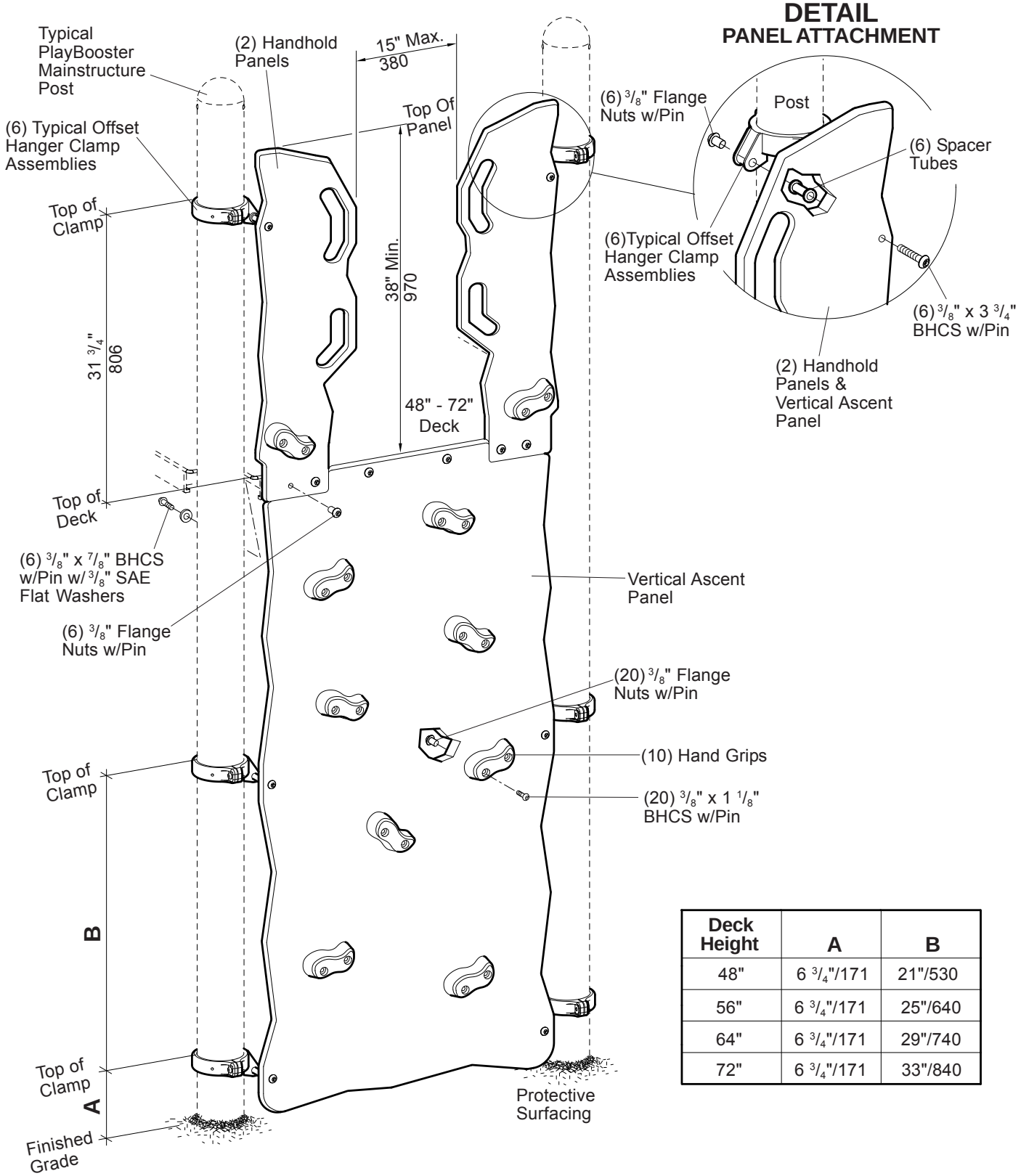
ISO 14001 CERTIFIED

ISO 9001 Certified

SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

15489700



Deck Height	A	B
48"	6 3/4"/171	21"/530
56"	6 3/4"/171	25"/640
64"	6 3/4"/171	29"/740
72"	6 3/4"/171	33"/840

PlayBooster® 145624 Vertical Ascent®, 48"-72"

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PlayBooster® 145624 Vertical Ascent®, 48"-72"

Parts List

Part#	Description	Qty.
182957	Vertical Ascent Handhold Panel, Specify Color	2
145597	Vertical Ascent Panel, 48" Deck, Specify Color	1
145596	Vertical Ascent Panel, 56" Deck, Specify Color	1
145595	Vertical Ascent Panel, 64" Deck, Specify Color	1
145585	Vertical Ascent Panel, 72" Deck, Specify Color	1
105327	5" Half Clamp, Specify Color	6
113729	Offset Hanger Clamp, Specify Color	6
113468	Spacer Tube, Specify Color	6
100610	1/4" x 5/8" Drive Rivet, AL/SST	6
145792	**Hand Grip Set**	1
143110	Hand Grip, Blue	2
143110	Hand Grip, Yellow	2
143110	Hand Grip, Red	3
143110	Hand Grip, Green	3
145616	**Vertical Ascent Hardware Package**	1
100196	3/8" x 7/8" BHCS w/Pin, SST	6
100198	3/8" x 1 1/8" BHCS w/Pin, SST	32
100351	3/8" Tee Nut, SST	12
100353	3/8" Flange Nut w/Pin, SST	32
100365	3/8" SAE Flat Washer, SST	6
124460	3/8" x 3 3/4" BHCS w/Pin, SST	6

Specifications

Hand Grip: Made from Polyester Resin. Hand Grips measure approx. 5 3/4" long x 2 1/4" wide x 1 3/4" high.

Panels: Solid color Permalene®, color specified.

Spacer Tube: Made from 6061-T6 aluminum 7/8" O.D. Finish: ProShield®, color specified.

Clamps: Cast aluminum. Finish: ProShield, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: Approx. 2 man hours

Weight:
48" Deck Height - 83 lbs.
56" Deck Height - 91 lbs.
64" Deck Height - 99 lbs.
72" Deck Height - 106 lbs.

Fall Height:
53 1/2"/1358 (48" Deck Height)
61 1/2"/1562 (56" Deck Height)
69 1/2"/1765 (64" Deck Height)
77 1/2"/1968 (72" Deck Height)

Installation Instructions

1) Attach handhold panels and vertical ascent panel to deck using 3/8" x 7/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" flange nuts w/pin, as shown.

2) Attach handhold panels and vertical ascent panel to offset hanger clamps using 3/8" x 3 3/4" BHCS w/pin, spacer tubes and 3/8" flange nuts w/pin. Refer to the Panel Attachment Detail.

3) Attach offset hanger clamps to posts at heights shown using 5" half clamps, 3/8" x 1 1/8" BHCS w/pin and 3/8" tee nuts. Refer to the Typical Offset Hanger Clamp Spec Sheet.

4) Attach hand grips to handhold panels and vertical ascent panel using 3/8" x 1 1/8" BHCS w/pin and 3/8" flange nuts w/pin, as shown.

5) Install 1/4" x 5/8" drive rivets in all 5" half clamps. Refer to the Typical Offset Hanger Clamp Spec Sheet.

6) Install protective surfacing before users are allowed to play on the structure.

Specifications are subject to change without notice.

Eco #54466 Document 18298100 replaces 15489700. Replaced handhold panels.

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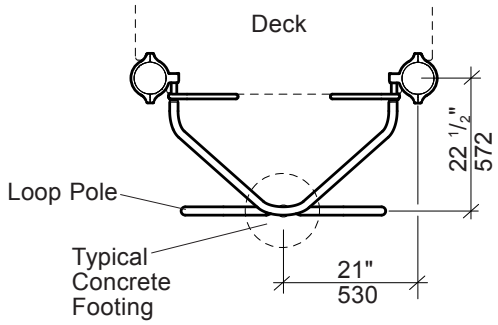
ISO 9001 Certified

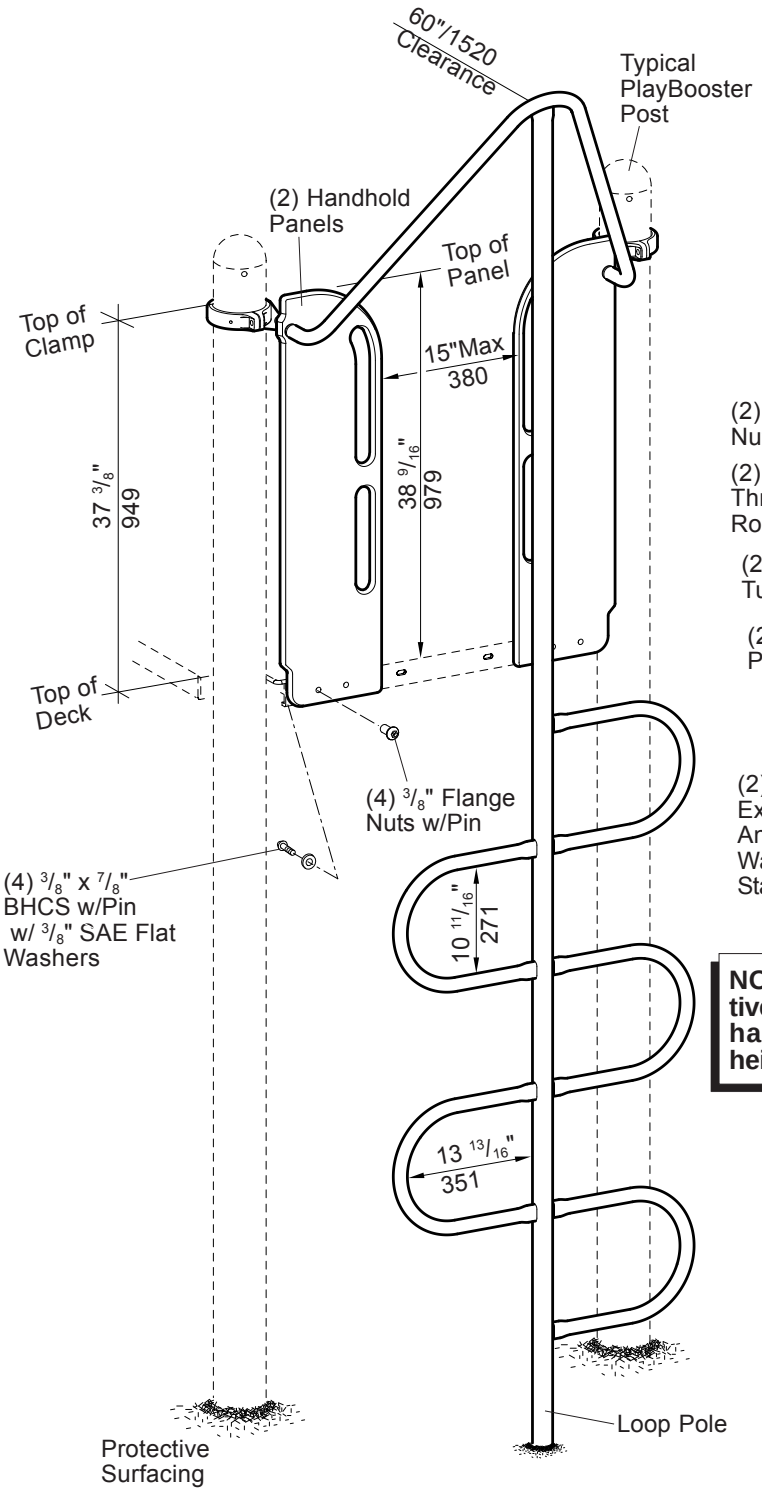
SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

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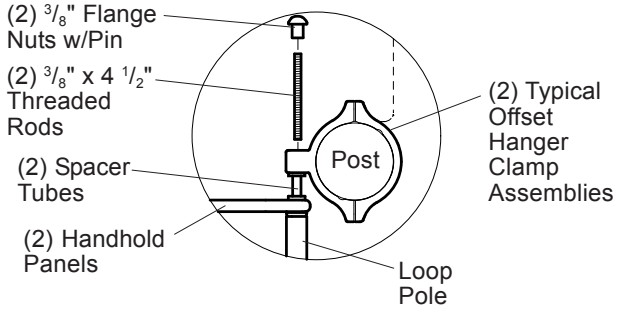
PLAN VIEW/ FOOTING LAYOUT



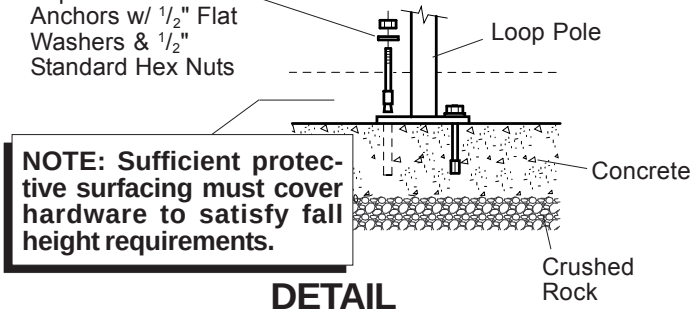


72" Deck Height Shown

DETAIL
HANDHOLD PANEL ATTACHMENT

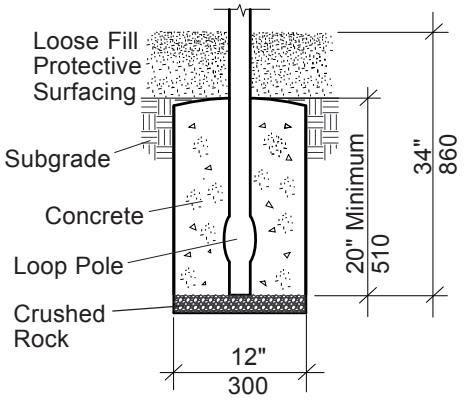


DETAIL
SURFACE MOUNT



NOTE: Sufficient protective surfacing must cover hardware to satisfy fall height requirements.

DETAIL
DIRECT BURY



PlayBooster® 148434 Loop Poles, 32"-72"

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PlayBooster® 148434 Loop Poles, 32"-72"

Parts List

Part#	Description	Qty.
147954	Handhold Panel, Specify Color	2
105327	5" Half Clamp, Specify Color	2
113729	Offset Hanger Clamp, Specify Color	2
147975	Loop Pole, 32" Deck (DB), Specify Color	1
147976	Loop Pole, 40" Deck (DB), Specify Color	1
147977	Loop Pole, 48" Deck (DB), Specify Color	1
147978	Loop Pole, 56" Deck (DB), Specify Color	1
147979	Loop Pole, 64" Deck (DB), Specify Color	1
147980	Loop Pole, 72" Deck (DB), Specify Color	1
147981	Loop Pole, 32" Deck (SM), Specify Color	1
147982	Loop Pole, 40" Deck (SM), Specify Color	1
147983	Loop Pole, 48" Deck (SM), Specify Color	1
147984	Loop Pole, 56" Deck (SM), Specify Color	1
147985	Loop Pole, 64" Deck (SM), Specify Color	1
147986	Loop Pole, 72" Deck (SM), Specify Color	1
113468	7/8" O.D. x 1 11/16" Spacer Tube, Specify Color	2
100610	1/4" x 5/8" Drive Rivet, AL/SST	2
148176	**Pole Hardware Package**	1
100196	3/8" x 7/8" BHCS w/Pin, SST	4
100198	3/8" x 1 1/8" BHCS w/Pin, SST	4
100351	3/8" Tee Nut, SST	4
100353	3/8" Flange Nut w/Pin, SST	6
100365	3/8" SAE Flat Washer, SST	4
148081	3/8" x 4 1/2" Threaded Rod, SST	2
111392	**2-Hole (SM) Hardware Package**	1
100266	1/2" x 2 3/4" Expansion Anchors	2
100322	1/2" Standard Hex Nut, SST	2
100363	1/2" Flat Washer, SST	2

DB = Direct Bury
SM = Surface Mount

Specifications

Loop Pole: Weldment comprised of 1.900" O.D. RS-20 (.090" - .100") galvanized steel tubing, and 1.315" O.D. RS-20 (.080" - .090") galvanized steel tubing. Finish: ProShield®, color specified.

Handhold Panel: Solid color Permalene®, color specified.

Spacer Tube: Made from 6061-T6 aluminum 7/8" O.D. x 1 11/16". Finish: ProShield, color specified.

Clamps: Cast aluminum. Finish: ProShield, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: **SM** - Approx. 1 1/2 man hours
DB - Approx. 2 man hours

Concrete Req.: Approx. 1.3 cu. ft.

Weight: 65 lbs. (32"-48" Deck)
76 lbs. (56"-72" Deck)

Fall Height: Deck Height

Specifications are subject to change without notice.

Installation Instructions

1) **(Direct Bury)** Dig footing hole as shown. Refer to the Plan View/ Footing Layout.

2) Attach offset hanger clamps to posts at heights shown using 5" half clamps, 3/8" x 1 1/8" BHCS w/pin and 3/8" tee nuts. Refer to the Typical Offset Hanger Clamp Spec Sheet.

3) Attach handhold panels to the face of the deck using 3/8" x 7/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" flange nuts w/pin.

4) Attach loop pole to handhold panels and offset hanger clamps using 3/8" flange nuts w/pin, 3/8" x 4 1/2" threaded rods and spacer tubes. Refer to the Handhold Panel Attachment Detail. **NOTE:** *Turn 3/8" x 4 1/2" threaded rod into 3/8" flange nut w/pin until it bottoms out, before attaching loop pole.*

5) **(Direct Bury)** With loop pole plumb, pour concrete footing. Allow concrete footing to cure a minimum of 72 hours before users are allowed to play on the structure.

   (Surface Mount) Drill 1/2" x 3" deep holes through support plate using hammer drill and 1/2" masonry bit. Tap expansion anchors into drilled holes. Fasten support plates to expansion anchors using 1/2" standard hex nuts with 1/2" flat washers.

6) Install protective surfacing before users are allowed to play on the structure.

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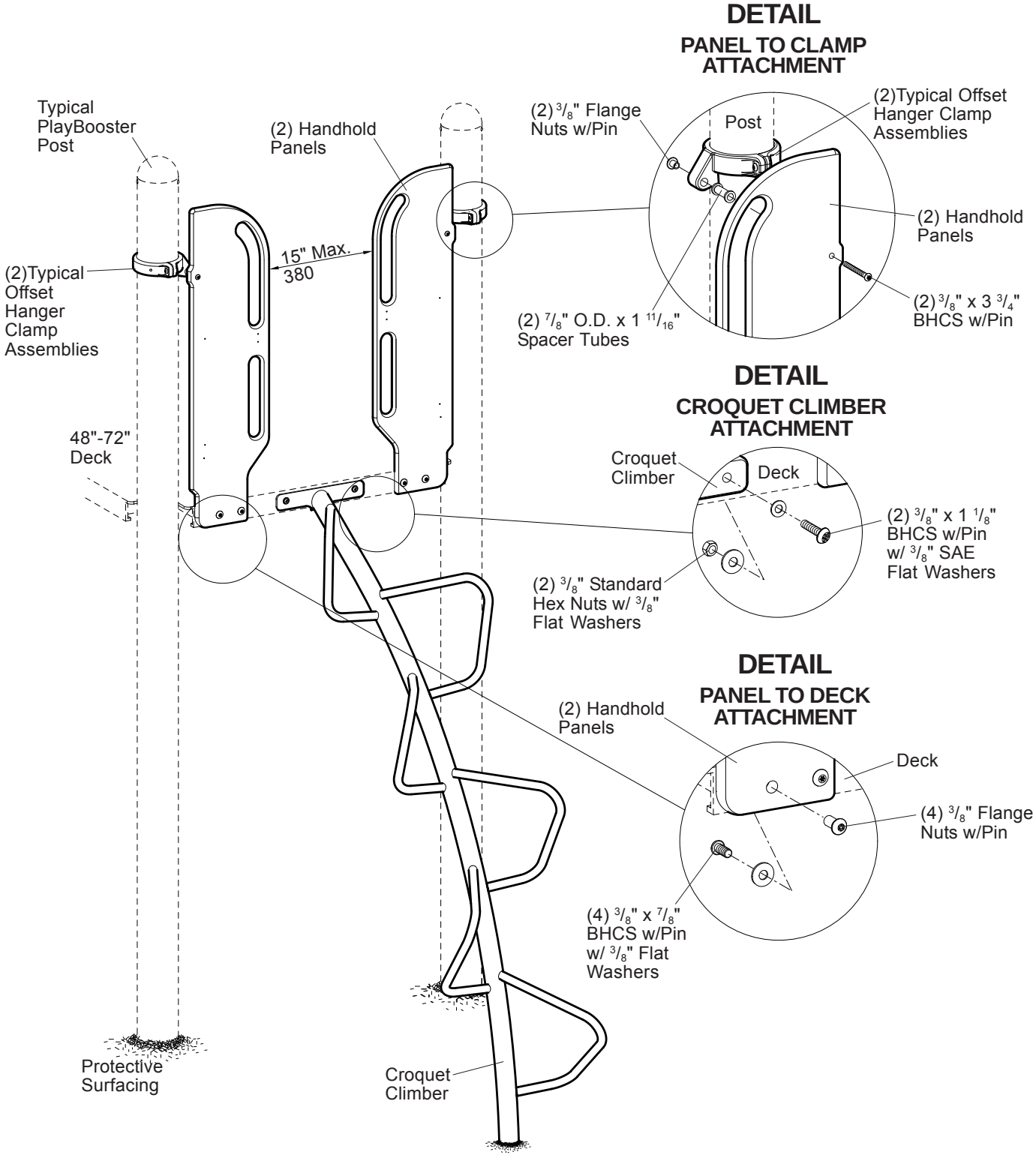
ISO 14001 CERTIFIED

ISO 9001 Certified

SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

17608200



PlayBooster® 176077 Croquet Climber, 48"-72" Deck

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Document #17608200

PlayBooster® 176077 Croquet Climber, 48"-72" Deck

Parts List

Part#	Description	Qty.
100610	1/4" x 5/8" Drive Rivet, AL/SST	2
105327	5" Half Clamp, Specify Color	2
113468	7/8" O.D. x 1 11/16" Spacer Tube, Specify Color	2
113729	5" Offset Hanger Clamp, Specify Color	2
139563	Handhold Panel, Specify Color	2
176202	48"-56" Croquet Climber, DB, Specify Color	1
175792	64"-72" Croquet Climber, DB, Specify Color	1
176111	48" Croquet Climber, SM, Specify Color	1
176112	56" Croquet Climber, SM, Specify Color	1
176113	64" Croquet Climber, SM, Specify Color	1
176114	72" Croquet Climber, SM, Specify Color	1
176385	**Croquet Climber Hardware Package**	1
100196	3/8" x 7/8" BHCS w/Pin, SST	4
100198	3/8" x 1 1/8" BHCS w/Pin, SST	6
100327	3/8" Standard Hex Nut, SST	2
100351	3/8" Tee Nut, SST	4
100353	3/8" Flange Nut w/Pin, SST	6
100362	3/8" Flat Washers, SST	6
100365	3/8" SAE Flat Washers, SST	2
124460	3/8" x 3 3/4" BHCS w/Pin, SST	2
111392	**2-Hole (SM) Hardware Package**	1
100266	1/2" x 2 3/4" Expansion Anchors	2
100322	1/2" Standard Hex Nut, SST	2
100363	1/2" Flat Washer, SST	2

DB = Direct Bury
SM = Surface Mount

Specifications

Croquet Climber: Weldment comprised of 2.375" O.D. RS20 (.095"-.105" wall) galvanized steel tube, 1.029" O.D. RS20 (.070"-.080" wall) galvanized steel tube, and 1/4" HRPO steel sheet. Finish: ProShield®, color specified.

Handhold Panel: Permalene®, color specified.

Spacer Tube: Made from 6061-T6 aluminum 7/8" O.D. x 1 11/16". Finish: ProShield, color specified.

Clamps: Cast aluminum. Finish: ProShield, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: **SM** - Approx. 1 1/2 man hours
DB - Approx. 2 man hours

Concrete: **DB** - Approx. 1.31 cu. ft.

Weight: **DB** 65 lbs. (48"-56")
DB 68 lbs. (64"-72")
SM 57 lbs. (48")
SM 58 lbs. (56")
SM 63 lbs. (64")
SM 64 lbs. (72")

Fall Height: Deck Height

Specifications are subject to change without notice.

Installation Instructions

1) **(Direct Bury)** Dig footing hole spaced as shown.

2) Attach the handhold panels to the face of the deck, using 3/8" x 7/8" BHCS w/pin with 3/8" flat washers and 3/8" flange nuts w/pin.

3) Attach handhold panels to the offset hanger clamps, using 3/8" x 3 3/4" BHCS w/pin, 7/8" O.D. x 1 11/16" spacer tubes and 3/8" flange nuts w/pin. Refer to the Panel Attachment Detail.

4) Attach offset hanger clamps to posts, using 5" half clamps, 3/8" x 1 1/8" BHCS w/pin and 3/8" tee nuts. Refer to the Typical Offset Hanger Clamp Spec Sheet.

5) Attach Croquet climber to deck, using 3/8" x 1 1/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" standard hex nuts with 3/8" flat washers.

6) Install 1/4" x 5/8" drive rivets in all 5" half clamps. Drill through hole in 5" half clamp and into 5" post with a 1/4" or "F" (only) drill bit, insert drive rivet into hole through clamp and into post. Hammer drive rivet pin in until flush with head. Refer to the Typical Offset Hanger Clamp Spec Sheet.

7) **(Direct Bury)** With Croquet climber plumb, pour concrete footing. Allow concrete footing to cure for a minimum of 72 hours before users are allowed to play on the structure.

   (Surface Mount) With Croquet climber plumb, drill 1/2" x 3" deep holes through mounting plates using hammer drill and 1/2" masonry bit. Tap expansion anchors into drilled holes. Fasten mounting plates to expansion anchors, using 1/2" standard hex nuts with 1/2" flat washers.

8) Install protective surfacing before users are allowed to play on the component.

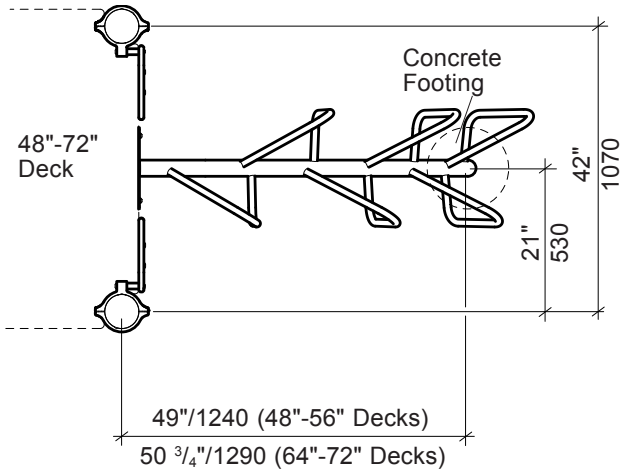
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SAFETY NOTE

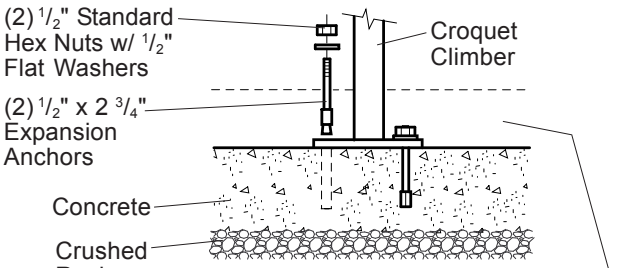
Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

176082A

PLAN VIEW/FOOTING LAYOUT

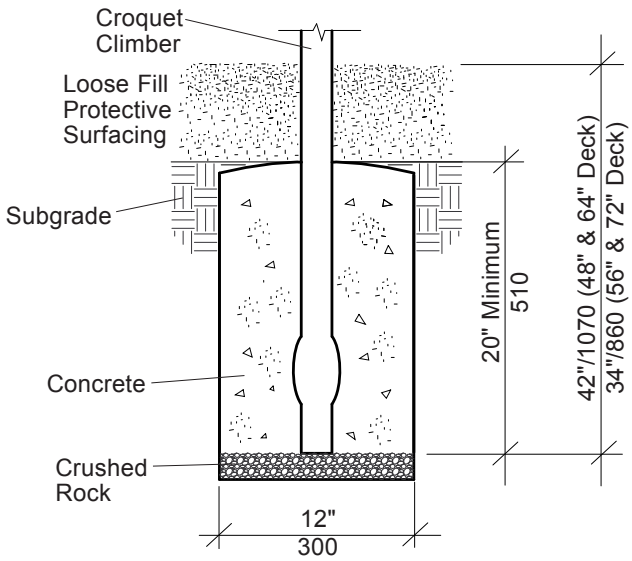


DETAIL
SURFACE MOUNT



NOTE: Sufficient protective surfacing must cover hardware to satisfy fall height requirements.

DETAIL
DIRECT BURY



PlayBooster® **176077 Croquet Climber, 48"-72" Deck**

601 7TH STREET SOUTH, DELANO, MINNESOTA 55328-8605 888-574-4678 LSI Install Help 888-438-6574 LSI Direct 763-972-5200 Int. FAX (763) 972-3185

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Document #17608200

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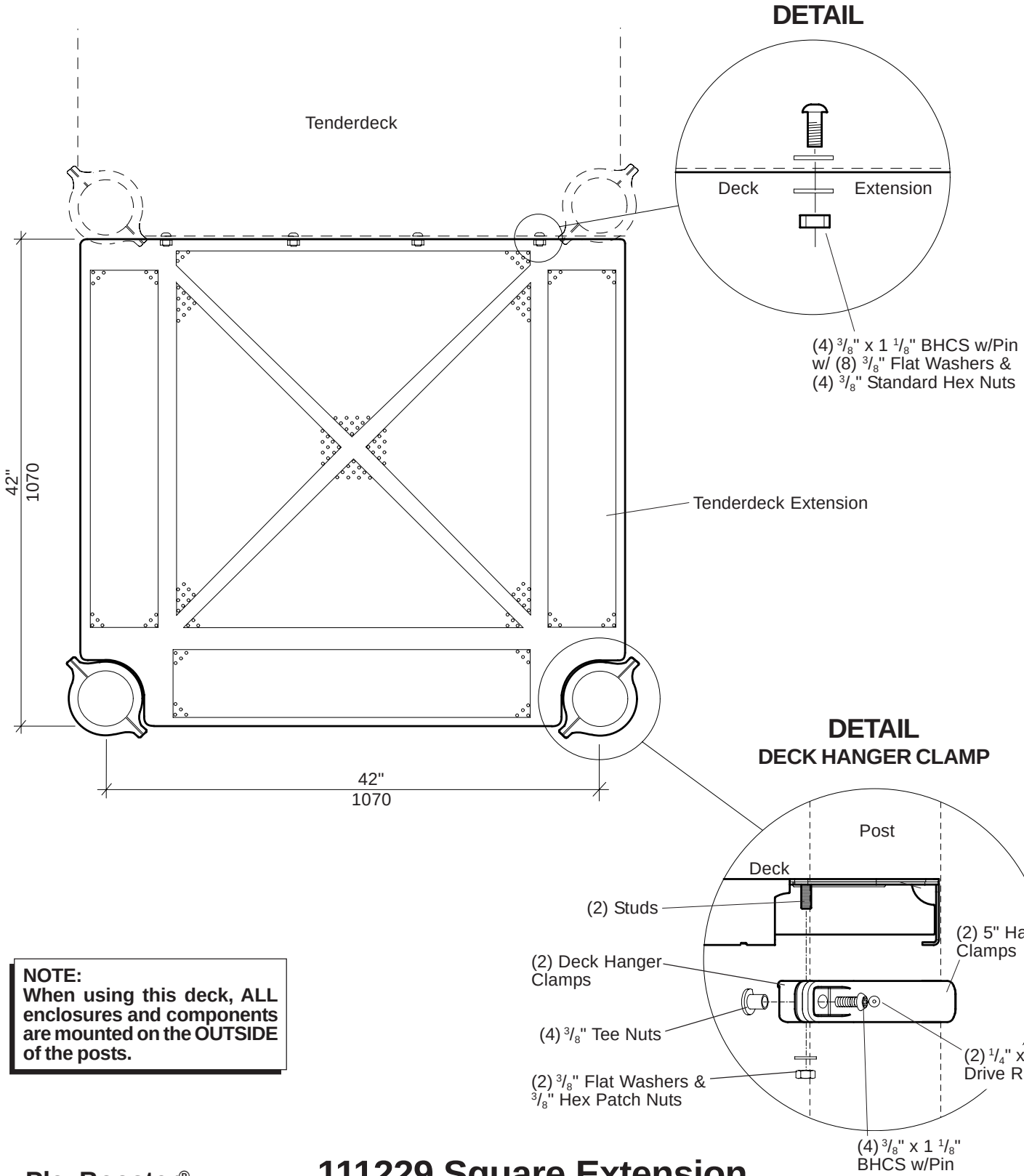
ISO 14001 CERTIFIED

ISO 9001 Certified

SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

14582200



NOTE:
When using this deck, ALL enclosures and components are mounted on the OUTSIDE of the posts.

PlayBooster®

111229 Square Extension

601 7TH STREET SOUTH, DELANO, MINNESOTA 55328-8605 888-574-4678 LSI Install Help 888-438-6574 LSI Direct 763-972-5200 Int. FAX (763) 972-3185

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PlayBooster® 111229 Square Extension

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Parts List

Part#	Description	Qty.
145661-00	Square Deck Extension, Specify Color	1
105327-01	5" Half Clamp, Specify Color	2
106022-00	5" Deck Hanger Clamp, Specify Color	2
106556-00	**Hardware Package**	1
100198-00	$^3/_8$" x 1 $^1/_8$" BHCS w/Pin, SST	8
100327-00	$^3/_8$" Standard Hex Nut, SST	4
100351-00	$^3/_8$" Tee Nut, SST	4
100362-00	$^3/_8$" Flat Washer, SST	10
100610-00	$^1/_4$" x $^5/_8$" Drive Rivet, AL/SST	2
100321-00	$^3/_8$" Hex Patch Nut, SST	2

Specifications

Square Deck Extension: Flange formed from 12 GA (.105") sheet steel conforming to ASTM A1011. Standing surface is perforated with $^5/_{16}$" diameter holes. Deck face has (4) slotted holes for face mounting components. The finished size measures 2 $^5/_8$" x 42" x 47". Finish: TenderTuff™, color specified.

Deck Hanger Clamp Assembly: Cast aluminum. Finish: ProShield®, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: Approx. 1 man hour

Weight: 106 lbs.

Installation Instructions

1) Mark posts for the appropriate height of the deck you are installing.
2) Fasten hanger clamps to marked position on posts. See Detail on front of sheet.
3) Lift deck into position, lining up studs underneath deck with deck hanger clamp as shown. Attach with $^3/_8$" flat washers and $^3/_8$" hex patch nuts.
4) Attach extension to tenderdeck using $^3/_8$" x 1 $^1/_8$" BHCS w/pin with $^3/_8$" flat washers and $^3/_8$" standard hex nuts.
5) Level deck and plumb posts. Install the $^1/_4$" x $^5/_8$" drive rivets in all 5" half clamps. Refer to the Typical Offset Hanger Clamp Spec Sheet.
6) After all enclosures/components are installed, pour concrete footings per the Typical Concrete Footing Spec Sheet.
7) Install protective surfacing before users are allowed to play on the structure.

Specifications are subject to change without notice.

Eco #52264 Document #14582200 replaces #13972000. Replaced deck extension.

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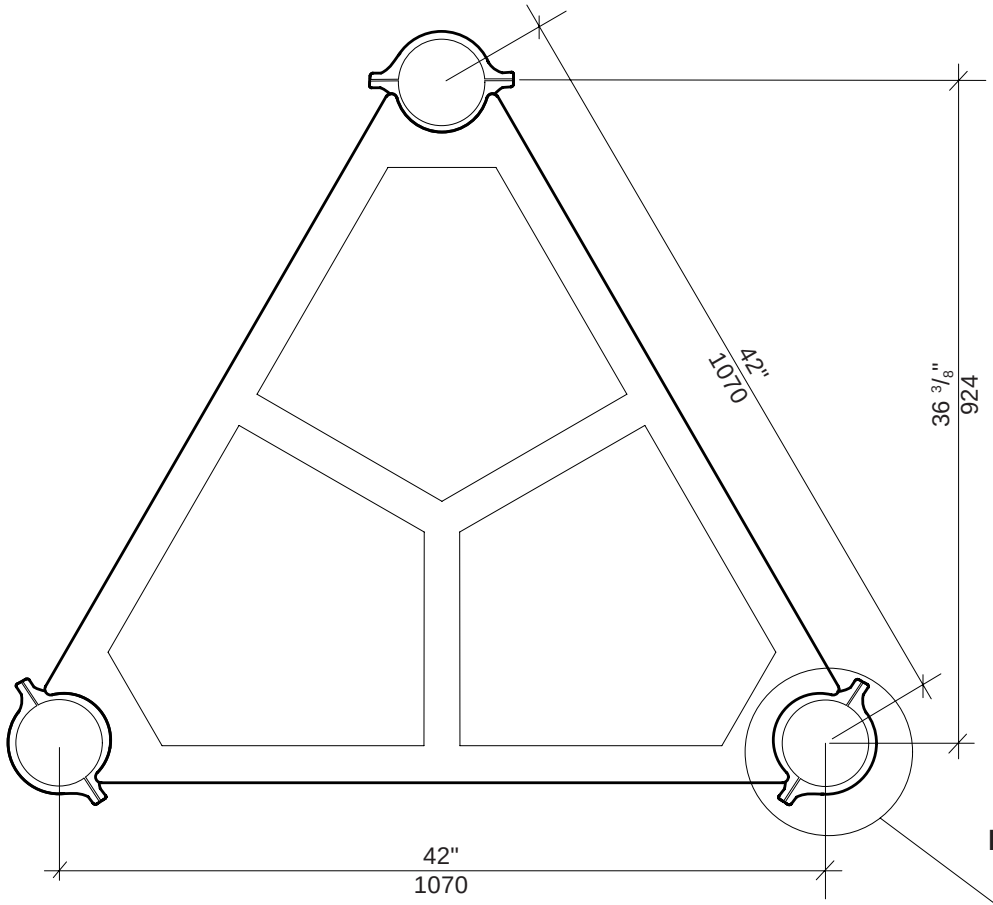
ISO 14001 CERTIFIED

ISO 9001 Certified

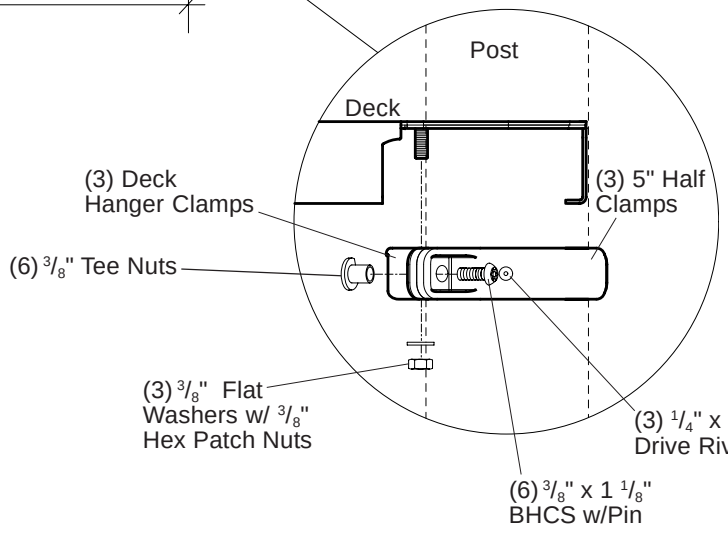
SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

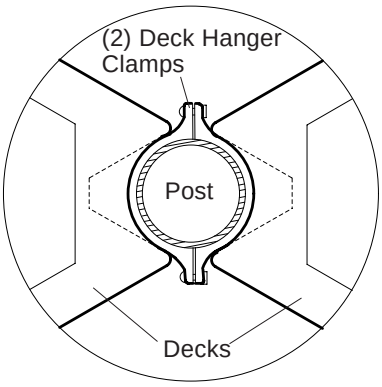
14582400



DETAIL
DECK HANGER CLAMP



DETAIL



Configuration for Back to Back Decks at Same Height.

PlayBooster®

111231 Triangular Tenderdeck

601 7TH STREET SOUTH, DELANO, MINNESOTA 55328-8605 888-574-4678 LSI Install Help 888-438-6574 LSI Direct 763-972-5200 Int. FAX (763) 972-3185

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PlayBooster® 111231 Triangular Tenderdeck

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Parts List

Part#	Description	Qty.
145657-00	Tri-Deck, Specify Color	1
105327-01	5" Half Clamp, Specify Color	3
106022-00	Deck Hanger Clamp, Specify Color	3
120203-00	**Triangular Deck Hardware Package**	1
100198-00	$^3/_8$" x 1 $^1/_8$" BHCS w/Pin, SST	6
100321-00	$^3/_8$" Hex Patch Nut, SST	3
100351-00	$^3/_8$" Tee Nut, SST	6
100362-00	$^3/_8$" Flat Washer, SST	3
100610-00	$^1/_4$" x $^5/_8$" Drive Rivet, AL/SST	3

Specifications

Triangular Deck: Flange formed from 12 GA (.105") sheet steel conforming to ASTM A1011. Standing surface is perforated with $^5/_{16}$" diameter holes. Deck face has (4) slotted holes for face mounting components. The finished size measures 2 $^5/_8$" x 37 $^3/_4$". Finish: TenderTuff™, color specified.

Deck Hanger Clamp Assembly: Cast aluminum. Finish: ProShield®, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: Approx. $^1/_2$ man hour

Weight: 61 lbs.

Installation Instructions

1) Mark posts for the appropriate height of the deck you are installing.
2) Fasten deck hanger clamps to marked position on posts. See Detail on the front of this sheet.
3) Lift deck assembly into position, lining up stud underneath deck with deck hanger clamp as shown. Attach using $^3/_8$" hex patch nuts with $^3/_8$" flat washers. With deck level and posts plumb, final tighten all hardware.
4) Install $^1/_4$" x $^5/_8$" drive rivets in all 5" half clamps. Refer to the Typical Offset Hanger Clamp Spec Sheet.
5) After attachment of enclosures and components is complete, pour concrete footings. Allow concrete footings to cure a minimum of 72 hours before users are allowed to play on the structure.
6) Install protective surfacing before users are allowed to play on the structure.

Specifications are subject to change without notice.

Eco #52268 Document #14582400 replaces #13954200. Replaced Tri-Deck.

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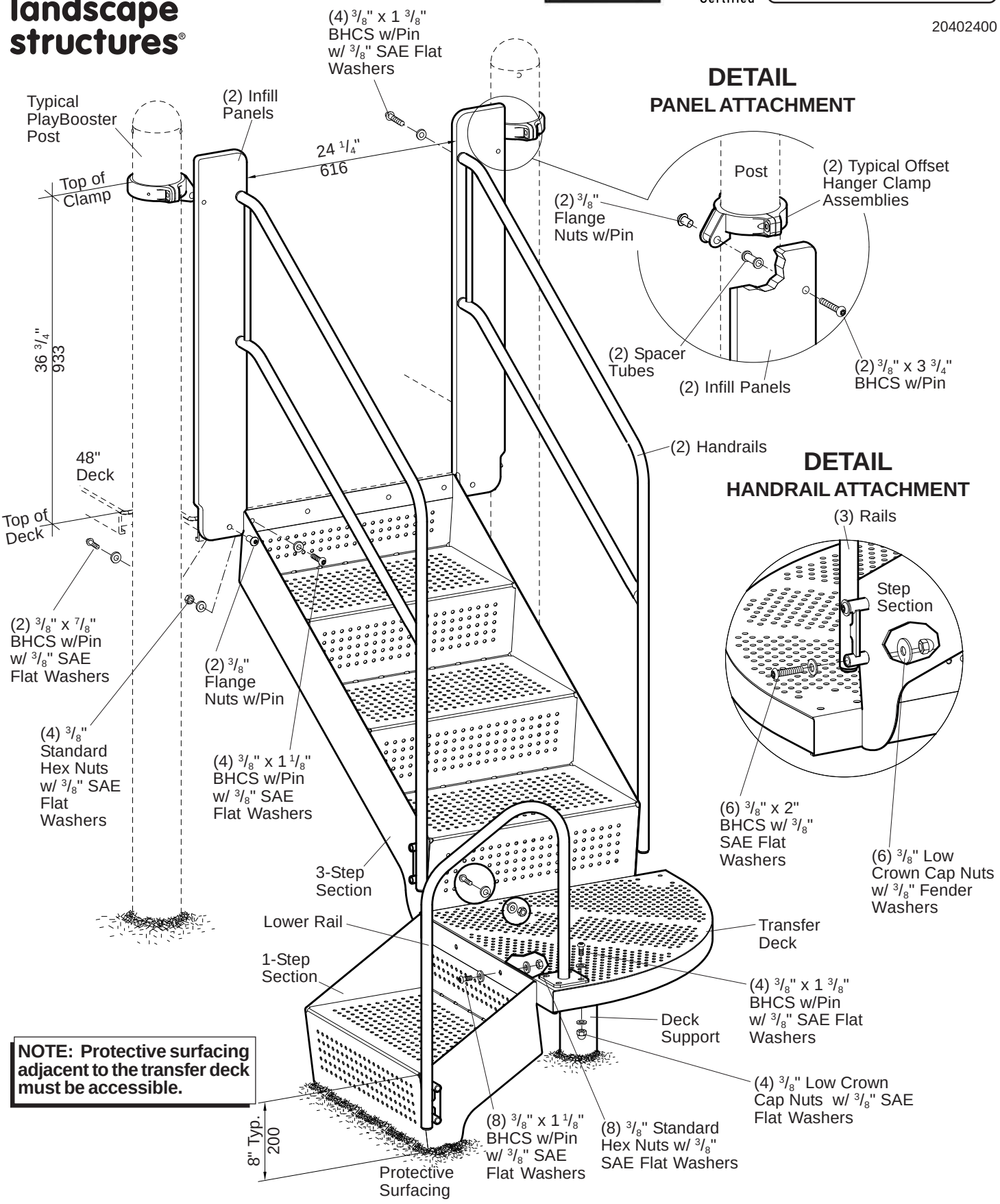
ISO 14001 CERTIFIED

ISO 9001 Certified

SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

20402400



DETAIL
PANEL ATTACHMENT

DETAIL
HANDRAIL ATTACHMENT

NOTE: Protective surfacing adjacent to the transfer deck must be accessible.

PlayBooster® 152911 Transfer Module, 48", w/Handrails

601 7TH STREET SOUTH, DELANO, MINNESOTA 55328-8605 888-574-4678 LSI Install Help 888-438-6574 LSI Direct 763-972-5200 Int. FAX (763) 972-3185

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PlayBooster® 152911 Transfer Module, 48", w/Handrails

Parts List

Part#	Description	Qty.
100610-00	1/4" x 5/8" Drive Rivet, AL/SST	2
105327-01	5" Half Clamp, Specify Color	2
113468-00	7/8" O.D. x 1 11/16" Spacer Tube, Specify Color	2
113729-00	Offset Hanger Clamp, Specify Color	2
181371-00	Deck Support (DB), Specify Color	1
181373-00	Deck Support (SM), Specify Color	1
181374-00	Step Support (DB), Specify Color	1
181376-00	Step Support (SM), Specify Color	1
144696-00	1-Step Section, Specify Color	1
144700-00	3-Step Section, Specify Color	1
152640-00	3-Step Handrail, Specify Color	2
152641-00	Lower Rail, Specify Color	1
153398-00	Transfer Deck, Specify Color	1
153399-00	Infill Panel, Specify Color	2
204034-00	**Transfer Module Hardware Package**	1
100173-00	3/8" x 2" BHCS, SST	6
100196-00	3/8" x 7/8" BHCS w/Pin, SST	4
100198-00	3/8" x 1 1/8" BHCS w/Pin, SST	20
100327-00	3/8" Standard Hex Nut, SST	16
100351-00	3/8" Tee Nut, SST	4
100353-00	3/8" Flange Nut w/Pin, SST	4
100365-00	3/8" SAE Flat Washer, SST	54
113027-00	3/8" x 1 3/8" BHCS w/Pin, SST	8
124460-00	3/8" x 3 3/4" BHCS w/Pin, SST	2
100378-00	3/8" Fender Washer, SST	6
100349-00	3/8" Low Crown Cap Nut, SST	12
111393-00	**4-Hole (SM) Hardware Package**	1
100263-00	3/8" x 2 3/4" Expansion Anchors	4
100327-00	3/8" Standard Hex Nut, SST	4
100365-00	3/8" SAE Flat Washers, SST	4
121256-00	**2-Hole (SM) Hardware Package**	1
100263-00	3/8" x 2 3/4" Expansion Anchors	2
100327-00	3/8" Standard Hex Nut, SST	2
100365-00	3/8" SAE Flat Washers, SST	2

DB = Direct Bury
SM = Surface Mount

Specifications

Deck: Flange formed from 12 GA (.105") sheet steel conforming to ASTM A1011. Standing surface is perforated with 5/16" diameter holes and measures 29" per (2) sides. Finish: TenderTuff™, color specified.

Railings: Weldment comprised of formed 1 1/8" O.D. x 11 GA (.120") steel tubing with 203 or 303 stainless steel inserts with 3/8" internal threads. Finish: TenderTuff, color specified.

Step Sections: Formed from 12 GA (.105") sheet steel conforming to ASTM A1011. Standing surface is 24 3/8" wide x 14" deep and is perforated with 5/16" diameter holes. Finish: TenderTuff, color specified.

Spacer Tube: Made from 6061-T6 aluminum 7/8" O.D. x 1 11/16". Finish: ProShield®, color specified.

Panel: Solid color Permalene® panel, color specified.

Deck Support: Weldment comprised of 3 1/2" O.D. RS20 (.125") galvanized steel tubing and 3/8" O.D. x 5" long rod. Finish: ProShield, color specified.

Step Support: Weldment comprised of 1.660 O.D. RS20 (.080"-.095) and 1 3/4" x 1 3/4" x 1/8" HR angle. Finish: ProShield, color specified.

Clamps: Cast aluminum. Finish: ProShield, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: **SM** - Approx. 3 man hours
DB - Approx. 4 man hours
Concrete Req.: Approx. 3.4 cu. ft.
Weight: **SM** - 264 lbs.
DB - 279 lbs.
Fall Height: Deck Height

Installation Instructions

1) **(Direct Bury)** Dig footings as shown. Refer to your Plan View/Footing Layout.

2) Attach the deck support to the transfer deck using 3/8" x 7/8" BHCS w/pin and 3/8" low crown cap nuts with 3/8" SAE flat washers. **NOTE:** *Make sure 3/8" rod on support is under support strap on deck as shown.* Refer to the Deck Support Attachment Detail.

3) Attach the 3-step section to the transfer deck using 3/8" x 1 1/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" standard hex nuts with 3/8" SAE flat washers.

4) Attach the 3-step section to the face of the mainstructure deck using 3/8" x 1 1/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" standard hex nuts with 3/8" SAE flat washers.

5) Attach the step support to the 1 step section using 3/8" x 1 1/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" standard hex nuts with 3/8" SAE flat washers. Refer to the Step Support Attachment Detail.

6) Attach the 1-step section to the transfer deck using 3/8" x 1 1/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" standard hex nuts with 3/8" SAE flat washers.

7) Attach offset hanger clamps to posts at heights shown using 5" half clamps, 3/8" x 1 1/8" BHCS w/pin and 3/8" tee nuts. Refer to the Typical Offset Hanger Clamp Spec Sheet.

8) Attach infill panels to the face of the mainstructure deck using 3/8" x 7/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" flange nuts w/pin.

9) Attach infill panels to offset hanger clamp assemblies using 3/8" x 3 3/4" BHCS, spacer tubes and 3/8" flange nuts w/pin. See Panel Attachment Detail.

10) Attach the handrails to the 3-step section using 3/8" x 2" BHCS with 3/8" SAE flat washers and 3/8" low crown cap nuts with 3/8" fender washers. Refer to the Handrail Attachment Detail.

11) Attach the handrails to the infill panels using 3/8" x 1 3/8" BHCS w/pin and 3/8" SAE flat washers.

12) Attach the lower rail to the transfer deck using 3/8" x 1 3/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" low crown cap nuts with 3/8" SAE flat washers.

13) Attach the lower rail to the 1-step section using 3/8" x 2" BHCS with 3/8" SAE flat washers and 3/8" low crown cap nuts with 3/8" fender washers. Refer to the Handrail Attachment Detail.

14) **(Direct Bury)** With transfer deck and steps level and supports plumb, pour concrete footings. Allow concrete footings to cure a minimum of 72 hours before users are allowed to play on the structure.

(Surface Mount) Mark holes for expansion anchors on concrete slab through support plates. Detach the module from the mainstructure and slide module aside, drill 3/8" x 3" deep holes on marks using hammer drill and 3/8" masonry bit. Reposition module over drilled holes and tap expansion anchors into drilled holes. Fasten support plates to expansion anchors using 3/8" standard hex nuts with 3/8" SAE flat washers. Reattach module to structure.

15) Install 1/4" x 5/8" drive rivets in all 5" half clamps. Refer to the Typical Offset Hanger Clamp Spec Sheet.

16) Install protective surfacing before users are allowed to play on the structure.

Specifications are subject to change without notice.

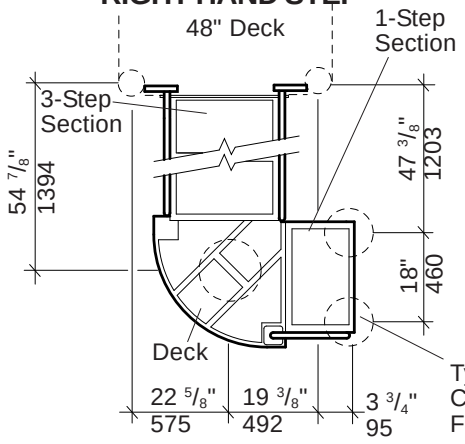
Eco 0100178 Document 20402400 replaces 18137900. Replaced hardware package.

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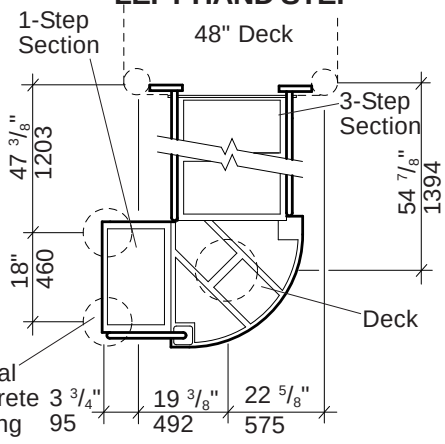
SAFETY NOTE
Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

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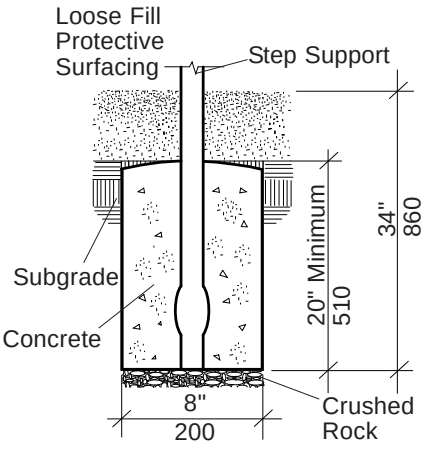
PLAN VIEW FOOTING LAYOUT
RIGHT HAND STEP



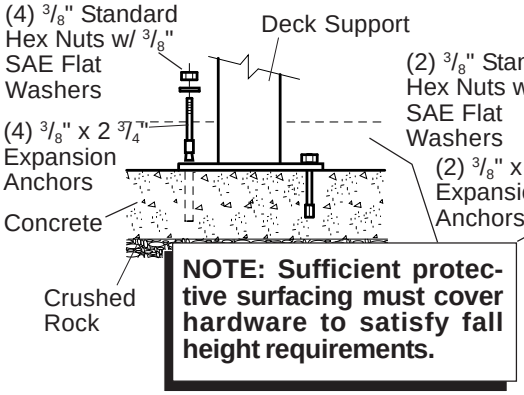
PLAN VIEW FOOTING LAYOUT
LEFT HAND STEP



DETAIL
STEP SUPPORT BURY

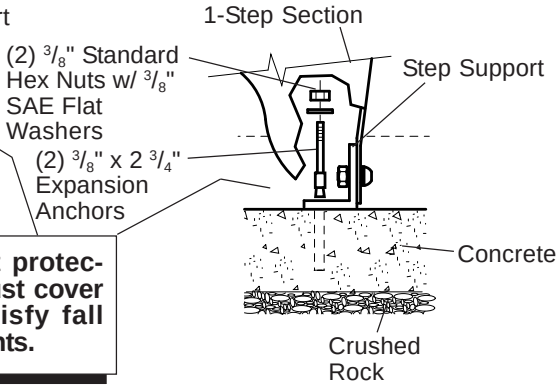


DETAIL
SURFACE MOUNT DECK SUPPORT

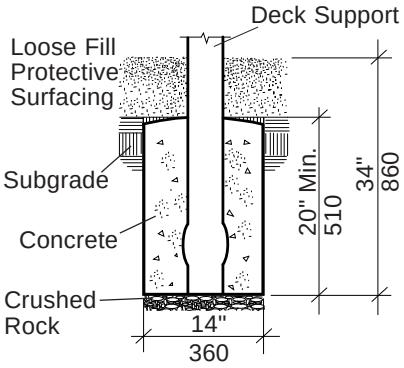


NOTE: Sufficient protective surfacing must cover hardware to satisfy fall height requirements.

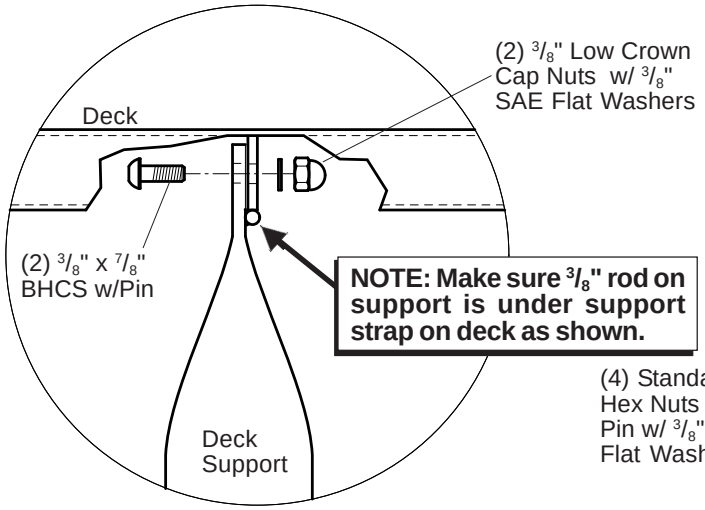
DETAIL
SURFACE MOUNT STEP SUPPORT



DETAIL
DECK SUPPORT BURY

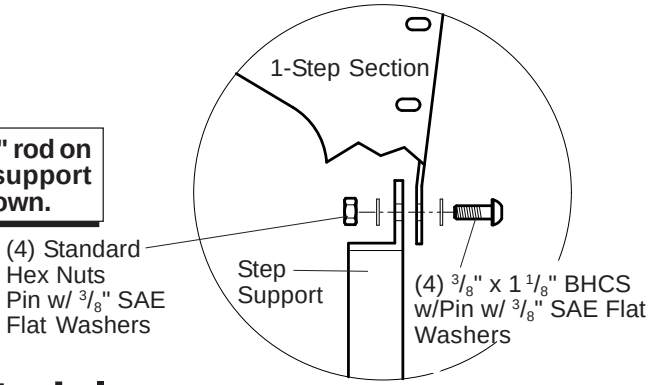


DETAIL
DECK SUPPORT ATTACHMENT



NOTE: Make sure 3/8" rod on support is under support strap on deck as shown.

DETAIL
STEP SUPPORT ATTACHMENT



PlayBooster® 152911 Transfer Module, 48", w/Handrails

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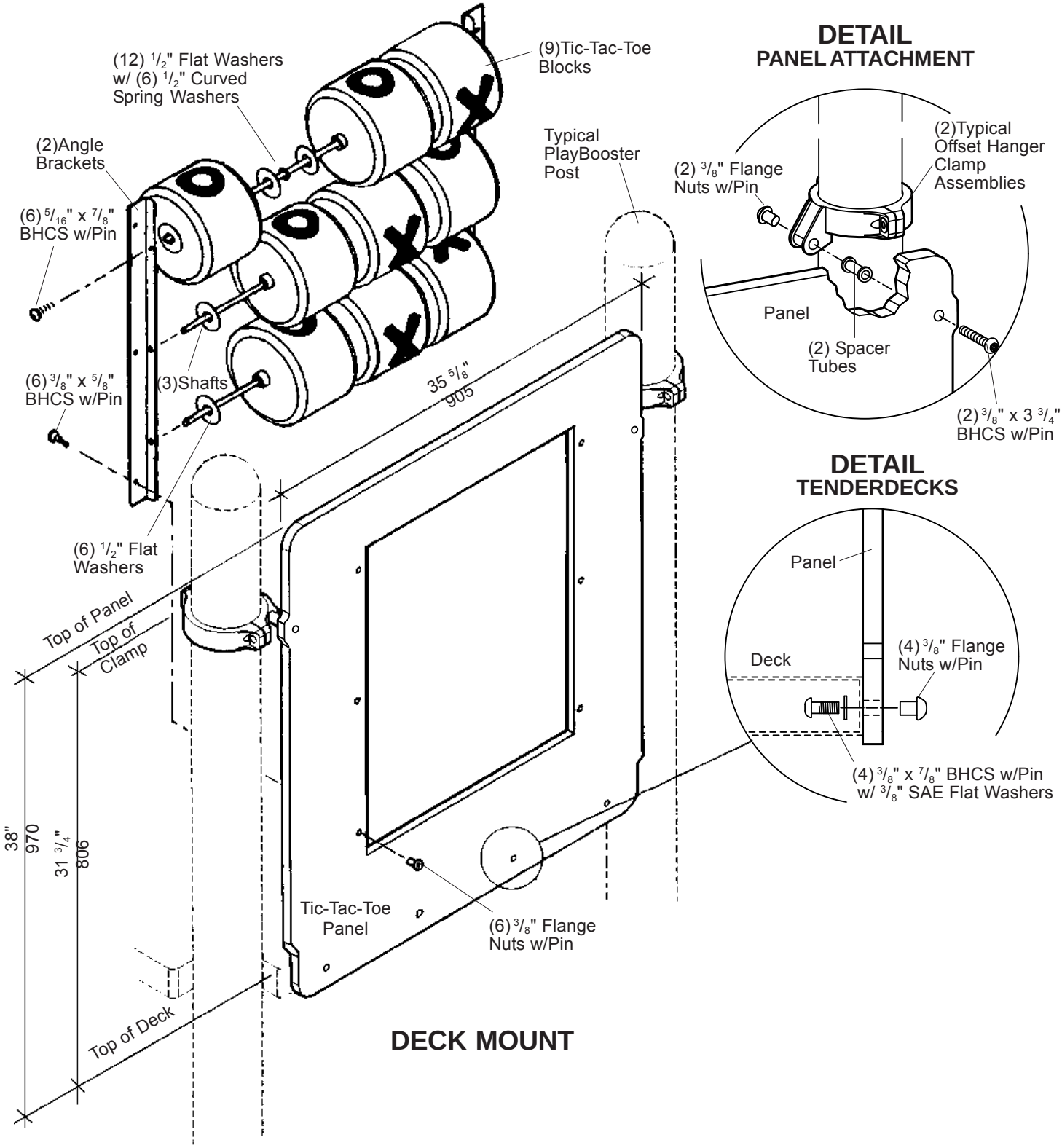
ISO 14001 CERTIFIED

ISO 9001 Certified

SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

14040200



DECK MOUNT

PlayBooster®

115231 Tic-Tac-Toe Panel

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Document #15475400

PlayBooster® 115231 Tic-Tac-Toe Panel

Parts List

Part#	Description	Qty.
	ABOVE DECK	
105327	5" Half Clamp, Specify Color	2
113729	Offset Hanger Clamp, Specify Color	2
113468	Spacer Tube, Specify Color	2
104715	Tic-Tac-Toe Bracket, Specify Color	2
106174	Shaft, SST	3
130642	Tic-Tac-Toe Block, Tan	9
113434	Tic-Tac-Toe Panel, Specify Color	1
134725	**Tic-Tac-Toe Hardware Package**	1
132626	5/16" x 7/8" BHCS w/Pin, SST	6
100195	3/8" x 5/8" BHCS w/Pin, SST	6
100353	3/8" Flange Nut w/Pin, SST	6
100363	1/2" Flat Washer, SST	18
100380	1/2" Curved Spring Washer	6
124900	**Tenderdeck Mounting Hardware Package**	1
124460	3/8" x 3 3/4" BHCS w/Pin, SST	2
100196	3/8" x 7/8" BHCS w/Pin, SST	4
100198	3/8" x 1 1/8" BHCS w/Pin, SST	4
100351	3/8" Tee Nut, SST	4
100353	3/8" Flange Nut w/Pin, SST	6
100365	3/8" SAE Flat Washer, SST	4
	BELOW DECK	
105327	5" Half Clamp, Specify Color	4
113729	Offset Hanger Clamp, Specify Color	4
113468	Spacer Tube, Specify Color	2
113464	Angled Panel Bracket, Specify Color	1
104715	Tic-Tac-Toe Bracket, Specify Color	2
106174	Shaft, SST	3
130642	Tic-Tac-Toe Block, Tan	9
113434	Tic-Tac-Toe Panel, Specify Color	1
100610	1/4" x 5/8" Drive Rivet, AL/SST	4
134725	**Tic-Tac-Toe Hardware Package**	1
132626	5/16" x 7/8" BHCS w/Pin, SST	6
100195	3/8" x 5/8" BHCS w/Pin, SST	6
100353	3/8" Flange Nut w/Pin, SST	6
100363	1/2" Flat Washer, SST	18
100380	1/2" Curved Spring Washer	6
124947	**Below Deck Mounting Hardware Package**	1
124460	3/8" x 3 3/4" BHCS w/Pin, SST	2
100195	3/8" x 5/8" BHCS w/Pin, SST	4
100198	3/8" x 1 1/8" BHCS w/Pin, SST	8
100203	5/8" x 2 1/4" BHCS w/Pin, SST	2
100351	3/8" Tee Nut, SST	8
100353	3/8" Flange Nut w/Pin, SST	6

Specifications

Permalene® Panel: Solid color panel measures 35 5/8" wide x 41" high, color specified.

Tic-Tac-Toe Blocks: Rotationally molded from U.V. stabilized linear low density polyethylene, tan in color with brown molded-in symbols.

Tic-Tac-Toe Brkt: Formed from .125" thick 5052 aluminum. Finish: ProShield®, color specified.

Shafts: Fabricated from 1/2" diameter stainless steel with ends tapped 5/16" 18UNC-2B.

Angled Panel Brkt: Weldment comprised of .190" thick 5052 aluminum formed angle with (2) 6061-T6 aluminum threaded tubes 1 1/8" O.D. x 1 1/2" long. Finish: ProShield, color specified.

Spacer Tube: Made from 6061-T6 aluminum 7/8" O.D. x 1 11/16". Finish: ProShield, color specified.

Offset Hanger Clamp Assembly: Cast aluminum. Finish: ProShield, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: Above Deck Approx. 3/4 man hour
Below Deck Approx. 1 man hour

Weight: Above Deck 50 lbs.
Below Deck 56 lbs.

Installation Instructions

ABOVE DECK (See Sheet 1 of 2)

1) Attach panel to the face of the deck using 3/8" x 7/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" flange nuts w/pin. See Detail.
2) Attach offset hanger clamp assemblies to posts at height shown, using 5" half clamps and 3/8" x 1 1/8" BHCS w/pin with 3/8" tee nuts. Refer To The Typical Offset Hanger Clamp Spec Sheet.
3) Attach panel to offset hanger clamp assemblies, using 3/8" x 3 3/4" BHCS w/pin, spacer tubes and 3/8" flange nuts w/pin. See Panel Attachment Detail.
4) Attach shafts to one tic-tac-toe bracket, as shown, using 5/16" x 7/8" BHCS w/pin.
5) Thread a 1/2" flat washer onto shaft, then one block over shaft followed by a 1/2" flat washer, 1/2" curved spring washer, and 1/2" flat washer, another block etc., ending with a 1/2" flat washer. Continue in this sequence until all blocks are on shafts. Fasten other tic-tac-toe bracket to shafts as previous.
6) Attach tic-tac-toe block assembly to panel using (6) 3/8" x 5/8" BHCS w/pin through tic-tac-toe brackets and 3/8" flange nuts w/pin through panel.
7) Install protective surfacing before users are allowed to play on the structure.

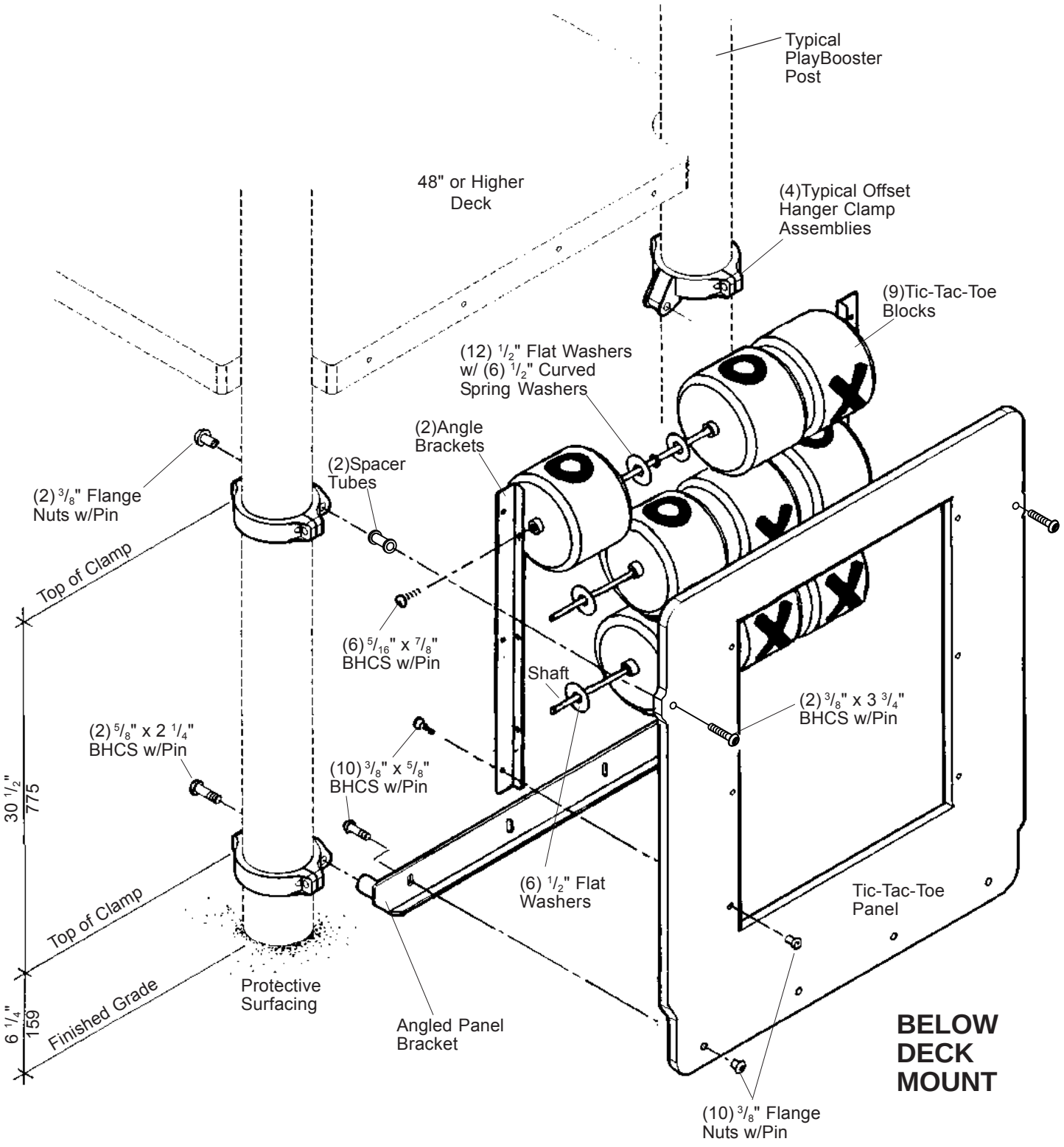
BELOW DECK (See Sheet 2 of 2)

1) Attach offset hanger assemblies to posts at height shown, using 5" half clamps and 3/8" x 1 1/8" BHCS w/pin with 3/8" tee nuts. Refer To The Typical Offset Hanger Clamp Spec Sheet.
2) Attach angled panel bracket to bottom of panel, using 3/8" x 5/8" BHCS w/pin and 3/8" flange nuts w/pin. See Panel Attachment Detail.
3) Attach angled panel bracket with panel to offset hanger clamp assemblies, using 5/8" x 2 1/4" BHCS w/pin. See Below Deck Mount.
4) Attach top of panel to offset hanger clamp assemblies, using 3/8" x 3 3/4" BHCS w/pin, spacer tubes and 3/8" flange nuts w/pin. See Typical Attachment To Post Detail.
5) Attach shafts to one tic-tac-toe bracket, as shown, using 5/16" x 7/8" BHCS w/pin.
6) Thread a 1/2" flat washer onto shaft, then one block over shaft followed by a 1/2" flat washer, 1/2" curved spring washer, and 1/2" flat washer, another block etc., ending with a 1/2" flat washer. Continue in this sequence until all blocks are on shafts. Fasten other tic-tac-toe bracket to shafts as previous.
7) Attach tic-tac-toe block assembly to panel, using (6) 3/8" x 5/8" BHCS w/pin through tic-tac-toe brackets and 3/8" flange nuts w/pin through panel.
8) Install 1/4" x 5/8" drive rivets in all 5" half clamps. Refer to the Typical Offset Hanger Clamp Spec Sheet.
9) Install protective surfacing before users are allowed to play on the structure.

Specifications are subject to change without notice.

Eco #52869 Document #15475400 replaces #14040200. Replaced Tic-Tac-Toe Block Set.

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115231 Tic-Tac-Toe Panel

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Document #15475400

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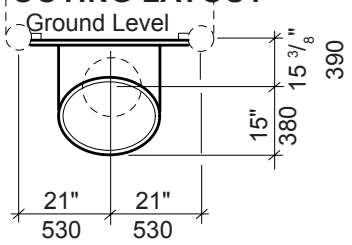
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SAFETY NOTE

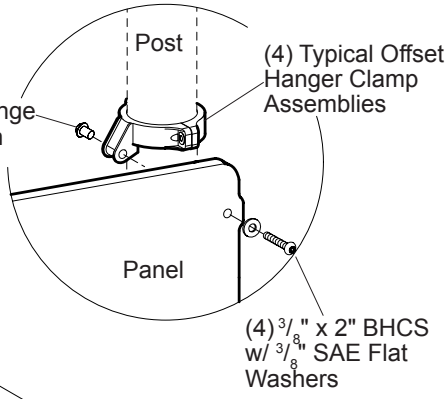
Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. ASTM F1487.)

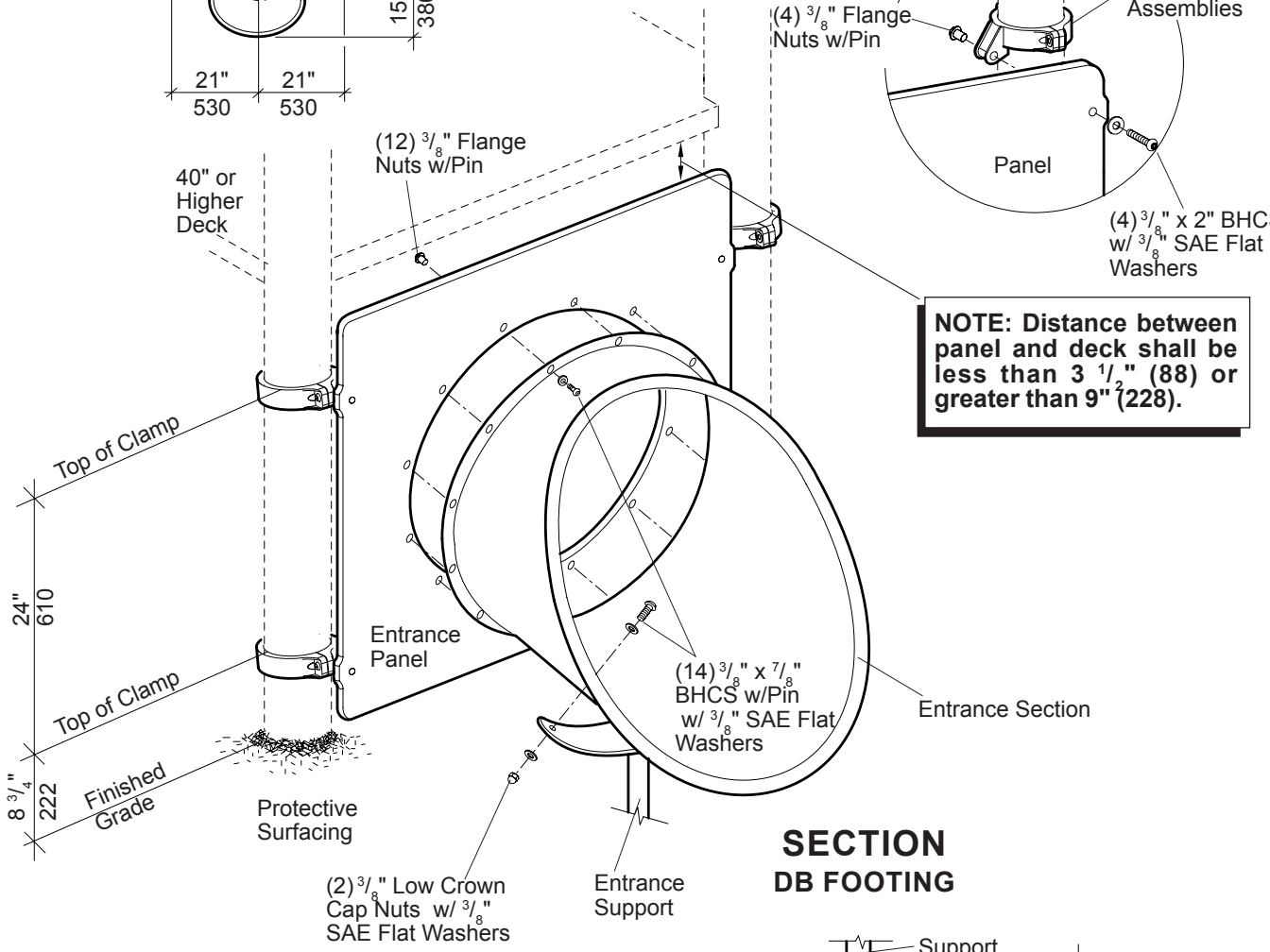
18354300

PLAN VIEW
DB FOOTING LAYOUT



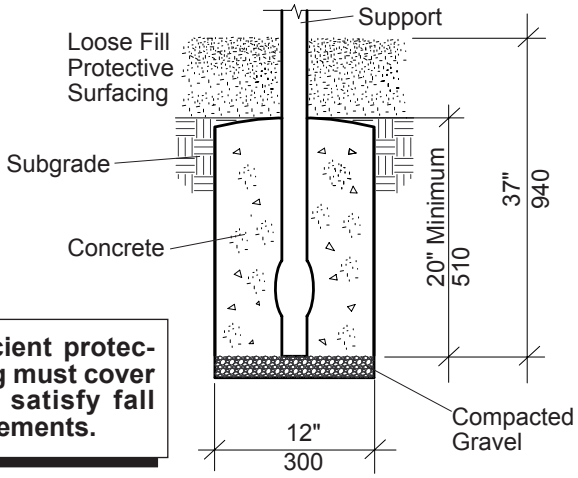
DETAIL
PANEL ATTACHMENT



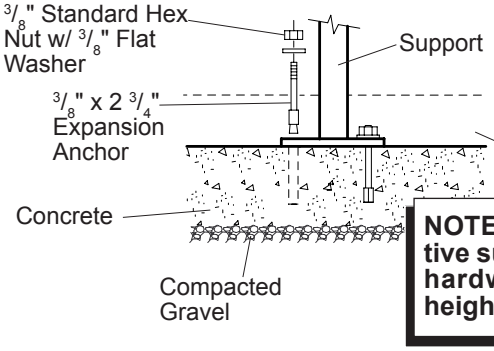


NOTE: Distance between panel and deck shall be less than 3 1/2" (88) or greater than 9" (228).

SECTION
DB FOOTING



SECTION
SURFACE MOUNT



NOTE: Sufficient protective surfacing must cover hardware to satisfy fall height requirements.

PlayBooster® 115242 Slant Entrance Panel, Ground Level

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PlayBooster® 115242 Slant Entrance Panel, Ground Level

Parts List

Part#	Description	Qty.
105327	5" Half Clamp, Specify Color	4
113729	Offset Hanger Clamp, Specify Color	4
129661	Exit Tunnel Section, Specify Color	1
133458	Entrance Panel, Specify Color	1
111378	Slant Entrance Support, (SM), Specify Color	1
111380	Slant Entrance Support, (DB) Specify Color	1
183538	**Slant Entrance Attachment Hardware Package**	1
100196	3/8" x 7/8" BHCS w/Pin, SST	14
100349	3/8" Low Crown Cap Nut, SST	2
100353	3/8" Flange Nut w/Pin, SST	12
100365	3/8" SAE Flat Washer, SST	16
133444	**Panel Attachment Hardware Package**	1
100173	3/8" x 2" BHCS, SST	4
100198	3/8" x 1 1/8" BHCS w/Pin, SST	8
100351	3/8" Tee Nut, SST	8
100353	3/8" Flange Nut w/Pin, SST	4
100610	1/8" x 5/8" Drive Rivet, AL/SST	4
100365	3/8" SAE Flat Washer, SST	4
111391	**2 Hole (SM) Hardware Package**	1
100263	3/8" x 2 3/4" Expansion Anchor	2
100327	3/8" Standard Hex Nut, SST	2
100362	3/8" Flat Washer, SST	2

DB = Direct Bury
SM = Surface Mount

Specifications

Slant Entrance Panel: Solid color Permalene®. Panel measures 35 5/8" wide x 35" high, color specified.

Slant Entrance: Rotationally molded from U.V. stabilized linear low density polyethylene, color specified.

Support: Weldment comprised of 1.900" O.D. RS-20 (.090" - .100") galvanized steel tubing and 1/4" x 4" HRS flat plate. Finish: ProShield®, color specified.

Offset Hanger Clamp Assembly: Cast aluminum. Finish: ProShield, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: **SM** - Approx. 1 1/4 man hours
DB - Approx. 1 3/4 man hours

Concrete Req: Approx. 1.5 cu. ft.

Area Req: 6' (1,83 m) minimum use zone

Weight: **SM** - 57 lbs.
DB - 53 lbs.

Installation Instructions

Direct Bury

1) Dig footings to dimensions as shown.
2) Attach offset hanger clamp assemblies to posts at height shown, using half clamps and 3/8" x 1 1/8" BHCS w/pin with 3/8" tee nuts. Refer To The Typical Offset Hanger Clamp Spec Sheet.
3) Attach panel to offset hanger clamp assemblies, using 3/8" x 2" BHCS with 3/8" SAE flat washers and 3/8" flange nuts w/pin. See Panel Attachment Detail.
4) Attach slant entrance to panel as shown, using 3/8" x 7/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" flange nuts w/pin.
5) Set support in footing hole and position under the slant entrance as shown. With support post plumb, drill through the predrilled holes in base and through slant entrance. Fasten with 3/8" x 7/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" low crown cap nuts with 3/8" SAE flat washers on outside.
6) Pour concrete footing. Allow concrete footing to cure a minimum of 72 hours before users are allowed to play on the structure.
7) Install protective surfacing before users are allowed to play on the structure.

Surface Mount

1) Attach offset hanger clamp assemblies to posts at height shown, using half clamps and 3/8" x 1 1/8" BHCS w/pin with 3/8" tee nuts. Refer To The Typical Offset Hanger Clamp Spec Sheet.
2) Attach panel to offset hanger clamp assemblies, using 3/8" x 2" BHCS with 3/8" SAE flat washers and 3/8" flange nuts w/pin. See Panel Attachment Detail.
3) Attach slant entrance to panel as shown, using 3/8" x 7/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" flange nuts w/pin.
4) Set support in position under the slant entrance as shown. With support post plumb, drill through the predrilled holes in base and through slant entrance. Fasten with 3/8" x 7/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" low crown cap nuts with 3/8" SAE flat washers on outside.
5) Mark anchor bolt locations on concrete slab through holes in base.
6) Remove panel, slant entrance and support in one piece from brackets to drill marked holes.
7) Drill 3/8" x 3" deep holes on marks into concrete using 3/8" masonry bit and hammer drill. Tap expansion anchors into drilled holes.
8) Reattach panel, slant entrance and support.
9) Fasten base to expansion anchors using 3/8" standard hex nuts with 3/8" flat washers.
10) Install protective surfacing before users are allowed to play on the structure.

Specifications are subject to change without notice.

Eco #54488 Document #18354300 replaces #13785400. Replaced hardware package.

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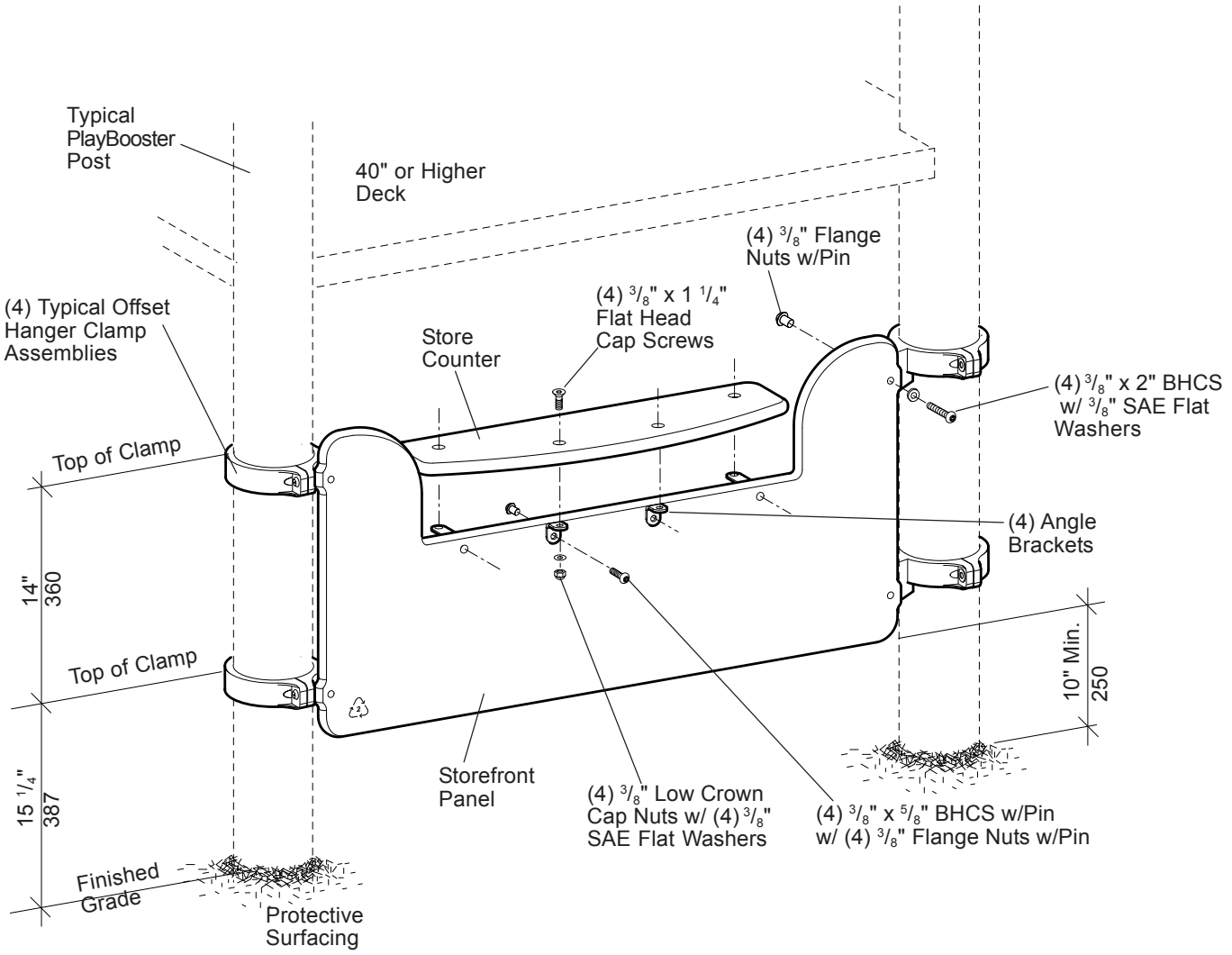
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SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

18868700



NOTE:
This Panel is used at ground level only, under 40" or higher decks.

PlayBooster® 115254 Storefront Panel

601 7TH STREET SOUTH, DELANO, MINNESOTA 55328-8605 888-574-4678 LSI Install Help 888-438-6574 LSI Direct 763-972-5200 Int. FAX (763) 972-3185

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PlayBooster® 115254 Storefront Panel

Parts List

Part#	Description	Qty.
105327	5" Half Clamp, Specify Color	4
113729	Offset Hanger Clamp, Specify Color	4
144581	Storefront Panel, Specify Color	1
144580	Store Counter, Specify Color	1
133444	**Panel Attachment Hardware Package**	1
100173	3/8" x 2" BHCS, SST	4
100198	3/8" x 1 1/8" BHCS w/Pin, SST	8
100351	3/8" Tee Nut, SST	8
100353	3/8" Flange Nut w/Pin, SST	4
100610	1/4" x 5/8" Drive Rivet, AL/SST	4
100365	3/8" SAE Flat Washer, SST	4
188683	**Store Counter Top Hardware Package**	1
100195	3/8" x 5/8" BHCS w/Pin, SST	4
100252	3/8" x 1 1/4" Flat Head Cap Screw, SST	4
100349	3/8" Low Crown Cap Nut, SST	4
100353	3/8" Flange Nut w/Pin, SST	4
100365	3/8" SAE Flat Washer, SST	4
188664	Steel Angle Bracket, Silver	4

Specifications

Storefront Panel: Permalene® solid color. Panel measures 35 5/8" wide x 20" high, color specified.

Offset Hanger Clamp Assembly: Cast aluminum. Finish: ProShield®, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: Approx. 1 man hour

Weight: 29 lbs.

Installation Instructions

1) Attach offset hanger clamp assemblies to posts at height shown, using half clamps and 3/8" x 1 1/8" BHCS w/pin with 3/8" tee nuts. Refer To The Typical Offset Hanger Clamp Spec Sheet.

2) Attach panel to offset hanger clamp assemblies, using 3/8" x 2" BHCS with 3/8" SAE flat washers and 3/8" flange nuts w/pin.

3) Attach angle brackets to storefront panel using 3/8" x 5/8" BHCS w/pin through angles and 3/8" flange nuts w/pin through panel. Attach store counter top to angle brackets using 3/8" x 1 1/4" flat head cap screws through counter top and 3/8" low crown cap nuts with 3/8" SAE flat washers underneath angles.

4) Install 1/4" x 5/8" drive rivets in all 5" half clamps. Refer to the Typical Offset Hanger Clamp Spec Sheet.

5) Install protective surfacing before users are allowed to play on the structure.

Specifications are subject to change without notice.

Eco #54708 Document #18868700 replaces #16060200. Changed angle bracket to 3/16" steel.

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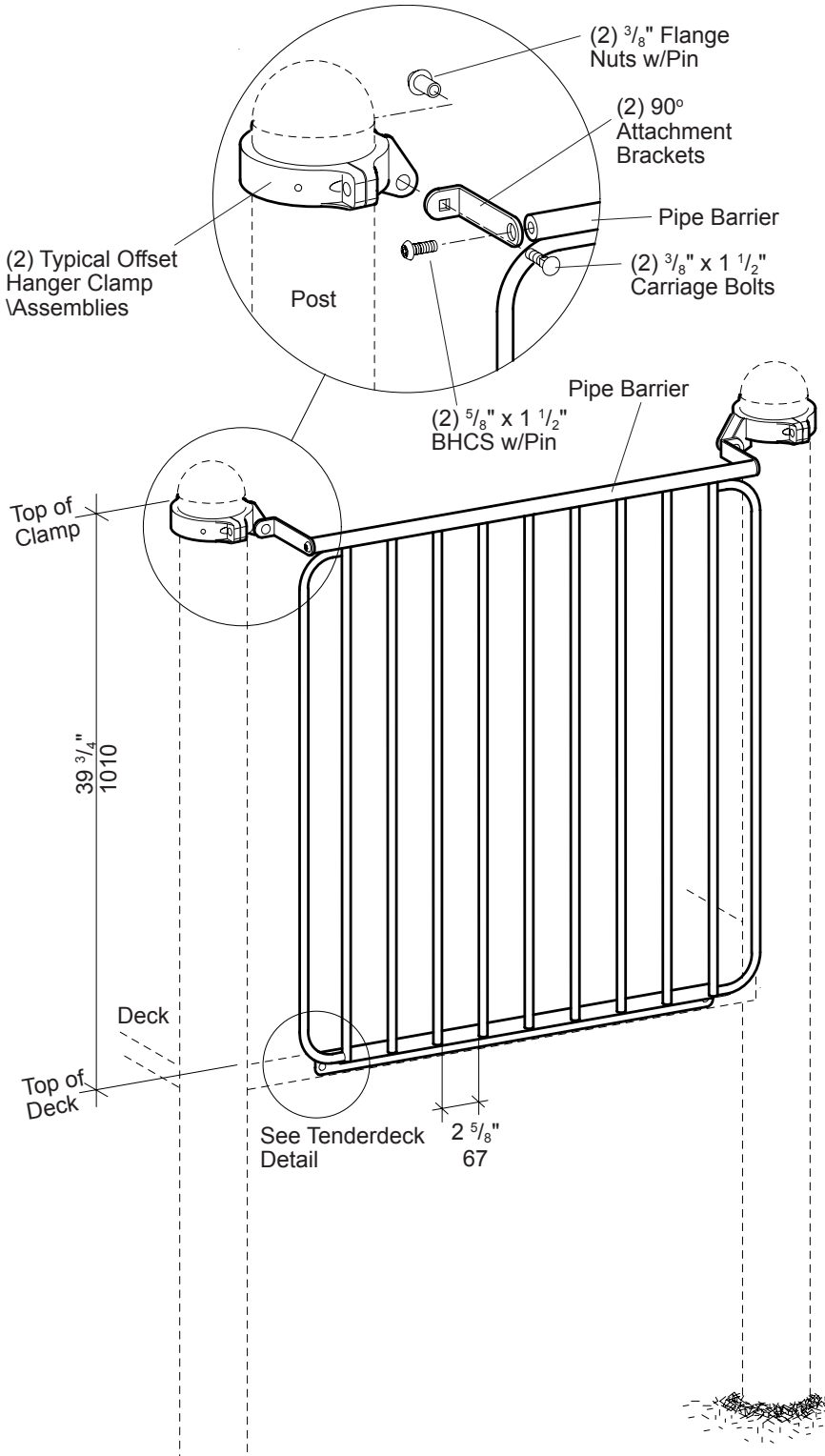
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SAFETY NOTE

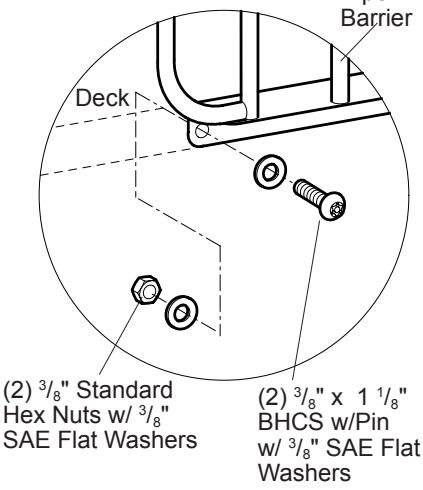
Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. ASTM F1487.)

13533100

DETAIL
90° ATTACHMENT BRACKETS



DETAIL
TENDERDECKS



DECK MOUNT

PlayBooster

116244 Pipe Barrier

601 7TH STREET SOUTH, DELANO, MINNESOTA 55328-8605 (763) 972-3391 1-888-LSI-INST (1-888-574-4678) FAX (763) 972-3185

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PlayBooster® 116244 Pipe Barrier

Parts List

Part#	Description	Qty.
	ABOVE DECK	
132755-00	Pipe Barrier, Specify Color	1
128824-00	90° Attachment Bracket, Specify Color	2
105327-01	5" Half Clamp, Specify Color	2
113729-00	Offset Hanger Clamp, Specify Color	2
100610-00	1/4" x 5/8" Drive Rivet, AL/SST	2
132739-00	**Barrier, Above Deck Hardware Package**	1
100198-00	3/8" x 1 1/8" BHCS w/Pin, SST	6
100201-00	5/8" x 1 1/2" BHCS w/Pin, SST	2
100351-00	3/8" Tee Nut, SST	4
100353-00	3/8" Flange Nut w/Pin, SST	2
116017-00	3/8" x 1 1/2" Carriage Bolt w/Patch, SST	2
100327-00	3/8" Standard Hex Nut, SST	2
100365-00	3/8" SAE Flat Washer, SST	4
	BELOW DECK	
132755-00	Pipe Barrier, Specify Color	1
128824-00	90° Attachment Bracket, Specify Color	2
105327-01	5" Half Clamp, Specify Color	4
113729-00	Offset Hanger Clamp, Specify Color	4
113464-00	Angled Panel Bracket, Specify Color	1
100610-00	1/4" x 5/8" Drive Rivet, AL/SST	4
132741-00	**Barrier, Below Deck Hardware Package**	1
116017-00	3/8" x 1 1/2" Carriage Bolt, SST	2
100198-00	3/8" x 1 1/8" BHCS w/Pin, SST	8
100196-00	3/8" x 7/8" BHCS w/Pin, SST	2
100203-00	5/8" x 2 1/4" BHCS w/Pin, SST	2
100351-00	3/8" Tee Nut, SST	8
100201-00	5/8" x 1 1/2" BHCS w/Pin, SST	2
100327-00	3/8" Standard Hex Nut, SST	2
100365-00	3/8" SAE Flat Washer, SST	4
100353-00	3/8" Flange Nut w/Pin, SST	2

Specifications

Barrier: Weldment comprised of 5/8" solid steel vertical rails, 1 1/8" O.D. x 11 GA (.120") steel horizontal rails with 203 or 303 stainless steel welded inserts with 5/8" internal threads, 1 1/2" x 1 1/2" x 29 1/2" angle iron. Barrier measures 33 7/8" wide x 39 13/16" high. Finish: TenderTuff™, color specified.

90° Bracket: Formed from 1/4" x 1 1/4" HRPO flat steel. Finish: ProShield®, color specified.

Angled Panel Brkt.: Weldment comprised of .190" thick 5052 aluminum formed angle with (2) 6061-T6 aluminum threaded tubes 1 1/8" O.D. x 1 1/2" long. Finish: ProShield, color specified.

Offset Hanger Clamp Assembly: Cast aluminum. Finish: ProShield, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications)

Installation Time: Approx. 1 man hour
Weight: Above Deck 52 lbs.
Below Deck 56 lbs.

Installation Instructions

ABOVE DECK (See Sheet 1 of 2)

1) Attach pipe barrier to the face of the deck using 3/8" x 1 1/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" standard hex nuts with 3/8" SAE flat washers. Refer To The Tenderdeck Detail..
2) Attach offset hanger clamps to posts at height shown, using 5" half clamps and 3/8" x 1 1/8" BHCS w/pin with 3/8" tee nuts. Refer To The Typical Offset Hanger Clamp Spec Sheet.
3) Attach the 90° attachment brackets to pipe barrier using 5/8" x 1 1/2" BHCS w/pin. Refer To The 90° Attachment Bracket Detail.
4) Attach the 90° attachment brackets to the offset hanger clamps using 3/8" x 1 1/2" carriage bolts and 3/8" flange nuts w/pin. Refer To The 90° Attachment Bracket Detail.
5) Install protective surfacing before users are allowed to play on the structure.

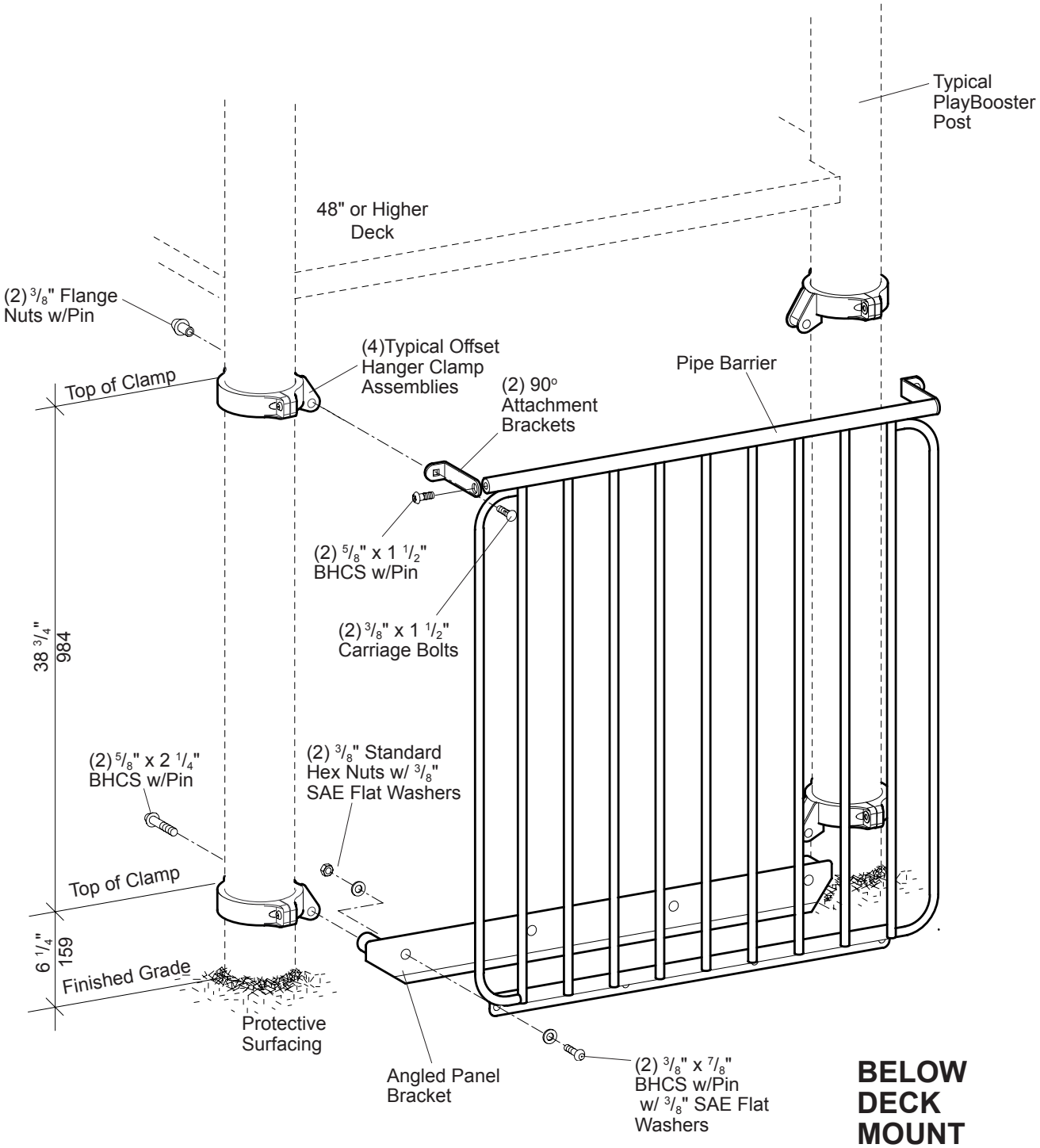
BELOW DECK (See Sheet 2 of 2)

1) Attach offset hanger assemblies to posts at height shown. Using 5" half clamps and 3/8" x 1 1/8" BHCS w/pin and with 3/8" tee nuts. Refer To The Typical Offset Hanger Clamp Spec Sheet.
2) Attach angled panel bracket to bottom of pipe barrier using 3/8" x 7/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" standard hex nuts with 3/8" SAE flat washers. See Below Deck Mount.
3) Attach angled panel bracket with pipe barrier to offset hanger clamp assemblies using 5/8" x 2 1/4" BHCS w/pin. See Below Deck Mount.
4) Attach the 90° attachment brackets to pipe barrier using 5/8" x 1 1/2" BHCS w/pin. Refer To The 90° Attachment Bracket Detail.
5) Attach the 90° attachment brackets to the offset hanger clamps using 3/8" x 1 1/2" carriage bolts and 3/8" flange nuts w/pin. Refer To The 90° Attachment Bracket Detail.
6) Install 1/4" x 5/8" drive rivets in all 5" half clamps. Refer to the Typical Offset Hanger Clamp Spec sheet.
7) Install protective surfacing before users are allowed to play on the structure.

Specifications are subject to change without notice.

5-30-01 Document #13533100 replaces #13164600. Removed 2 barrier mounting holes.

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BELOW DECK MOUNT

PlayBooster®

116244 Pipe Barrier

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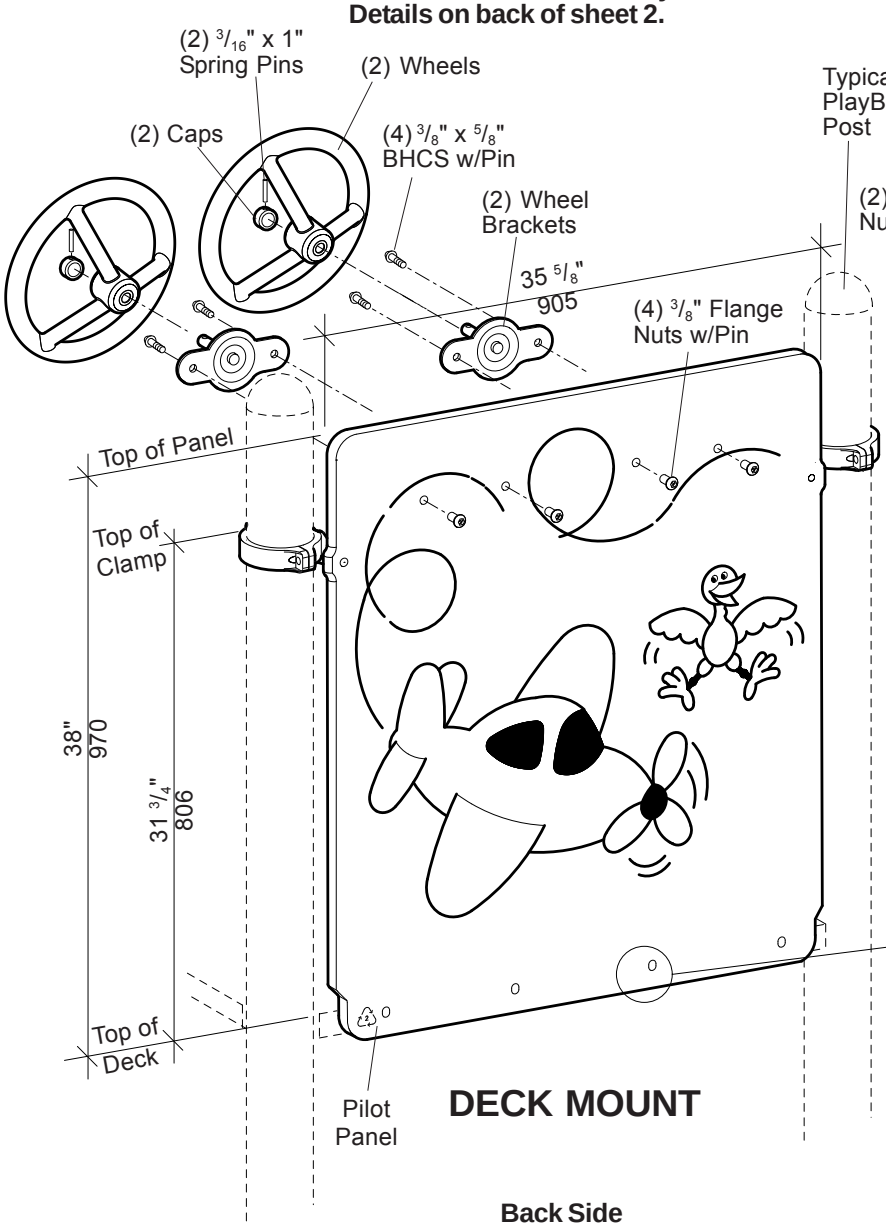
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SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

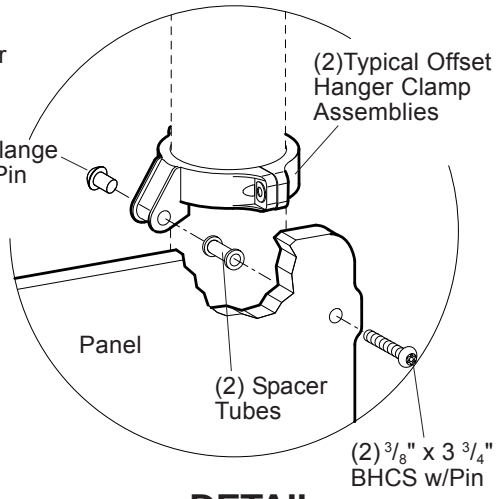
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Refer to Wheel Assembly Details on back of sheet 2.

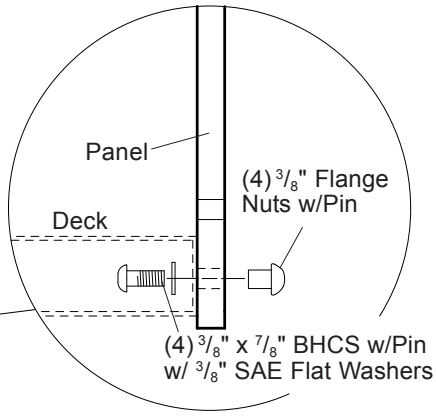


DECK MOUNT

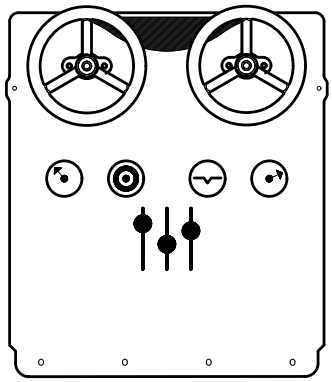
DETAIL
PANEL ATTACHMENT



DETAIL
TENDERDECKS



Back Side



NOTE: Steering Wheel Infill Panel available. Refer to the Wheel Spec Sheet.

PlayBooster®

119514 Pilot Panel

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Document #14868900

PlayBooster® 119514 Pilot Panel

Parts List

Part#	Description	Qty.
	ABOVE DECK	
127588	Pilot Panel, Specify Color	1
108432	Wheel, Specify Color	2
127242	Steering Wheel Bracket, Specify Color	2
105327	5" Half Clamp, Specify Color	2
113729	Offset Hanger Clamp, Specify Color	2
113468	Spacer Tube, Specify Color	2
100610	1/4" x 5/8" Drive Rivet, AL/SST	2
148626	**Permalene Panel Hardware Package**	2
100195	3/8" x 5/8" BHCS w/Pin, SST	4
100353	3/8" Flange Nut w/Pin, SST	4
118452	3/16" x 1" Spring Pin, SST	2
148623	Cap, White	2
124900	**Tenderdeck Mounting Hardware Package**	1
124460	3/8" x 3 3/4" BHCS w/Pin, SST	2
100196	3/8" x 7/8" BHCS w/Pin, SST	4
100198	3/8" x 1 1/8" BHCS w/Pin, SST	4
100351	3/8" Tee Nut, SST	4
100353	3/8" Flange Nut w/Pin, SST	6
100365	3/8" SAE Flat Washer, SST	4
	BELOW DECK	
127588	Pilot Panel, Specify Color	1
113464	Angled Panel Bracket, Specify Color	1
127242	Steering Wheel Bracket, Specify Color	2
108432	Wheel, Specify Color	2
105327	5" Half Clamp, Specify Color	4
113729	Offset Hanger Clamp, Specify Color	4
113468	Spacer Tube, Specify Color	2
100610	1/4" x 5/8" Drive Rivet, AL/SST	4
148626	**Permalene Panel Hardware Package**	2
100195	3/8" x 5/8" BHCS w/Pin, SST	4
100353	3/8" Flange Nut w/Pin, SST	4
118452	3/16" x 1" Spring Pin, SST	2
148623	Cap, White	2
124947	**Ground Level Mounting Hardware Package**	1
124460	3/8" x 3 3/4" BHCS w/Pin, SST	2
100195	3/8" x 5/8" BHCS w/Pin, SST	4
100198	3/8" x 1 1/8" BHCS w/Pin, SST	8
100203	5/8" x 2 1/4" BHCS w/Pin, SST	2
100351	3/8" Tee Nut, SST	8
100353	3/8" Flange Nut w/Pin, SST	6

Specifications

Permalene® Panel: Two color panel measures 35 5/8" wide x 41" high, color specified.

Wheel Bracket: Weldment comprised of formed 3/16" plate and 5/8" O.D. stainless steel shaft. Finish: ProShield®, color specified.

Wheel: 12" diameter castA356 aluminum alloy. Finish: TenderTuff®, color specified.

Angled Panel Brkt: Weldment comprised of .190" thick 5052 aluminum formed angle with (2) 6005-T5 aluminum threaded tubes 1 1/8" O.D. x 1 1/2" long. Finish: ProShield, color specified.

Spacer Tube: Made from 6061-T6 aluminum 7/8" O.D. x 1 11/16". Finish: ProShield, color specified.

Offset Hanger Clamp Assembly: Cast aluminum. Finish: ProShield, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: Above Deck Approx. 3/4 man hour
Below Deck Approx. 1 man hour

Weight: Above Deck 53 lbs.
Below Deck 61 lbs.

Installation Instructions

ABOVE DECK (See Sheet 1 of 2)

1) (Attach panel to the face of the decks, using 3/8" x 7/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" flange nuts w/pin. Refer to the Tenderdeck Detail.
2) Attach offset hanger assemblies to posts at height shown, using half clamps and 3/8" x 1 1/8" BHCS w/pin with 3/8" tee nuts. Refer to the Typical Offset Hanger Clamp Spec Sheet.
3) Attach panel to offset hanger assemblies, using 3/8" x 3 3/4" BHCS w/pin, spacer tubes and 3/8" flange nuts w/pin. See Panel Attachment Detail.
4) Attach wheels as shown on sheet 1 & back of sheet 2.
5) Install protective surfacing before users are allowed to play on the structure.

BELOW DECK (See Sheet 2 of 2)

1) Attach offset hanger assemblies to posts at height shown, using half clamps and 3/8" x 1 1/8" BHCS w/pin with 3/8" tee nuts. Refer to the Typical Offset Hanger Clamp Spec Sheet.
2) Attach angled panel bracket to bottom of panel using 3/8" x 5/8" BHCS w/pin and 3/8" flange nuts w/pin. See Below Deck Mount.
3) Attach angled panel bracket with panel to offset hanger assemblies, using 5/8" x 2 1/4" BHCS w/pin. See Below Deck Mount.
4) Attach top of panels to offset hanger assemblies, using 3/8" x 3 3/4" BHCS w/pin, spacer tubes and 3/8" flange nuts w/pin. See Below Deck Mount.
5) Attach wheels as shown on front & back of sheet 2.
6) Install 1/4" x 5/8" drive rivets in all 5" half clamps. Refer to the Typical Offset Hanger Clamp Spec Sheet.
7) Install protective surfacing before users are allowed to play on the structure.

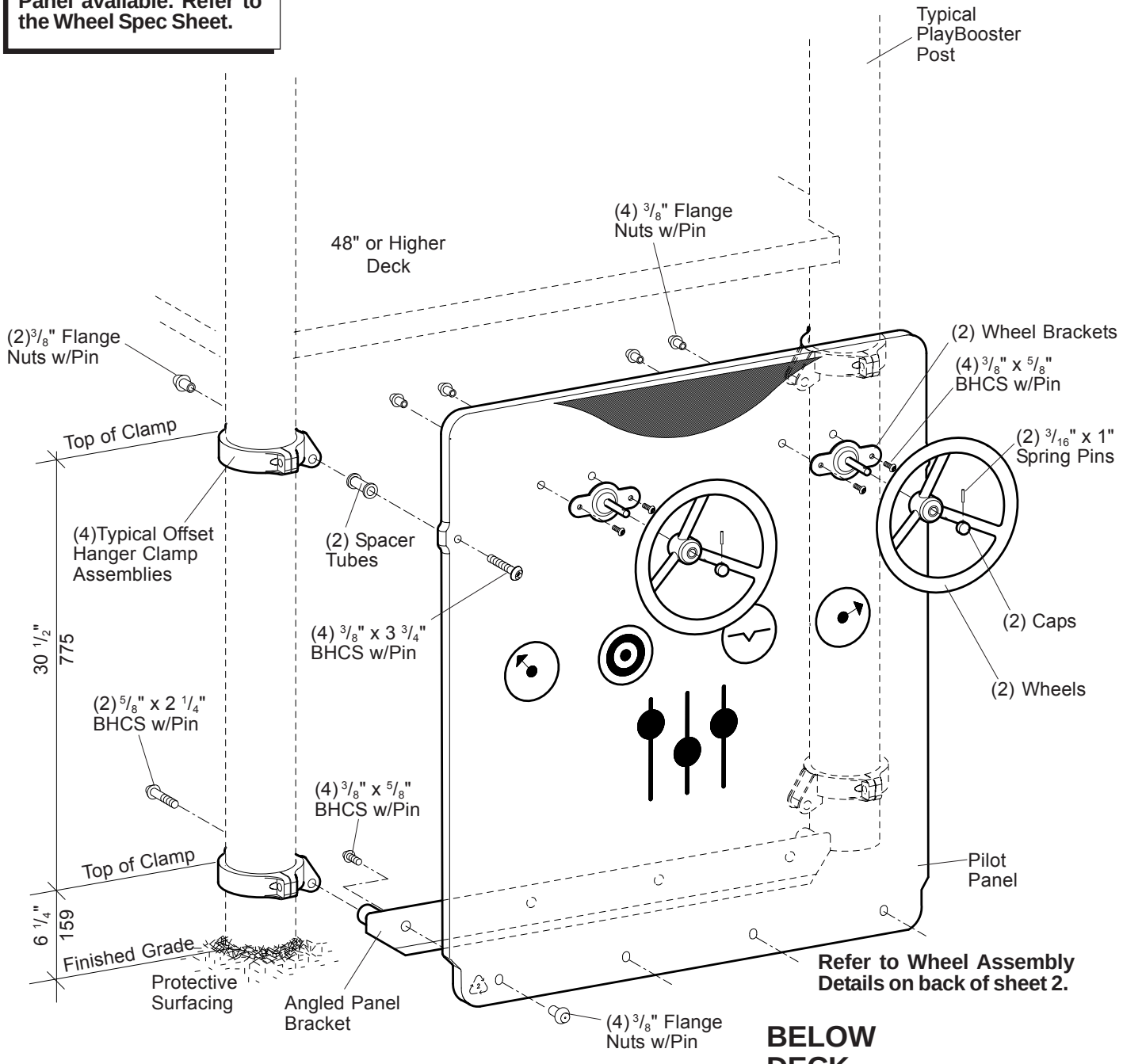
Specifications are subject to change without notice.

Eco #52508 Document #14868900 replaces #13396700. Replaced cap and spring pin.

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NOTE: Steering Infill Panel available. Refer to the Wheel Spec Sheet.



BELOW DECK MOUNT

PlayBooster® 119514 Pilot Panel

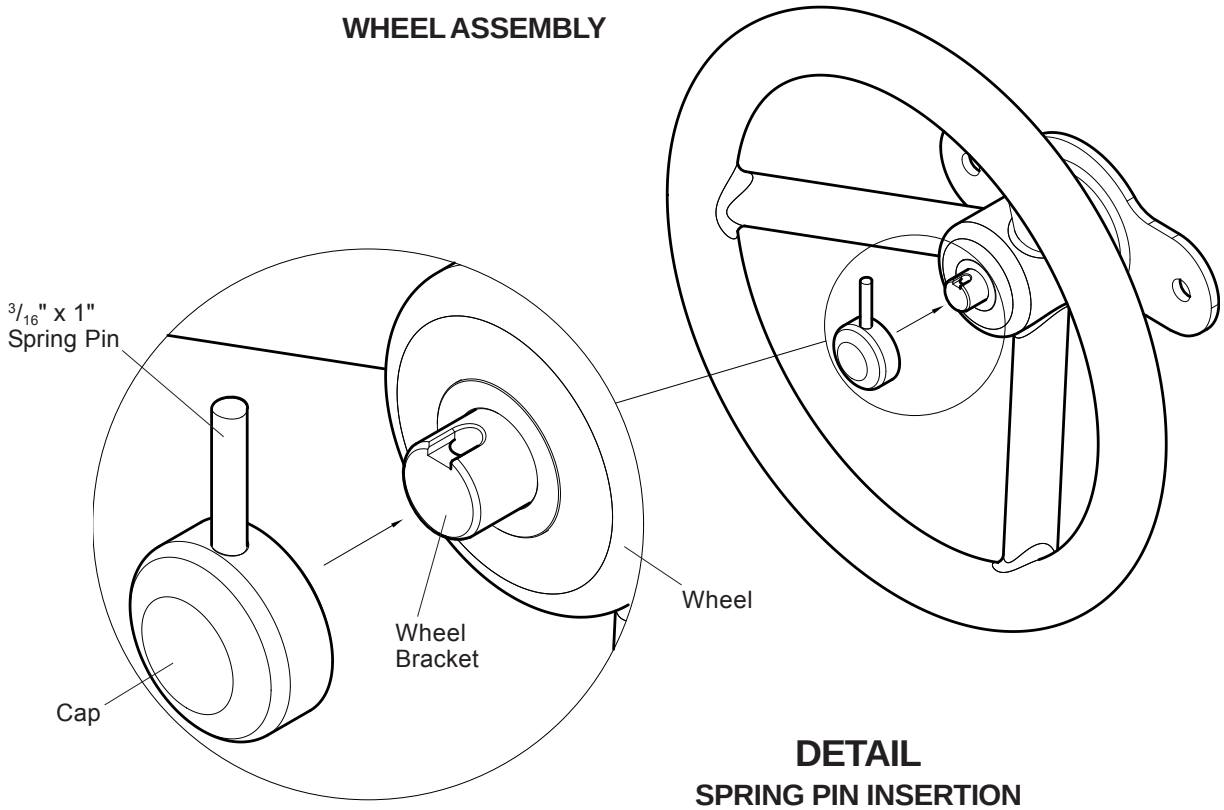
601 7TH STREET SOUTH, DELANO, MINNESOTA 55328-8605 888-574-4678 LSI Install Help 888-438-6574 LSI Direct 763-972-5200 Int. FAX (763) 972-3185

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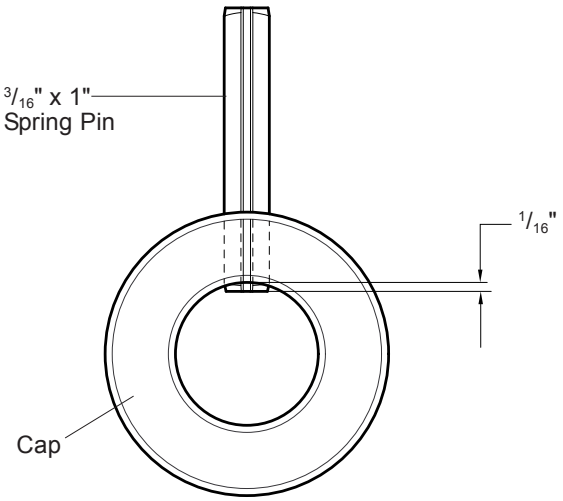
Document #14868900

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DETAIL
WHEEL ASSEMBLY



DETAIL
SPRING PIN INSERTION
(CAP BACK VIEW)



NOTE: To assist in the alignment of the cap to the wheel bracket shaft, tap spring pin through cap approximately 1/16". Orient spring pin to groove on wheel bracket shaft. Slide cap in place and tap spring pin though cap and shaft until flush.

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119514 Pilot Panel

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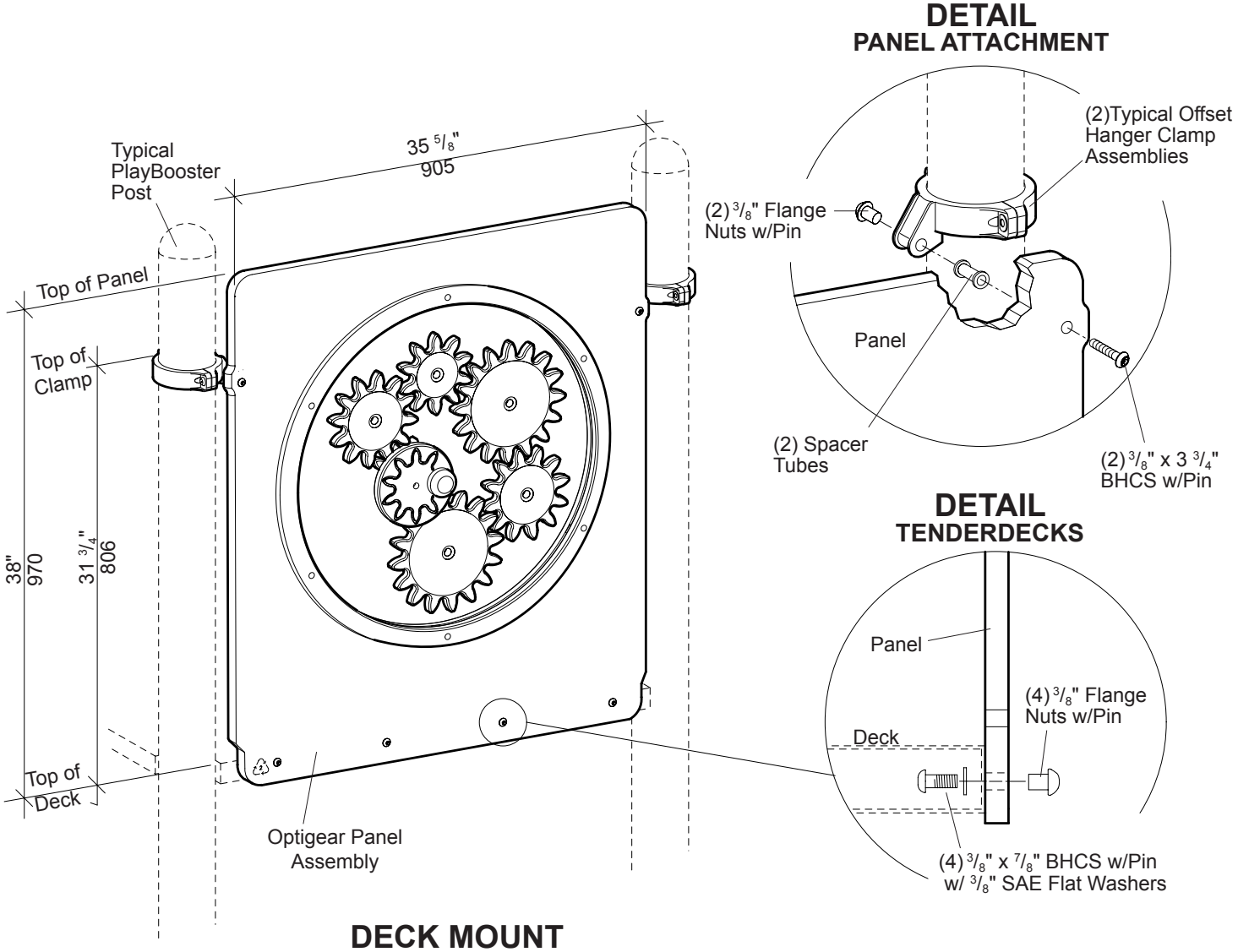
ISO 14001 CERTIFIED

ISO 9001 Certified

SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. ASTM F1487.)

18427700



DECK MOUNT

NOTE:
The Optigear Panel is preassembled at the factory.

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PlayBooster® 173564 Optigear Panel®

Parts List

Part#	Description	Qty.
	ABOVE DECK	
105327	5" Half Clamp, Specify Color	2
113729	Offset Hanger Clamp, Specify Color	2
113468	Spacer Tube, Specify Color	2
181982	Optigear Panel Assembly, Specify Color	1
100610	1/4" x 5/8" Drive Rivet, AL/SST	2
124900	**Tenderdeck Mounting Hardware Package**	1
124460	3/8" x 3 3/4" BHCS w/Pin, SST	2
100196	3/8" x 7/8" BHCS w/Pin, SST	4
100198	3/8" x 1 1/8" BHCS w/Pin, SST	4
100351	3/8" Tee Nut, SST	4
100353	3/8" Flange Nut w/Pin, SST	6
100365	3/8" SAE Flat Washer, SST	4
	BELOW DECK	
105327	5" Half Clamp, Specify Color	4
113729	Offset Hanger Clamp, Specify Color	4
113468	Spacer Tube, Specify Color	2
113464	Angled Panel Bracket, Specify Color	1
181982	Optigear Panel Assembly, Specify Color	1
100610	1/4" x 5/8" Drive Rivet, AL/SST	4
124947	**Below Deck Mounting Hardware Package**	1
124460	3/8" x 3 3/4" BHCS w/Pin, SST	2
100195	3/8" x 5/8" BHCS w/Pin, SST	4
100198	3/8" x 1 1/8" BHCS w/Pin, SST	8
100203	5/8" x 2 1/4" BHCS w/Pin, SST	2
100351	3/8" Tee Nut, SST	8
100353	3/8" Flange Nut w/Pin, SST	6

Specifications

Optigear Panel Assy.: (Panels) Two color Permalene®,color specified. (Poly Panel) .236" thick clear polycarbonate, 3/8" threaded rod and 3/16" SST plate.

Angled Panel Brkt: Weldment comprised of .190" thick 5052 aluminum formed angle with (2) 6061-T6 aluminum threaded tubes 1 1/8" O.D. x 1 1/2" long. Finish: ProShield®, color specified.

Spacer Tube: Made from 6061-T6 aluminum 7/8" O.D. x 1 11/16". Finish: ProShield, color specified.

Clamps: Cast aluminum. Finish: ProShield, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: Above Deck Approx. 3/4 man hour
Below Deck Approx. 1 man hour

Weight: Above Deck 59 lbs.
Below Deck 65 lbs.

Installation Instructions

ABOVE DECK (See Sheet 1 of 2)

1) Attach panel assembly to the face of the deck using 3/8" x 7/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" flange nuts w/pin. See Detail.
2) Attach offset hanger clamp assemblies to posts at height shown, using half clamps and 3/8" x 1 1/8" BHCS w/pin with 3/8" tee nuts. Refer To The Typical Offset Hanger Clamp Spec Sheet.
3) Attach panel to offset hanger clamp assemblies, using 3/8" x 3 3/4" BHCS w/pin, spacer tubes and 3/8" flange nuts w/pin. See Panel Attachment Detail.
4) Install protective surfacing before users are allowed to play on the structure.

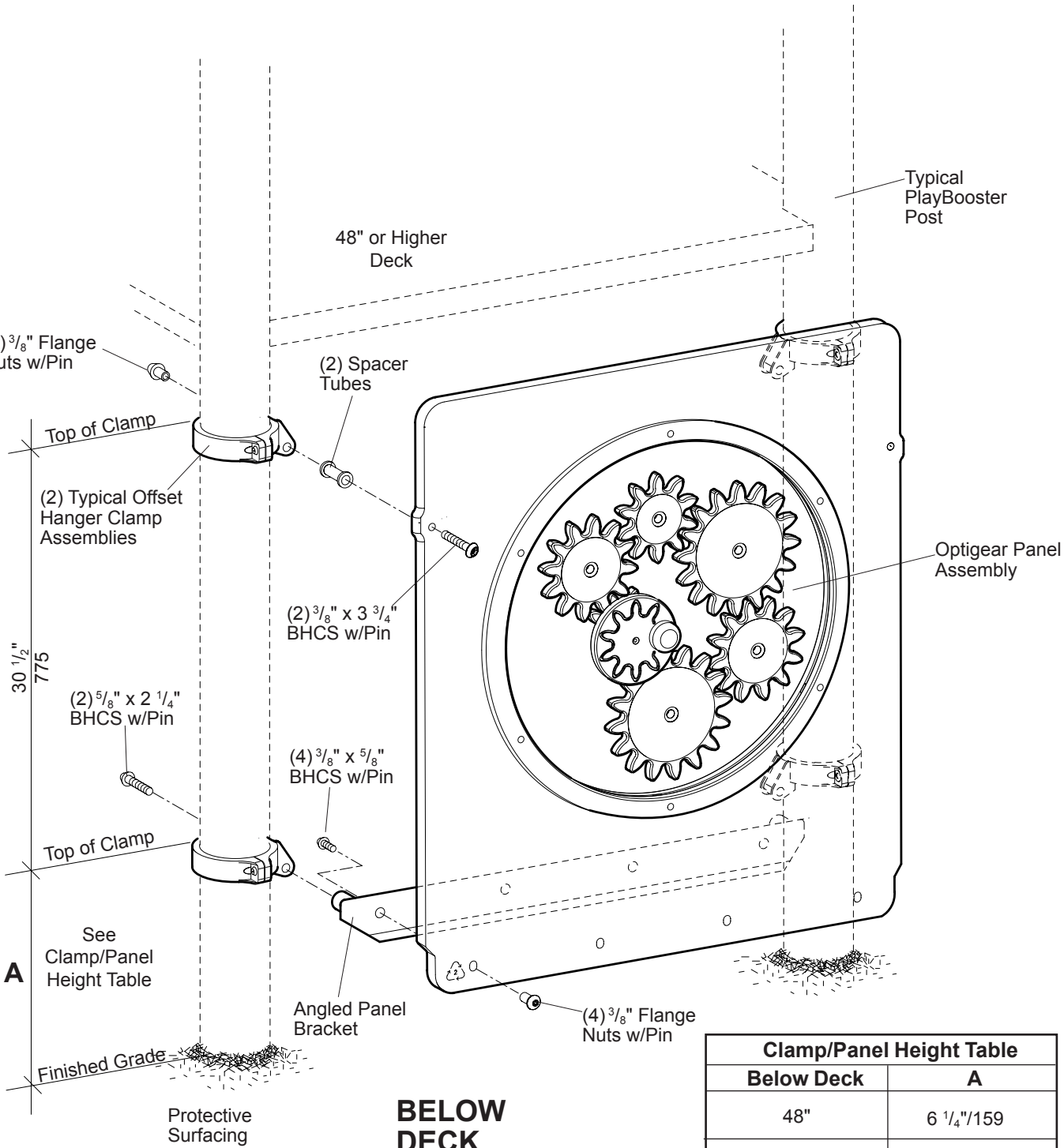
BELOW DECK (See Sheet 2 of 2)

1) Attach offset hanger clamp assemblies to posts at height shown, using half clamps and 3/8" x 1 1/8" BHCS w/pin with 3/8" tee nuts. Refer To The Typical Offset Hanger Clamp Spec Sheet.
2) Attach angled panel bracket to bottom of panel, using 3/8" x 5/8" BHCS w/pin and 3/8" flange nuts w/pin. See Below Deck Mount.
3) Attach angled panel bracket with panel to offset hanger clamp assemblies, using 5/8" x 2 1/4" BHCS w/pin. See Below Deck Mount.
4) Attach top of panel assembly to offset hanger clamp assemblies, using 3/8" x 3 3/4" BHCS w/pin, spacer tubes and 3/8" flange nuts w/pin. See Typical Attachment To Post Detail.
5) Install 1/4" x 5/8" drive rivets in all 5" half clamps. Refer to the Typical Offset Hanger Clamp Assembly sheet.
6) Install protective surfacing before users are allowed to play on the structure.

Specifications are subject to change without notice.

Eco #54521 Document #18427700 replaces #18205600. Updated optigear panel assembly.

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BELOW DECK MOUNT

Clamp/Panel Height Table	
Below Deck	**A**
48"	6 1/4"/159
56" And Higher	14 1/2"/368

PlayBooster® 173564 Optigear Panel®

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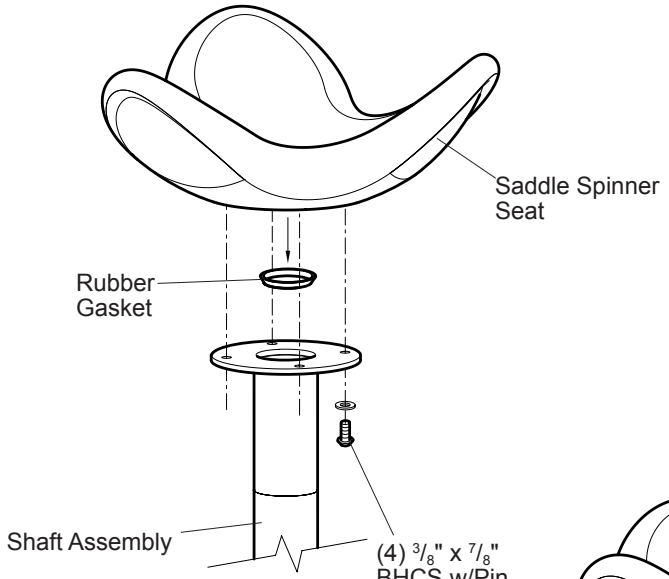
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SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. ASTM F1487.)

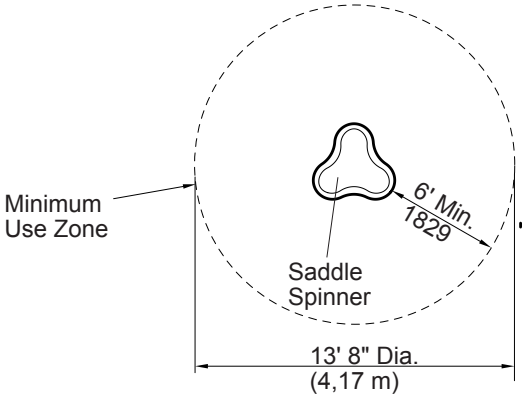
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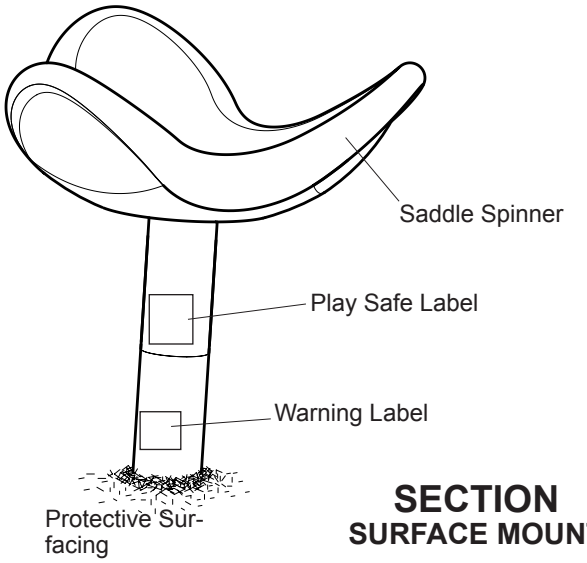
DETAIL
SADDLE SPINNER SEAT ASSEMBLY



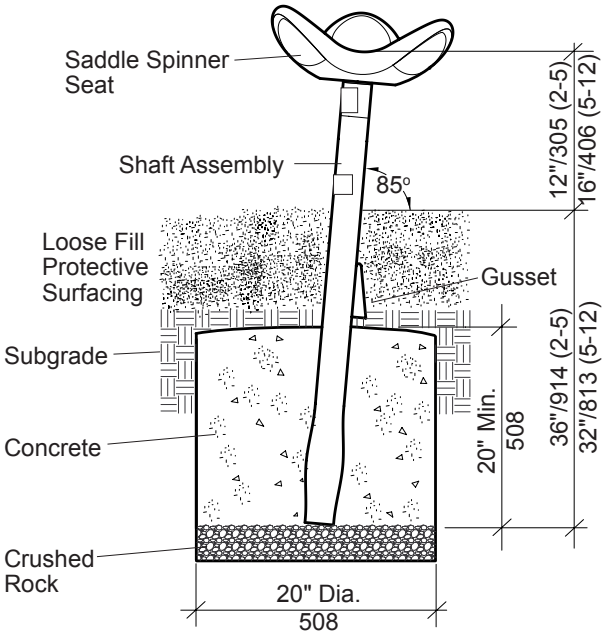
NOTE: Install Rubber Gasket with small diameter down.

DETAIL
MINIMUM USE ZONE

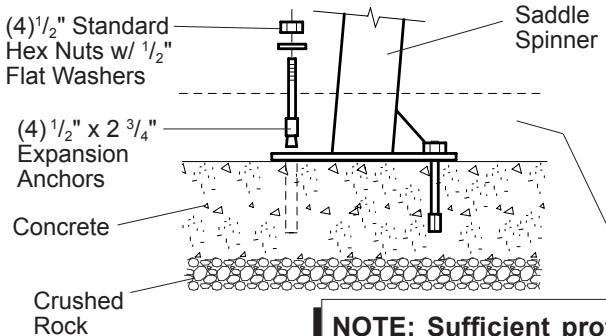




DETAIL
DIRECT BURY



SECTION
SURFACE MOUNT



NOTE: Sufficient protective surfacing must cover hardware to satisfy fall height requirements.

Kids In Motion 152179 Saddle Spinner

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Document #21141900

Kids In Motion 152179 Saddle Spinner

Parts List

Part #	Description	Qty.
151539	Saddle Spinner Seat, Specify Color	1
197017	Shaft Assy., DB, Specify Color	*
197018	Shaft Assy. 12" Seat Height, SM, Specify Color	*
197011	Shaft Assy. 16" Seat Height, SM, Specify Color	*
211418	**Spinner Seat Hardware Package**	1
100196	3/8" x 7/8" BHCS w/Pin, SST	4
100365	3/8" SAE Flat Washer, SST	4
156845	Play Safe Label, 2-5 Yrs.	1
156847	Play Safe Label, 5-12 Yrs.	1
127935	5/16" x 2 15/32" Rubber Gasket	1
183064	Warning label	1
121348	**4-Hole (SM) Hardware Package**	1
100266	1/2" x 2 3/4" Expansion Anchor	4
100322	1/2" Standard Hex Nut, SST	4
100363	1/2" Flat Washer, SST	4

*** = Quantity Determined By Your Order**
DB = Direct Bury
SM = Surface Mount

Specifications

Shaft Assembly: **(Saddle Spinner Seat Post)** Weldment comprised of 2.875" O.D. RS40 (.160"-.170" Wall) galvanized steel tubing, 1.250" O.D. steel shaft, 12 Ga. (.105") HR flat steel, and 1144 steel collar. Finish: Pro-Shield®, color specified. **(Sleeve/Plate)** Weldment comprised of 1/4" sheet HRPO steel and 2.875" O.D. schedule 80 steel tubing. Finish: ProShield, color specified.

Rubber Gasket: Made from 50 durometer neoprene.

Saddle Spinner Seat: Rotationally molded from U.V. stabilized linear low density polyethylene measuring 18 1/4" wide x 7" high, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: 1 man hour **(DB)**
3/4 man hour **(SM)**
Weight: 36 lbs. **(DB)**
30 lbs. 12" Seat Height **(SM)**
32 lbs. 16" Seat Height **(SM)**
Area Req.: 13' 8" (4,17 m) diameter
Min. Use Zone.: 6' (1,83 m)
Concrete: Approx. 3 1/2 cu. ft. **(DB)**
Fall Height: 12" (300 mm) 2-5 Years
16" (410 mm) 5-12 Years

Installation

1) **(Direct Bury)** Dig footing as shown. Refer to the Direct Bury Detail.

2) Attach saddle spinner seat and rubber gasket to shaft assembly using 3/8" x 7/8" BHCS w/pin and 3/8" SAE flat washers. Refer to the Saddle Spinner Seat Attachment Detail. **NOTE:** *Install Rubber Gasket with small diameter down.*

3) **(Direct Bury)** Place the shaft assembly in footing hole. Place a level on the shaft assembly gusset, when gusset is plumb pour concrete footing. Allow concrete footing to cure a minimum of 72 hours before users are allowed to play on structure. **NOTE**: *Saddle spinner will have to be propped in position, until concrete has cured.*

   (Surface Mount) Drill 1/2" x 3" deep holes through base plate using hammer drill and 1/2" masonry bit. Tap expansion anchors into drilled holes. Attach shaft assembly base plate to expansion anchors using 1/2" standard hex nuts with 1/2" flat washers.

4) If required to meet Canadian Standard (CSA Z614) requirement for water ponding, drill (3) 1/8" diameter drain holes on top side of seat, and (3) 1/8" diameter holes on bottom side of seat. **NOTE:** *Positions are prelocated on both sides of seat with an indent marking. Use caution to drill through one wall of plastic only.*

5) Apply labels as shown.

6) Install protective surfacing before users are allowed to play on the structure.

Specifications are subject to change without notice.

Eco #0100389 Document #21141900 replaces #20182800. Replace hardware package.

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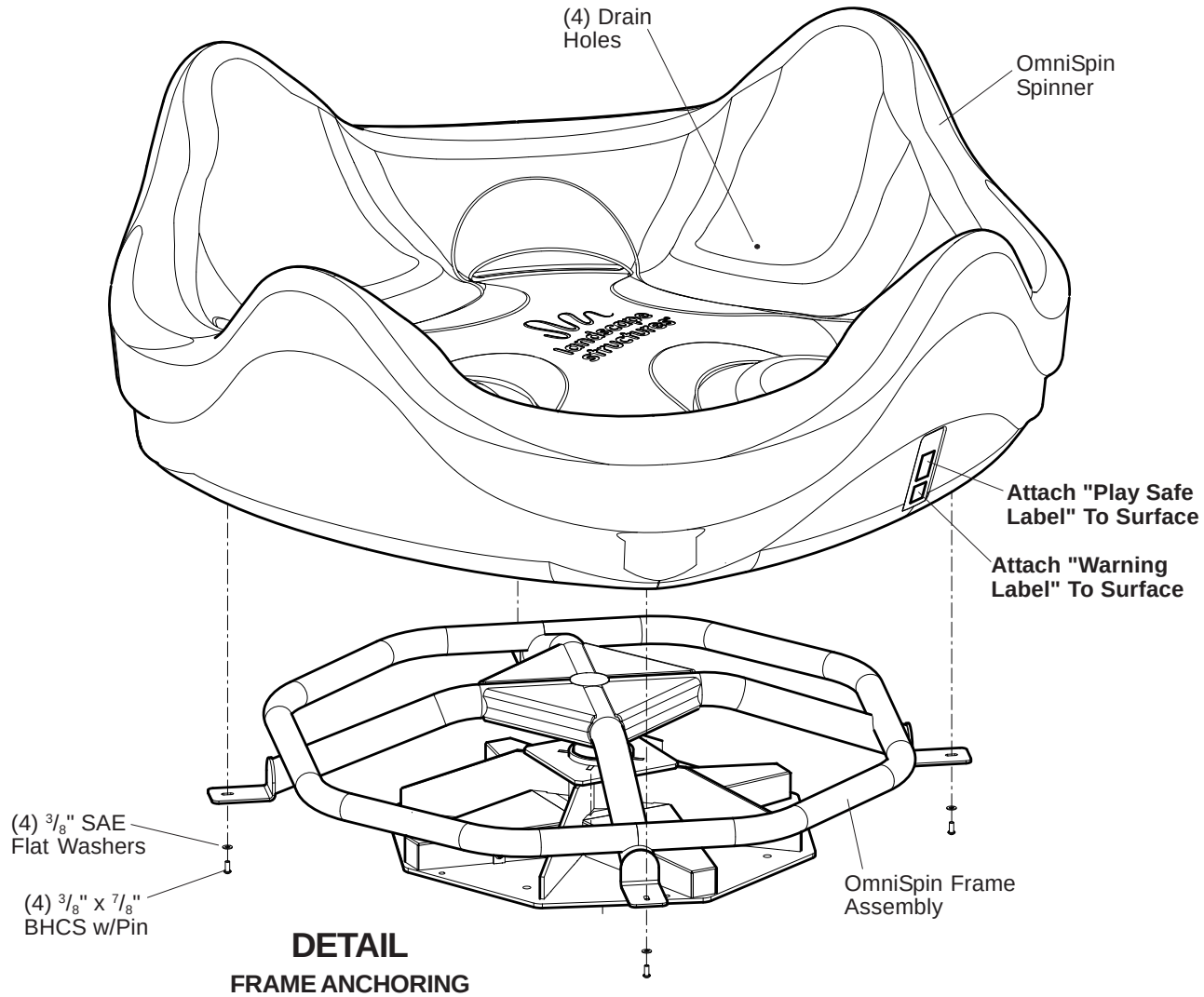
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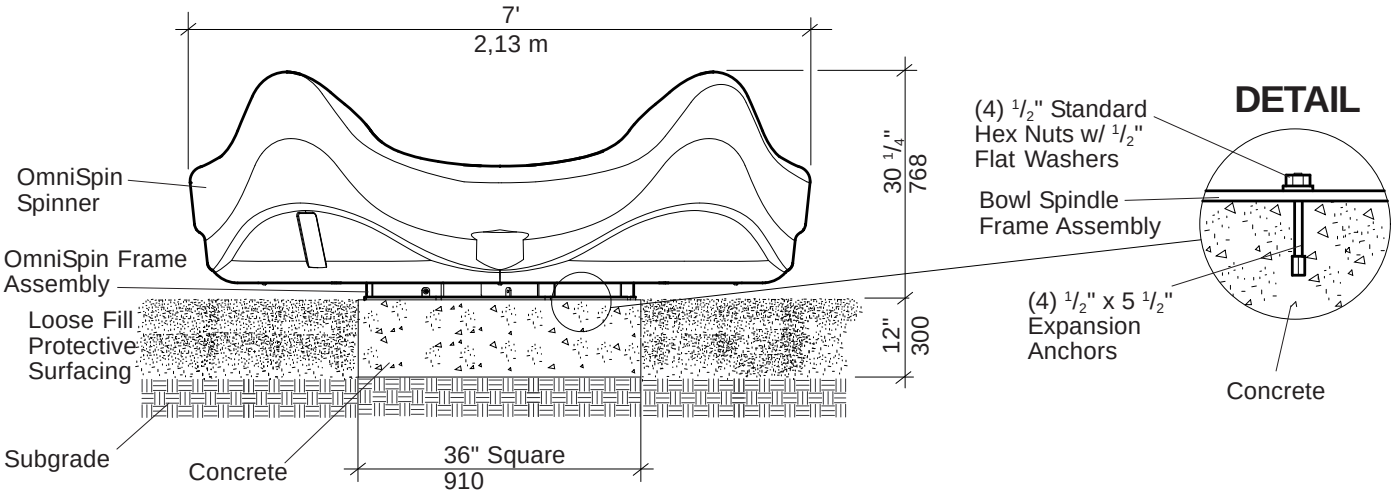
SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

18384300



DETAIL
FRAME ANCHORING



Kids in Motion 173591 OmniSpin® Spinner

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Kids in Motion 173591 OmniSpin® Spinner

Parts List

Part#	Description	Qty.
171060-00	OmniSpin Spinner, Specify Color	1
171061-00	OmniSpin Spinner Frame Assy., Black	1
183892-00	**OmniSpin Spinner Hardware Package**	1
100196-00	3/8" x 7/8" BHCS w/Pin, SST	4
100365-00	3/8" SAE Flat Washer, SST	4
156846-00	Play Safe Label, 2-12 Years	1
183064-00	Warning Label	1
175599-00	**4 Hole (SM) Hardware Package**	1
100271-00	1/2" x 5 1/2" Expansion Anchor w/Nut/Washer	4

SM = Surface Mount

Specifications

OmniSpin Spinner: Rotationally molded from U.V. stabilized linear low density polyethylene, color specified.

OmniSpin Spinner Frame Assembly: **(Frame)** Weldment comprised of 2.375" O.D. RS20 (.095"-.105" wall) galvanized steel tubing, 2.875" O.D. RS40 (.160"-.170" wall) galvanized steel tubing, 1/4" HR flat steel and 3 1/2" O.D. CF steel bar. **(Base)** Weldment comprised of 3/8" HRPO sheet steel and 3/16" HRPO sheet steel. **(Shock Covers)** 16 GA (.060") HRPO sheet steel. **(Crank Arms & Pins)** Fabricated from stainless steel. **(Shocks)** Gas shocks with fixed bearings. Finish: ProShield®, black in color.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: **(Direct Bury)** Concrete Footing - 2 People approx. 3 hours
Assembly - 3 People 1 hour

Concrete: **(Direct Bury)** 9 cu. ft.

Weight: 499 lbs.

Actual Size: 7' x 7' (2,13 m x 2,13 m)

Area Required: 19' x 19' (5,79 m x 5,79 m) ASTM

Fall Height: 18" (460 mm)

Installation Instructions

1) **(Direct Bury)** Build and pour concrete footing. Refer to Frame Anchoring Details. Allow concrete footing to cure for a minimum of 72 hours before continuing.

2) With OmniSpin Spinner frame in position, drill through 4 outside holes in OmniSpin Spinner frame 5 1/2" deep into concrete slab, using 1/2" masonry bit and hammer drill. Refer to the Frame Anchoring Detail.

3) Tap 1/2" x 5 1/2" expansion anchors into drilled holes and secure using 1/2" standard hex nuts with 1/2" flat washers. Refer to the Frame Anchoring Details.

4) Attach OmniSpin Spinner to OmniSpin Spinner frame, using 3/8" x 7/8" BHCS w/pin and 3/8" SAE flat washers.

5) Apply labels as shown.

6) Install protective surfacing before users are allowed to play on the component.

Specifications are subject to change without notice.

Eco #54517 Document #18384300 replaces #180818400. Added warning label to hardware package.

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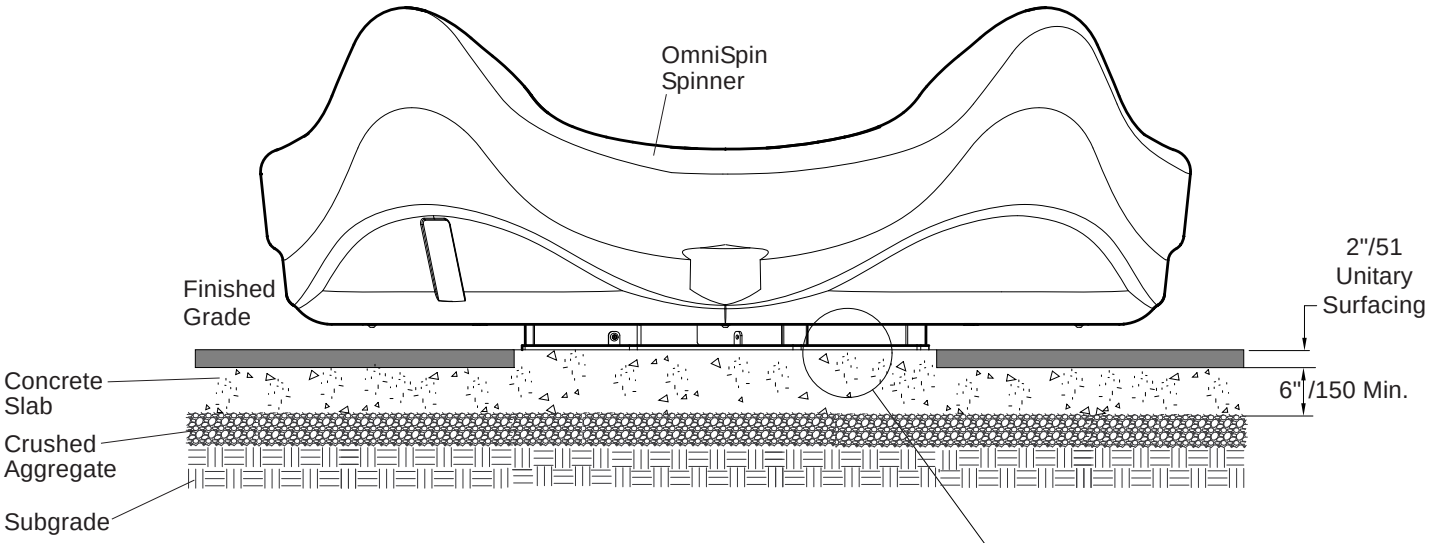
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SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

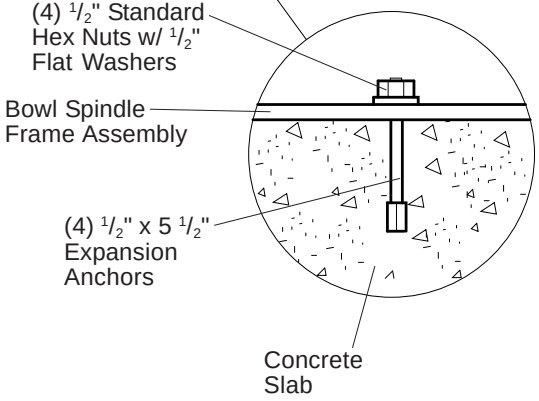
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Unitary Surfacing



NOTE: When using unitary surfacing on crushed aggregate, refer to Frame Anchoring Detail for loose fill protective surfacing.

DETAIL



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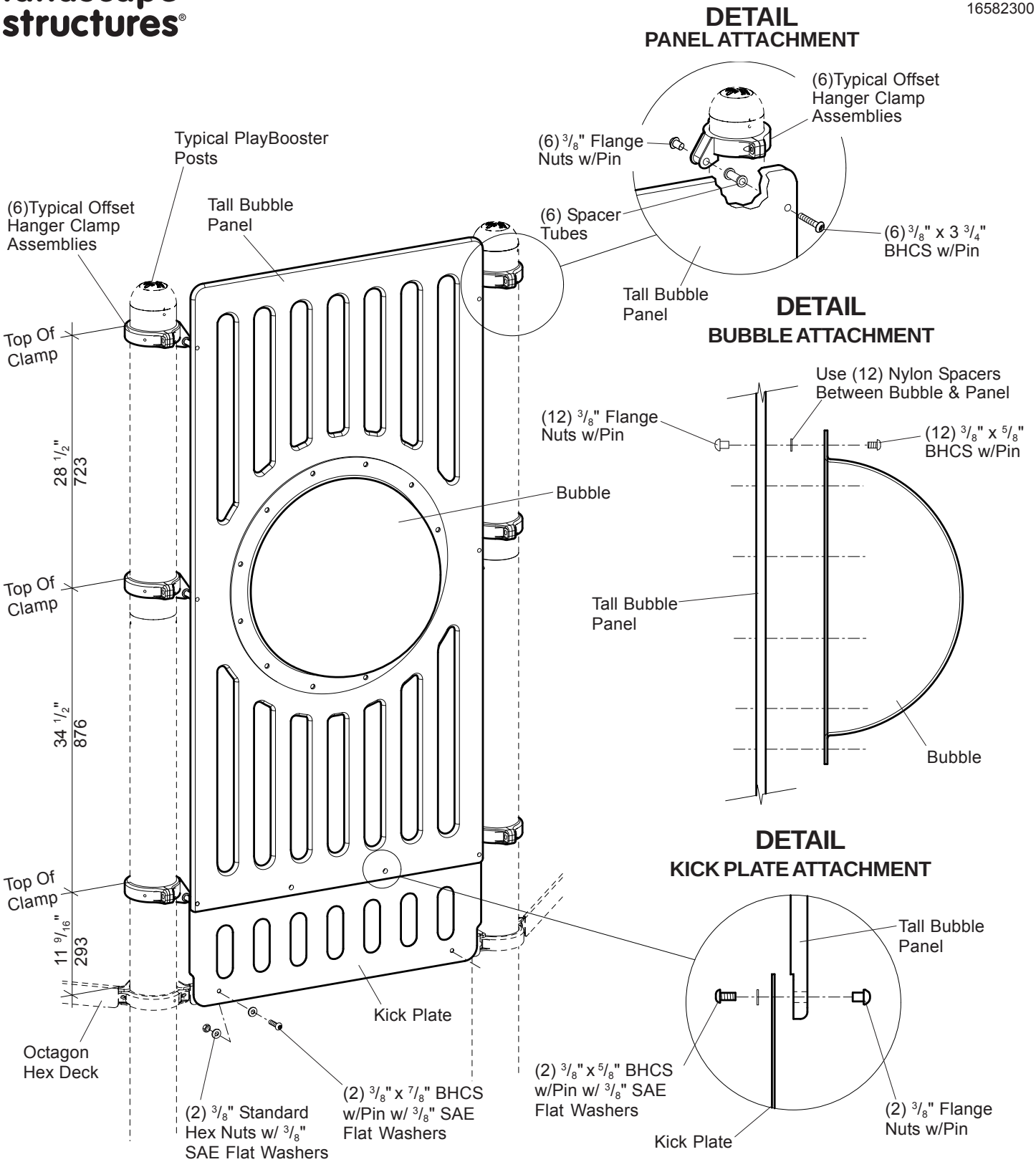
ISO 14001 CERTIFIED

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SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

16582300



PlayBooster® 165824 Tower Bubble Panel

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PlayBooster® 165824 Tower Bubble Panel

Parts List

Part#	Description	Qty.
100610	1/4" x 5/8" Drive Rivets, AL/SST	6
105327	5" Half Clamp, Specify Color	6
113468	Spacer Tube, Specify Color	6
113729	Offset Hanger Clamp, Specify Color	6
119883	Bubble	1
165820	Tall Bubble Panel, Specify Color	1
165821	Kick Plate, Specify Color	1
115385	**Bubble Hardware Package**	1
100195	3/8" x 5/8" BHCS w/Pin, SST	12
100353	3/8" Flange Nut w/Pin, SST	12
112501	Nylon Spacer	12
165822	**Tall Permalene Panel Hardware Package**	1
100195	3/8" x 5/8" BHCS w/Pin, SST	2
100196	3/8" x 7/8" BHCS w/Pin, SST	2
100198	3/8" x 1 1/8" BHCS w/Pin, SST	12
100327	3/8" Standard Hex Nut, SST	2
100351	3/8" Tee Nut, SST	12
100353	3/8" Flange Nut w/Pin, SST	8
100365	3/8" SAE Flat Washer, SST	6
124460	3/8" x 3 3/4" BHCS w/Pin, SST	6

Specifications

Permalene® Panel: Solid color panel measures 35 5/8" wide x 71" high, color specified.

Bubble: Vacuum formed .230" x 26 3/8" diameter clear polycarbonate.

Nylon Spacer: 3/8" I.D. nylon washer.

Spacer Tube: Made from 6061-T6 aluminum 7/8" O.D. x 1 11/16". Finish: ProShield®, color specified.

Kick Plate: Fabricated from 11 Ga. (.120"). Finish: ProShield, color specified.

Clamps: Cast aluminum. Finish: ProShield, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: 1 man hour
Weight: 72 lbs.

Installation Instructions

1) Attach bubble to tall bubble panel with panel laying on its backside. Position the (12) nylon spacers over the panel holes. Place the (12) 3/8" x 5/8" BHCS w/pin through the bubble holes, lower bubble onto panel and secure using 3/8" flange nuts w/pin from backside of panel.

2) Attach offset hanger clamps to posts at height shown, using half clamps and 3/8" x 1 1/8" BHCS w/pin and with 3/8" tee nuts. Refer To The Typical Offset Hanger Clamp Assembly Sheet.

3) Attach kick plate to the face of the deck using 3/8" x 7/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" standard hex nuts with 3/8" SAE flat washers, as shown.

4) Attach tall bubble panel to kick plate and offset hanger clamp assemblies using 3/8" x 3 3/4" BHCS w/pin, spacer tubes and 3/8" flange nuts w/pin. See Kick Plate Attachment Detail.

5) Attach tall bubble panel to offset hanger clamp assemblies using 3/8" x 3 3/4" BHCS w/pin, spacer tubes and 3/8" flange nuts w/pin. See Panel Attachment Detail.

6) Install protective surfacing before users are allowed to play on the structure.

Specifications are subject to change without notice.

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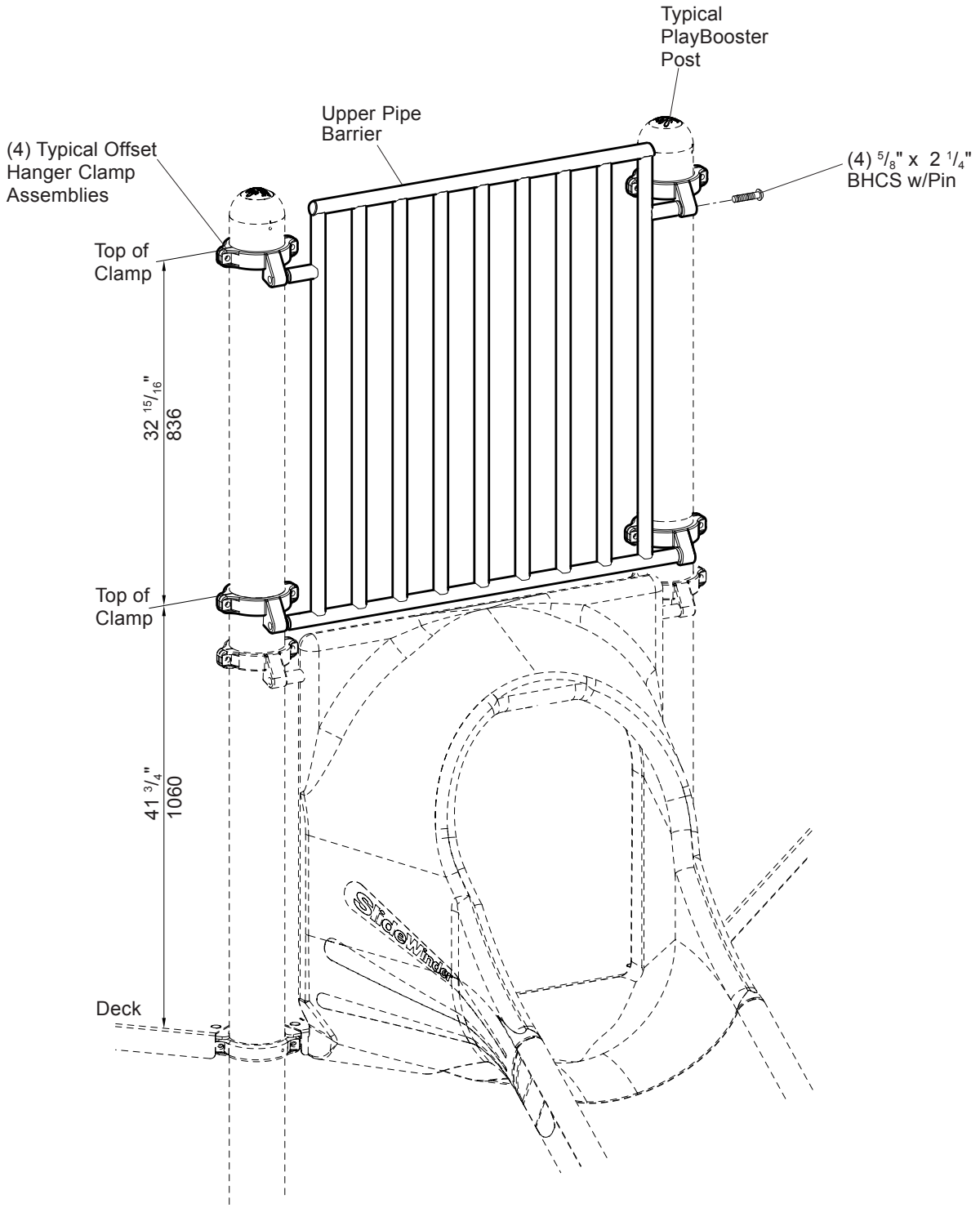
ISO 14001 CERTIFIED

ISO 9001 Certified

SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

16630000



PlayBooster® 166302 Upper Pipe Barrier

601 7TH STREET SOUTH, DELANO, MINNESOTA 55328-8605 888-574-4678 LSI Install Help 888-438-6574 LSI Direct 763-972-5200 Int. FAX (763) 972-3185

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PlayBooster® 166302 Upper Pipe Barrier

Parts List

Part#	Description	Qty.
100610	1/4" x 5/8" Drive Rivets, AL/SST	4
105327	5" Half Clamp, Specify Color	4
113729	Offset Hanger Clamp, Specify Color	4
166196	Upper Pipe Barrier, Specify Color	1
166470	**4- Clamp Barrier Hardware Package**	1
100198	3/8" x 1 1/8" BHCS w/Pin, SST	8
100203	5/8" x 2 1/4" BHCS w/Pin, SST	4
100351	3/8" Tee Nut, SST	8

Specifications

Upper Pipe Barrier: Weldment comprised of 1.315" O.D. RS20 (.080"-.090" wall) galvanized steel tube with 203 or 303 stainless steel welded inserts with 5/8" internal threads, and 12 GA. (.105") steel pipe cap. Finish: ProShield®, color specified.

Clamps: Cast aluminum. Finish: ProShield, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: 3/4 man hour
Weight: 49 lbs.

Installation Instructions

1) Attach the offset hanger clamps to the posts at height shown, using 5" half clamps and 3/8" x 1 1/8" BHCS w/pin with 3/8" tee nuts. Refer to the Typical Offset Hanger Clamp Spec Sheet.

2) Attach Upper Pipe Barrier to offset hanger clamp assemblies, using 5/8" x 2 1/4" BHCS w/pin.

3) Install drive rivets in half clamps per the Typical Offset Hanger Clamp Assembly Sheet.

4) Install protective surfacing before users are allowed to play on the structure.

Specifications are subject to change without notice.

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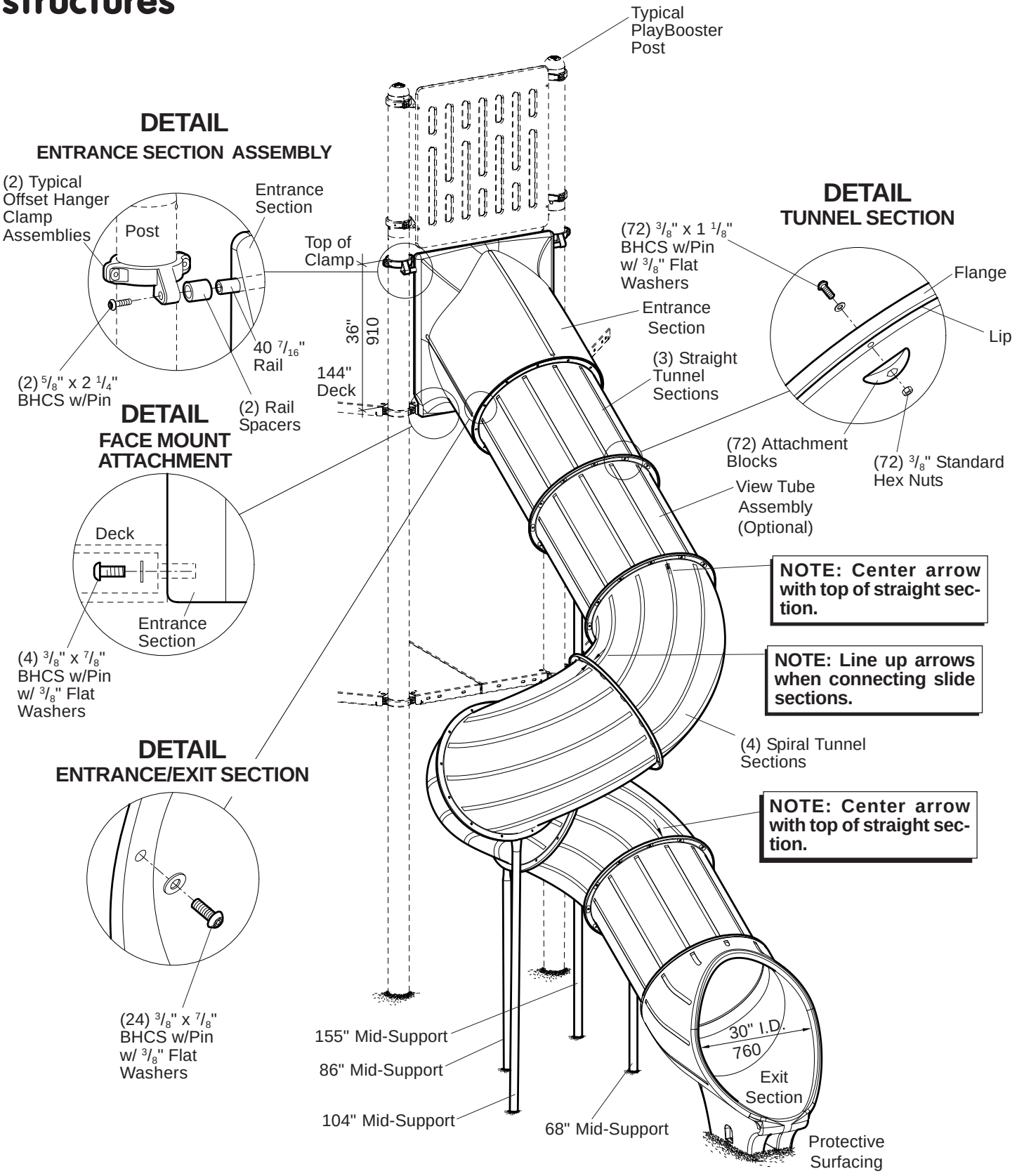
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ISO 9001 Certified

SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

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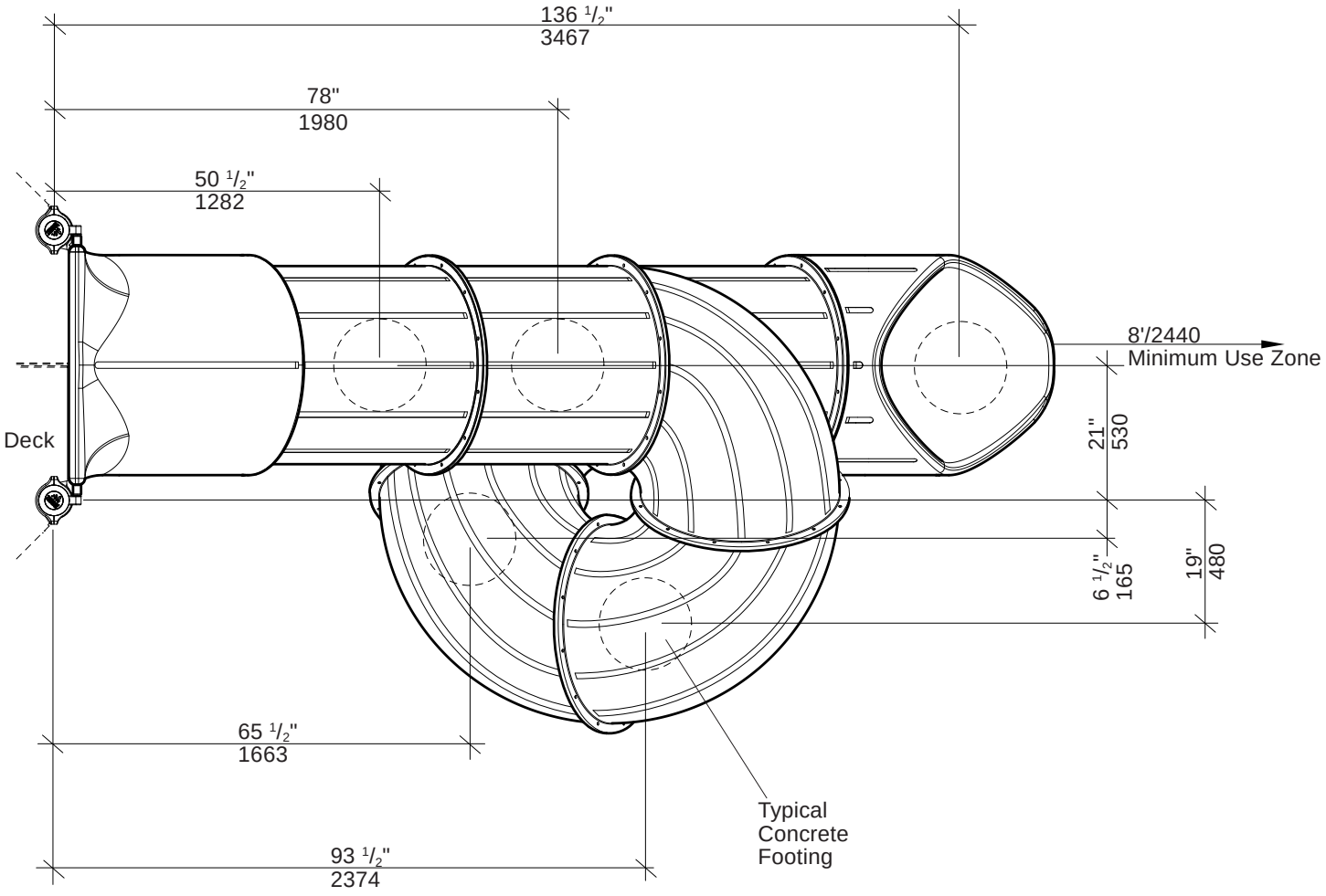
PlayBooster® 165827 Tower Turbo Twister™

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PLAV VIEW/FOOTING LAYOUT



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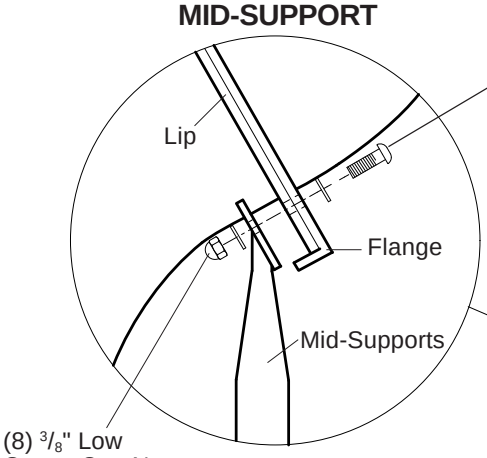
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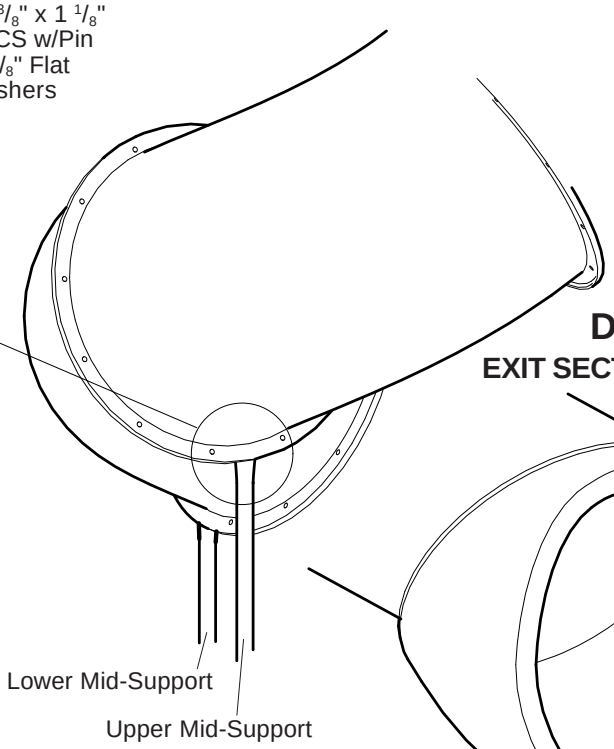
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SAFETY NOTE
Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

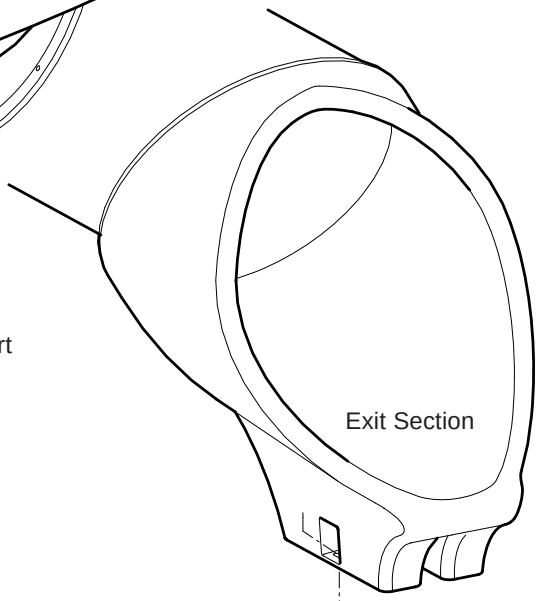
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DETAIL
MID-SUPPORT

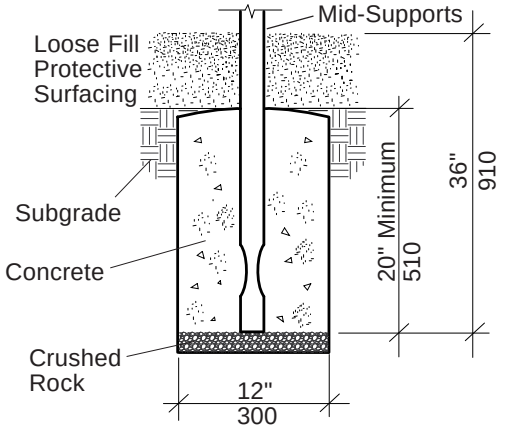




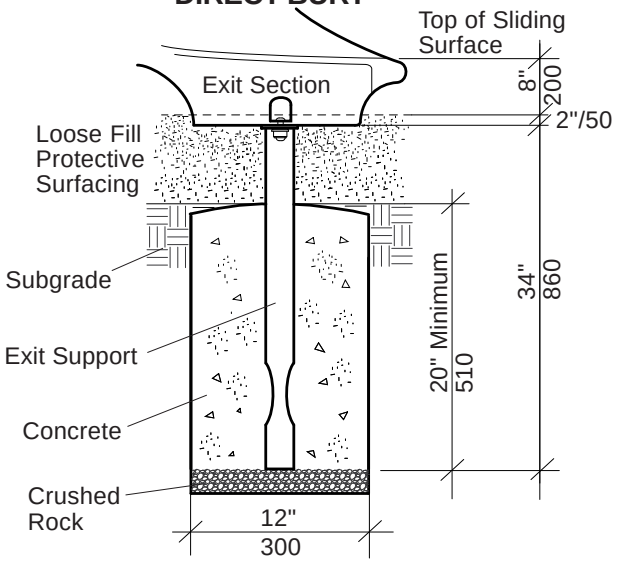
DETAIL
EXIT SECTION SUPPORT



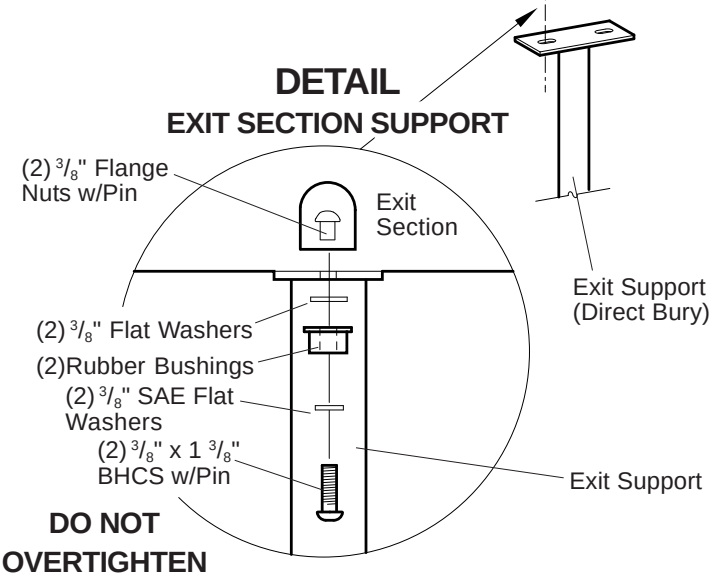
DETAIL
MID-SUPPORT DIRECT BURY



DETAIL
DIRECT BURY



DETAIL
EXIT SECTION SUPPORT



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165827 Tower Turbo Twister™

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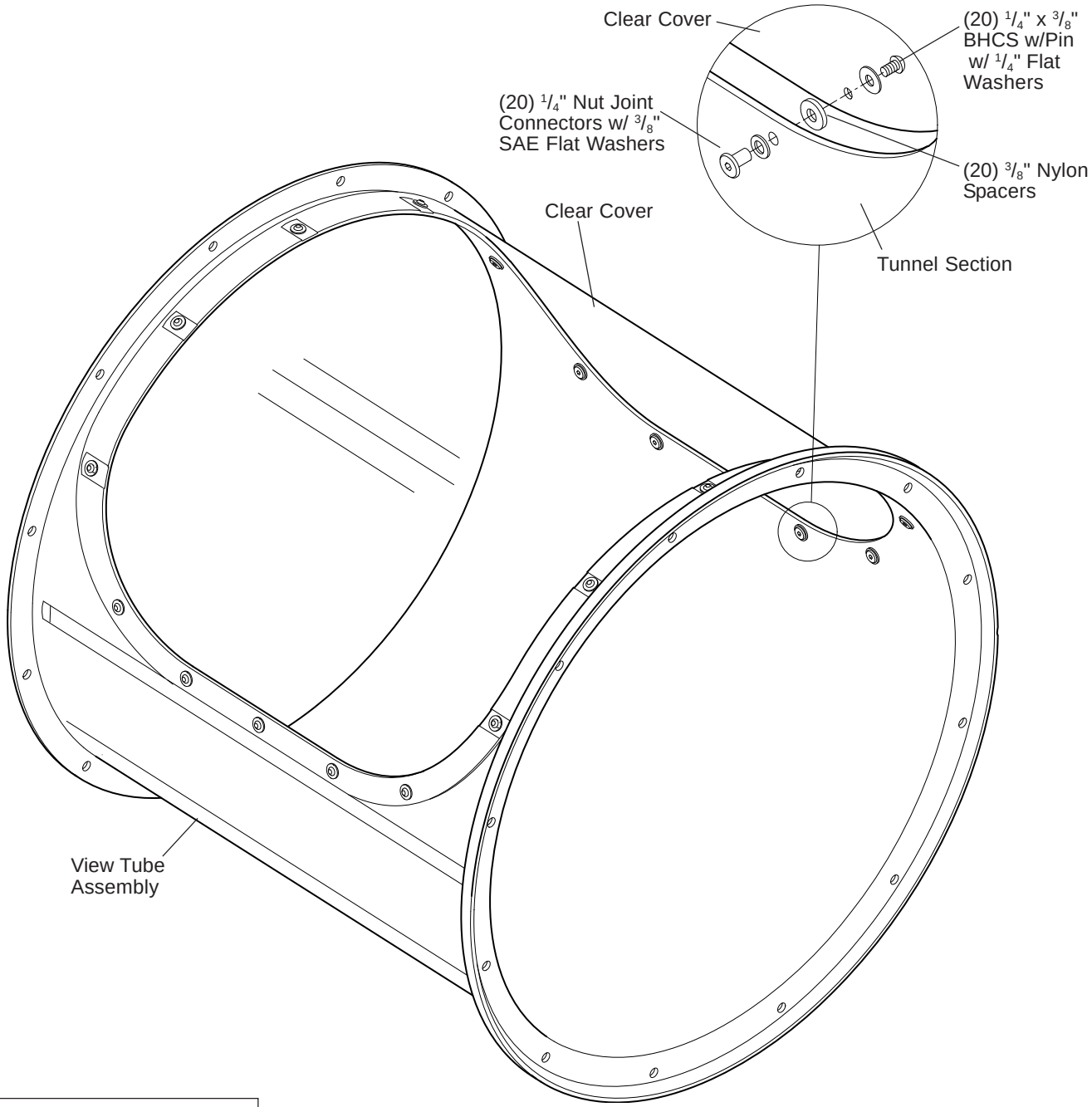
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DETAIL

COVER ATTACHMENT

(SHOWN FOR REFERNCE ONLY)



NOTE:
The View Tube is preassembled at factory and replaces 32" straight section. Install View Tube with clear cover up.

PlayBooster® Optional View Tube, 32" Section

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PlayBooster® 165827 Tower Turbo Twister™

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Parts List

Part#	Description	Qty.
100583-00	40 7/16" Rail, Specify Color	1
100610-00	1/4" x 5/8" Drive Rivet, AL/SST	2
105327-01	5" Half Clamp, Specify Color	2
111716-00	Exit Support (DB), Specify Color	1
113729-00	Offset Hanger Clamp, Specify Color	2
127687-00	Tunnel Slide Section, Specify Color	4
127694-00	Entrance Section, Specify Color	1
127695-00	Exit Section, Specify Color	1
127699-00	32" Straight Section, Specify Color	2/3
132443-00	Rail Spacers, Specify Color	2
133047-00	Attachment Block, Specify Color	72
166036-00	Tunnel Mid-Support 68", Specify Color	1
166080-00	Tunnel Mid-Support 86", Specify Color	1
166083-00	Tunnel Mid-Support 104", Specify Color	1
166074-00	Tunnel Mid-Support 155", Specify Color	1
125629-00	View Tube Assembly (Optional), Specify Color	1
111704-01	**Exit Support Hardware Package**	1
100353-00	3/8" Flange Nut w/Pin, SST	2
100362-00	3/8" Flat Washer, SST	2
100365-00	3/8" SAE Flat Washer, SST	2
111442-00	Rubber Bushing	2
113027-00	3/8" x 1 3/8" BHCS w/Pin, SST	2
121371-00	**Entrance/Deck Hardware Package**	1
100196-00	3/8" x 7/8" BHCS w/Pin, SST	4
100362-00	3/8" Flat Washer, SST	4
124342-00	**Rail Hardware Package**	1
100198-00	3/8" x 1 1/8" BHCS w/Pin, SST	4
100203-00	5/8" x 2 1/4" BHCS w/Pin, SST	2
100351-00	3/8" Tee Nut, SST	4
204573-00	**Turbo Twister 144" Deck Hardware Package**	1
100196-00	3/8" x 7/8" BHCS w/Pin, SST	24
100198-00	3/8" x 1 1/8" BHCS w/Pin, SST	80
100327-00	3/8" Standard Hex Nut, SST	72
100362-00	3/8" Flat Washer, SST	114
100349-00	3/8" Low Crown Cap Nut, SST	8

DB = Direct Bury

Specifications

Tunnel Section: Rotationally molded from U.V. stabilized linear low-density polyethylene, color specified.

Attachment Blocks: U.V. stabilized high-density polyethylene, color specified.

Mid-Support: Weldment comprised of 1.900" O.D. RS-20 (.090" - .100") galvanized steel tubing and 3/16" x 1 1/4" zinc plated steel strap. Finish: ProShield®, color specified.

Exit Support: Weldment comprised of 2.375" RS-20 (.095" - .105") galvanized steel tubing and 1/4" x 4" x 11 3/4" mounting plate. Finish: ProShield, color specified.

Rail: 1 1/8" O.D. 6061-T6 aluminum extrusion with 5/16" walls. Finish: ProShield, color specified.

Clear Cover: Drape formed .177" x 30" x 47 3/8" clear polycarbonate.

Rail Spacers: Fabricated from 1.3125 O.D. x 16 Ga. (.065) steel tubing. Finish: ProShield, color specified.

Clamps: Cast aluminum. Finish: ProShield, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: Approx. 4 hours with 2 people
Concrete Req.: Approx. 9 cu. ft.
Area Req.: 11' (3,35 m) minimum use zone at exit
Weight: 486 lbs.
498 lbs. w/ one view tube
Fall Height: 12' (3,65 m) (Deck Height)

Installation Instructions

1) Dig footing holes spaced as shown.

2) Insert 40 7/16" rail through top of entrance section, place rail spacers over each end of the 40 7/16" rail and attach to offset hanger clamps using 5/8" x 2 1/4" BHCS w/Pin.

3) Attach entrance section to the face of the deck using 3/8" x 7/8" BHCS w/Pin with 3/8" flat washers. Refer to the Face Mount Attachment Detail.

4) Attach offset hanger clamps to posts, using 5" half clamps, 3/8" x 1 1/8" BHCS w/Pin and 3/8" tee nuts. Refer to the Typical Offset Hanger Clamp Spec Sheet.

5) Fasten straight tunnel section to the entrance section using 3/8" x 7/8" BHCS w/Pin with 3/8" flat washers. Refer to the Entrance/Exit Section Detail.

6) Fasten tunnel slide sections together, using 3/8" x 1 1/8" BHCS w/Pin with 3/8" flat washers and attachment blocks with 3/8" standard hex nuts on regular tunnel section side. **NOTE:** *Line up arrows when connecting slide sections.*

7) Attach mid-supports to the slide sections shown, using 3/8" x 1 1/8" BHCS w/Pin with 3/8" flat washers and 3/8" low crown cap nuts with 3/8" flat washers. Refer to the Mid-Support Detail.

8) Fasten exit section to tunnel slide sections,using 3/8" x 7/8" BHCS w/ Pin with 3/8" flat washers. Refer to the Entrance/Exit Section Detail.

9) Attach exit support to exit section using 3/8" x 1 3/8" BHCS w/Pin, 3/8" SAE flat washers, rubber bushings, 3/8" flat washers and 3/8" flange nuts w/Pin. **NOTE:** *Attach bolts in the center of the slots to allow for expansion and contraction. Snug bolts down only, do not overtighten.* Refer to the Exit Section Support Detail.

10) With supports plumb, pour concrete footings. Allow concrete footings to cure a minimum of 72 hours before users are allowed to play on the structure.

11) Install protective surfacing before users are allowed to play on the structure.

Specifications are subject to change without notice.

Eco #0100187 Document #20454600 replaces #16583000. Replaced turbo twister hardware package.

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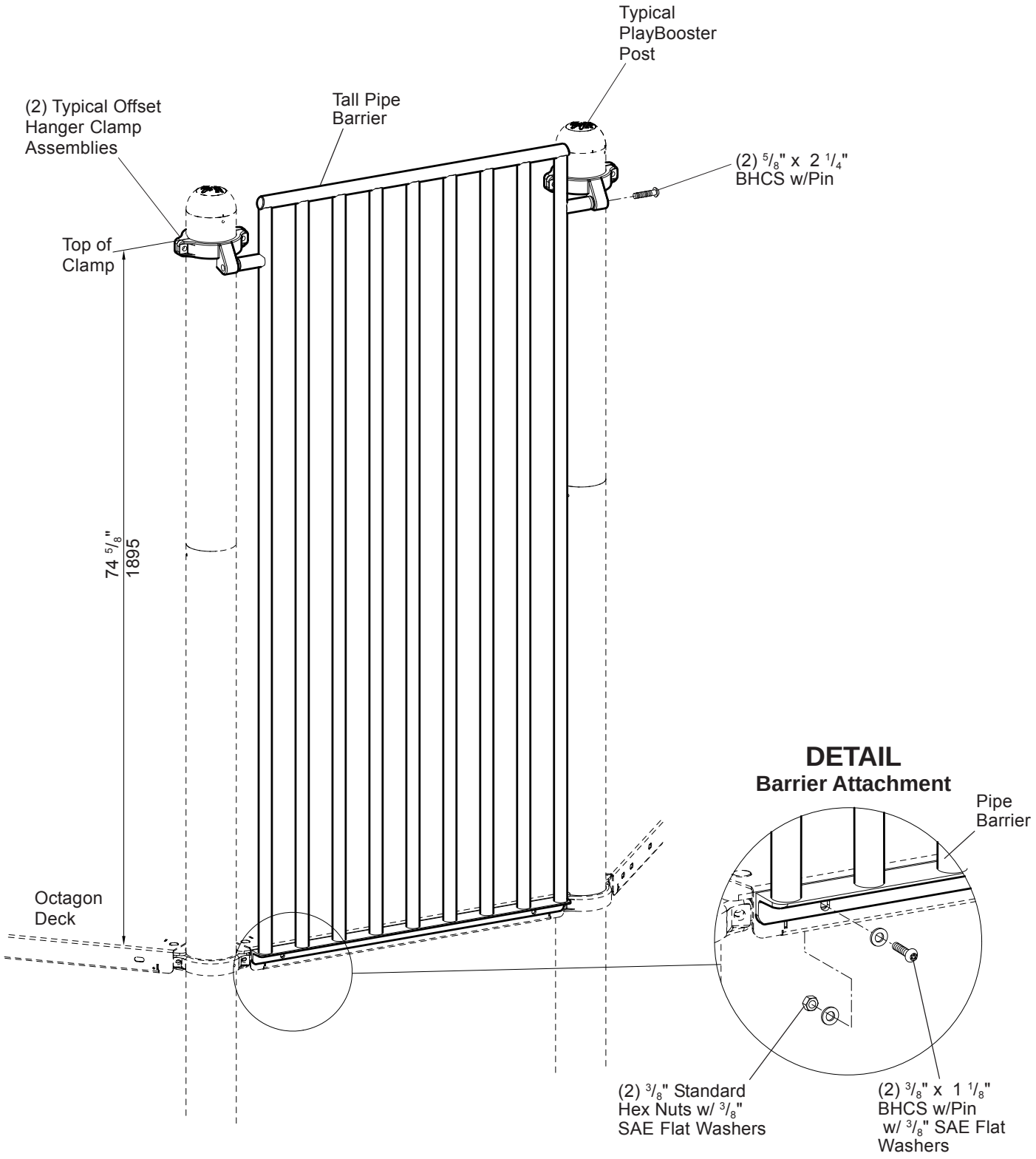
ISO 14001 CERTIFIED

ISO 9001 Certified

SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

16596100



PlayBooster®

165960 Tower Pipe Barrier

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PlayBooster® 165960 Tower Pipe Barrier

Parts List

Part#	Description	Qty.
100610	1/4" x 5/8" Drive Rivets, AL/SST	2
105327	5" Half Clamp, Specify Color	2
113729	Offset Hanger Clamp, Specify Color	2
165887	Tall Pipe Barrier, Specify Color	1
114309	**Rail Hardware Package**	1
100198	3/8" x 1 1/8" BHCS w/Pin, SST	4
100203	5/8" x 2 1/4" BHCS w/Pin, SST	2
100351	3/8" Tee Nut, SST	4
100610	1/4" x 5/8" Drive Rivet, AL/SST	2
132743	**Deck Mount Barrier Hardware Package**	1
100198	3/8" x 1 1/8" BHCS w/Pin, SST	2
100327	3/8" Standard Hex Nut, SST	2
100365	3/8" SAE Flat Washer, SST	4

Specifications

Tall Pipe Barrier: Weldment comprised of 1.315" O.D. RS20 (.080"-.090" wall) galvanized steel tube with 203 or 303 stainless steel welded inserts with 5/8" internal threads, 1 1/2" x 2" x 3/16" steel angle and 12 GA. (.105") steel pipe cap. Finish: ProShield®, color specified.

Clamps: Cast aluminum. Finish: ProShield, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: 3/4 man hour
Weight: 82 lbs.

Installation Instructions

1) Attach the Tall Pipe Barrier to the face of the deck using 3/8" x 1 1/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" standard hex nuts with 3/8" SAE flat washers. Refer to the Barrier Attachment Detail.

2) Attach the offset hanger clamps to posts, using 5" half clamps and 3/8" x 1 1/8" BHCS w/pin with 3/8" tee nuts. Refer to the Typical Offset Hanger Clamp Spec Sheet.

3) Attach Tall Pipe Barrier to offset hanger clamp assemblies, using 5/8" x 2 1/4" BHCS w/pin.

4) Install protective surfacing before users are allowed to play on the structure.

Specifications are subject to change without notice.

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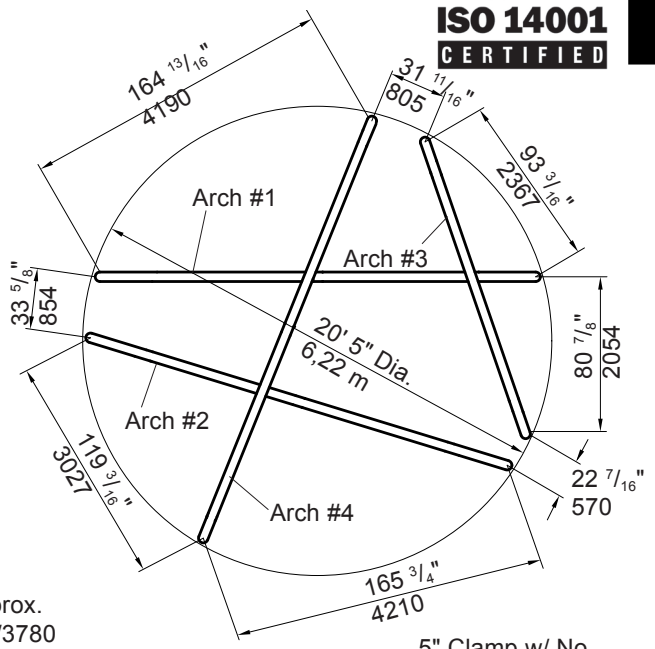
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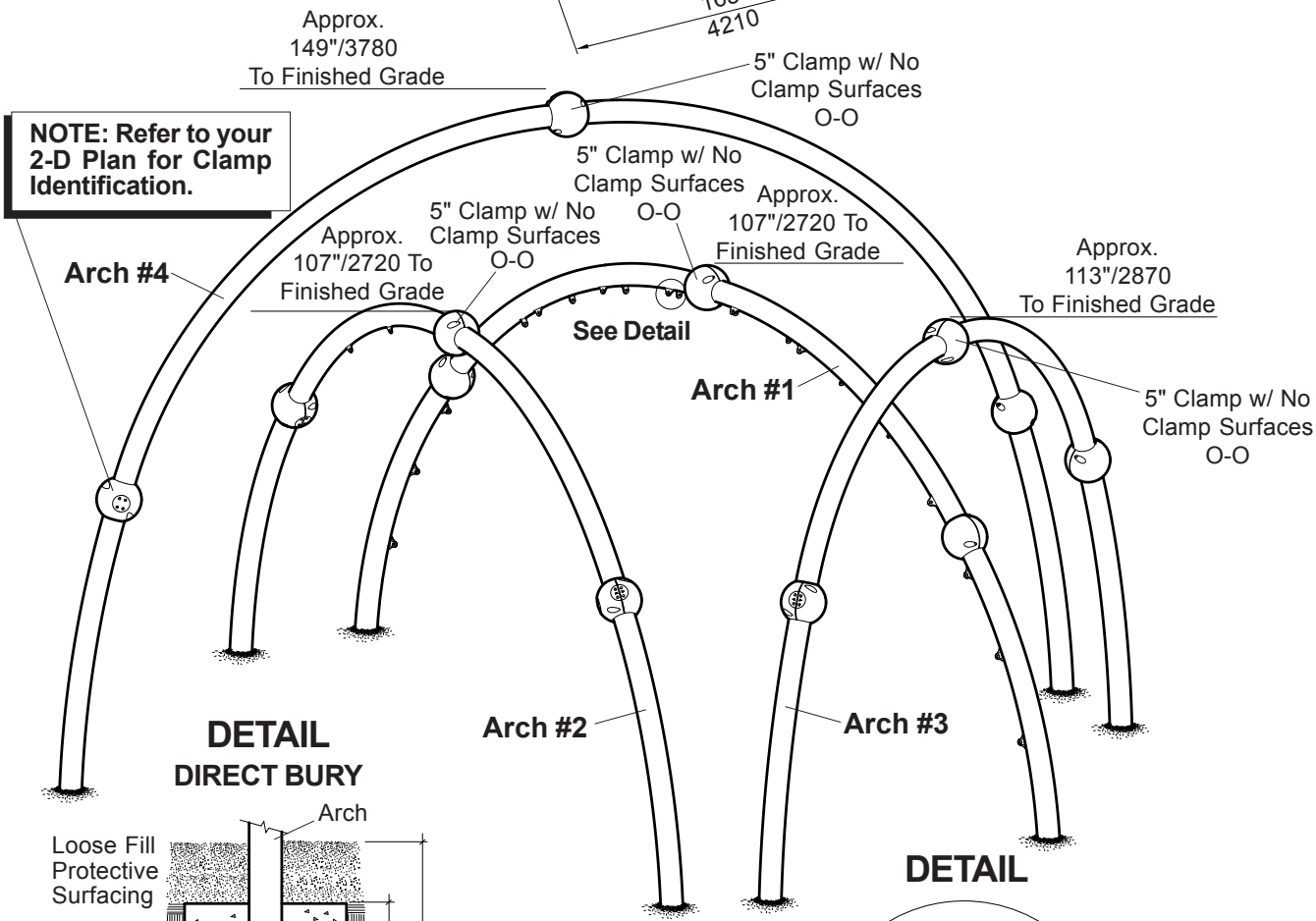
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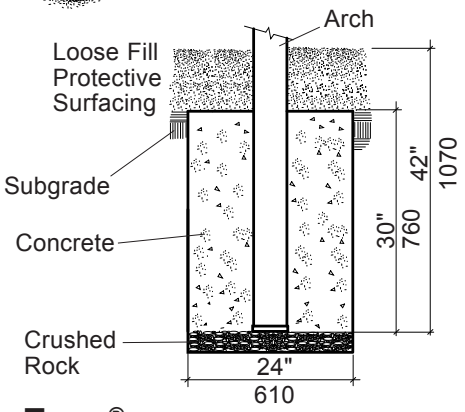
Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

PLAN VIEW

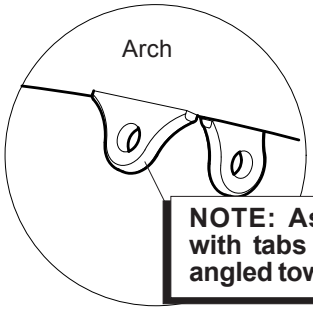




DETAIL
DIRECT BURY



DETAIL



NOTE: Assemble structure with tabs on arches #1 & #2 angled towards each other.

Arches

Evos®

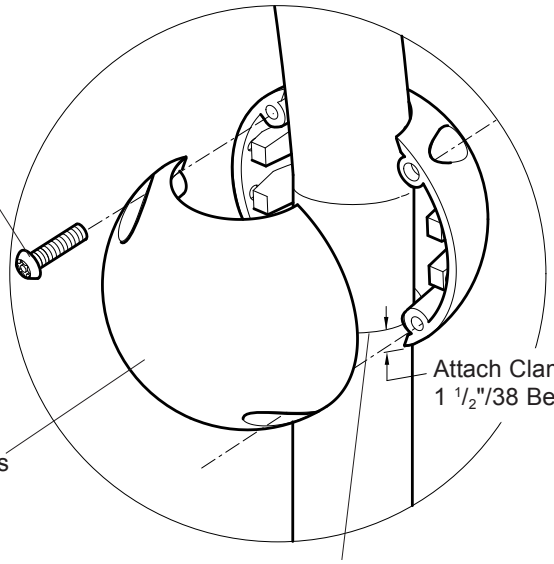
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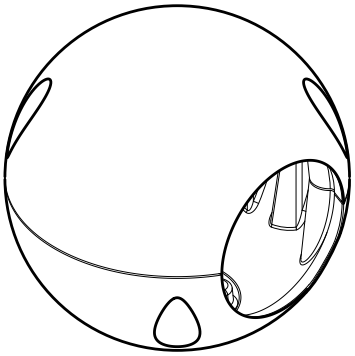
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Document #16814600

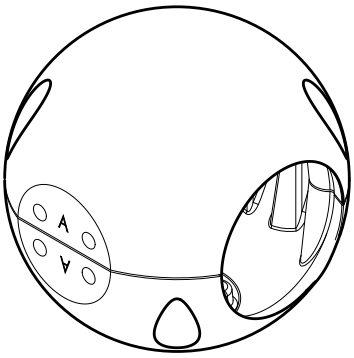
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DETAIL
5" CLAMP ATTACHMENT

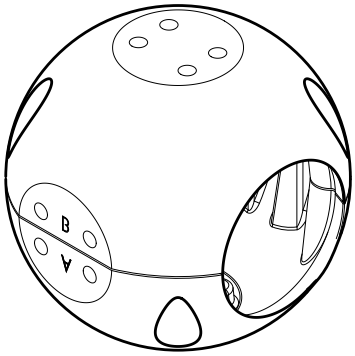




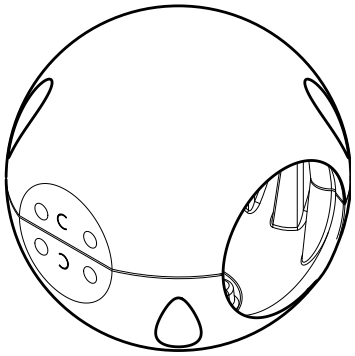
5" Clamp w/ No
Clamp Surfaces
O-O



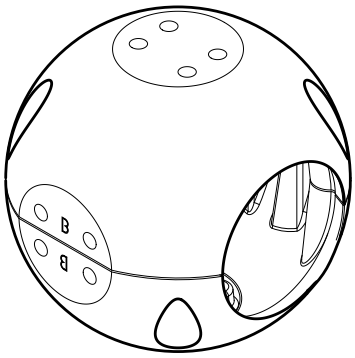
5" Clamp w/ 1
Clamp Surface
A-A



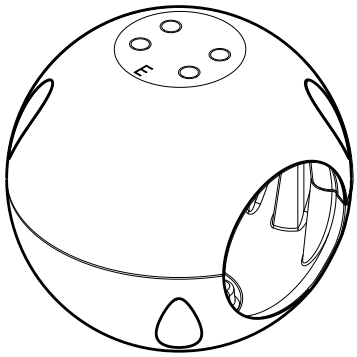
5" Clamp w/ 2 Clamp
Surfaces @ 90°
A-B



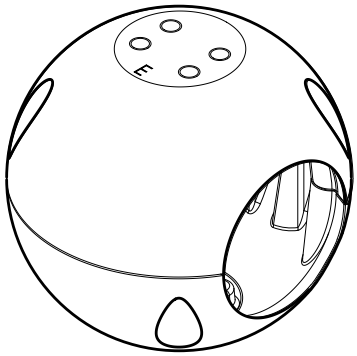
5" Clamp w/ 2 Clamp
Surfaces @ 180°
C-C



5" Clamp
w/ 3 Clamp Surfaces
B-B



5" Clamp
w/ 1 Clamp Surface
O-E



5" Clamp w/ 2 Clamp
Surfaces @ 180°
E-E

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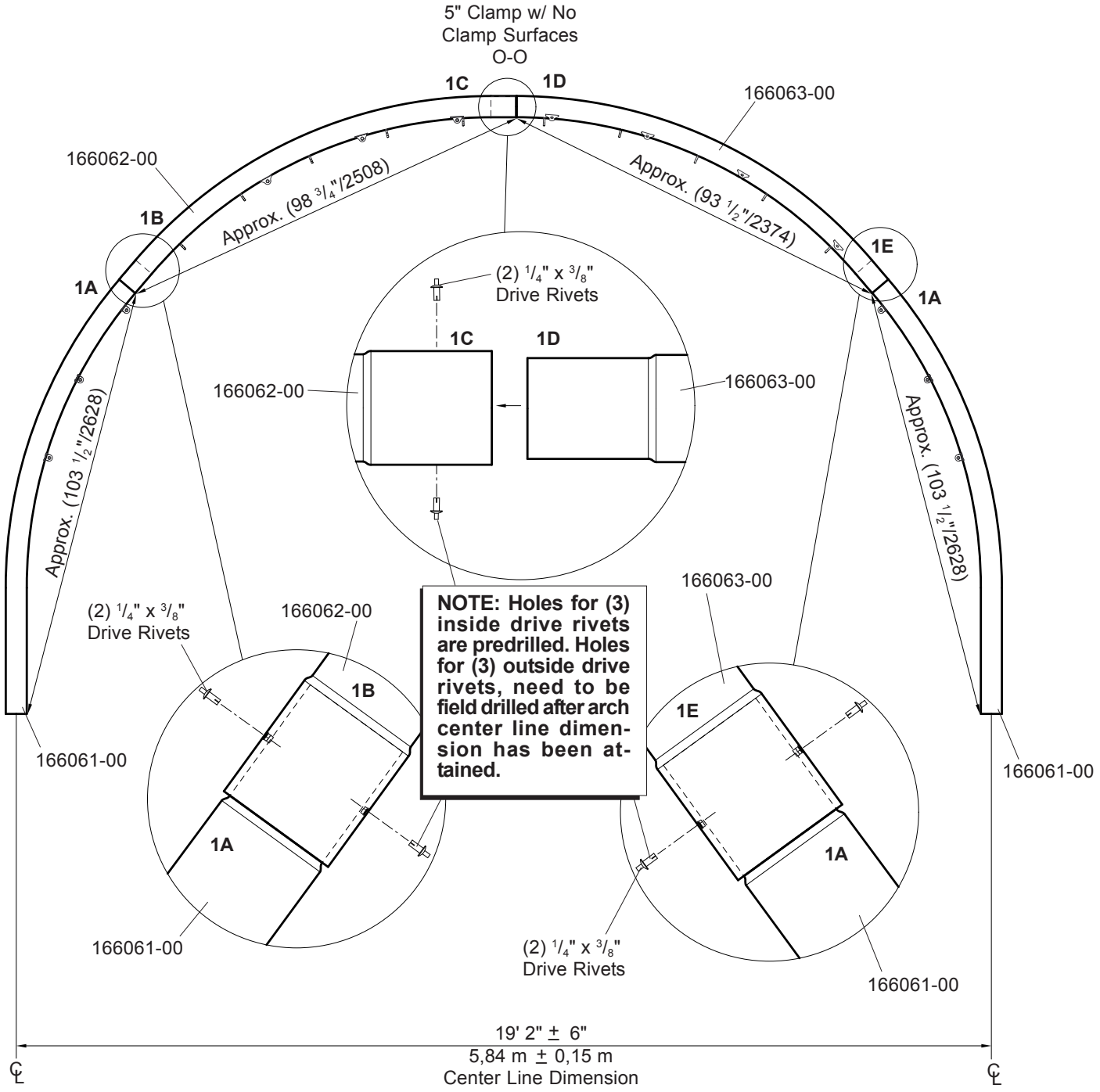
5" Clamps

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ARCH #1 ASSEMBLY



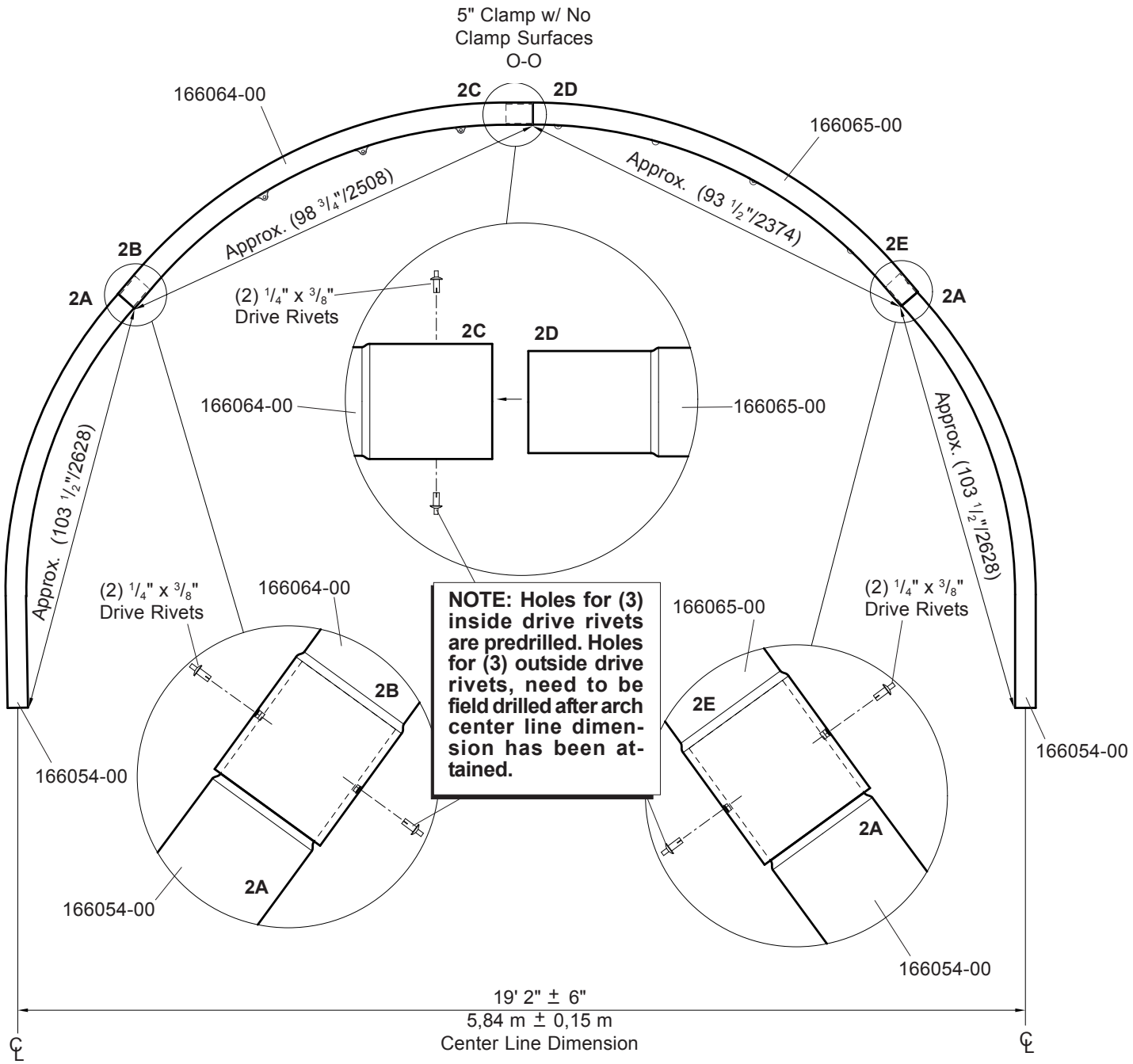
NOTE: Holes for (3) inside drive rivets are predrilled. Holes for (3) outside drive rivets, need to be field drilled after arch center line dimension has been attained.

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ARCH #2 ASSEMBLY



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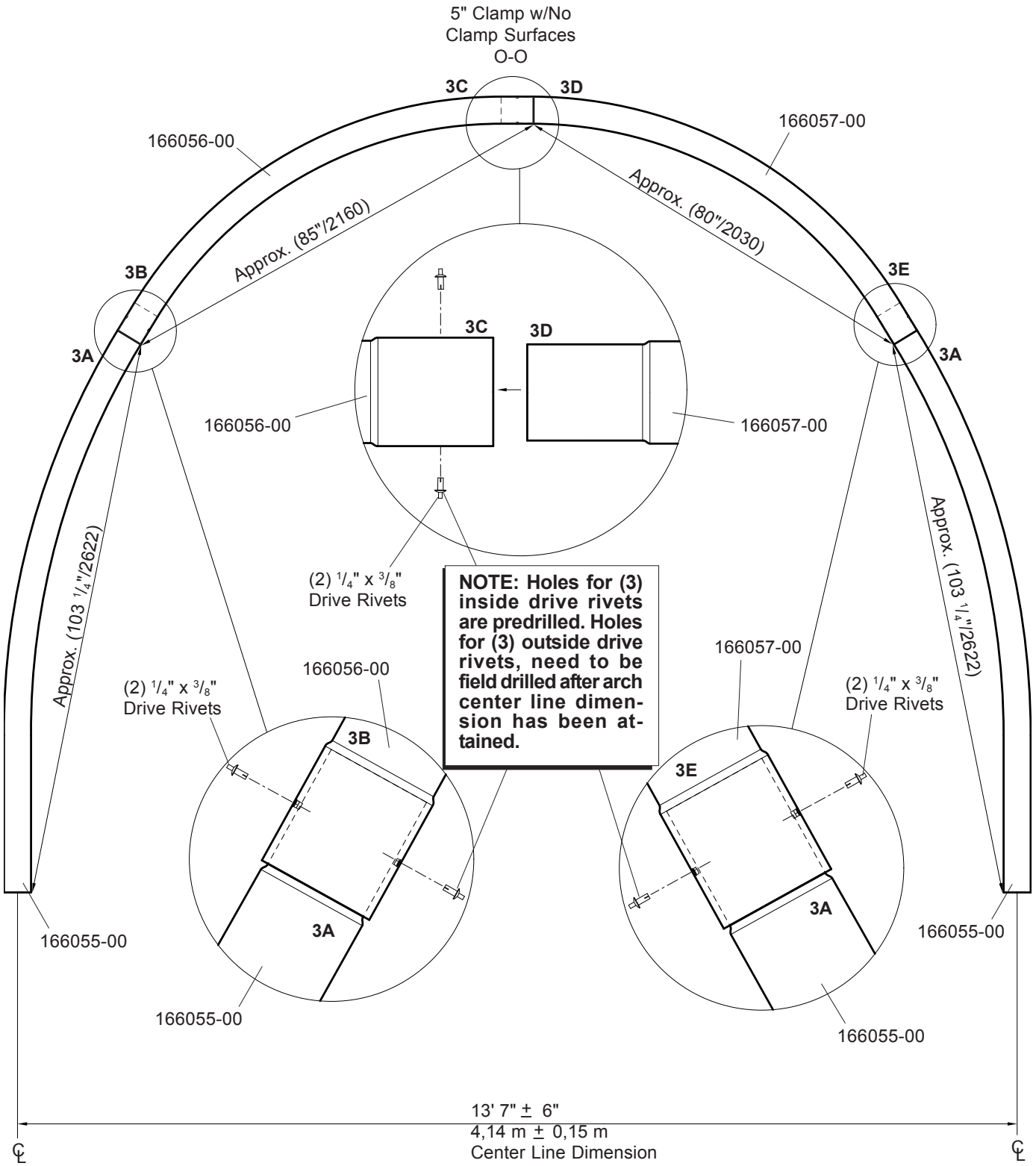
Arch #2

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ARCH #3 ASSEMBLY



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Arch #3

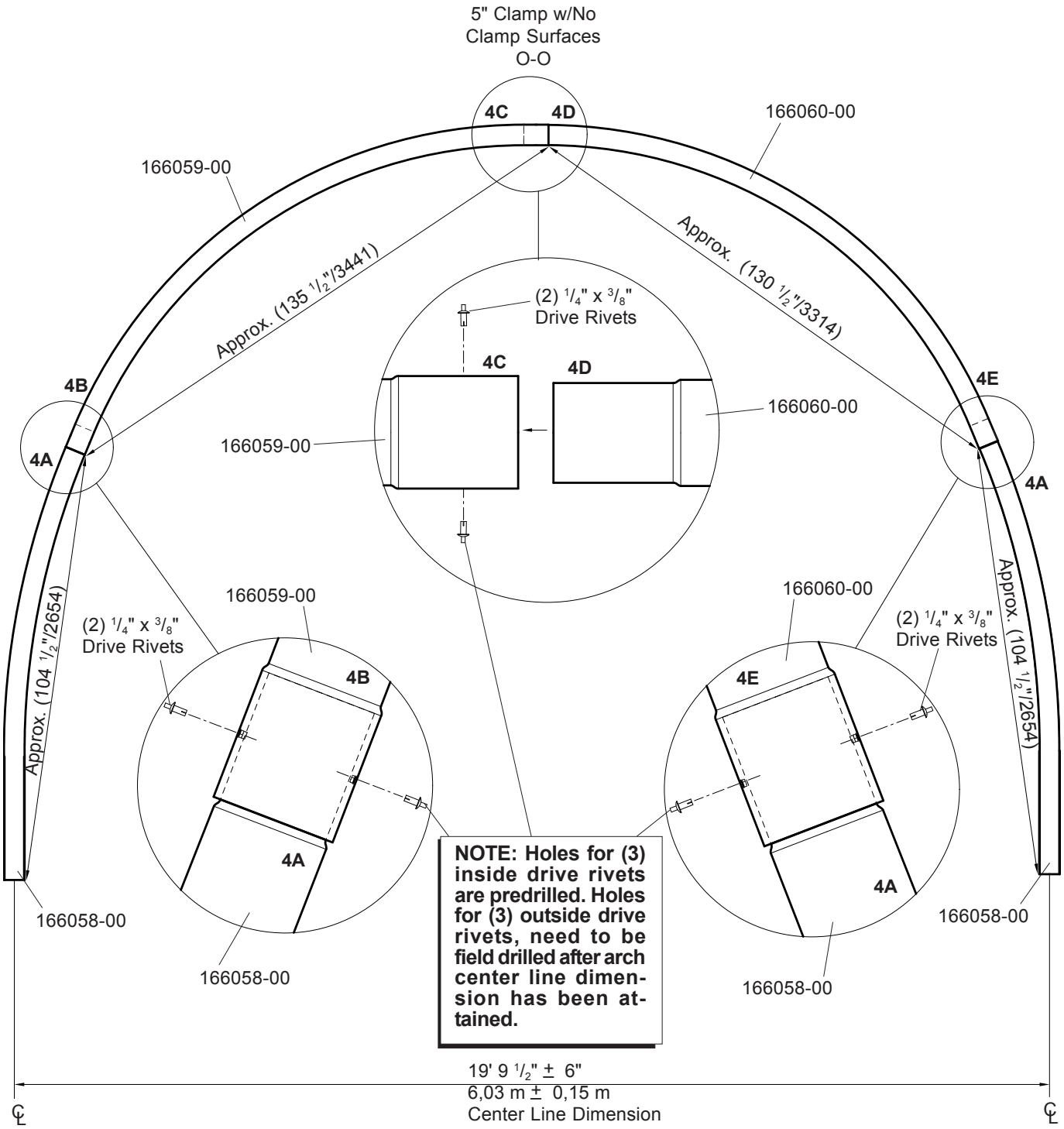
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ARCH #4 ASSEMBLY



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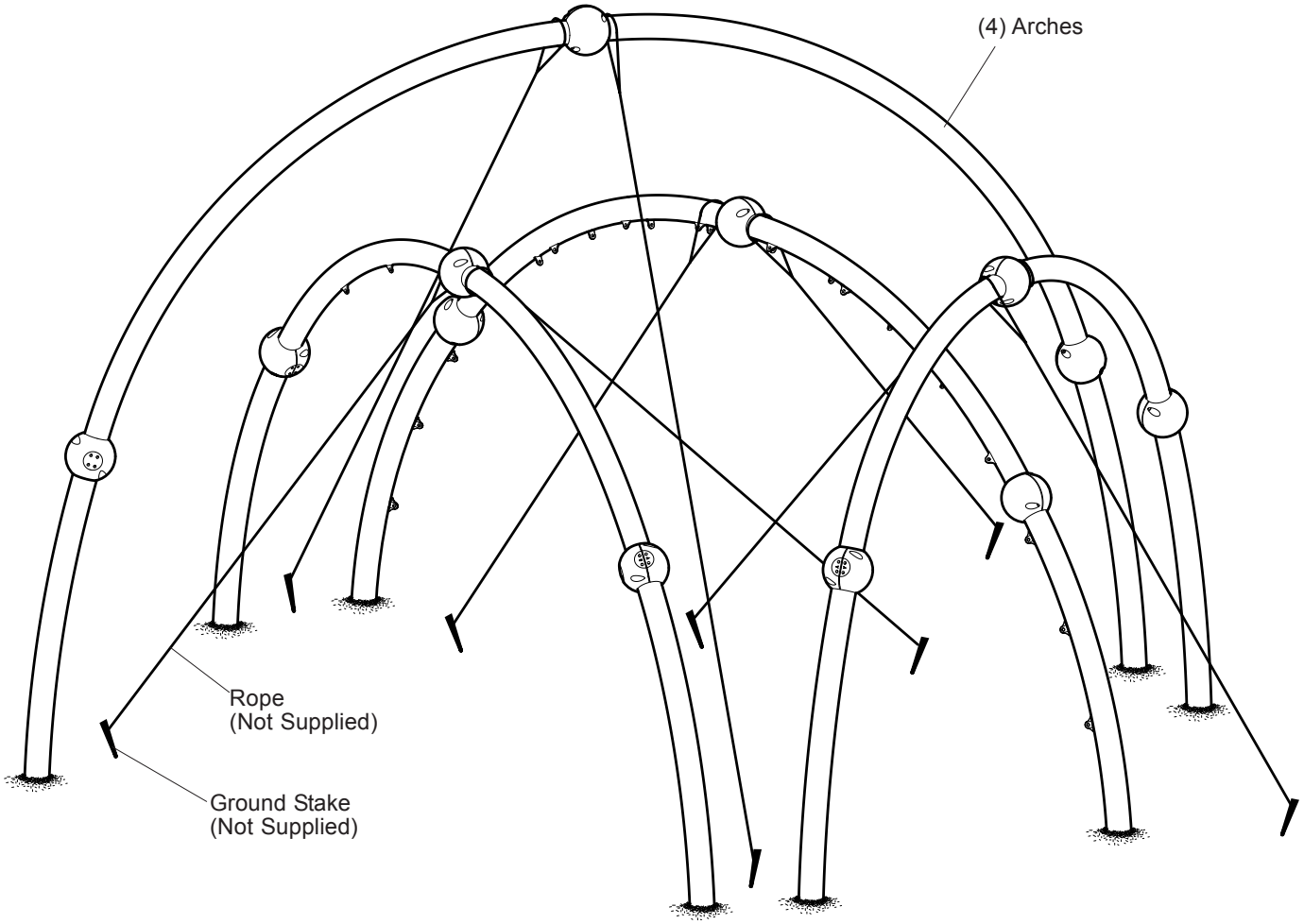
Arch #4

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DETAIL
ROPE/GROUND STAKES



NOTE: ***Rope may be used to tie off the arches. The use of rope will help keep the arches in plumb position, while attaching outriggers. Tie a rope (not supplied) on each side of the top 5" clamp. The rope should be long enough to attach to a ground stake (not supplied). When the arches are in plumb position, pull the ropes tight, and attach to ground stakes.***

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J:\SPECS\168\16814600.P65

Evos® Arches

Parts List

Part#	Description	Qty.
166061-00	Arch 1 A With Net Tabs, Specify Color	*
166054-00	Arch 2 A, Specify Color	*
166062-00	Arch 1B/1C With Tabs, Specify Color	*
166063-00	Arch 1D/1E With Tabs, Specify Color	*
166064-00	Arch 2B/2C With Tabs, Specify Color	*
166065-00	Arch 2D/2E With Tabs, Specify Color	*
166055-00	Arch 3A, Specify Color	*
166056-00	Arch 3B/3C, Specify Color	*
166057-00	Arch 3D/3E, Specify Color	*
166058-00	Arch 4A, Specify Color	*
166059-00	Arch 4B/4C, Specify Color	*
166060-00	Arch 4D/4E, Specify Color	*
166271-00	5" Clamp A, Specify Color	*
166272-00	5" Clamp B, Specify Color	*
166273-00	5" Clamp C, Specify Color	*
166275-00	5" Clamp E, Specify Color	*
166276-00	5" Clamp O, Specify Color	*
100611-00	1/4" x 3/8" Drive Rivet, AL/SST	*
127551-00	5/8" x 1 1/2" BHCS w/Pin, SST	*

*** = Quantity Determined By Your Order**

Specifications

5" Clamps: Cast from 356-T6 aluminum. Finish: ProShield®, color specified.

5" Arch: Steel arch is manufactured from 5" O.D. galvanized tubing with a wall thickness of .120". Finish: ProShield, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: 4 People minimum approx. 6 man hours
Concrete Req.: Approx. 2.25 cu. yds.
Area Req.: 6' (1,83 m) minimum use zone
Weight: 98 lbs.
Fall Height: 75"

Installation Instructions

1) **(Direct Bury) Refer to the Site Plan for footing locations.**

   IMPORTANT! Do not pour concrete footings until all outriggers have been attached to 5" clamps with surfaces.

2) An Evos structure consists of (2-4) arch assemblies, numbered #1 through #4. Each arch assembly consists of (4) arches with part numbers to ensure the arch is assembled correctly.

3) Lay (4) arches on a flat surface. Using the part numbers shown on the detail as a guide, slide arches together as shown. Level arches. **NOTE:** *Lay arches on cardboard to prevent arches from being scratched during assembly.*

4) Line up (3) holes on inside of arches. Insert 1/4" x 3/8" drive rivets into holes and hammer rivet pins in until it is flush with head.

5) Measure center line dimension of lower arches. Position lower arches as needed to attain center line dimension. Drill through (3) outer holes in arches with 1/4" of "F" (only) drill bit. Insert 1/4" x 3/8" drive rivets into holes and hammer rivet pins in until it is flush with head.

6) Using the arch assembly detail as a guide, attach (3) 5" clamps to each arch using 5/8" x 1 1/2" BHCS w/pin (with gray anti-sieze). **NOTE:** *Refer to your 2-D Plan for clamp identification.* The 5" clamps will be positioned on top of the drive rivets and arch ends. Refer to the arch assembly details for proper location of each clamp. **NOTE:** *The 5" clamps with clamp surfaces, will need to be adjusted when outriggers are attached to the structure.*

7) Place the fully assembled arches in footing holes. Refer to the Site Plan for proper location of arches. **NOTE:** *Rope may be used to tie off the arches. The use of rope will help keep the arches in plumb position, while attaching outriggers. Tie a rope (not supplied) on each side of the top 5" clamp. The rope should be long enough to attach to a ground stake (not supplied). When the arches are in plumb position, pull the ropes tight, and attach to ground stakes. Refer to sheet 4.*

Specifications are subject to change without notice.

Eco #53850 Document 16814600 replaces 16620200. Changed 5" clamp part numbers.
6/16/10 Changed arch descriptions.

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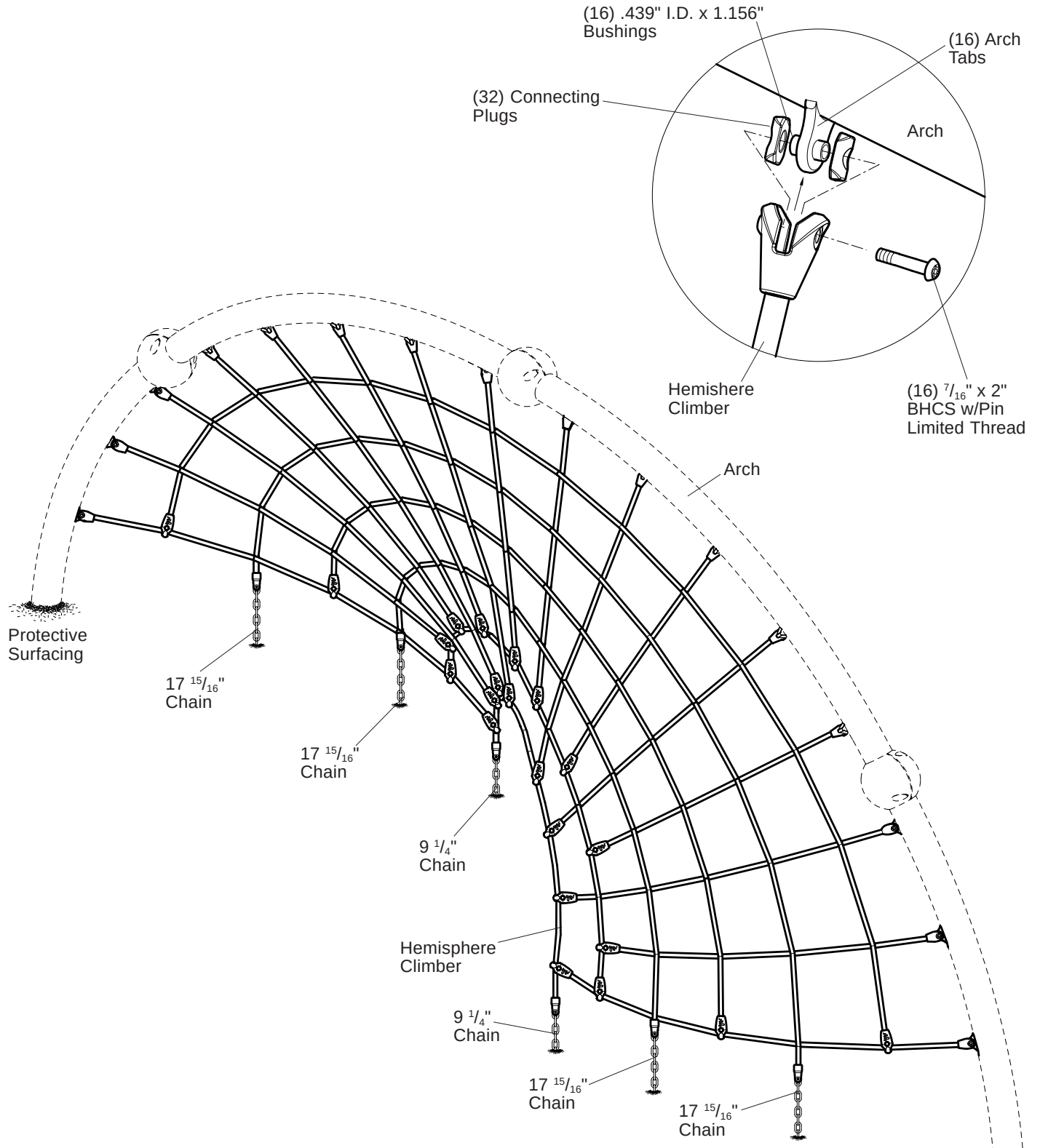
SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

20772700

DETAIL

HEMISPHERE CLIMBER ATTACHMENT



Evos™

156447 Hemisphere Climber™

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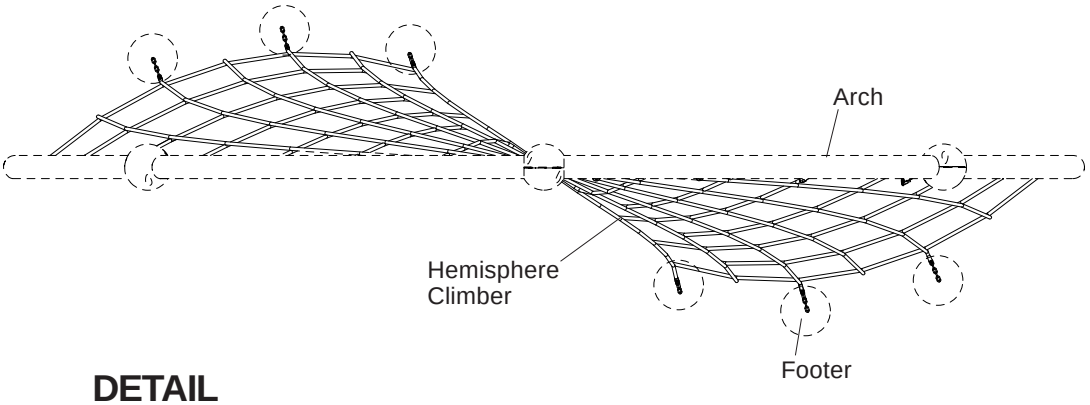
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SAFETY NOTE

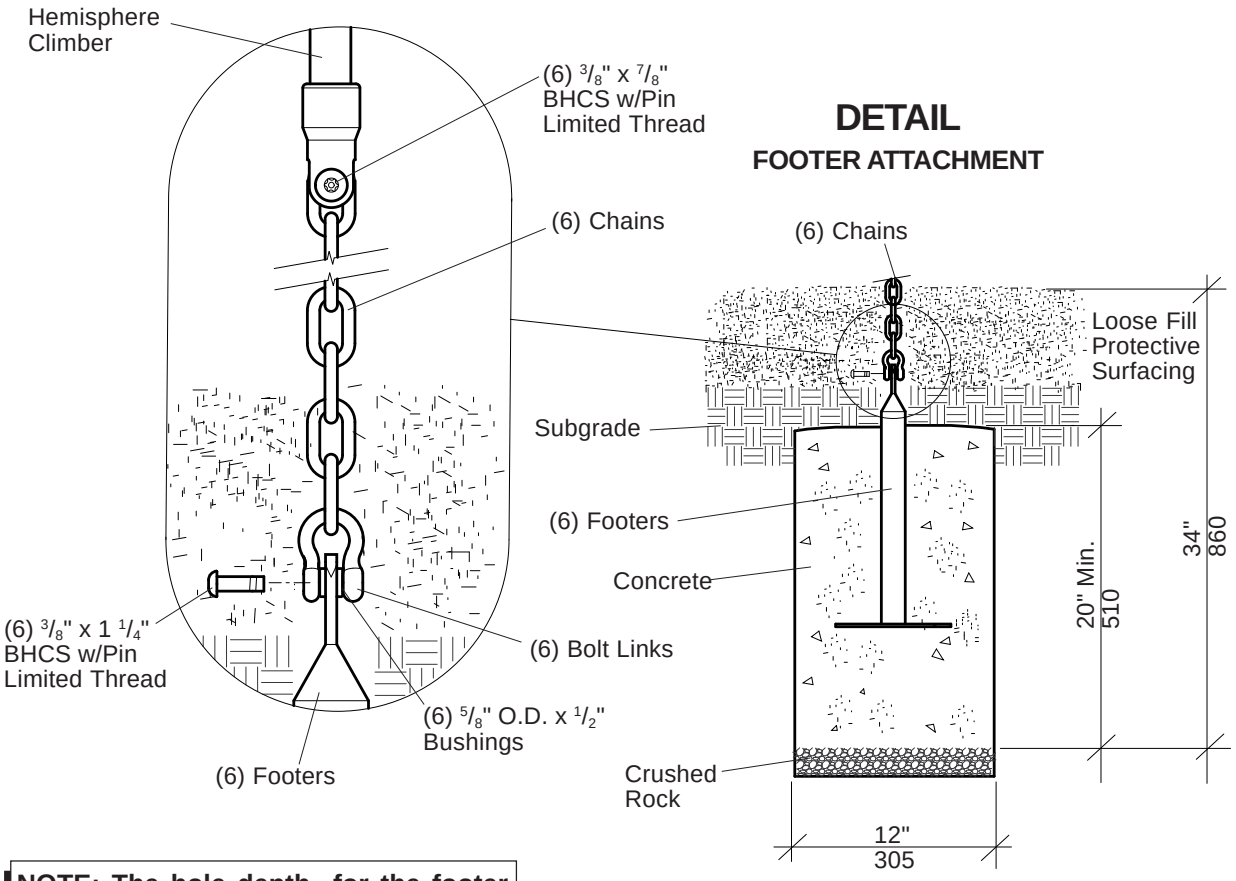
Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

202930a

PLAN VIEW



DETAIL



DETAIL

FOOTER ATTACHMENT

NOTE: The hole depth for the footer needs to be deep enough, so the footer plate doesn't contact the bottom of the hole. The weight of the concrete will force the footer plate down, tightening the cord.

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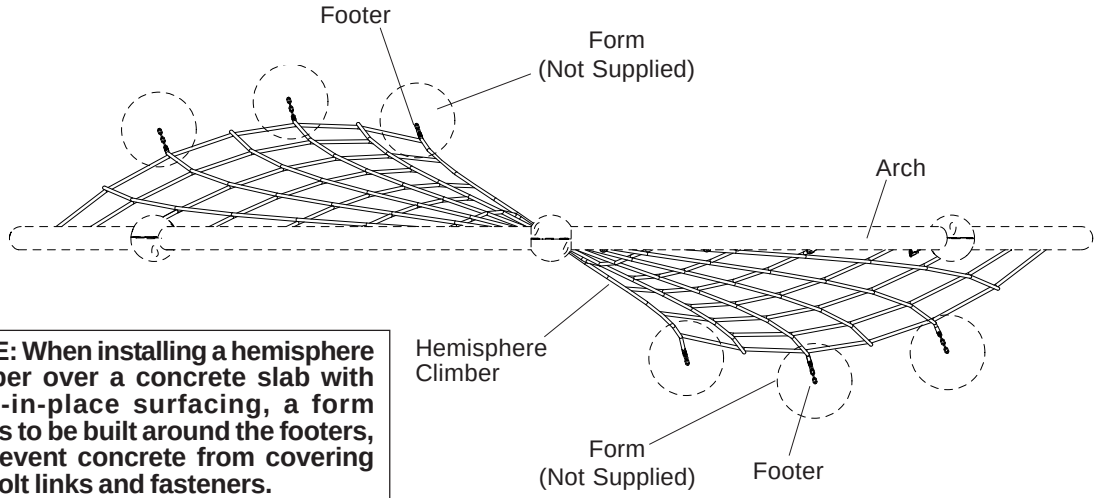
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SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

202930c

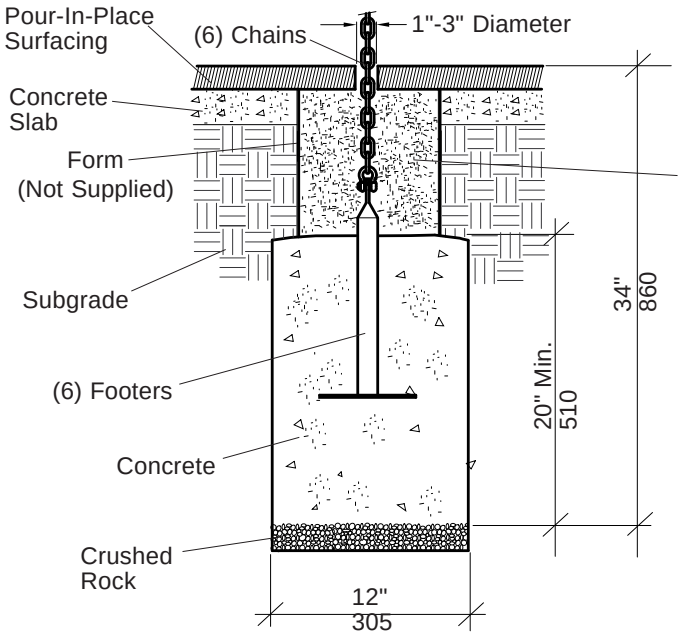
PLAN VIEW



NOTE: When installing a hemisphere climber over a concrete slab with pour-in-place surfacing, a form needs to be built around the footers, to prevent concrete from covering the bolt links and fasteners.

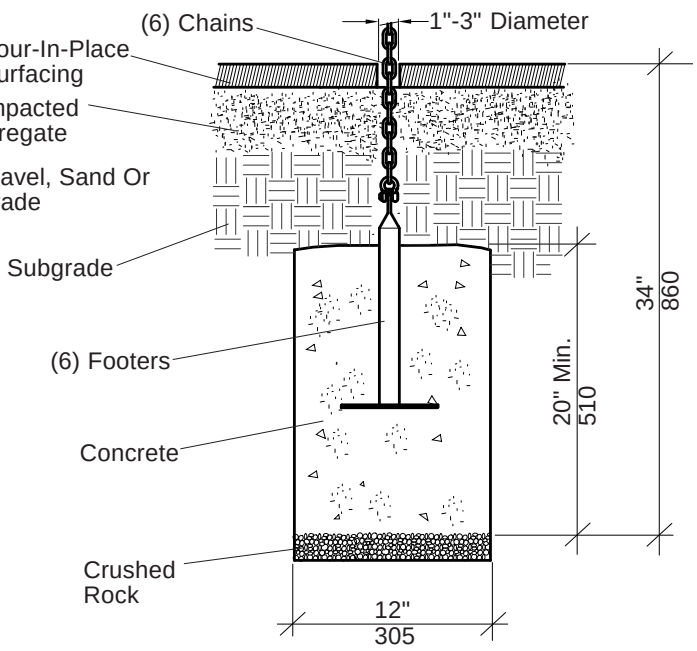
DETAIL

DIRECT BURY WITH POUR-IN-PLACE SURFACING



DETAIL

DIRECT BURY WITH POUR-IN-PLACE SURFACING (COMPACTED AGGREGATE)



Evos™ Detail Plan For Pour In Place Surfacing

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Evos™ 156447 Hemisphere Climber™

Parts List

Part#	Description	Qty.
202547	Net Assembly, Black	1
164367	Footer, Specify Color	6
136721	9 1/4" Long Chain	2
190780	17 15/16" Long Chain	4
190829	**Hemisphere Climber Hardware Package**	1
100290	3/8" x 7/8" BHCS w/Pin Limited Thread, SST	6
100292	3/8" x 1 1/4" BHCS w/Pin Limited Thread, SST	6
138915	Bolt Link, SST	6
156962	5/8" O.D. x 1/2" Long Bushing, SST	6
157224	.439" I.D. x 1.156" Bushing, SST	16
157704	7/16" x 2" BHCS w/Pin Limited Thread, SST	16
162729	Connecting Plug	32

Specifications

Net Assembly: **(Net)** Made of tightly woven polyester-wrapped, six-stranded galvanized-steel cable with a polypropylene core. **(Swage)** 3/4" schedule 40 6061-T6 aluminum pipe. **(S-Hooks)** Fabricated from 5/16" diameter 316-TI stainless steel. **(Cable Connectors)** Cast from 356-T6 aluminum. Finish: ProShield, black in color. **(Footing Connector)** Fabricated from 1 5/16" O.D. 6061-T6 aluminum.

Chain: Steel 1/4" straight link chain, 3,150 lb. working load limit. Finish: Peer Gold.

Footer: Weldment comprised of 1.660" O.D. RS20 (.085" - .095") galvanized steel tubing, and 7 GA. (.179") HRPO sheet steel. Finish: ProShield, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: Approx. 3 1/2 man hours
Concrete Req.: 34.25 cu. ft
Area Req.: 6' (1,83 m) minimum use zone
Weight: 145 lbs.
Fall Height: 87" (2,20 m)

Installation Instructions

1) **(Direct Bury) Refer to the Site Plan for footing locations.**

2) Attach hemisphere climber to arch tabs, using .439" I.D. x 1.156" bushings, connecting plugs and 7/16" x 2" BHCS w/pin limited thread bolts. Refer to the Hemisphere Climber Attachment Detail.

3) Attach chains to hemisphere climber, using 3/8" x 7/8" BHCS w/pin limited thread bolts, as shown.

4) Attach footers to chains, using bolt links, 5/8" O.D. x 1/2" long bushings and 3/8" x 1 1/4" BHCS w/pin limited thread bolts, as shown. Place footers in footing holes. Refer to the Footer Attachment Details. **NOTE:** *If footers are not fully suspended, a trench will need to be dug the full length of the footers. Refer to the Plan View.*

5) Pour concrete footings. Allow concrete footings to cure for a minimum of 72 hours before users are allowed to play on the structure.

6) Install protective surfacing before users are allowed to play on the structure.

Specifications are subject to change without notice.

Eco #0100303 Document #20772700 replaces #20293000. Replaced net.

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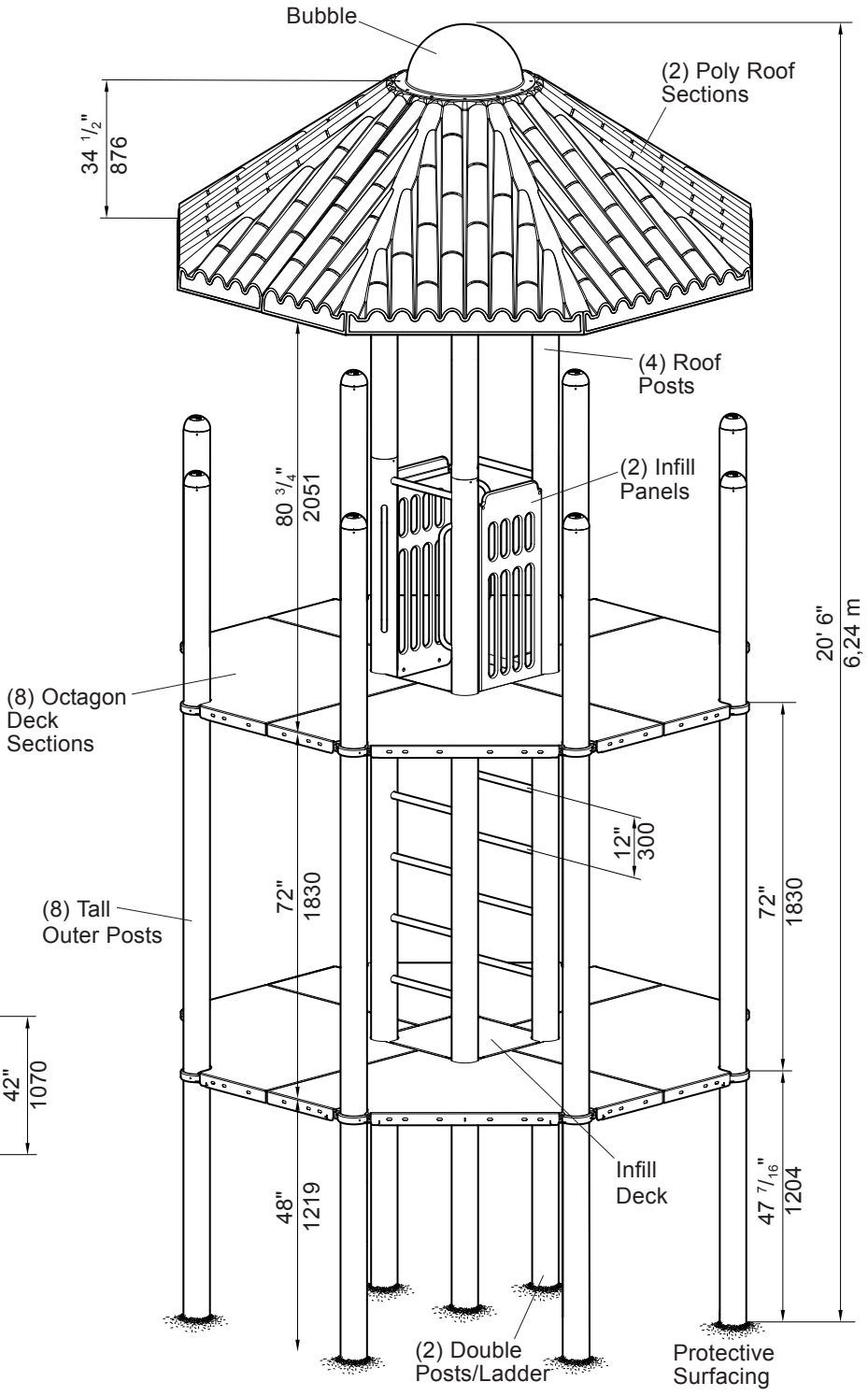
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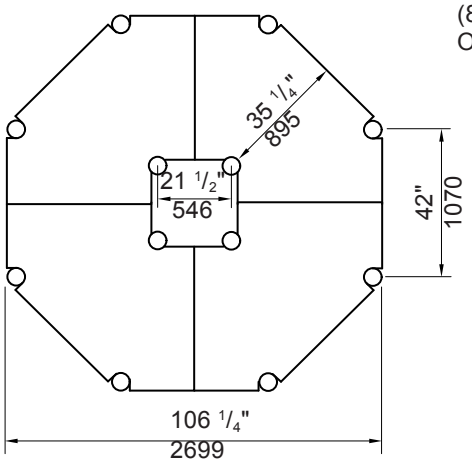
SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

18529900



PLAN VIEW



PlayOdyssey

185296 PlayOdyssey® 10' Tower

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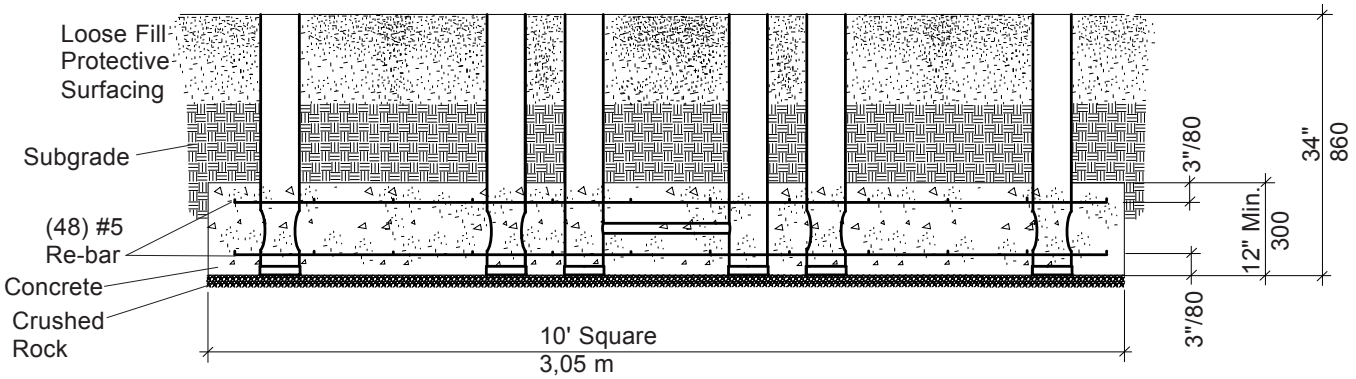
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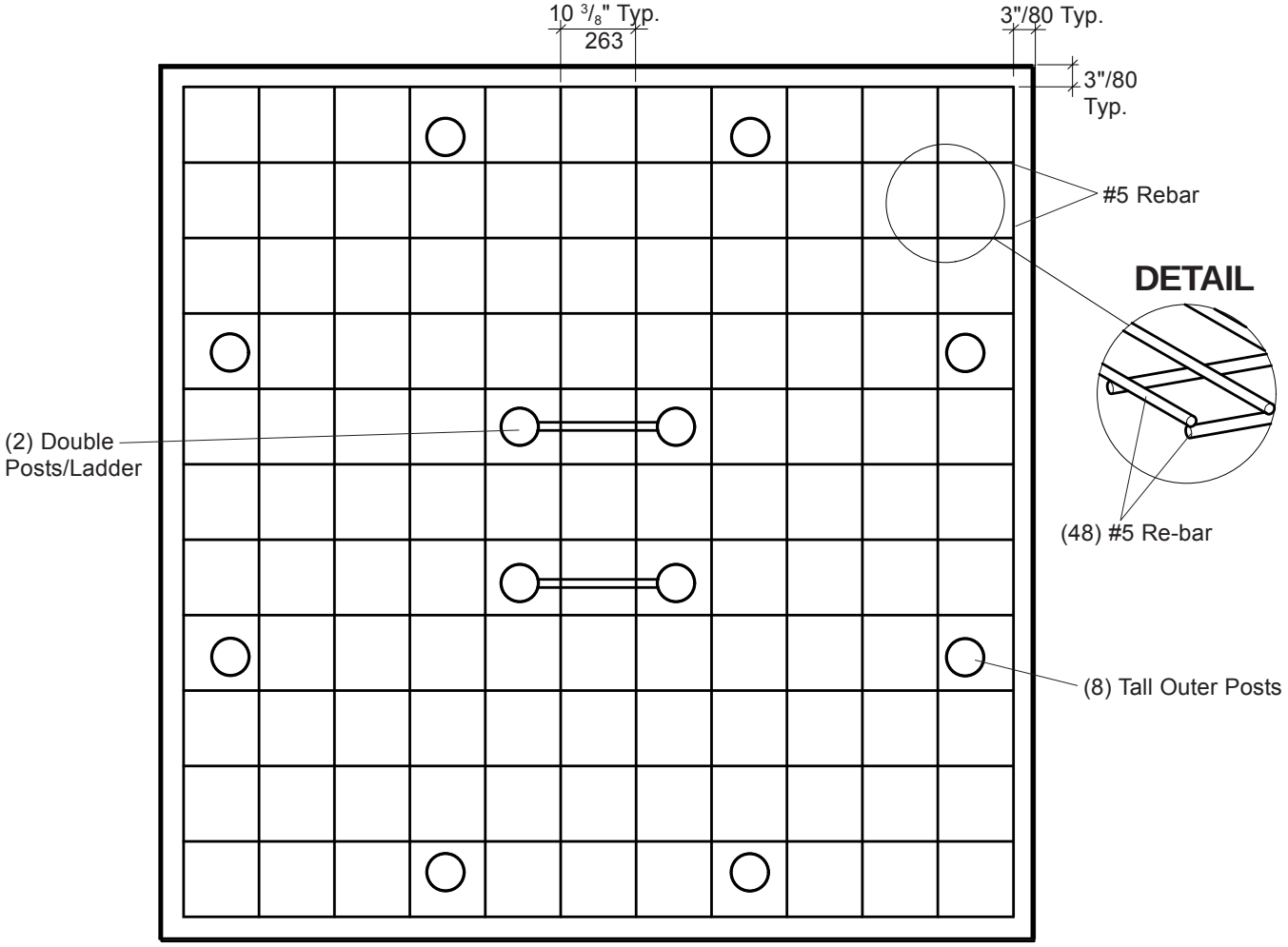
SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

165848b

PLAN VIEW/FOOTING LAYOUT





NOTE: Place #5 re-bar 3" up from the bottom and 3" down from the top of the concrete, as shown. Rebar should be placed 3" in from the edge of the concrete on all sides and approximately 10 3/8" on center.

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Concrete Footing With Re-Rod

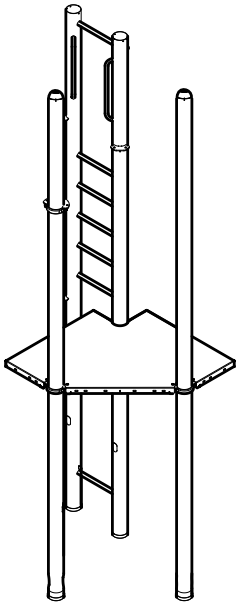
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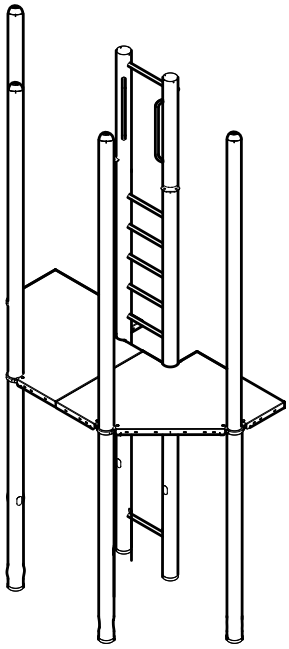
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DETAIL
MAINSTRUCTURE ASSEMBLY SEQUENCE

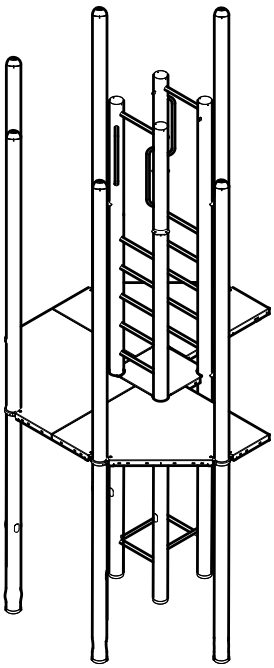
Step #1



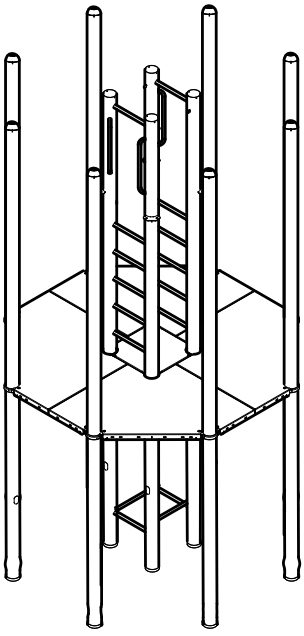
Step #2



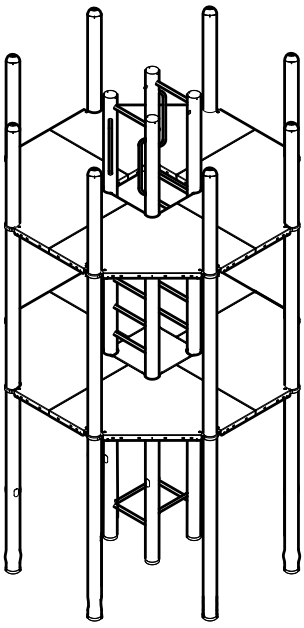
Step #3



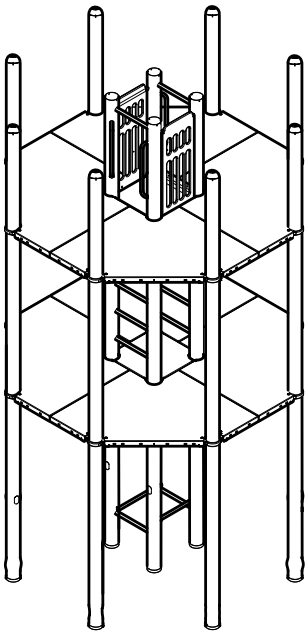
Step #4



Step #5



Step #6



PlayOdyssey

185296 PlayOdyssey® 10' Tower

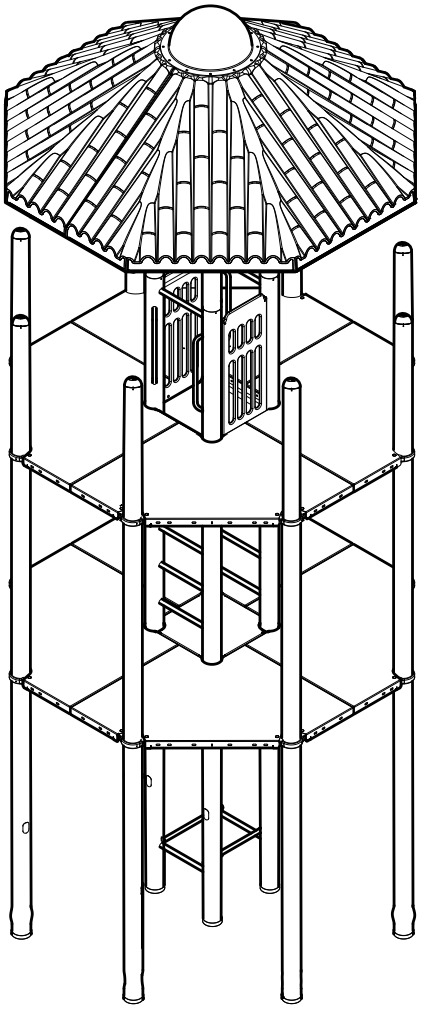
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DETAIL
MAINSTRUCTURE ASSEMBLY SEQUENCE

Step #7

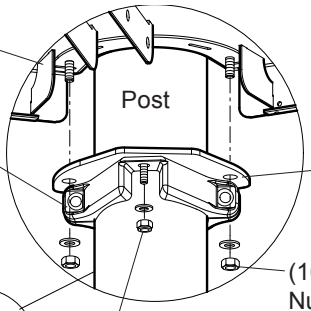


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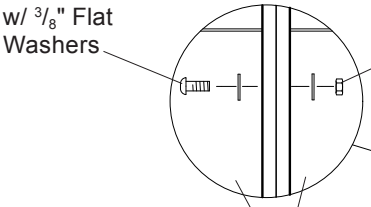
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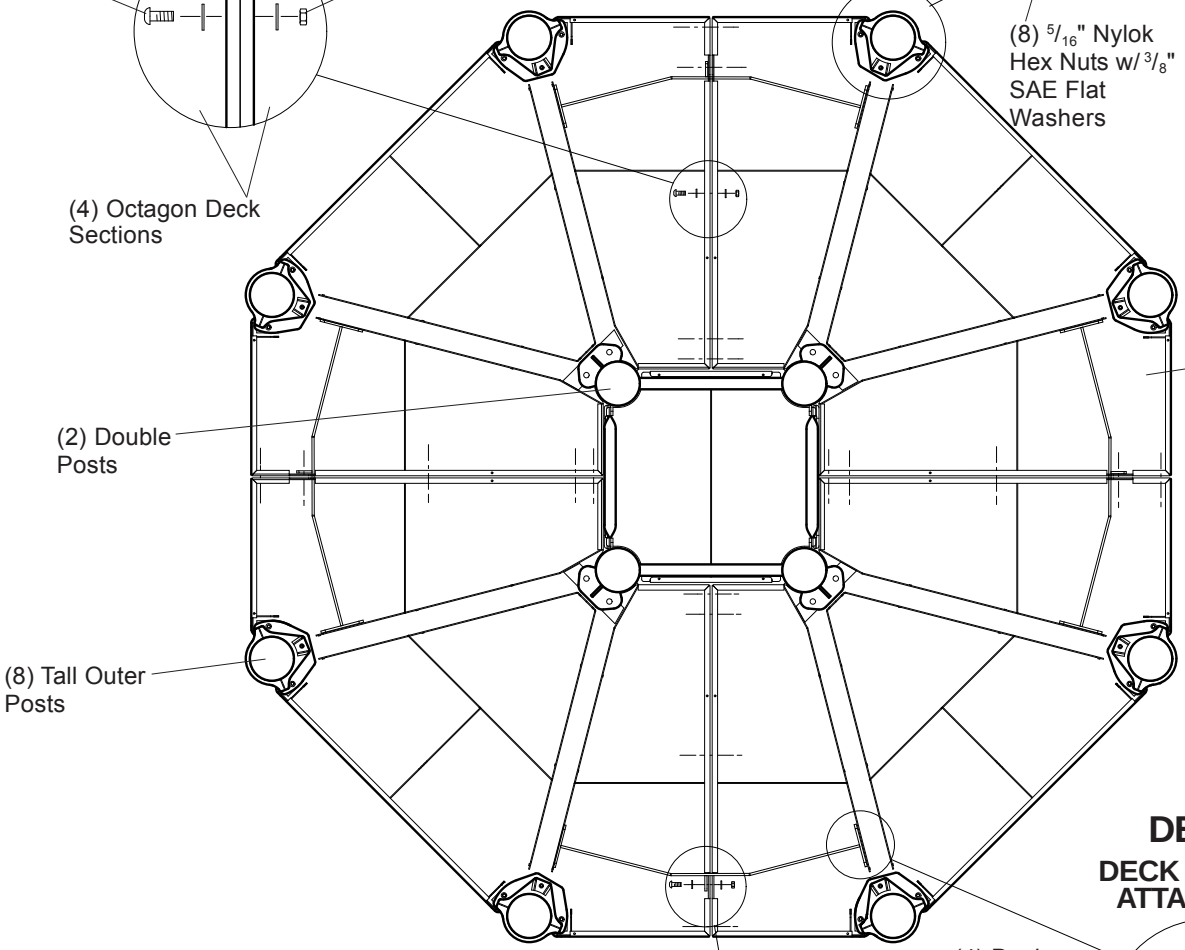
DETAIL
DECK TO TALL OUTER POST ATTACHMENT



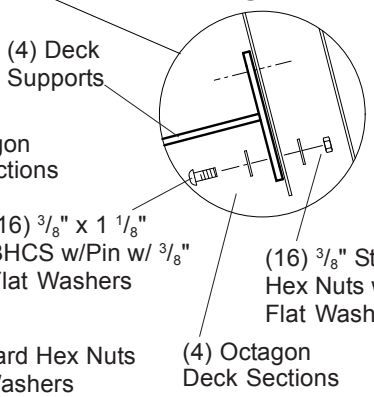
DETAIL
DECK TO DECK ATTACHMENT



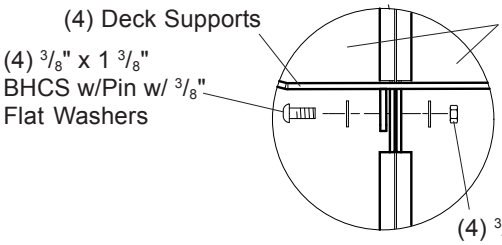
DETAIL
DECK ASSEMBLY (BOTTOM VIEW)



DETAIL
DECK SUPPORT ATTACHMENT



DETAIL
DECK SUPPORT ATTACHMENT



Deck Assembly

PlayOdyssey®

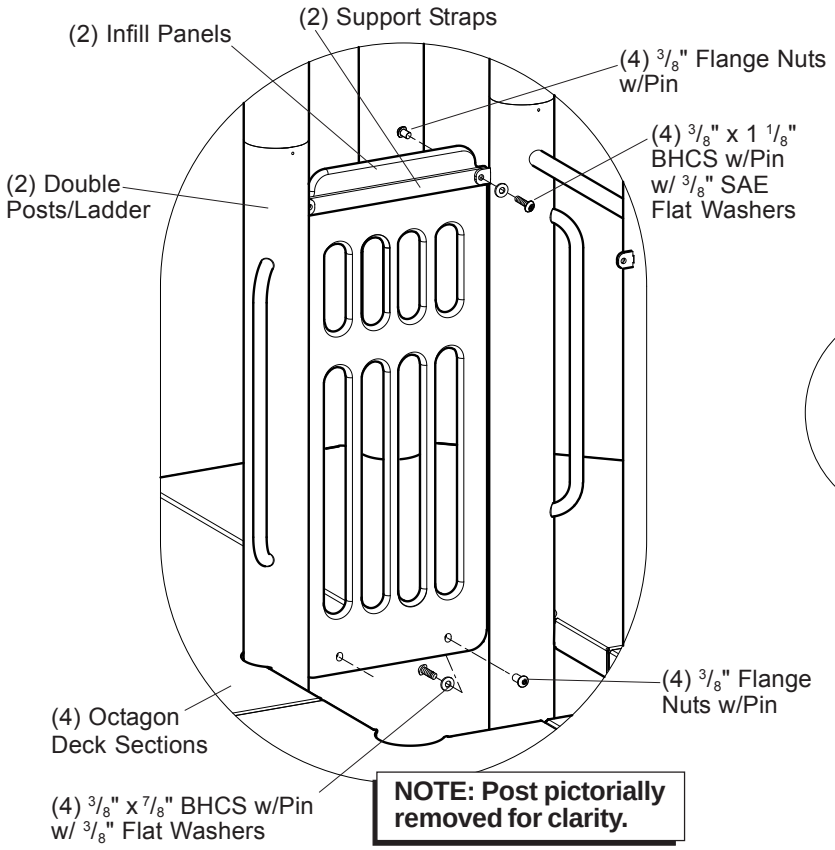
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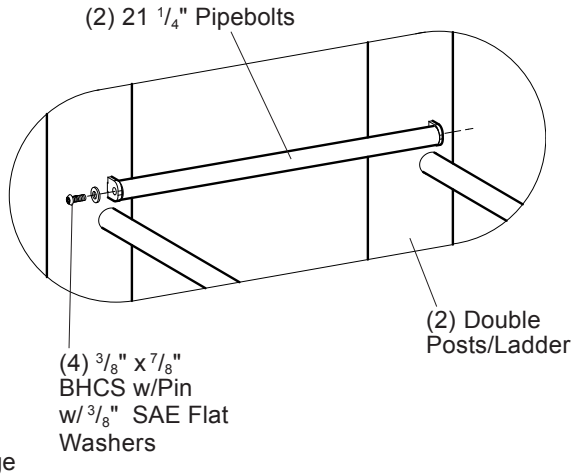
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DETAIL
INFILL PANEL ATTACHMENT

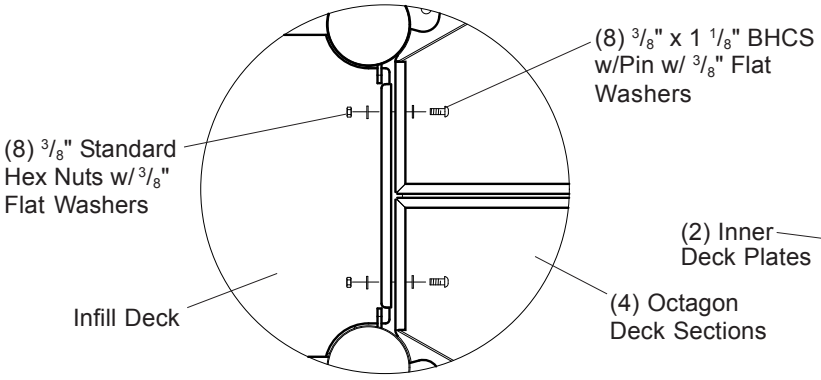


NOTE: Post pictorially removed for clarity.

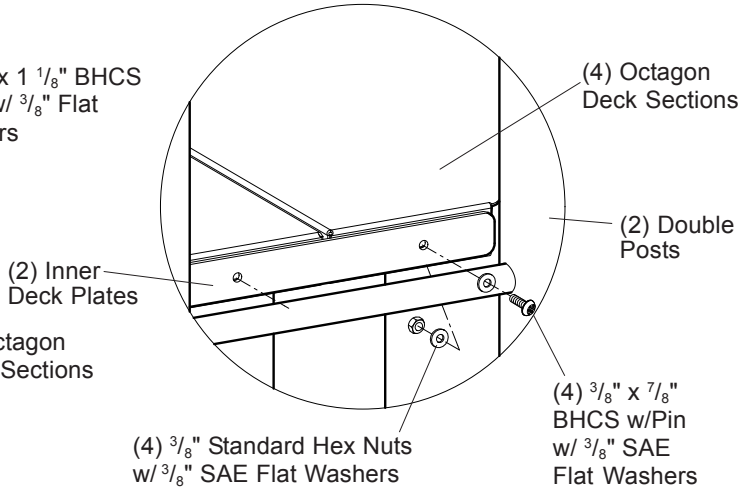
DETAIL
PIPEBOLT ATTACHMENT



DETAIL
INFILL DECK ATTACHMENT (BOTTOM VIEW)



DETAIL
INNER UPPER DECK PLATE ATTACHMENT



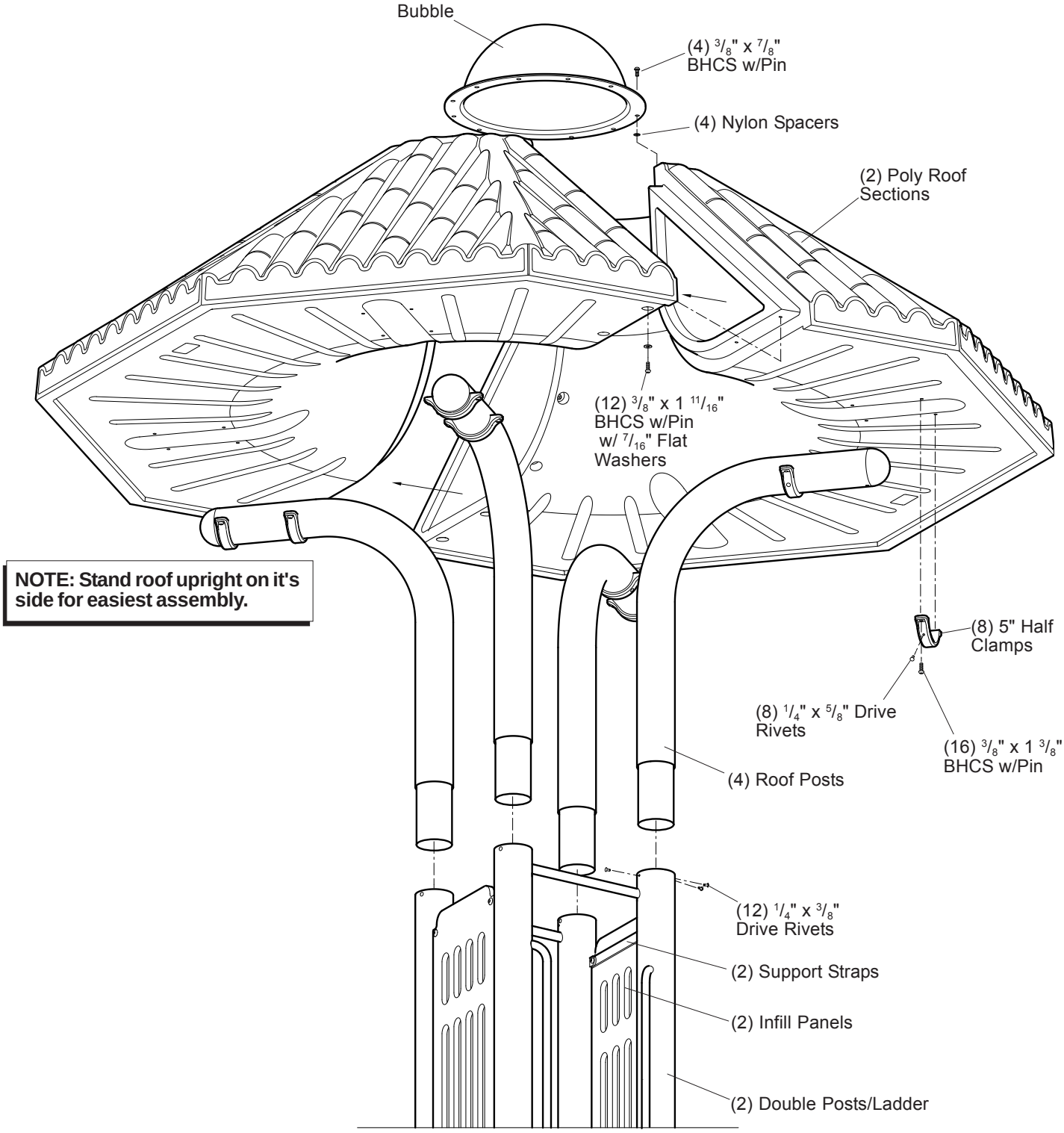
PlayOdyssey

185296 PlayOdyssey® 10' Tower

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Roof Post, Roof & Bubble Assembly

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PlayOdyssey 185296 PlayOdyssey® 10' Tower

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Parts List

Part#	Description	Qty.
100610	1/4" x 5/8" Drive Rivet, Al/SST	16
105327	5" Half Clamp, Specify Color	24
106022	Deck Hanger Clamp, Specify Color	16
119883	Bubble	1
126900	Poly Roof Section, Specify Color	2
127914	Roof Post, Specify Color	4
128503	Infill Panel, Specify Color	2
136366	Infill Deck, Specify Color	1
149182	Support Strap, Specify Color	2
152982	Octagon Deck Section, Specify Color	8
165206	Outer Attachment Plate, Specify Color	16
185297	Double Post/Ladder, (DB), Specify Color	2
185298	Tall Outer Post, (DB), Specify Color	8
165501	Deck Support, Specify Color	8
165725	21 1/4" Pipebolt, Specify Color	2
165726	Inner Deck Plate, Specify Color	2
165895	Re-bar #5 x 114" long	48
130009	**Roof Hardware Package**	1
100196	3/8" x 7/8" BHCS w/Pin, SST	4
113027	3/8" x 1 3/8" BHCS w/Pin, SST	16
100610	1/4" x 5/8" Drive Rivet, AL/SST	8
100611	1/4" x 3/8" Drive Rivet, AL/SST	12
112501	Nylon Spacer	4
112793	7/16" Flat Washer, SST	12
123224	3/8" x 1 11/16" BHCS w/Pin, SST	12
165599	**PlayOdyssey Tower Hardware Package**	1
100196	3/8" x 7/8" BHCS w/Pin, SST	12
100198	3/8" x 1 1/8" BHCS w/Pin, SST	108
100321	3/8" Hex Patch Nut, SST	32
100327	3/8" Standard Hex Nut, SST	84
100329	5/16" Nylok Hex Nut, SST	16
100351	3/8" T-Nut, SST	32
100353	3/8" Flange Nut w/Pin, SST	8
100362	3/8" Flat Washer, SST	164
100365	3/8" SAE Flat Washer, SST	64
113027	3/8" x 1 3/8" BHCS w/Pin, SST	8

Specifications

Double Post: Weldment comprised of 5" O.D. x 11 GA (.120") galvanized steel tubing, 1.029" O.D. RS-20 (.070" - .080") galvanized steel tubing, 1.315" O.D. RS-20 (.080" - .090") galvanized steel tubing and 1/4" x 1 1/4" HRPO flat steel. Finish: ProShield®, color specified.

Roof Post: Weldment comprised of 4.675" O.D. x .150" 6065-T5 extruded aluminum and formed 5" O.D. x .125" 6061-T6 extruded aluminum. Finish: ProShield, color specified.

Outer Post: Fabricated from 5" O.D. x 11 GA (.120") galvanized steel tubing and die cast 369.1 aluminum post cap. Finish: ProShield, color specified.

Poly Roof: Rotationally molded from U.V. stabilized linear low density polyethylene, color specified.

Bubble: Vacuum formed .230" x 26 3/8" diameter clear polycarbonate.

Octagon Deck: Flange formed from 12 GA (.105") sheet steel conforming to ASTM A1011. Standing surface is perforated with 5/16" diameter holes. Deck face has (4) slotted holes for face mounting components. The combined finished size measures 2 5/8" x 106 1/4" x 106 1/4". Finish: TenderTuff®, color specified.

Re-bar #5: 5/8" Diameter.

Nylon Spacer: 3/8" I.D. nylon washer.

Pipebolt: Fabricated from 1.125" O.D. 6061-T6 aluminum tube, with 3/8" internal threads.

Infill Deck: Flange formed from 12 GA (.105") sheet steel conforming to ASTM A1011. Standing surface is perforated with 5/16" diameter holes. The finished size measures 2 5/8" x 24 3/8" x 24 3/8". Finish: TenderTuff, color specified.

Infill Panel: Solid color Permalene®, color specified.

Inner Deck Plate: Fabricated from 1/4" HRPO steel sheet. Finish: ProShield, color specified.

Support Strap: Fabricated from 1/4" x 1 1/4" HRPO flat steel. Finish: ProShield, color specified.

Clamps: Cast aluminum. Finish: ProShield, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: Approx. 36 hours with 4 people minimum
Concrete Req.: Approx. 3.70 cu. yds.
Actual Size: 106 1/4" x 106 1/4" (2,70 m x 2,70 m)
Weight: 3380 lbs.
Fall Height: 120" (3,04 m) Deck Height

Specifications are subject to change without notice.

PlayOdyssey 185296 PlayOdyssey® 10' Tower

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Installation Instructions

NOTE: *To lift deck sections and poly roof, a "Lull" type material handler is recommended.*

1) Dig footing, and level ground as shown. Refer to the Plan View/ Footing Layout.

Deck/Double Post Assembly

2) **Step #1 -** Attach deck hanger clamps to outer posts at height shown, using 5" half clamps, 3/8" x 1 1/8" BHCS w/pin and 3/8" tee nuts. Refer to the Offset Hanger Clamp Assembly Spec Sheet.

3) Attach outer attachment plates to deck hanger clamps, using 5/16" nylok hex nuts with 3/8" SAE flat washers. Refer to Detail.

4) Stand double post/ladder and (2) tall outer posts upright in footing hole. **NOTE:** *Rope may be used to tie off the double post. The use of rope will help keep the double post in plumb position, while attaching decks. Tie a rope (not supplied) on each side of the top ladder rung. The rope should be long enough to attach to a ground stake (not supplied). When the double post is in plumb position, pull the ropes tight, and attach to ground stakes.*

5) Lift deck section and place onto outer attachment plates, and double post plate. Attach deck section to tall outer post attachment plates, using 3/8" patch hex nuts with 3/8" SAE flat washers. Refer to Detail.

6) **Step #2 -** Stand (2) tall outer posts upright in footing hole. Lift deck section and place onto tall outer post attachment plates, and double post plate. Attach deck section to tall outer post attachment plates, using 3/8" patch hex nuts with 3/8" SAE flat washers. Refer to Detail.

7) **Step #3 -** Attach infill deck to deck sections, using 3/8" x 1 1/8" BHCS w/pin with 3/8" flat washers and 3/8" standard hex nuts with 3/8" flat washers. Refer to the Infill Deck Attachment Detail.

8) Stand remaining double post and (2) tall outer posts upright in footing hole. Lift deck section and place onto tall outer post attachment plates, and double post plate. Attach deck section to tall outer post attachment plates, using 3/8" patch hex nuts with 3/8" SAE flat washers. Refer to Detail.

9) Attach 21 1/4" pipebolts to double posts, using 3/8" x 7/8" BHCS w/ pin and 3/8" SAE flat washers. Refer to the Pipebolt Attachment Detail.

10) **Step #4 -** Stand remaining tall outer posts upright in footing hole. Lift deck section and place onto tall outer post attachment plates, and double post plate. Attach deck section to tall outer post attachment plates, using 3/8" patch hex nuts with 3/8" SAE flat washers. Refer to Detail.

11) Attach infill deck to deck sections, using 3/8" x 1 1/8" BHCS w/pin with 3/8" flat washers and 3/8" standard hex nuts with 3/8" flat washers. Refer to the Infill Deck Attachment Detail.

12) Attach (4) deck sections together, using 3/8" x 1 1/8" BHCS w/pin with 3/8" flat washers and 3/8" standard hex nuts with 3/8" flat washers. Refer to the Deck Assembly Detail.

13) Attach (4) deck supports to decks, using 3/8" x 1 3/8" BHCS w/pin, 3/8" x 1 1/8" BHCS w/pin,3/8" flat washers and 3/8" standard hex nuts. Refer to the Deck Assembly Detail.

14) **Step #5 -** Attach remaining (4) deck sections to tall outer post attachment plates, using 3/8" patch hex nuts with 3/8" SAE flat washers. Refer to Detail.

15) **Step #6 -** Attach infill panels to double posts, using support straps, 3/8" flange nuts and 3/8" x 1 1/8" BHCS w/pin with 3/8" SAE flat washers. Refer to the Infill Panel Attachment Detail.

16) Attach (2) inner upper deck plates to deck sections, using 3/8" x 7/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" standard hex nuts with 3/8" SAE flat washers. Refer to the Inner Deck Plate Attachment Detail.

Roof & Bubble Assembly

17) **Step #7 -** Attach the bubble to the roof using nylon washers between the bubble and the roof and 3/8" x 7/8" BHCS w/pin. Refer to the Roof Post, Roof & Bubble Assembly page.

18) Insert the roof posts into the double posts. Refer to the Roof Post, Roof & Bubble Assembly page.

19) Assemble the roof using 3/8" x 1 11/16" BHCS w/pin with 7/16" flat washers. Refer to the Roof Post, Roof & Bubble Assembly page. **NOTE:** *Stand roof upright on it's side for easiest assembly.*

20) Position roof on roof posts **with a minimum of 6 people** and fasten using 5" half clamps and 3/8" x 1 3/8" BHCS w/pin. Refer to the Roof Post, Roof & Bubble Assembly page. **NOTE:** *Roof will rest on top of posts.*

21) Using the holes in the double posts as guides drill through holes with a 1/4" or "F" only drill bit. Insert 1/4" x 3/8" drive rivets in holes and hammer drive rivet pin in until flush with head. Refer to the Roof Post, Roof & Bubble Assembly page.

Finishing Steps

22) Install 1/4" x 5/8" drive rivets in all 5" half clamps. Refer to the Typical Offset Hanger Clamp Spec Sheet. Refer to the Roof Post, Roof & Bubble Assembly page.

23) With posts plumb and decks level, pour concrete footing. Let concrete cure for 72 hours before use. Refer to the Plan View/Footing Layout. **NOTE:** *Make sure Re-rod is placed in concrete as shown.*

24) Install enclosures/play components as shown on your site drawings.

25) Install protective surfacing before users are allowed to play on the structure.

Specifications are subject to change without notice.

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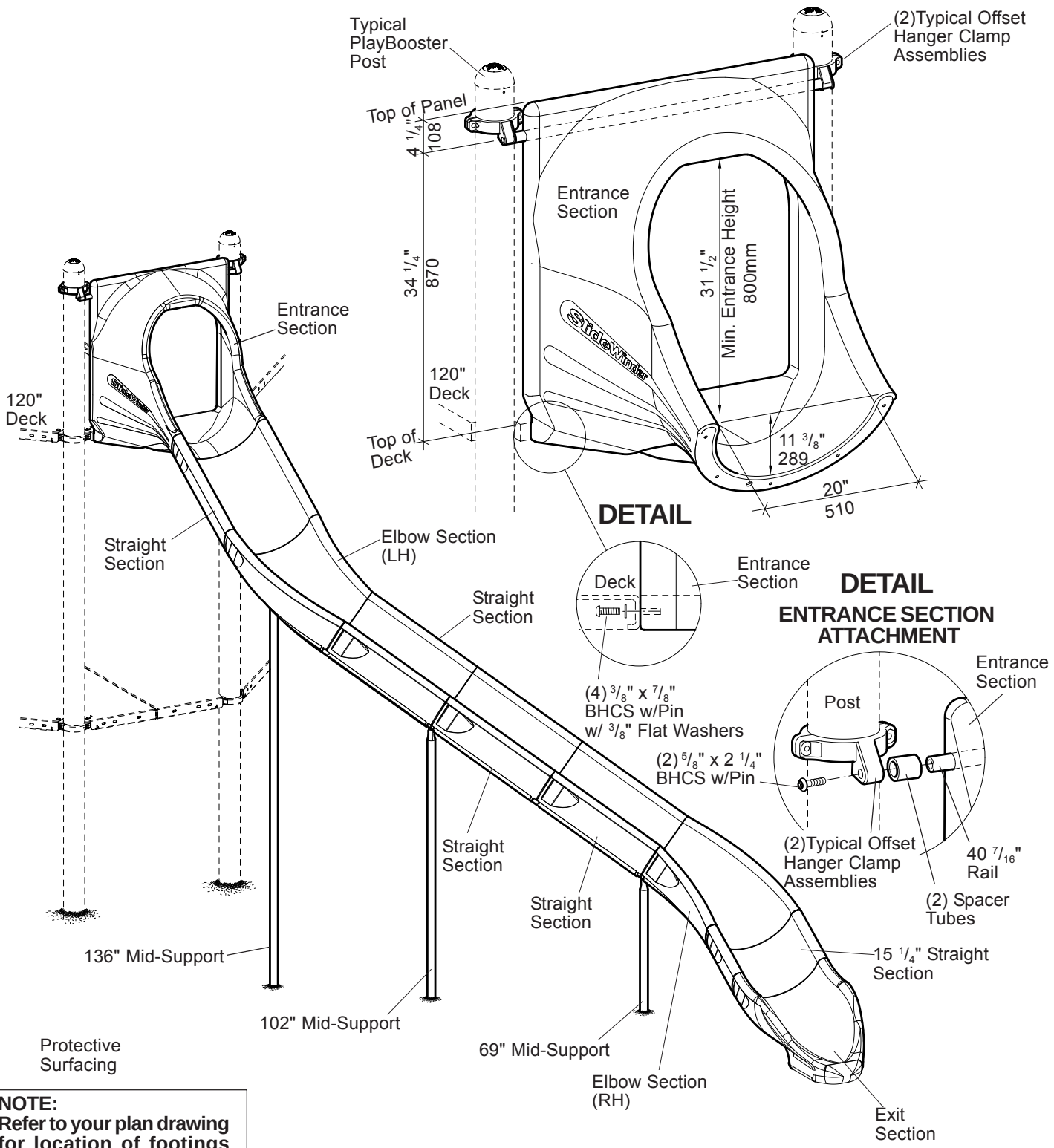
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SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

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ENTRANCE SECTION



NOTE:
Refer to your plan drawing for location of footings and layout and direction of SlideWinder sections.

PlayBooster® 185346 Tower SlideWinder2, 10FT.

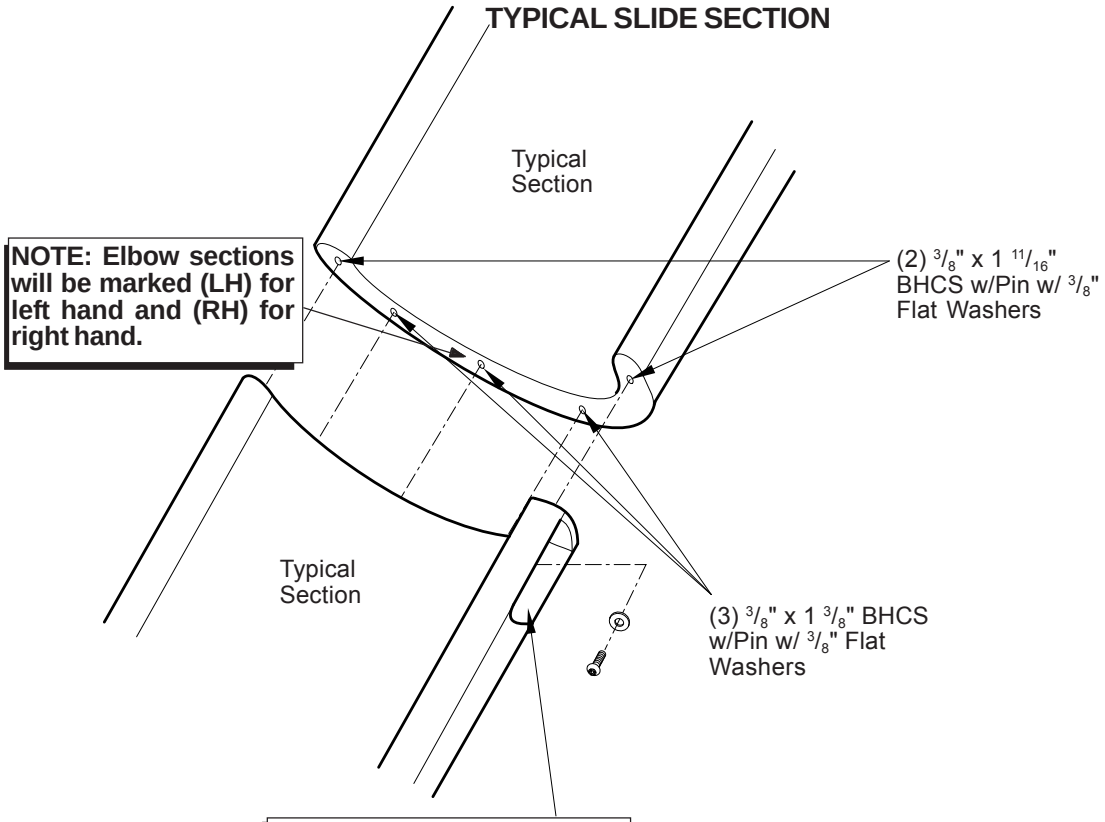
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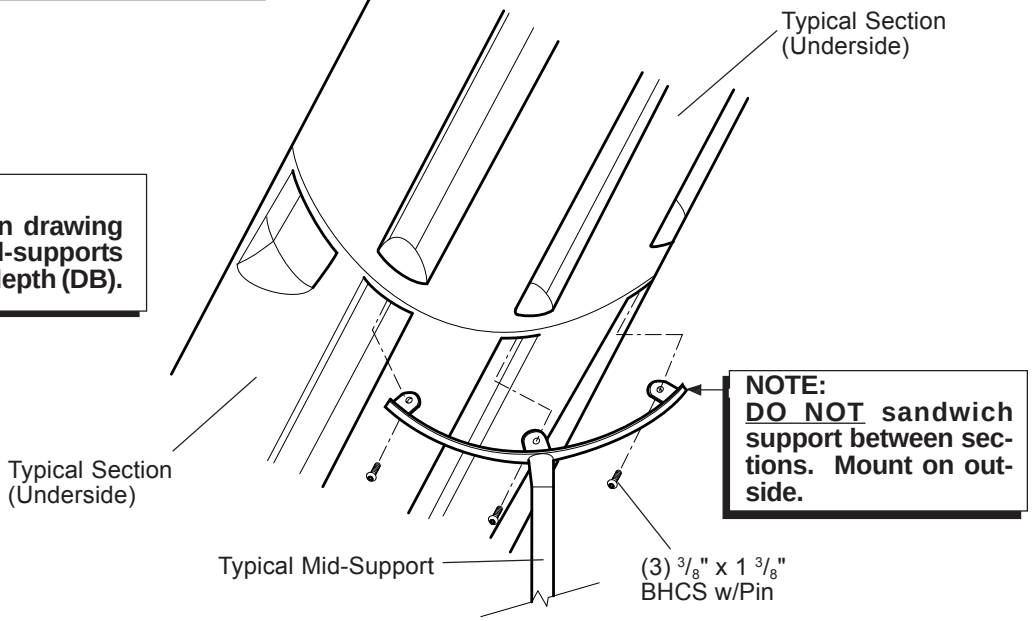
DETAIL
TYPICAL SLIDE SECTION



NOTE: Elbow sections will be marked (LH) for left hand and (RH) for right hand.

NOTE: Fasten top of slide section with pockets to bottom of slide section without pockets.

DETAIL
TYPICAL MID-SUPPORT
BOTTOM VIEW



NOTE:
Refer to your plan drawing for location of mid-supports and their footing depth (DB).

NOTE:
DO NOT sandwich support between sections. Mount on outside.

PlayBooster® 185346 Tower SlideWinder2, 10FT. Details

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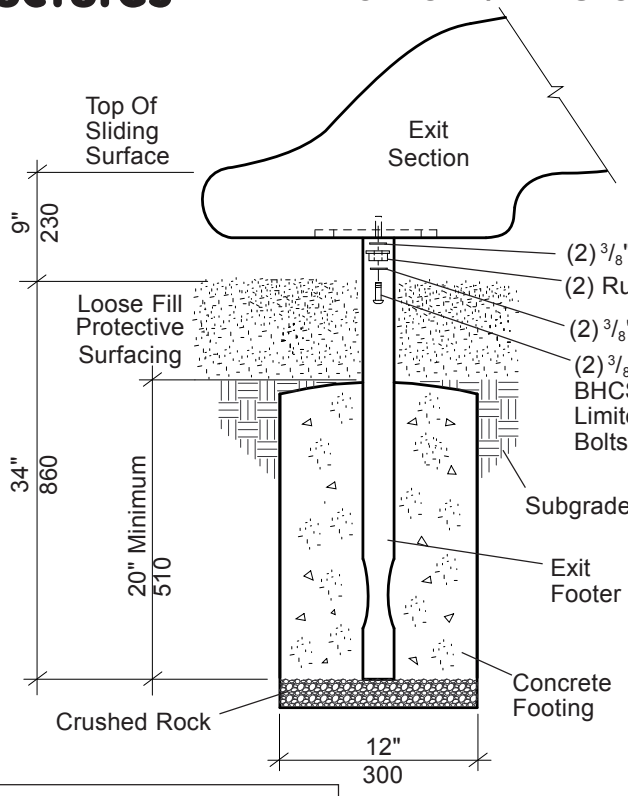
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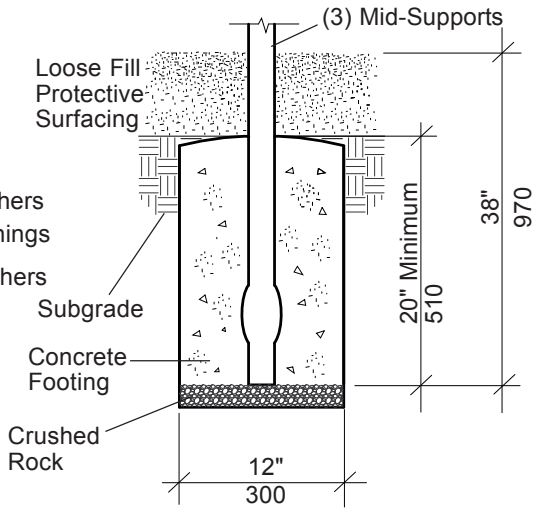
SAFETY NOTE
Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

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DETAIL
DIRECT BURY / EXIT SECTION



DETAIL
DIRECT BURY / MID-SUPPORTS

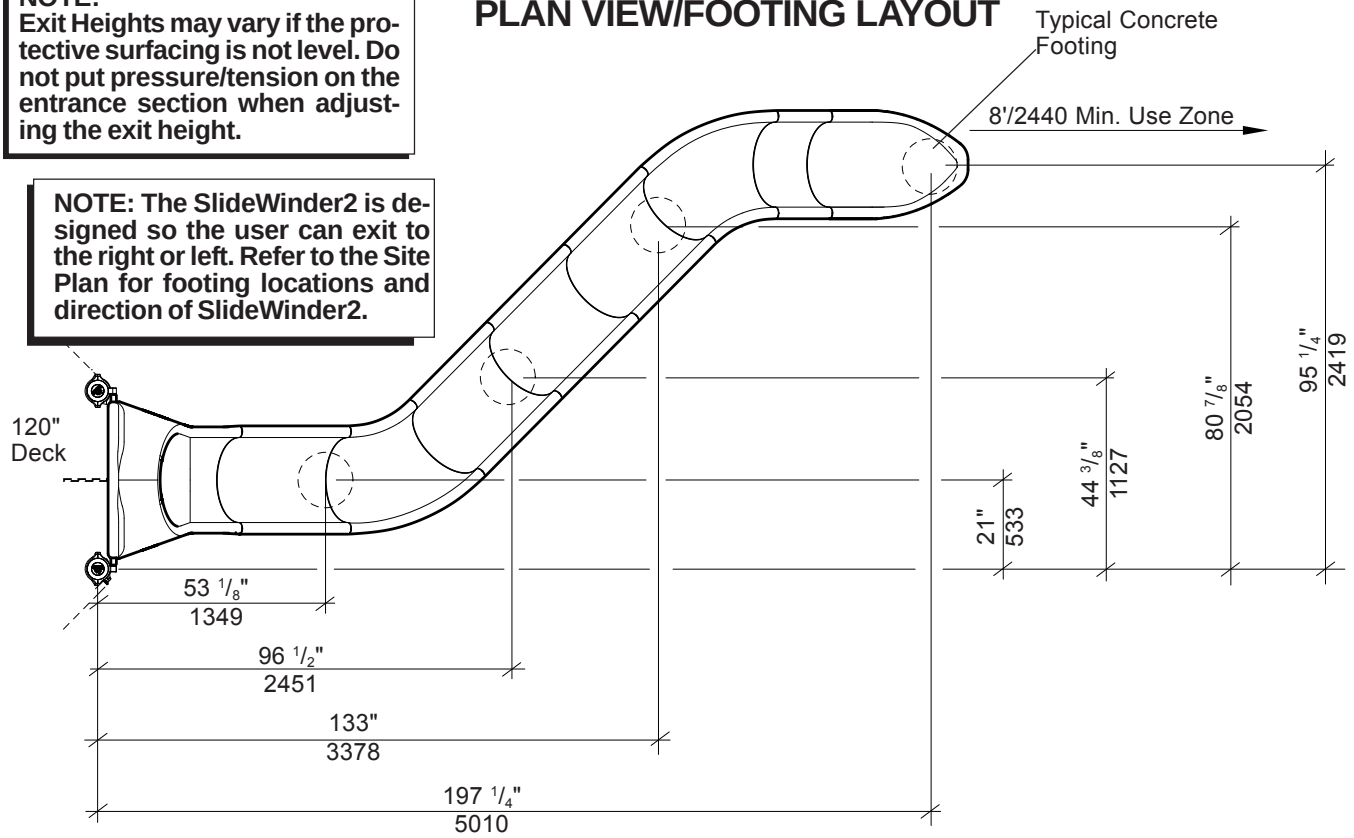


NOTE:
Attach bolts in the center of the footer slots to allow for expansion and contraction. Snug bolts down only, do not overtighten!

NOTE:
Exit Heights may vary if the protective surfacing is not level. Do not put pressure/tension on the entrance section when adjusting the exit height.

NOTE: The SlideWinder2 is designed so the user can exit to the right or left. Refer to the Site Plan for footing locations and direction of SlideWinder2.

PLAN VIEW/FOOTING LAYOUT



PlayBooster® 185346 Tower SlideWinder2, 10FT. Details

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Document #18534700

PlayBooster® 185346 Tower SlideWinder2, 10FT.

Parts List

Part#	Description	Qty.
100583	40 7/16" Rail, Specify Color	1
105327	5" Half Clamp, Specify Color	2
113729	Offset Hanger Clamp, Specify Color	2
124864	Straight Section (30 1/2" Long), Specify Color	4
124867	Elbow Section (RH), Specify Color	1
124868	Elbow Section (LH), Specify Color	1
124876	Entrance Section, Specify Color	1
124877	Exit Section, Specify Color	1
128261	Exit Footer (DB), Specify Color	1
185675	69" Mid-Support (DB), Specify Color	1
185674	102" Mid-Support (DB), Specify Color	1
185673	136" Mid-Support (DB), Specify Color	1
100610	1/4" x 5/8" Drive Rivets, AL/SST	2
132443	Spacer Tube, Specify Color	2
125655	15 1/4" Straight Section, Specify Color	1
121371	**Entrance/Deck Mounting Hardware Package**	1
100196	3/8" x 7/8" BHCS w/Pin, SST	4
100362	3/8" Flat Washer, SST	4
124342	**Rail Hardware Package**	1
100198	3/8" x 1 1/8" BHCS w/Pin, SST	4
100203	5/8" x 2 1/4" BHCS w/Pin, SST	2
100351	3/8" Tee Nut, SST	4
128373	**Exit Support Hardware Package (DB)**	1
100292	3/8" x 1 1/4" BHCS w/Pin Limited Thread Bolt, SST	2
100362	3/8" Flat Washer, SST	4
111442	Rubber Bushing	2
154942	**SlideWinder Section Hardware Package**	8
100362	3/8" Flat Washer, SST	40
113027	3/8" x 1 3/8" BHCS w/Pin, SST	24
123224	3/8" x 1 11/16" BHCS w/Pin, SST	16

DB = Direct Bury
RH = Right Hand
LH = Left Hand

Specifications

Slide Sections: Rotationally molded from U.V. stabilized linear low density polyethylene, color specified.

Rail: 1 1/8" O.D. 6061-T6 aluminum extrusion with 5/16" walls. Finish: ProShield®, color specified.

Spacer Tube: Fabricated from 1.3125 O.D. x 16 Ga. (.065) steel tubing. Finish: ProShield, color specified.

Mid-Support: Weldment comprised of 1.900" O.D. RS-20 (.090" - .100") galvanized steel tubing and 3/16" x 1 1/4" zinc plated steel strap. Finish: ProShield, color specified.

Exit Footer: Weldment comprised of 2.375" O.D. RS-20 (.095" - .105") galvanized steel tubing and 1/4" x 3" x 7 1/2" mounting plate. Finish: ProShield, color specified.

Offset Hanger Clamp Assy.: Cast aluminum. Finish: ProShield, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: 4 man hours with 2 people
Concrete Req.: 5.25 cu. ft.
Weight: 323 lbs.
Fall Height: 120" (3,05 m)

Installation Instructions

1) Refer to the Site Plan for footing locations and direction of SlideWinder2.
2) Dig footing holes spaced as shown. Refer to the Direct Bury Exit Section and Direct Bury Mid-Support Details.
3) Place 40 7/16" rail through entrance section, place spacer tubes over each end of the 40 7/16" rail, attach offset hanger clamps using 5/8" x 2 1/4" BHCS w/Pin.
4) Attach entrance section to the face of the deck using 3/8" x 7/8" BHCS w/Pin and 3/8" flat washers.
5) Attach offset hanger clamps to posts, using 5" half clamps, 3/8" x 1 1/8" BHCS w/Pin and 3/8" tee nuts. Refer to the Typical Offset Hanger Clamp Spec Sheet.
6) Attach SlideWinder straight section to entrance section loosely, starting in the middle and working your way to the outside of each section, using 3/8" x 1 3/8" BHCS w/Pin with 3/8" flat washers on the 3 inside holes and 3/8" x 1 11/16" BHCS w/pin with 3/8" flat washers on the 2 outside holes. When all bolts are started, pull the tops flush with each other and tighten. Add remaining Slide Winder sections.The left elbow section reads (LH) and the right elbow section reads (RH). Refer to the Typical Slide Section Detail.
7) Attach mid-supports to slide using 3/8" x 1 3/8" BHCS w/Pin. Refer to the Typical Mid-Support Detail.
8) Attach exit footer to base of slide using 3/8" x 1 1/4" BHCS w/Pin limited thread bolts, 3/8" flat washers, rubber bushings and 3/8" flat washers. **NOTE:** *Attach bolts in the center of the slots to allow for expansion and contraction. Snug bolts down only, do not overtighten. See Direct Bury/Exit Section Detail.*
9) With supports plumb pour concrete footings. Allow concrete footings to cure for a minimum of 72 hours before users are allowed to play on the structure.
10) Install protective surfacing before users are allowed to play on the structure.

Specifications are subject to change without notice.

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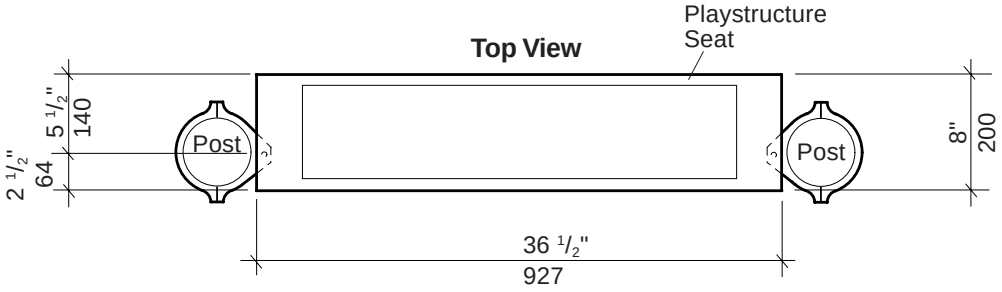
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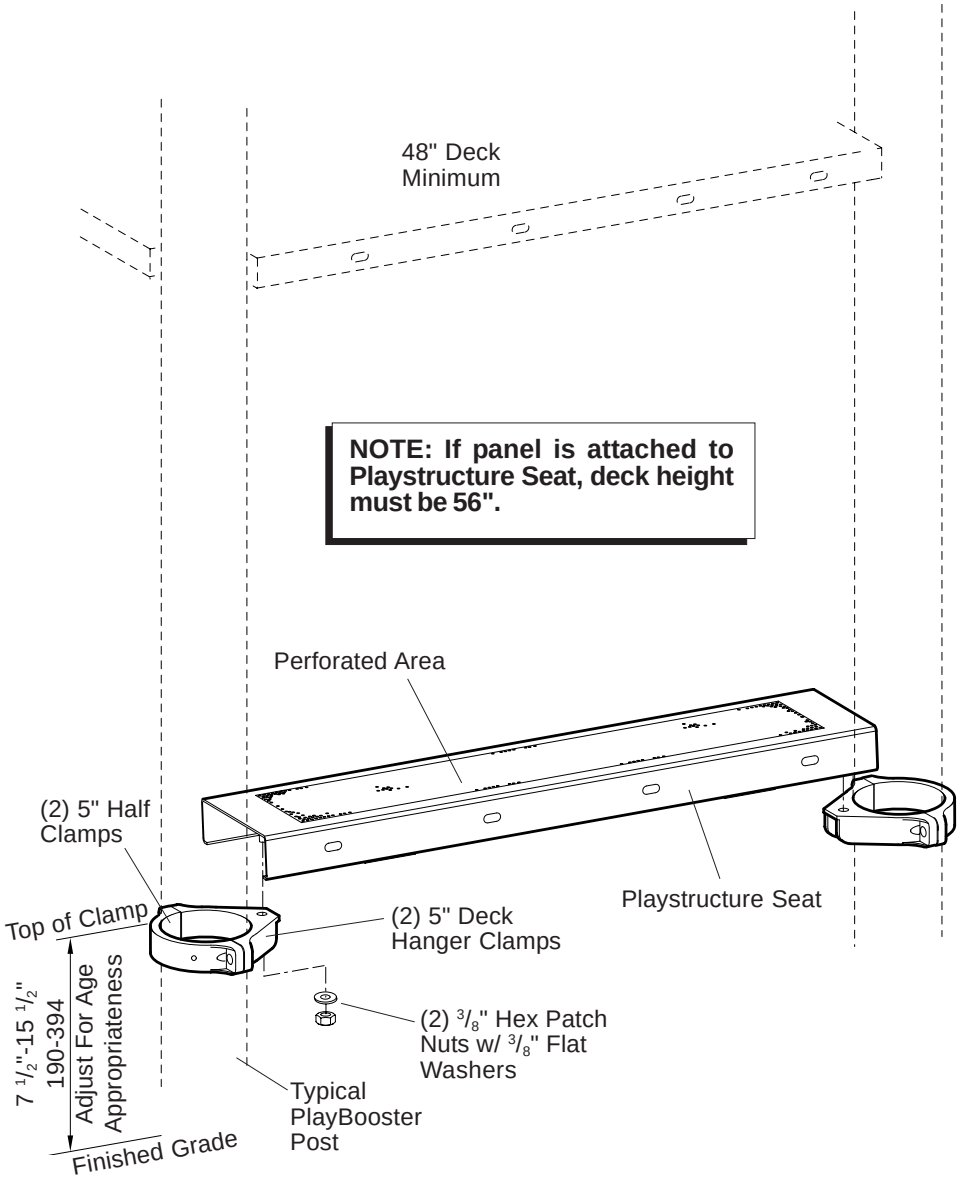
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SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

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PlayBooster®

120818 Playstructure Seat

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PlayBooster® 120818 Playstructure Seat

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Parts List

Part#	Description	Qty.
153952-00	Playstructure Seat, Specify Color	1
105327-01	5" Half Clamp, Specify Color	2
106022-00	5" Deck Hanger Clamp, Specify Color	2
106676-00	**Seat Hardware Package**	1
100198-00	3/8" x 1 1/8" BHCS w/Pin, SST	4
100321-00	3/8" Hex Patch Nut, SST	2
100351-00	3/8" Tee Nut, SST	4
100362-00	3/8" Flat Washer, SST	2
100610-00	1/4" x 5/8" Drive Rivet, AL/SST	2

Specifications

Seat: Flange formed from 11 GA (.120") sheet steel. Seating surface is perforated with 5/16" diameter holes. Finish: TenderTuff™, color specified.

Deck Hanger Clamp Assembly: Cast aluminum. Finish: ProShield®, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: Approx. 1 man hour

Weight: 26 lbs.

Installation Instructions

1) Playstructure seat attaches offset to posts. Refer to your site layout for where and which direction the playstructure seat needs to be installed. **NOTE:** *If panel is attached to Playstructure Seat, deck height must be 56".*

2) Mark posts for the appropriate height of the playstructure seat you are installing. **NOTE:** *Height is adjustable 8"-16".*

3) Fasten 5"deck hanger clamps to the marked position on posts using 5" half clamps and 3/8" x 1 1/8" BHCS w/pin with 3/8" tee nuts. Refer to the Typical Offset Hanger Clamp Spec Sheet.

4) Position seat over 5" deck hanger clamps and attach using 3/8" hex patch nuts with 3/8" flat washers, as shown.

5) Install 1/4" x 5/8" drive rivets in all 5" half clamps. Refer to the Typical Offset Hanger Clamp Spec Sheet.

6) Install protective surfacing before users are allowed to play on the structure.

Specifications are subject to change without notice.

Eco #54117 Document #17398100 replaces #15395600. Changed seat from brown to color specified.

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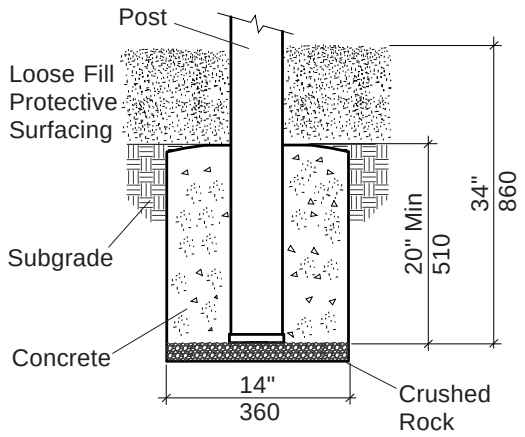
SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

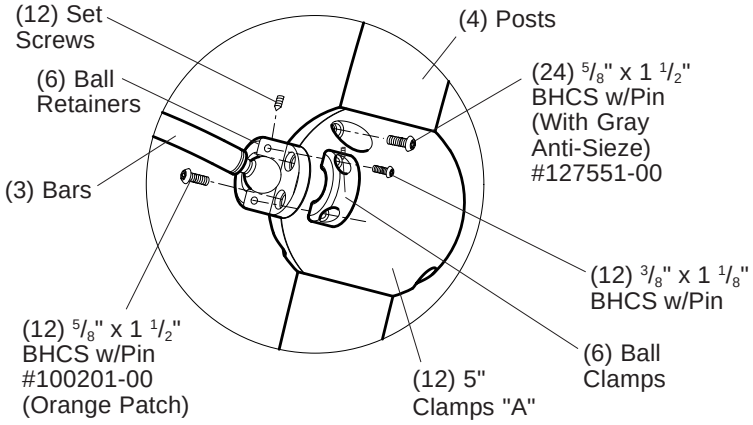
18446600

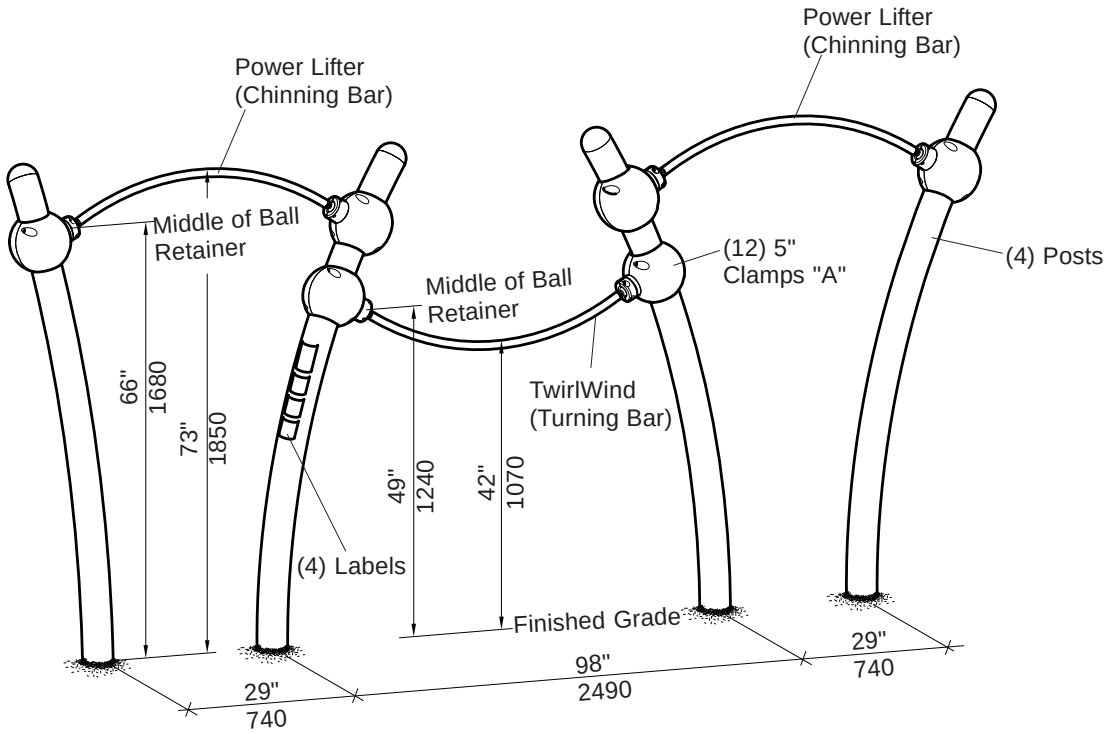
NOTE: It is critical to engage set screws securely against the bar.

DETAIL
DIRECT BURY



DETAIL
BAR ATTACHMENT





Protective Surfacing

Power Lifter/TwirlWind/Power Lifter

Sensory Play

160216 Power Lifter™, Triple Bay

601 7TH STREET SOUTH, DELANO, MINNESOTA 55328-8605 888-574-4678 LSI Install Help 888-438-6574 LSI Direct 763-972-5200 Int. FAX (763) 972-3185

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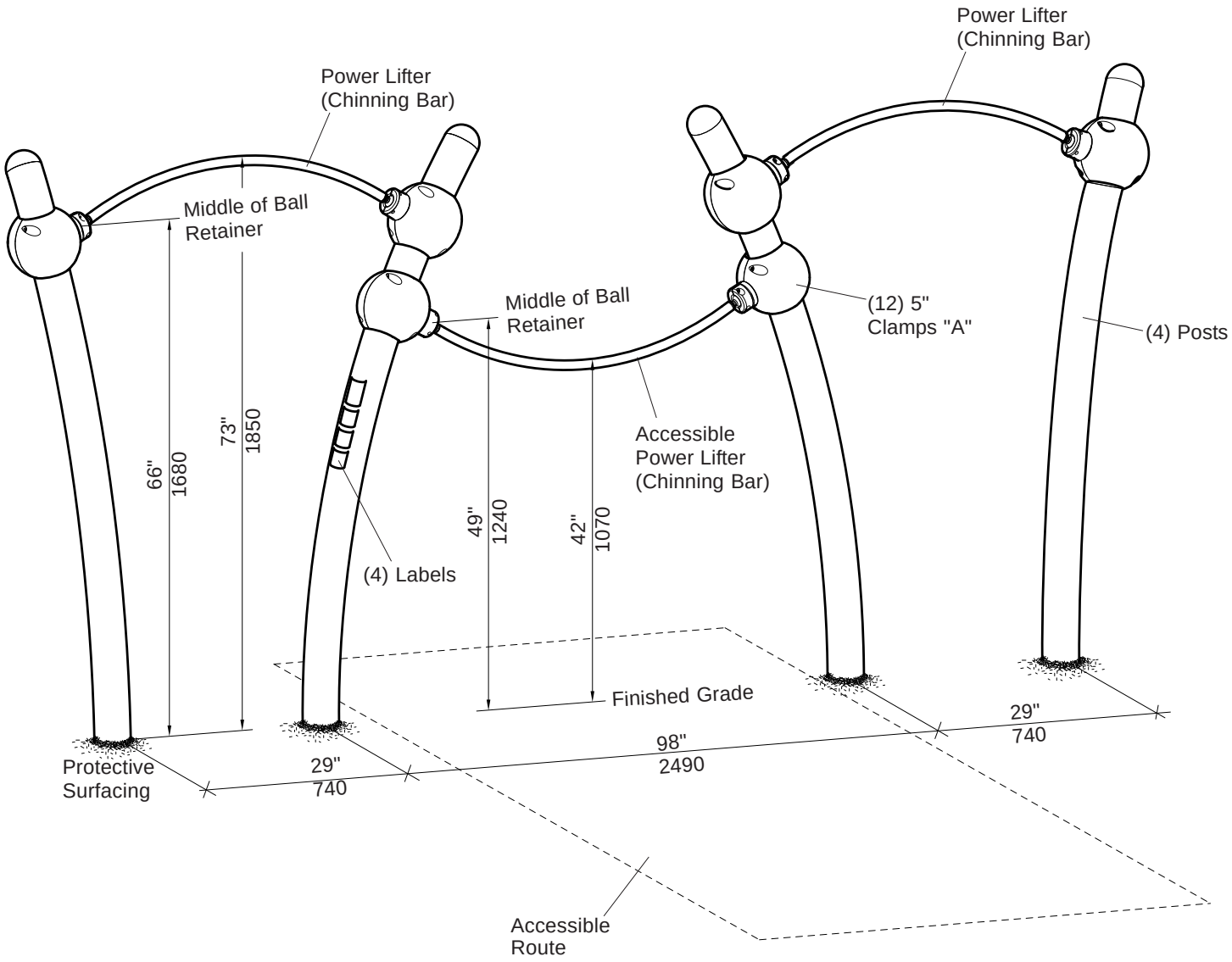
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SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

184466a



Power Lifter/Accessible Power Lifter//Power Lifter

Sensory Play

160216 Power Lifter™, Triple Bay

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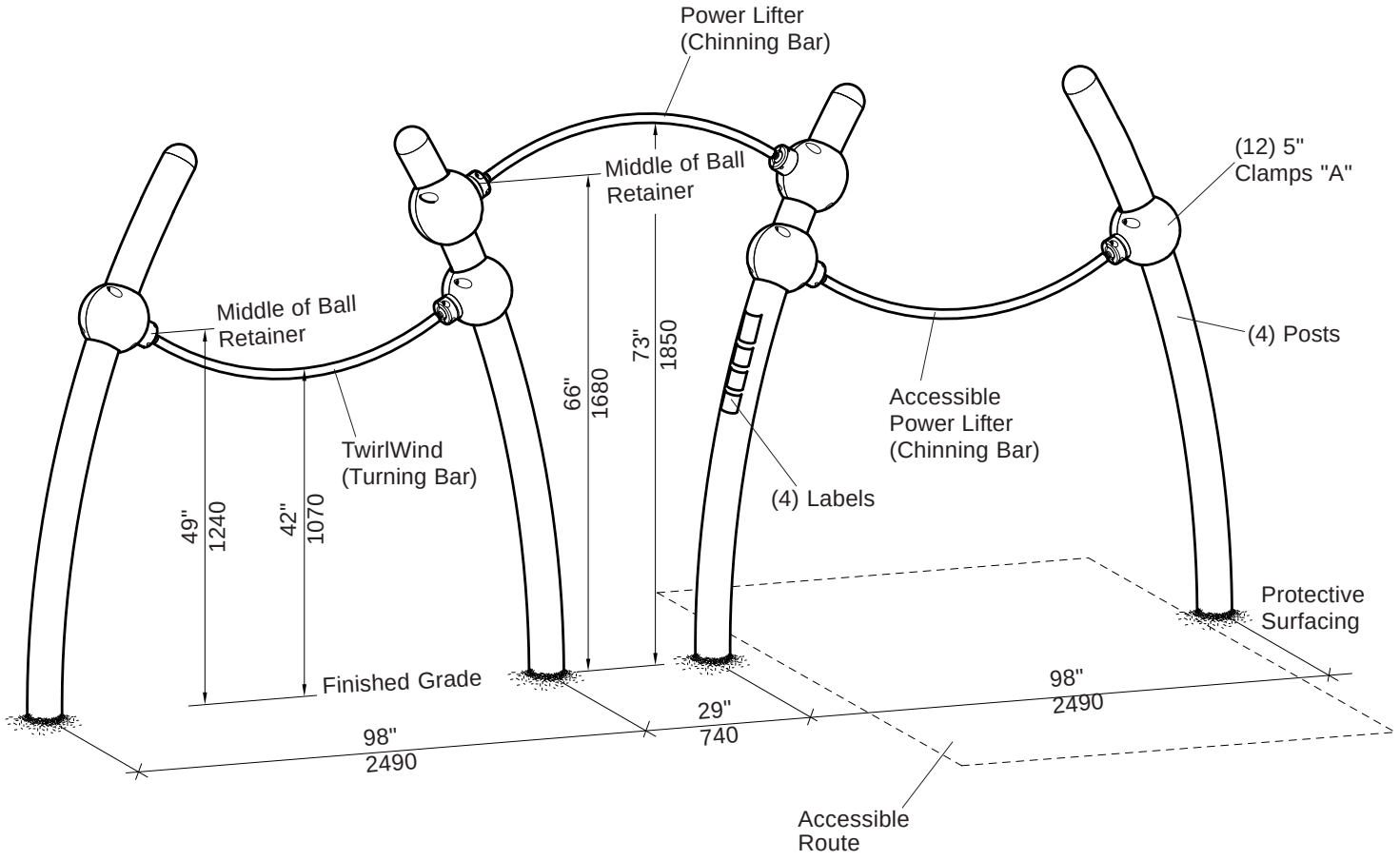
ISO 14001 CERTIFIED

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SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

184466c



TwirlWind/Power Lifter/AccessiblePower Lifter

Sensory Play — 160216 Power Lifter™, Triple Bay

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Sensory Play 160216 Power Lifter™, Triple Bay

Parts List

Part#	Description	Qty.
127551-00	5/8" x 1 1/2" BHCS w/Pin, SST	24
166271-00	5" Round Clamp "A", Specify Color	12
156699-00	Ball Clamp, Specify Color	6
169690-00	Ball Retainer, Specify Color	6
159051-00	Chinning Bar, Specify Color	3
168634-00	Post, Specify Color	4
185412-00	**Power Lifter Hardware Package**	1
100198-00	3/8" x 1 1/8" BHCS w/Pin, SST	12
100201-00	5/8" x 1 1/2" BHCS w/Pin, SST	12
156847-00	Play Safe Label, 5-12 Years	1
182213-00	Hot Surface Warning Label	1
182212-00	Entanglement Warning Label	1
115176-00	Hard Surface Warning Label	1
169691-00	3/8" x 3/4" Set Screw	12

Specifications

5" Round Clamp: Cast from 535 almag. Finish: ProShield, color specified.

Post: Fabricated from 5.000" O.D. x 11 GA. (.120" wall) galvanized steel tube. Finish: ProShield, color specified.

Ball Clamp/ Ball Retainer: Cast from 356-T6 Aluminum. Finish: ProShield, color specified.

Chinning Bar: Fabricated from 1.315" O.D. RS20 (.095"-.105" Wall) galvanized steel tubing, and 1 7/8" steel ball. Finish: ProShield, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: Approx. 2 man hours (Power Lifter)
Approx. 3 man hours (Power Lifter & TwirlWind)
Concrete Req.: Approx. 3.5 cu. ft.
Min. Use Zone: 6' (1830 mm) minimum use zone
Area Required: 29' 3 7/8" x 12' 10" (8,93 m x 3,91 m)
Weight: 401 lbs.
Fall Height: 73" (1850 mm) (Power Lifter)
49" (1240 mm) (Twirlwind)

Installation Instructions

1) **(Direct Bury)** Dig footings spaced as shown.

2) Attach 5" clamps to posts at height shown, using 5/8" x 1 1/2" BHCS w/pin (with gray anti-sieze). Do not final tighten fasteners at this time, 5" round clamps will need to be adjusted to attach Power Lifter/ TwirlWind™.

3) Attach ball retainers to 5" clamps, using 5/8" x 1 1/2" BHCS w/pin. Attach Power Lifter/TwirlWind to ball retainers using ball clamps and 3/8" x 1 1/8" BHCS w/pin and 3/8" x 3/4" set screws. With Power Lifter/ TwirlWind at proper height, final tighten 5" clamp fasteners. Refer to the Bar Attachment Detail.

4) With posts plumb, pour concrete footings. Allow concrete footings to cure for a minimum of 72 hours before users are allowed to play on the structure.

5) Apply Play Safe and Warning Labels, as shown.

6) Install protective surfacing before users are allowed to play on the structure.

Specifications are subject to change without notice.

Eco #54545 Document #18446600 replaces #17022500. Added warning labels to hardware package.

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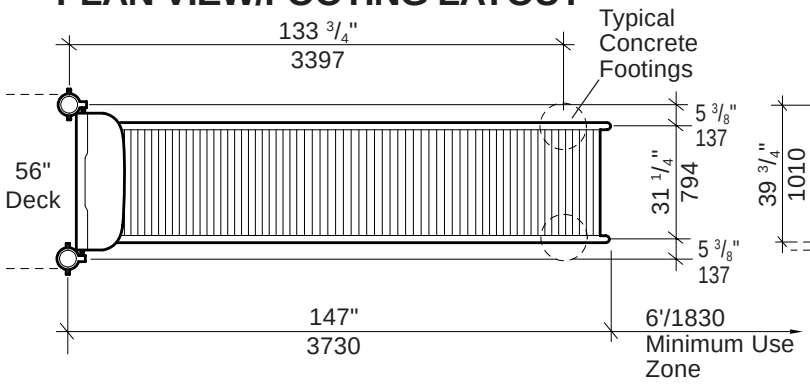
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SAFETY NOTE

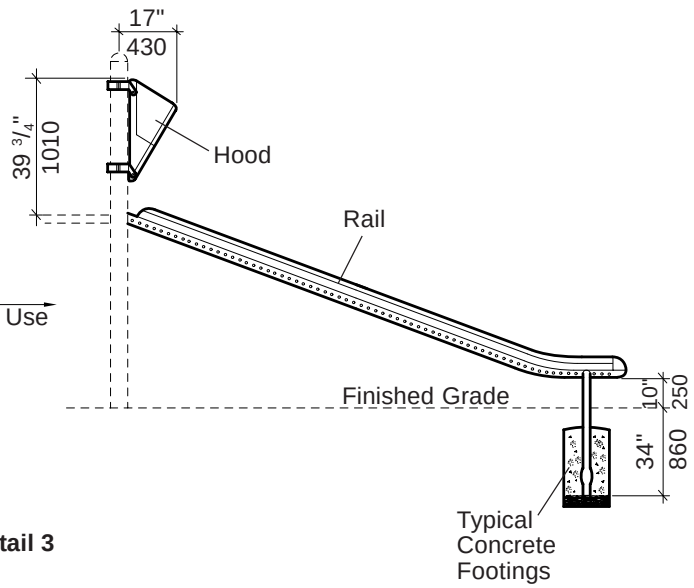
Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

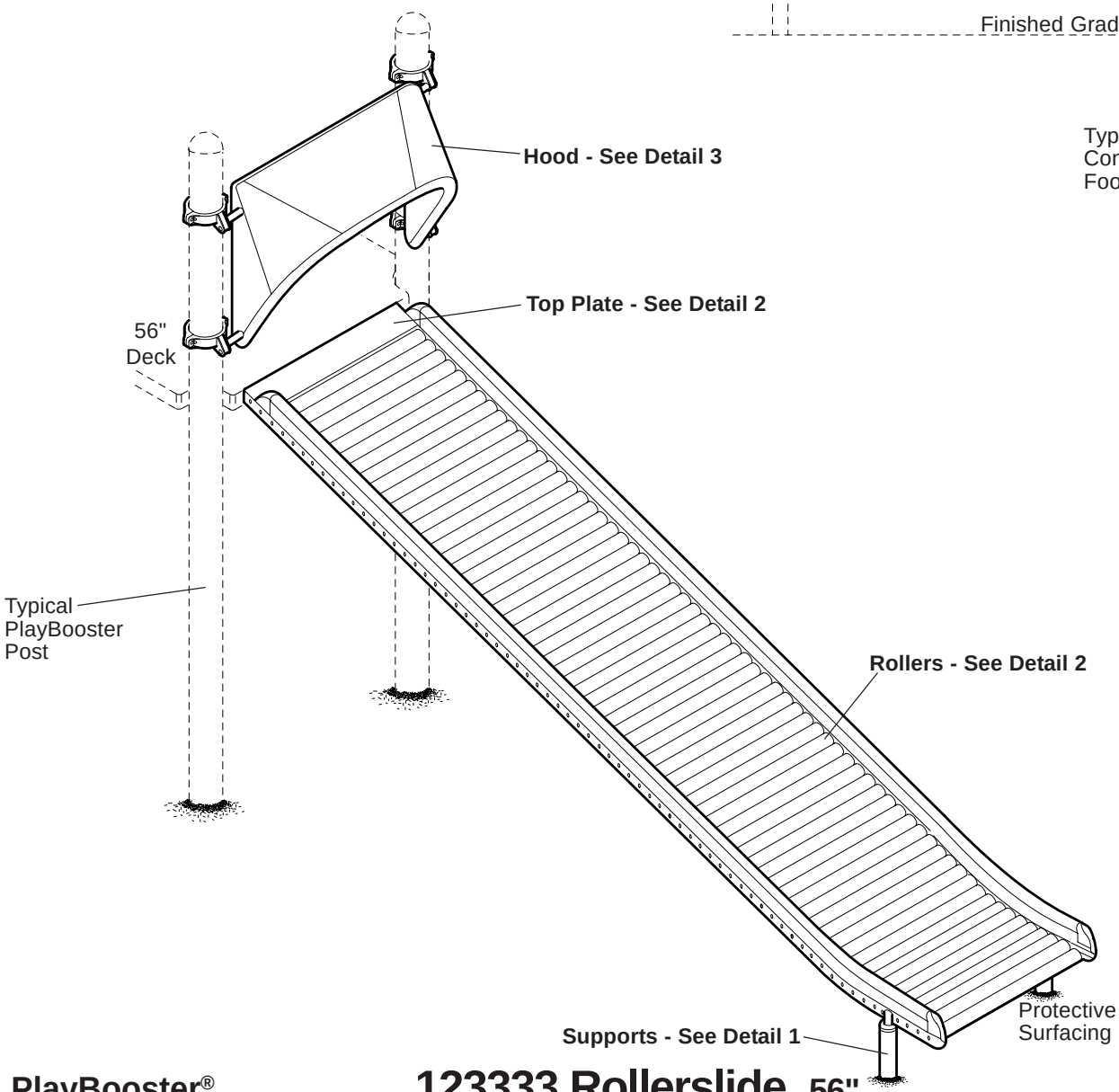
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PLAN VIEW/FOOTING LAYOUT



ELEVATION





PlayBooster® 123333 Rollerslide, 56"

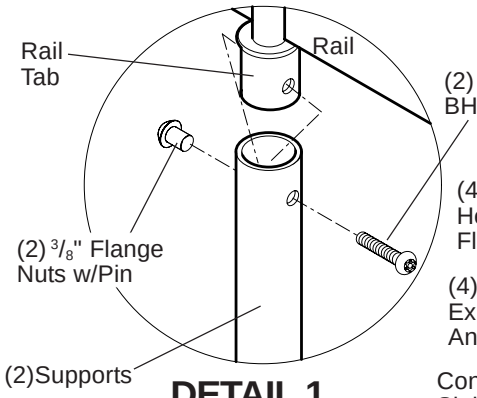
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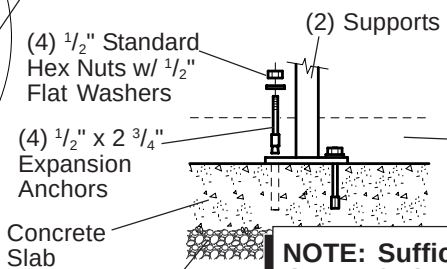
SAFETY NOTE
Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

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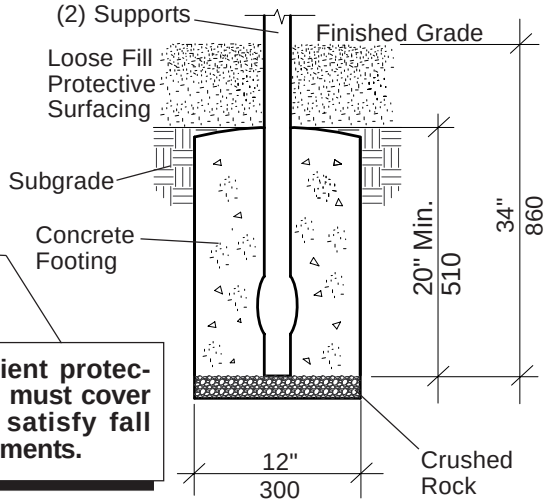
DETAIL 1
SUPPORTS

DETAIL
SURFACE MOUNT

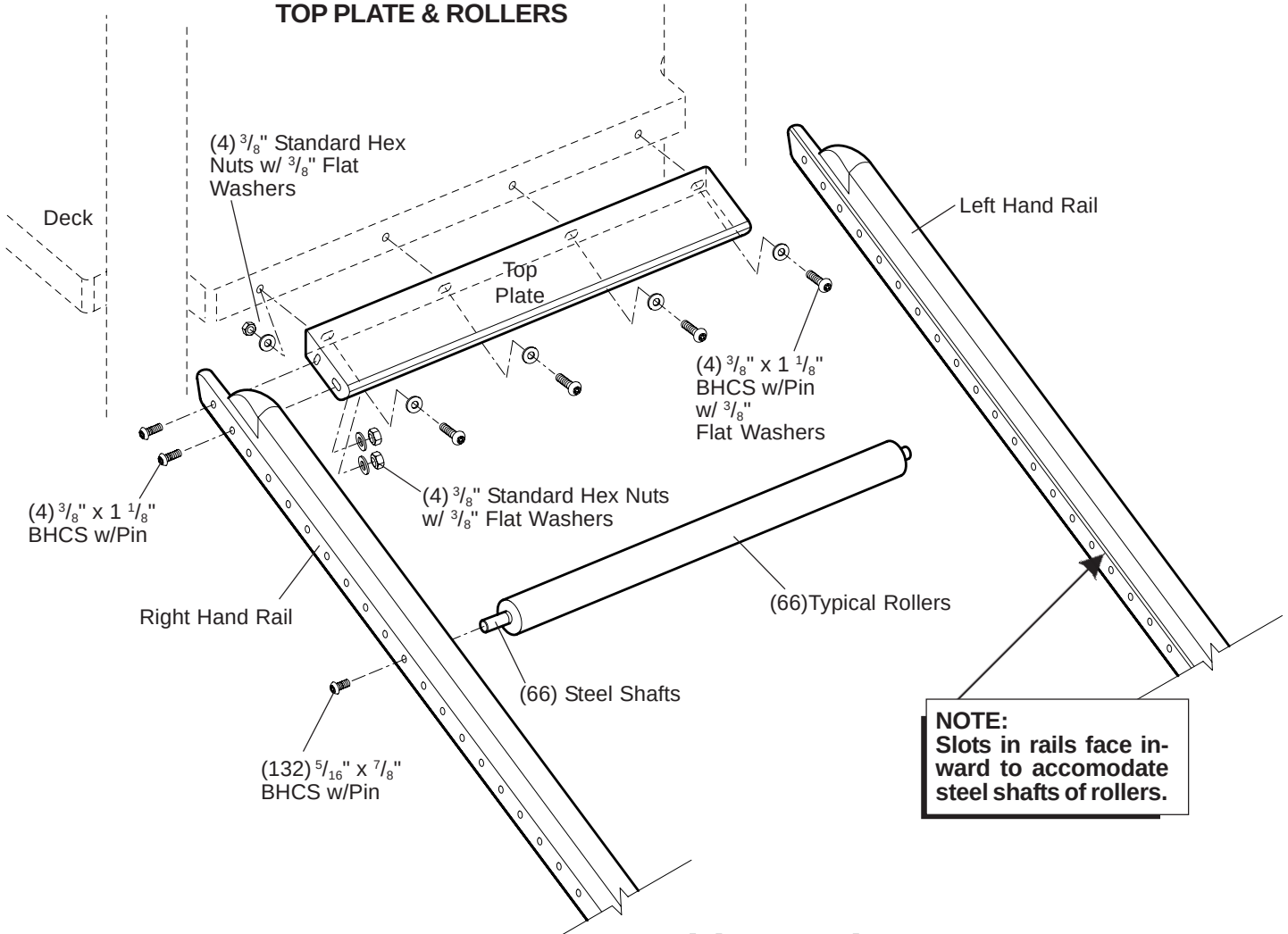


NOTE: Sufficient protective surfacing must cover hardware to satisfy fall height requirements.

DETAIL
DIRECT BURY



DETAIL 2
TOP PLATE & ROLLERS



NOTE:
Slots in rails face inward to accomodate steel shafts of rollers.

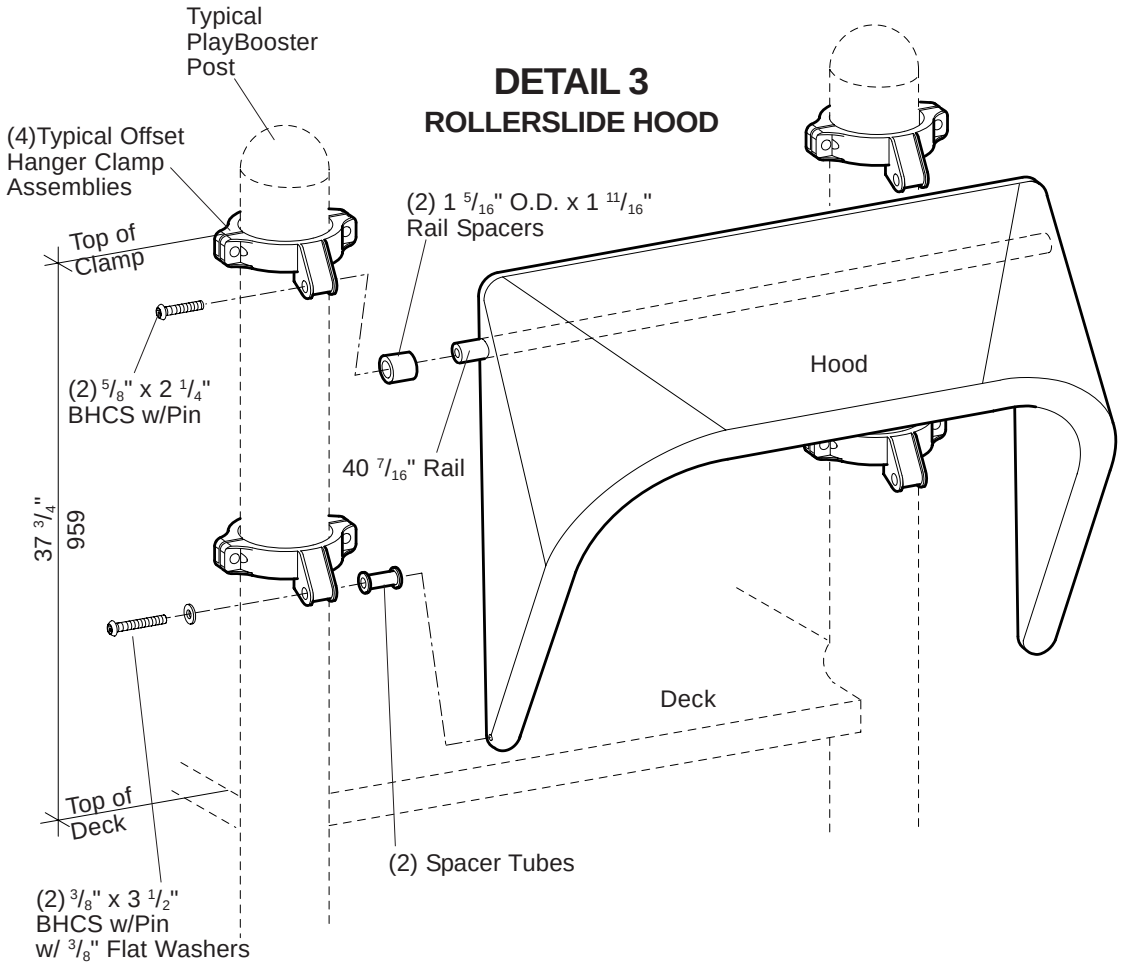
PlayBooster® 123333 Rollerslide Details, 56"

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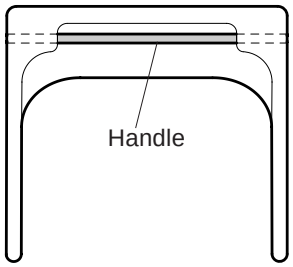
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DETAIL 3
ROLLERSLIDE HOOD



HOOD - HANDLE DETAIL



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PlayBooster® 123333 Rollerslide, 56"

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Parts List

Part#	Description	Qty.
103977-00	Support, (DB), Specify Color	2
103089-00	Support, (SM), Specify Color	2
104278-00	30 3/8" Roller Shaft	66
115347-00	Roller Assembly, Specify Color	66
135145-00	Top Plate, Specify Color	1
126957-00	Double Slide Hood, Specify Color	1
100583-00	40 7/16" Rail, Specify Color	1
113468-00	Spacer Tube, Specify Color	2
105327-01	5" Half Clamp, Specify Color	4
113729-00	Offset Hanger Clamp, Specify Color	4
167133-00	Rail 56" Rollerslide (LH), Specify Color	1
167134-00	Rail 56" Rollerslide (RH), Specify Color	1
132443-00	Rail Spacer, Specify Color	2
106577-00	**Double Slide Hood Hardware Package**	1
100198-00	3/8" x 1 1/8" BHCS w/Pin, SST	8
100200-00	3/8" x 3 1/2" BHCS w/Pin, SST	2
100203-00	5/8" x 2 1/4" BHCS w/Pin, SST	2
100351-00	3/8" Tee Nut, SST	8
100362-00	3/8" Flat Washer, SST	2
100610-00	1/4" x 5/8" Drive Rivet, AL/SST	4
134536-00	**Rollerslide 56" Deck Hardware Package**	1
123224-00	3/8" x 1 11/16" BHCS w/Pin, SST	2
132626-00	5/16" x 7/8" BHCS w/Pin, SST	132
100198-00	3/8" x 1 1/8" BHCS w/Pin, SST	8
100327-00	3/8" Standard Hex Nut, SST	8
100353-00	3/8" Flange Nut w/Pin, SST	2
100362-00	3/8" Flat Washer, SST	12
121348-00	**4-Hole (SM) Hardware Package**	1
100266-00	1/2" x 2 3/4" Expansion Anchor	4
100322-00	1/2" Standard Hex Nut, SST	4
100363-00	1/2" Flat Washer, SST	4

DB = Direct Bury
SM = Surface Mount
(LH) = Left Hand
(RH) = Right Hand

Specifications

Hood: Rotationally molded from U.V. stabilized linear low density polyethylene, color specified.

Rollers: Fabricated from 1.900" O.D. x 16 GA (.060") galvanized steel tubing. Finish: TenderTuff™, color specified.

Roller Shafts: Fabricated from 1/2" diameter CRS zinc-plated with yellow chromate finish.

Support Leg: Fabricated from 1.900" O.D. RS-20 (.090" - .100") galvanized steel tubing. Finish: ProShield®, color specified.

Rails: Extruded from 6005-T1 aluminum. Finish: ProShield, color specified.

Top Plate: Formed from 10 GA (.135") 304-2B SST. Finish: TenderTuff, color specified.

Rail: 1 1/8" O.D. 6005-T5 aluminum extrusion with 5/16" walls. Finish: ProShield, color specified.

Rail Spacer: Fabricated from 1.3125 O.D. x 16 Ga. (.065) steel tubing. Finish: ProShield, color specified.

Spacer Tube: Made from 6061-T6 aluminum 7/8" O.D. x 1 11/16". Finish: ProShield, color specified.

Offset Hanger Clamp Assembly: Cast aluminum. Finish: ProShield, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: Approx. 5 1/2 man hours
Concrete Req.: Approx. 2.6 cu. ft.
Exit Req.: 6' (1,83 m) minimum use zone at exit
Weight: 522 lbs.
Fall Height: 56" (1,42 m)

Installation Instructions

1) **(Direct Bury)** Dig footing holes spaced as shown.

2) Attach the supports to bottom of rails as shown in Detail 1, using 3/8" x 1 11/16" BHCS w/Pin with 3/8" flange nuts w/Pin. **NOTE:** *Insert flange nuts w/Pin through side facing deck.*

3) Attach top plate to deck, as shown in Detail 2, using 3/8" x 1 1/8" BHCS w/Pin with 3/8" flat washers and 3/8" standard hex nuts with 3/8" flat washers.

4) Locate left and right rollerslide rails and attach to top plate using 3/8" x 1 1/8" BHCS w/Pin and 3/8" standard hex nuts with 3/8" flat washers, as shown in Detail 2,

5) Insert the 30 3/8" steel roller shafts into the rollers. Starting at top, next to the top plate, attach all roller assemblies to rails, as shown in Detail 2, using 5/16" x 7/8" BHCS w/Pin.

6) Insert 40 7/16" rail through top of hood, place rail spacer tube on each end of the 40 7/16" rail and attach to posts at height shown using offset hanger clamp assemblies. Refer to the Typical Offset Hanger Clamp Spec Sheet. Fasten bottom of hood to offset hanger clamp assemblies using 3/8" x 3 1/2" BHCS w/Pin with 3/8" flat washers through clamp and spacer tubes and into threaded inserts in hood. Refer to Detail 3.

7) **(Direct Bury)** With supports plumb pour concrete footings. Allow concrete footings to cure for a minimum of 72 hours before users are allowed to play on the structure.

   (Surface Mount) Mark anchor bolt locations on concrete slab through holes in anchor plate and remove rollerslide. Drill 1/2" x 3" deep holes on marks into concrete using a hammer drill and 1/2" masonry bit. Tap expansion anchors into drilled holes. Reposition rollerslide and reattach to the face of the deck following step 3. Fasten support to expansion anchors using 1/2" standard hex nuts with 1/2" flat washers.

8) Install 1/4" x 5/8" drive rivets in all 5" half clamps. Refer to the Typical Offset Hanger Clamp Spec Sheet.

9) Install protective surfacing before users are allowed to play on the structure.

Specifications are subject to change without notice.

Eco #53807 Document #16703000 replaces #16108400. Replaced rail sets with (RH) & (LH) rails.

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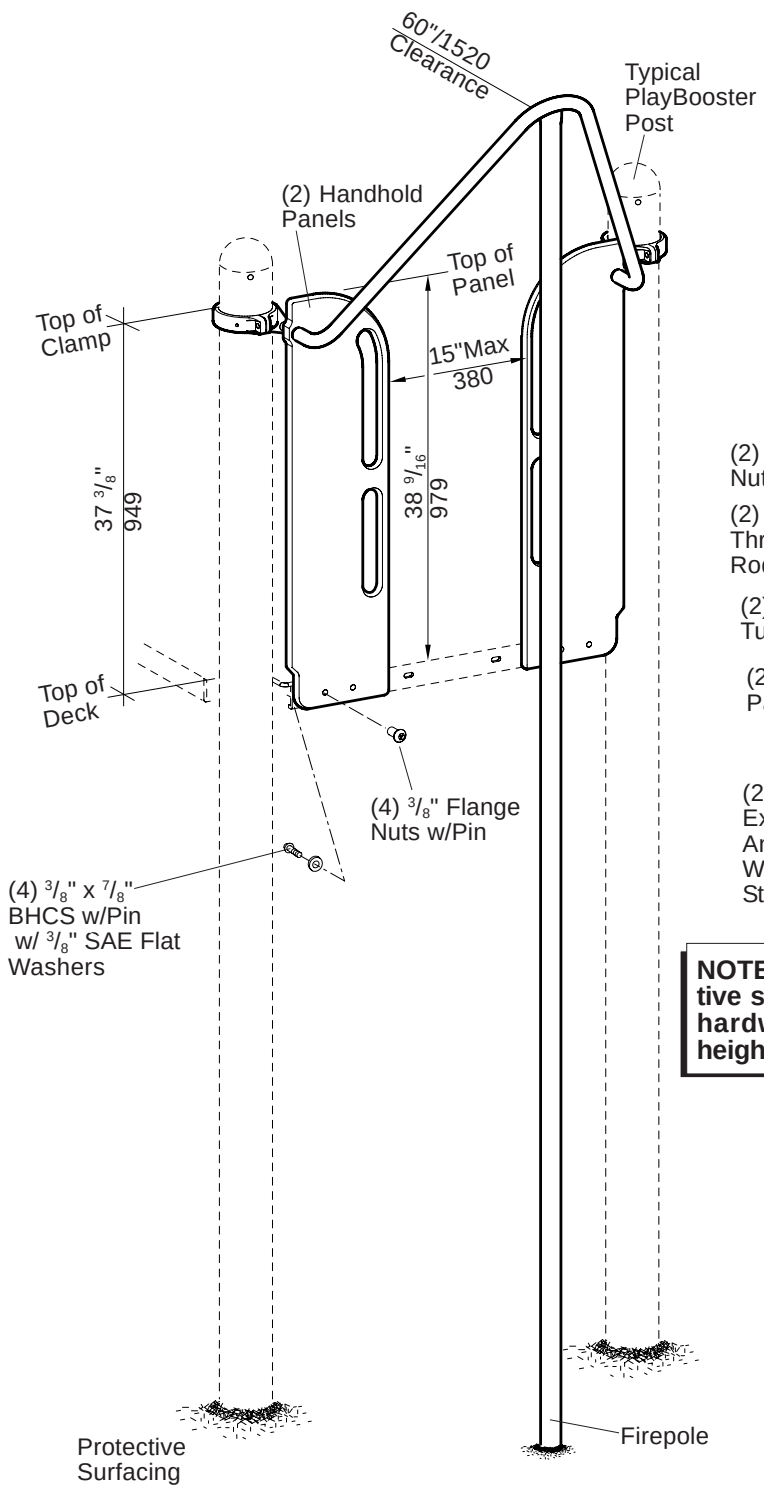
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SAFETY NOTE

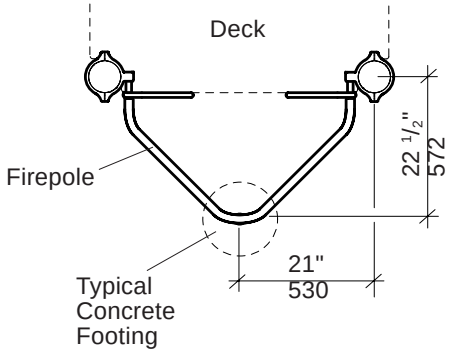
Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

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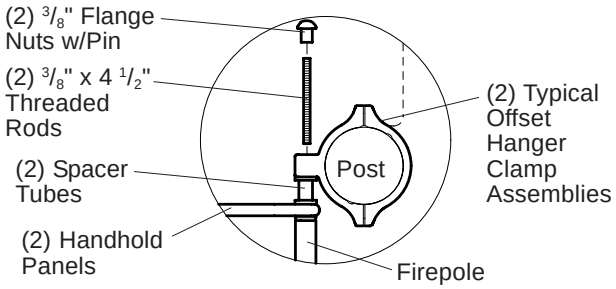


72" Deck Height Shown

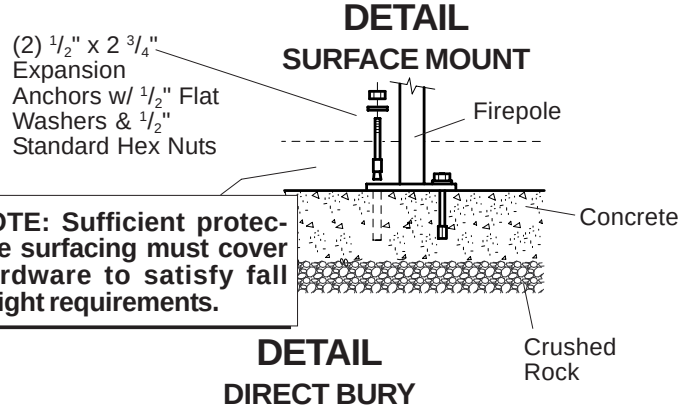
PLAN VIEW/ FOOTING LAYOUT



DETAIL
HANDHOLD PANEL ATTACHMENT

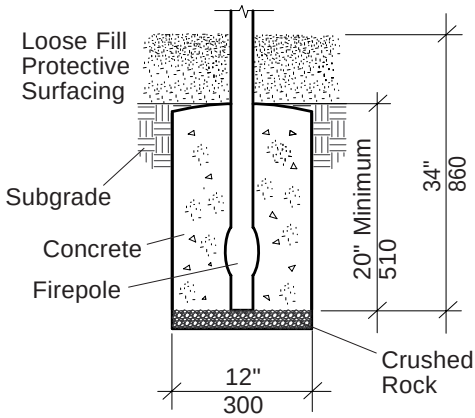


DETAIL
SURFACE MOUNT



NOTE: Sufficient protective surfacing must cover hardware to satisfy fall height requirements.

DETAIL
DIRECT BURY



PlayBooster® 148426 Firepoles, 32"-72" Decks

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PlayBooster® 148426 Firepoles, 32"-72" Decks

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Parts List

Part#	Description	Qty.
147954-00	Handhold Panel, Specify Color	2
105327-01	5" Half Clamp, Specify Color	2
113729-00	Offset Hanger Clamp, Specify Color	2
147956-00	Firepole, 32" Deck (DB), Specify Color	1
147957-00	Firepole, 40" Deck (DB), Specify Color	1
147958-00	Firepole, 48" Deck (DB), Specify Color	1
147959-00	Firepole, 56" Deck (DB), Specify Color	1
147960-00	Firepole, 64" Deck (DB), Specify Color	1
147961-00	Firepole, 72" Deck (DB), Specify Color	1
147962-00	Firepole, 32" Deck (SM), Specify Color	1
147963-00	Firepole, 40" Deck (SM), Specify Color	1
147964-00	Firepole, 48" Deck (SM), Specify Color	1
147965-00	Firepole, 56" Deck (SM), Specify Color	1
147966-00	Firepole, 64" Deck (SM), Specify Color	1
147967-00	Firepole, 72" Deck (SM), Specify Color	1
113468-00	7/8" O.D. x 1 11/16" Spacer Tube, Specify Color	2
100610-00	1/4" x 5/8" Drive Rivet, AL/SST	2
148176-00	**Pole Hardware Package**	1
100196-00	3/8" x 7/8" BHCS w/Pin, SST	4
100198-00	3/8" x 1 1/8" BHCS w/Pin, SST	4
100351-00	3/8" Tee Nut, SST	4
100353-00	3/8" Flange Nut w/Pin, SST	6
100365-00	3/8" SAE Flat Washer, SST	4
148081-00	3/8" x 4 1/2" Threaded Rod, SST	2
111392-00	**2-Hole (SM) Hardware Package**	1
100266-00	1/2" x 2 3/4" Expansion Anchors	2
100322-00	1/2" Standard Hex Nut, SST	2
100363-00	1/2" Flat Washer, SST	2

DB = Direct Bury
SM = Surface Mount

Specifications

Firepole: Weldment comprised of 1.900" O.D. RS20 (.090" - .100") galvanized steel tubing, and 1.315" O.D. RS20 (.080" - .090") galvanized steel tubing. Finish: ProShield®, color specified.

Handhold Panel: Solid color Permalene®, color specified.

Clamps: Cast aluminum. Finish: ProShield, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: **SM** - Approx. 1 1/2 man hours
DB - Approx. 2 man hours

Concrete Req.: Approx. 1.3 cu. ft.

Weight: 55 lbs. (32"-48" Deck)
59 lbs. (56"-72" Deck)

Fall Height: Deck Height

Installation Instructions

1) **(Direct Bury)** Dig footing hole as shown. Refer to the Plan View/ Footing Layout.

2) Attach offset hanger clamps to posts at heights shown using 5" half clamps, 3/8" x 1 1/8" BHCS w/pin and 3/8" tee nuts. Refer to the Typical Offset Hanger Clamp Spec Sheet.

3) Attach handhold panels to the face of the deck using 3/8" x 7/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" flange nuts w/pin.

4) Attach firepole to handhold panels and offset hanger clamps using 3/8" flange nuts w/pin, 3/8" x 4 1/2" threaded rods and spacer tubes. Refer to the Handhold Panel Attachment Detail. **NOTE:** *Turn 3/8" x 4 1/2" threaded rod into 3/8" flange nut w/pin until it bottoms out, before attaching firepole.*

5) **(Direct Bury)** With firepole plumb, pour concrete footing. Allow concrete footing to cure a minimum of 72 hours before users are allowed to play on the structure.

   (Surface Mount) Drill 1/2" x 3" deep holes through support plate using hammer drill and 1/2" masonry bit. Tap expansion anchors into drilled holes. Fasten support plates to expansion anchors using 1/2" standard hex nuts with 1/2" flat washers.

6) Install protective surfacing before users are allowed to play on the structure.

Specifications are subject to change without notice.

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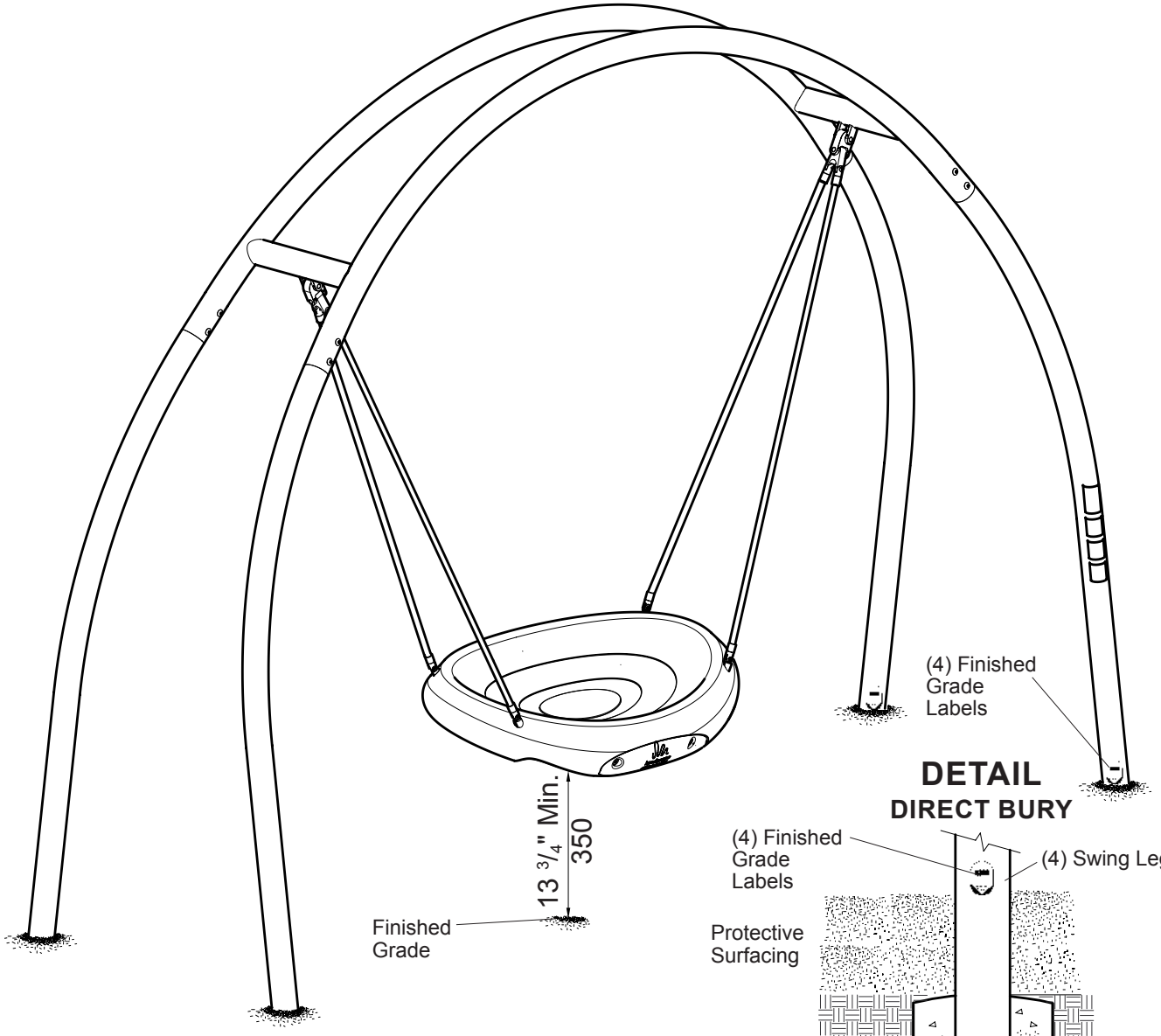
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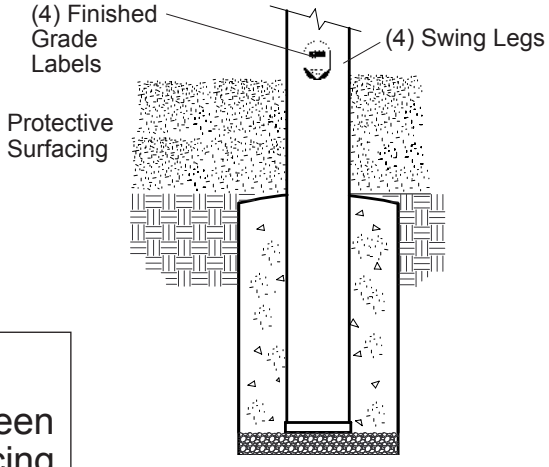
SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. ASTM F1487.)

19397700E



DETAIL
DIRECT BURY



⚠ WARNING

Failure to meet the minimum 13 3/4" clearance between the lowest point of the seat and the protective surfacing may result in serious injury. Children have sustained broken legs and ankles due to the seat being installed too low.

Swings

173592 Oodle® Swing

601 7TH STREET SOUTH, DELANO, MINNESOTA 55328-8605 888-574-4678 LSI Install Help 888-438-6574 LSI Direct 763-972-5200 Int. FAX (763) 972-3185

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SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. ASTM F1487.)

DETAILS

FINISHED GRADE TO SWING SEAT MEASUREMENT







NOTE: Take dimension from the lowest point on the seat.

Swings

173592 Oodle® Swing

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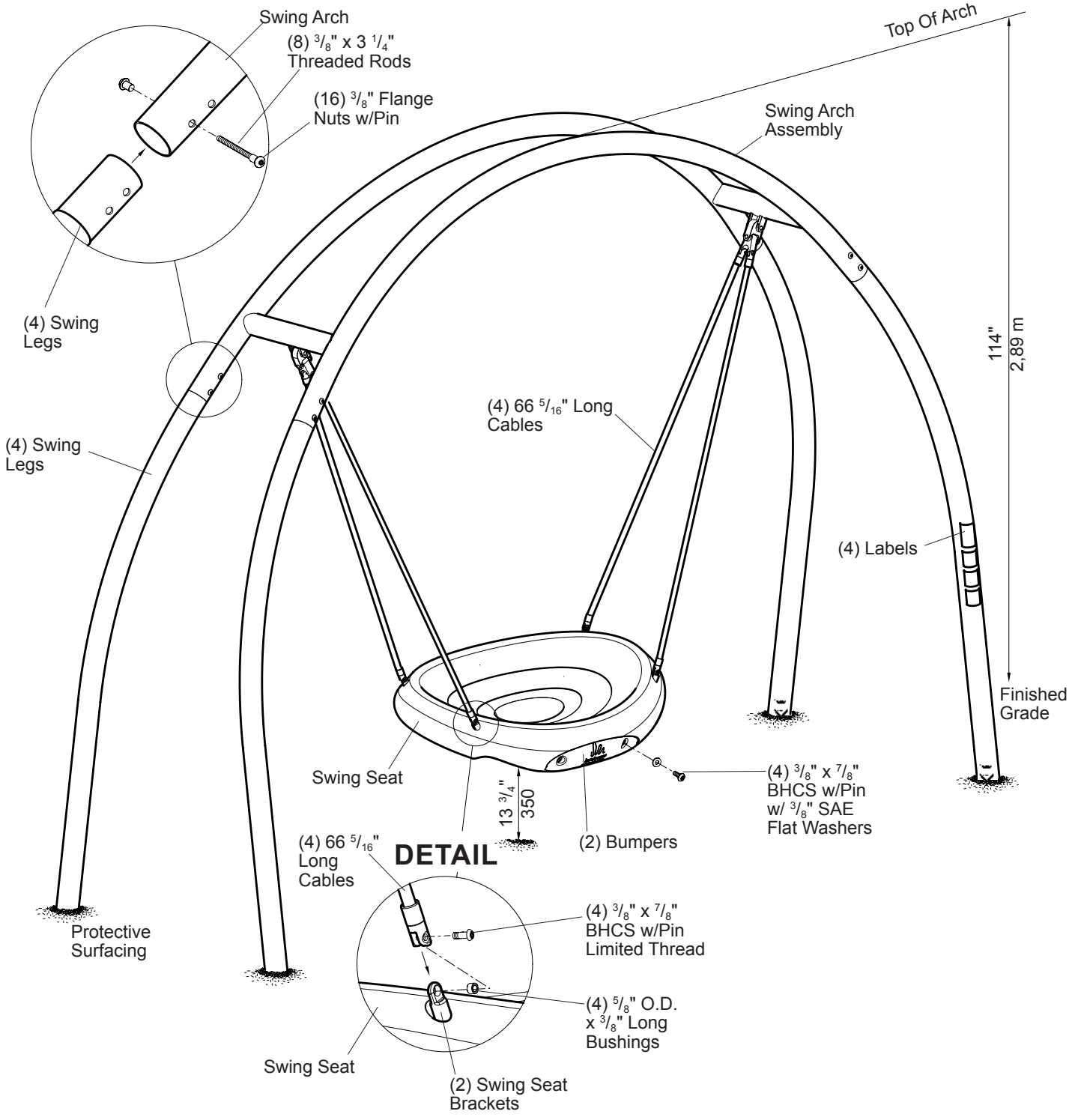
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SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. ASTM F1487.)

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DETAIL
SWING LEG ATTACHMENT



Swings

173592 Oodle® Swing

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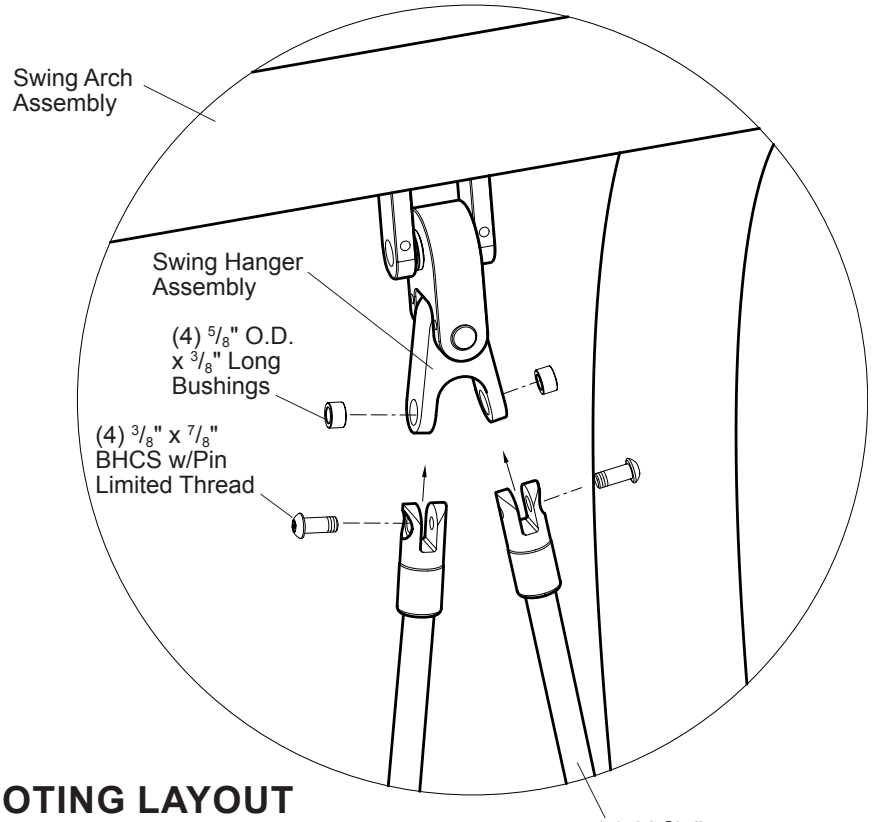
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SAFETY NOTE

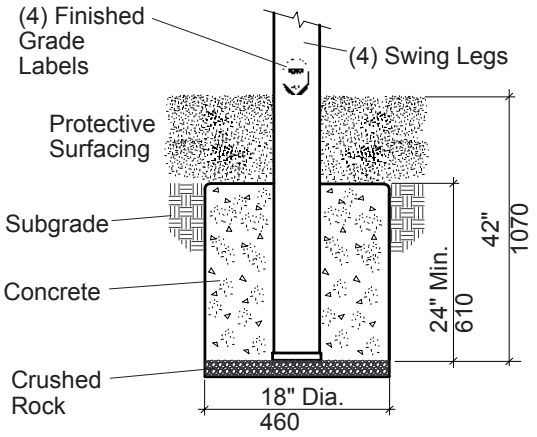
Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. ASTM F1487.)

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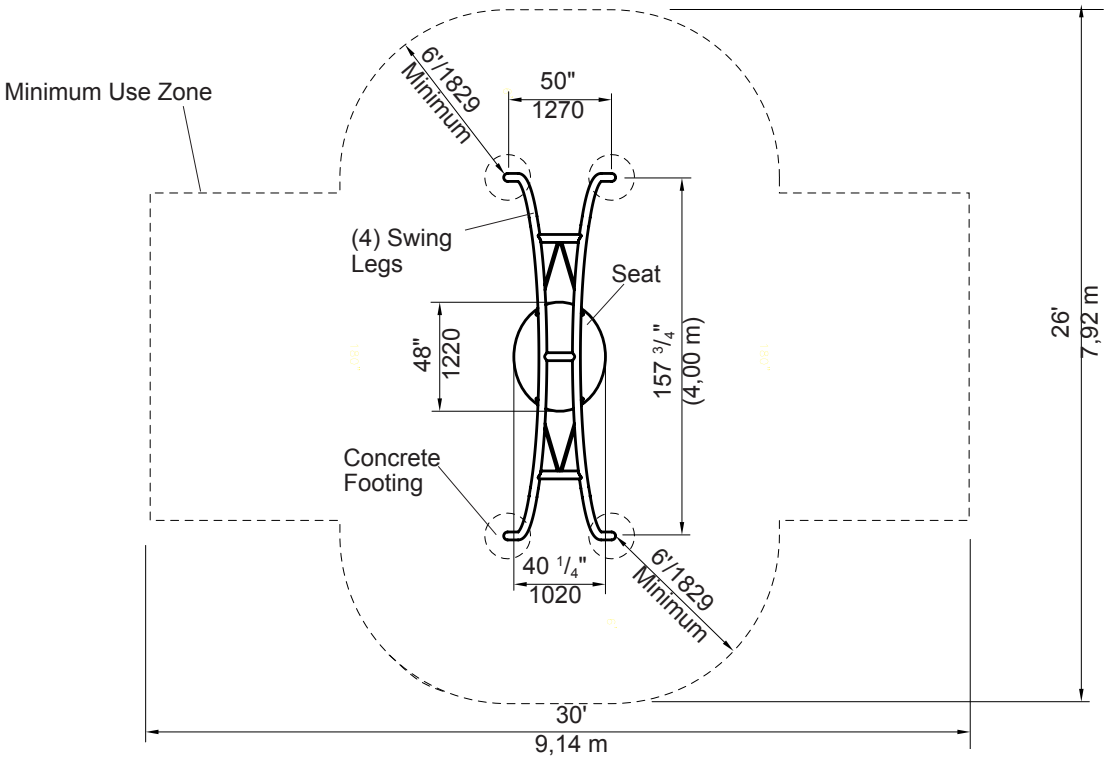
DETAIL
CABLE ATTACHMENT



DETAIL
DIRECT BURY



PLAN VIEW/FOOTING LAYOUT



Swings

173592 Oodle® Swing

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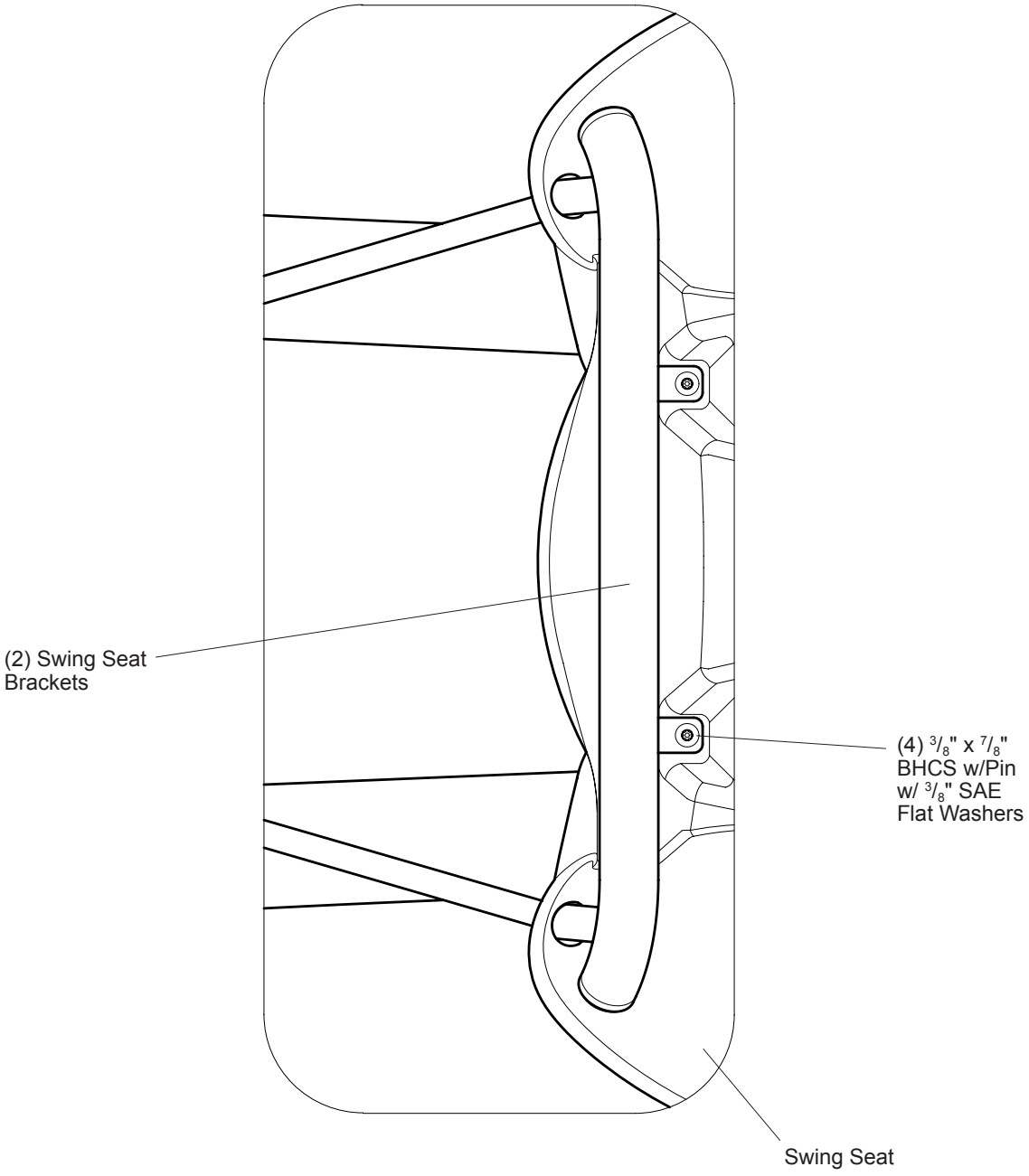
SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. ASTM F1487.)

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DETAIL
SWING SEAT ATTACHMENT

Bottom View



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Swings 173592 Oodle® Swing

Parts List

Part#	Description	Qty.
193982-00	Swing Seat, Specify Color	1
172045-00	Swing Bumper, Black	2
174343-00	Swing Leg, Specify Color	4
198541-00	66 5/16" Swing Cable, Black	4
177254-00	Swing Arch, Specify Color	1
189148-00	Swing Seat Bracket, Specify Color	2
184423-00	**Oodle Swing Hardware Package**	1
100196-00	3/8" x 7/8" BHCS w/Pin, SST	8
100290-00	3/8" x 7/8" BHCS w/Pin Limited Thread, SST	8
100353-00	3/8" Flange Nut w/Pin, SST	16
100365-00	3/8" SAE Flat Washer, SST	8
176539-00	3/8" x 3 1/4" Threaded Rod, SST	8
127179-00	5/8" O.D. x 3/8" Long Bushing, SST	8
156847-00	Play Safe Label, 5-12 Yrs.	1
182213-00	Hot Surface Warning Label	1
182212-00	Entanglement Warning Label	1
115176-00	Hard Surface Warning Label	1

Specifications

Swing Seat: Rotationally molded from U.V. stabilized linear low density polyethylene, color specified.

Swing Seat Brkt: Weldment comprised of 1.66" (42,16 mm) O.D. RS20 (.085"-.095") (2,16 mm-2,41 mm) wall galvanized steel tube, 1.000" (25,4 mm) O.D. x .750" (19,05 mm) I.D. 1018 steel tube and 7GA (.179") (4,55 mm) HRPO steel sheet. Finish: ProShield®, color specified.

Cable: Made of tightly woven polyester-wrapped, six-stranded galvanized-steel cable with a polypropylene core. **(Cable Connectors)** 6061-T6 aluminum.

Bumper: Molded from U.V. stabilized black EPDM rubber encapsulating 11 GA (.120") HRPO steel sheet.

Swing Arch: Weldment comprised of 3.500" O.D. RS20 (.080"-.090" wall) galvanized steel tube and 1/2" thick stainless steel tabs. Finish: ProShield®, color specified.

Swing Leg: 3.500" O.D. RS20 (.080"-.090" wall) galvanized steel tube. Finish: ProShield, color specified.

Swing Hanger Assembly: Assembly comprised of 300 series stainless steel knuckle and yoke, stainless steel swing pin, stainless steel spring pin and oilite bushings.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: 8 - 10 man hours
Area Required: 26' x 30' (7,92 m x 9,14 m) minimum
Weight: 395 lbs.
Concrete: .52 cu. yards
Fall Height: 90" (2,28 m)

Installation Instructions

1) Dig footings spaced as shown. Refer to the Plan View/Footing Layout.
2) Preassemble the Oodle swing over a clean non-scratching surface.
3) Attach swing legs to swing arch, using 3/8" x 3 1/4" threaded rods and 3/8" flange nuts w/pin. Refer to the Swing Leg Attachment Detail.
4) Stand swing upright onto legs and position in footing holes. Make final adjustments so arch is at proper height and legs are in line with each other.

⚠ WARNING: Considering the depth of the surfacing material that will be used under the swing, make sure that the finished grade label (attached on each swing leg) is at the appropriate height. This confirms that the swing can be set at a safe and proper elevation.

5) Pour concrete footings and let cure for 72 hours before proceeding.
6) Attach bumpers to swing seat, using 3/8" x 7/8" BHCS w/pin and 3/8" SAE flat washers.
7) Attach swing seat brackets to swing seat, using 3/8" x 7/8" BHCS w/pin and 3/8" SAE flat washers. Refer to the Swing Seat Attachment Detail.
8) Place 5/8" O.D. x 3/8" long bushings into swing seat bracket tab holes. Attach cables to swing seat brackets, using 3/8" x 7/8" BHCS w/pin limited thread. Refer to the Swing Seat Attachment Detail.
9) Place 5/8" O.D. x 3/8" long bushings into swing hanger clamp assembly holes. Attach cables to swing hanger assemblies, using 3/8" x 7/8" BHCS w/pin limited thread. Refer to the Cable Attachment Detail.
10) Apply Play Safe and Warning Labels, as shown.
11) Install protective surfacing before users are allowed to play on the structure.

IMPORTANT: Verify seat has a safe clearance from the surfacing material as shown on sheet 1. Failure to do so could result in a hazardous installation that may result in serious injury.

Specifications are subject to change without notice.

Eco #0100000 Document #19854200 replaces #19697500. Replaced swing cables.

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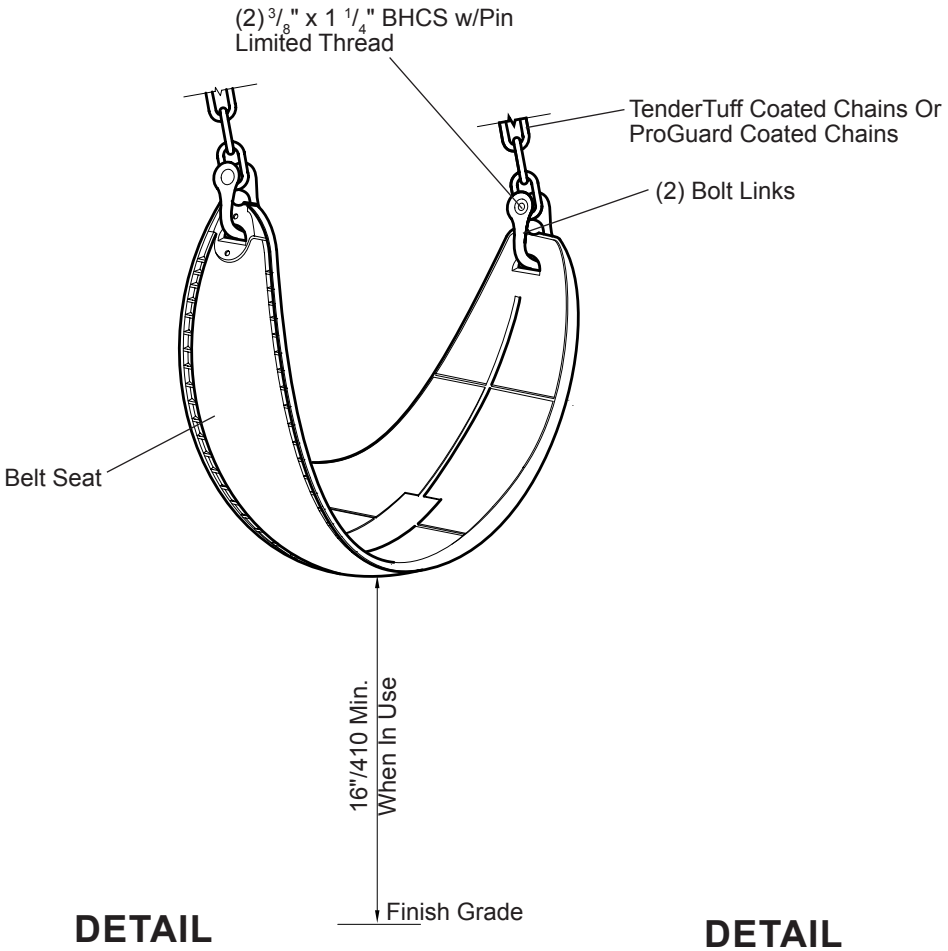
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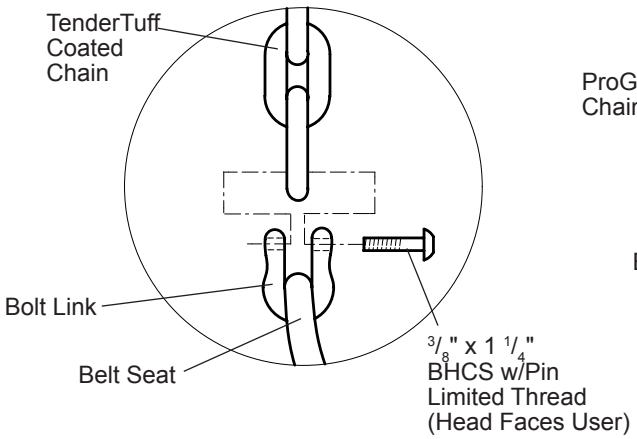
SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

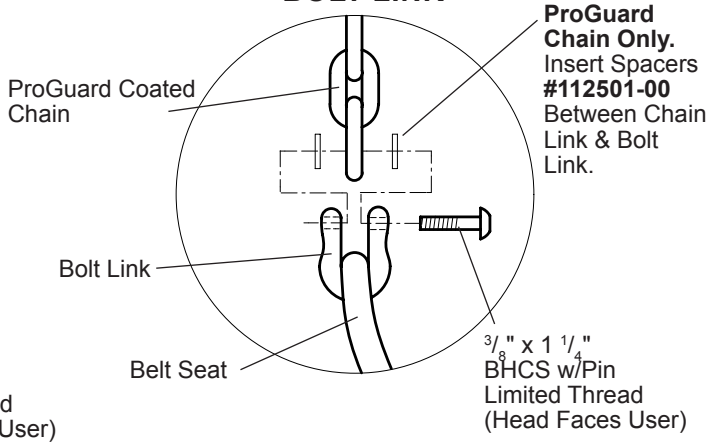
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DETAIL
BOLT LINK



DETAIL
BOLT LINK



Swings

174018 Belt Seat

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Swings 174018 Belt Seat

Parts List

Part #	Description	Qty.
	7 Ft. High Beam	
128842	Belt Swing Seat, Black	1
178679	57 7/16" Chain, TenderTuff, Specify Color	2
175251	57 7/16" Chain, ProGuard	2
132672	**Bolt Link w/Bolt & Spacers**	1
100292	3/8" x 1 1/4" BHCS w/Pin Ltd. Thread, SST	2
138915	Bolt Link, SST	2
112501	Chain Spacer	4
132635	**Bolt Link w/Bolt Hardware Package**	1
100292-00	3/8" x 1 1/4" BHCS w/Pin Ltd. Thread, SST	2
138915	Bolt Link, SST	2
	8 Ft. High Beam	
128842	Belt Swing Seat, Black	1
152050	67 7/8" Chain, TenderTuff, Specify Color	2
174404	67 7/8" Chain, ProGuard	2
132672	**Bolt Link w/Bolt & Spacers**	1
100292	3/8" x 1 1/4" BHCS w/Pin Ltd. Thread, SST	2
138915	Bolt Link, SST	2
112501	Chain Spacer	4
132635	**Bolt Link w/Bolt Hardware Package**	1
100292	3/8" x 1 1/4" BHCS w/Pin Ltd. Thread, SST	2
138915	Bolt Link, SST	2
	10 Ft. High Beam	
128842	Belt Swing Seat, Black	1
152052	90 11/16" Chain, TenderTuff, Specify Color	2
174884	90 11/16" Chain, ProGuard	2
132672	**Bolt Link w/Bolt & Spacers**	1
100292	3/8" x 1 1/4" BHCS w/Pin Ltd. Thread, SST	2
138915	Bolt Link, SST	2
112501	Chain Spacer	4
132635	**Bolt Link w/Bolt Hardware Package**	1
100292	3/8" x 1 1/4" BHCS w/Pin Ltd. Thread, SST	2
138915	Bolt Link, SST	2

Specifications

Chain Spacer: Made from white nylon measuring .080" x .785" O.D.

Chain/ProGuard: Steel 3/16" straight link chain, 800 lb. working load limit. Finish: ProGuard.

Chain/Coated: Steel 3/16" straight link chain, 800 lb. working load limit. Finish: TenderTuff®, color specified.

Belt Seats: Molded from U.V. stabilized black EPDM rubber encapsulating a weldment comprised of a 22 GA (.029") spring stainless steel sheet, and (4) .105" thick stainless steel washers. The belt seat elliptical shape measures 7" wide x 26" long x .700" thick.

Bolt Link: Stainless Steel.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: 1/4 man hour per seat

Weight: 8 lbs. (7 Ft. Beam w/ProGuard Chains)
9 lbs. (7 Ft. Beam w/TenderTuff Chains
8 lbs. (8 Ft. Beam w/ProGuard Chains)
9 lbs. (8 Ft. Beam w/TenderTuff Chains)
10 lbs. (10 Ft. Beam w/ProGuard Chains)
11 lbs. (10 Ft. Beam w/TenderTuff Chains)

Installation

Swing Hangers With Double Clevis

1) Attach chains to double clevis using 3/8" x 1 1/4" BHCS w/pin limited thread, as shown.
2) Attach chains to belt seat using bolt links with 3/8" x 1 1/4" BHCS w/ pin limited thread. Be sure bolt heads face user. **NOTE:** *Use chain spacers as shown when installing ProGuard chains.*
3) Install protective surfacing before users are allowed to play on the structure.

Anti-wrap Swing Hangers

1) Attach chains to aluminum clevis using 3/8" x 7/8" BHCS w/pin limited thread, as shown.
2) Attach chains to belt seat using bolt links with 3/8" x 1 1/4" BHCS w/ pin limited thread. Be sure bolt heads face user. **NOTE:** *Use chain spacers as shown when installing ProGuard chains.*
3) Install protective surfacing before users are allowed to play on the structure.

Specifications are subject to change without notice.

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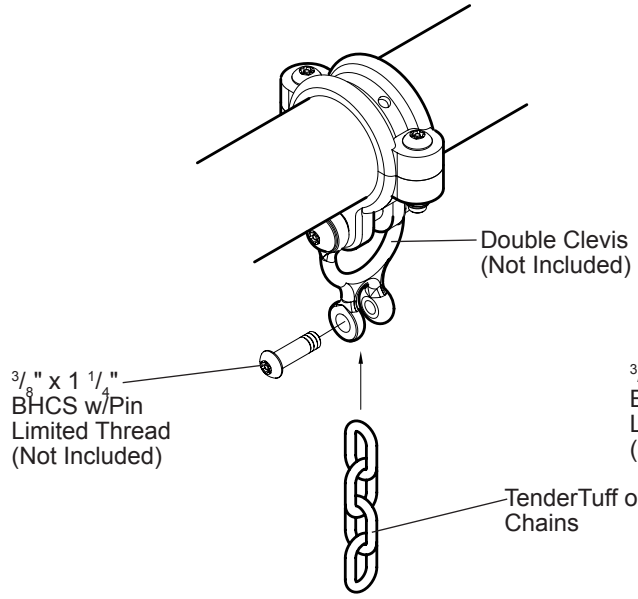
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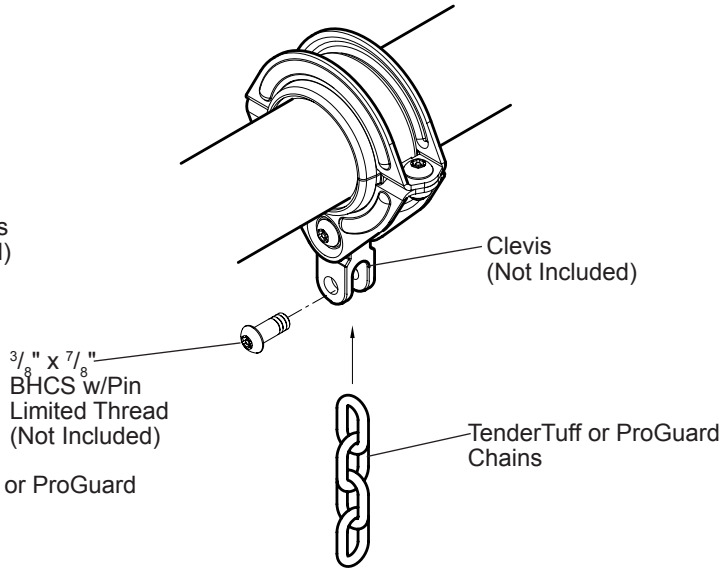
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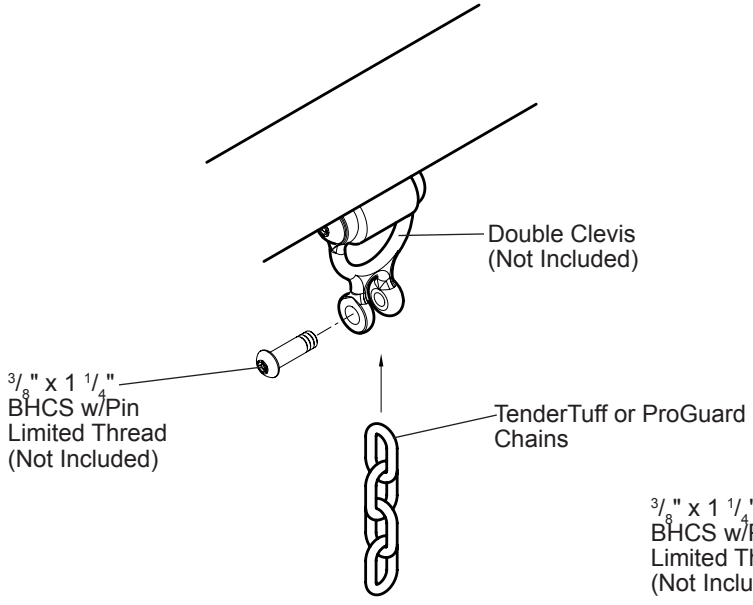
Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

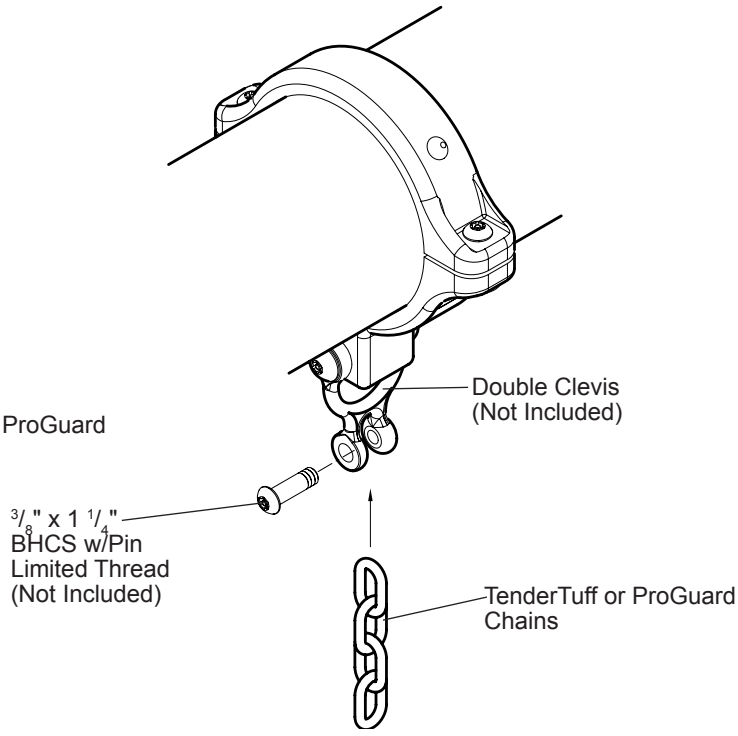
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SWING HANGER OPTIONS









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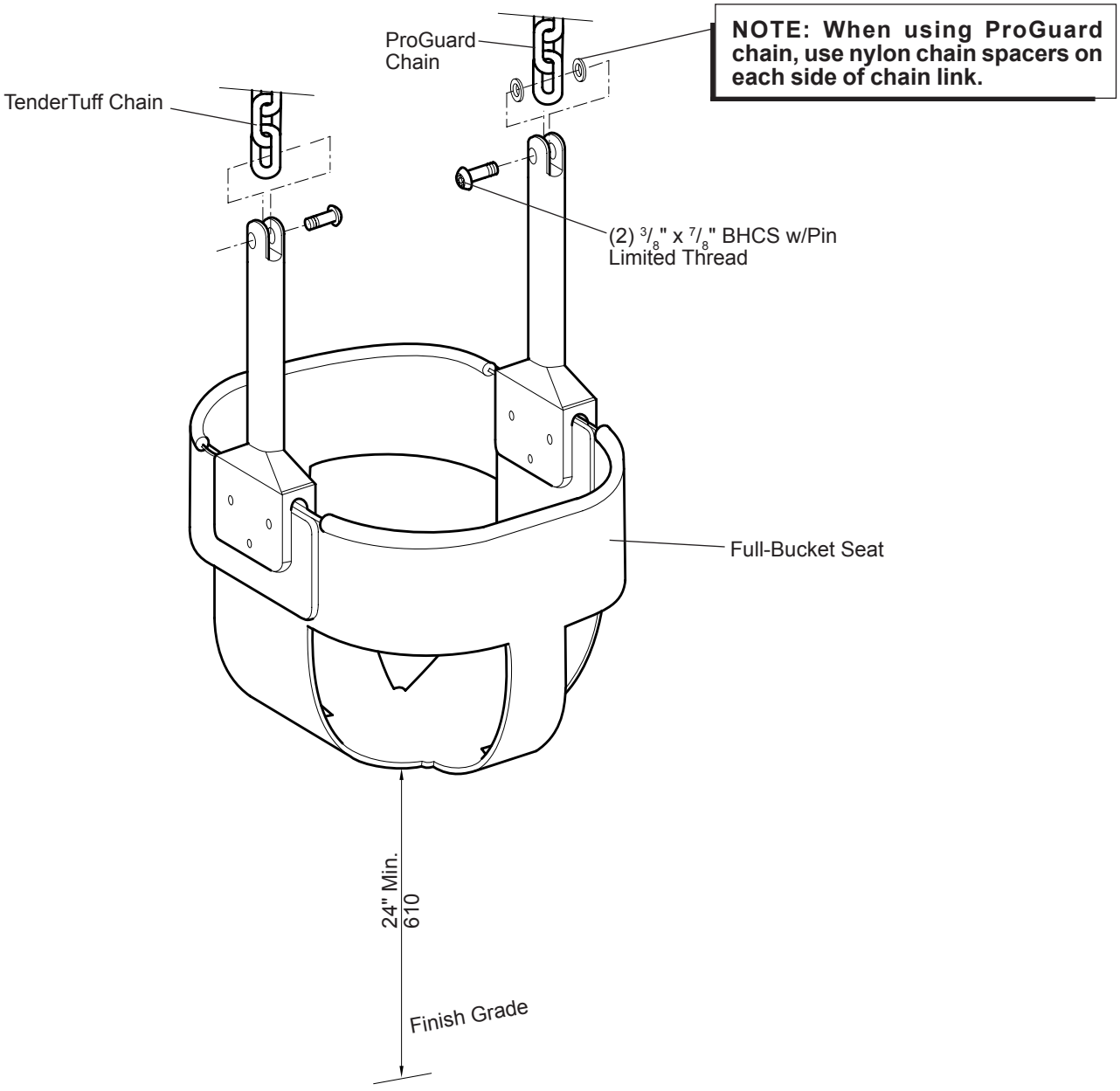
SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

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NOTE: Face bolt heads inward as shown.

NOTE: When using ProGuard chain, use nylon chain spacers on each side of chain link.



Swings 176038 Full-Bucket Seat, w/Chains

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Swings 176038 Full-Bucket Seat, w/Chains

Parts List

Part#	Description	Qty.
	7 Ft. High Beam (5" Dia. Beam)	
186276	Full-Bucket Swing Seat, Black	1
141739	43 3/16" Chain, TenderTuff, Specify Color	2
175248	43 3/16" Chain, ProGuard	2
138414	**Bucket Seat Hardware Package**	1
100290	3/8" x 7/8" BHCS w/Pin Limited Thread, SST	2
112501	Chain Spacer (For ProGuard Chains Only)	4
	8 Ft. High Beam	
186276	Full-Bucket Swing Seat, Black	1
160110	52 9/16" Chain, TenderTuff, Specify Color	2
174882	52 9/16" Chain, ProGuard	2
138414	**Bucket Seat Hardware Package**	1
100290	3/8" x 7/8" BHCS w/Pin Limited Thread, SST	2
112501	Chain Spacer (For ProGuard Chains Only)	4
	10 Ft. High Beam	
186276	Full-Bucket Swing Seat, Black	1
152051	76 7/16" Chain, TenderTuff, Specify Color	2
174883	76 7/16" Chain, ProGuard	2
138414	**Bucket Seat Hardware Package**	1
100290	3/8" x 7/8" BHCS w/Pin Limited Thread, SST	2
112501	Chain Spacer (For ProGuard Chains Only)	4
	7 Ft. High Beam (Tot)	
186276	Full-Bucket Swing Seat, Black	1
152053	37 1/2" Chain, TenderTuff, Specify Color	2
175247	37 1/2" Chain, ProGuard	2
138414	**Bucket Seat Hardware Package**	1
100290	3/8" x 7/8" BHCS w/Pin Limited Thread, SST	2
112501	Chain Spacer (For ProGuard Chains Only)	4
	75" High Beam (Toddler)	
186276	Full-Bucket Swing Seat, Black	1
152016	29 7/8" Chain, TenderTuff, Specify Color	2
174881	29 7/8" Chain, ProGuard	2
138414	**Bucket Seat Hardware Package**	1
100290	3/8" x 7/8" BHCS w/Pin Limited Thread, SST	2
112501	Chain Spacer (For ProGuard Chains Only)	4

Specifications

Full-Bucket Seat: Seat shall be molded of U.V. stabilized, high quality, black rubber, encapsulating a 24 gauge stainless steel reinforcement plate. Handle cast from 356-T6 aluminum alloy with black polyarmor paint finish. Handle attaches to seat with (3) 1/4" x 1 5/16" long stainless steel rivets. The finished size of the full bucket shall be 9" deep x 10 1/2" wide.

Chain/Coated: Steel 3/16" straight link chain, 800 lb. working load limit. Finish: TenderTuff, color specified.

Chain/ProGuard: Steel 3/16" straight link chain, 800 lb. working load limit. Finish: ProGuard.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: 1/4 man hour per seat

Weight:
14 lbs. (7 FT. Beam 5" Dia. w/TenderTuff Chain)
13 lbs. (7 FT. Beam 5" Dia. w/ProGuard Chain)
14 lbs. (8 FT. Beam w/TenderTuff Chain)
14 lbs. (8 FT. Beam w/ProGuard Chain)
17 lbs. (10 FT. Beam w/TenderTuff Chain)
16 lbs. (10 FT. Beam w/ProGuard Chain)
12 lbs. (7 FT. Beam w/TenderTuff Chain)
12 lbs. (7 FT. Beam w/ProGuard Chain)
11 lbs. (75" Beam w/TenderTuff Chain)
11 lbs. (75" Beam w/ProGuard Chain)

Installation Instructions

Swing Hangers with Double Clevis

1) Attach chains to double clevis using 3/8" x 1 1/4" BHCS w/pin limited thread bolts, as shown.
2) Attach chains to full-bucket seat using 3/8" x 7/8" BHCS w/pin limited thread bolts. Be sure bolt heads face user. **NOTE:** *Use chain spacers as shown when installing ProGuard chains.*
3) Install protective surfacing before users are allowed to play on the structure.

Anti-wrap Swing Hangers

1) Attach chains to aluminum clevis using 3/8" x 7/8" BHCS w/pin limited thread bolts, as shown.
2) Attach chains to full-bucket seat using 3/8" x 7/8" BHCS w/pin limited thread bolts. Be sure bolt heads face user. **NOTE:** *Use chain spacers as shown when installing ProGuard chains.*
3) Install protective surfacing before users are allowed to play on the structure.

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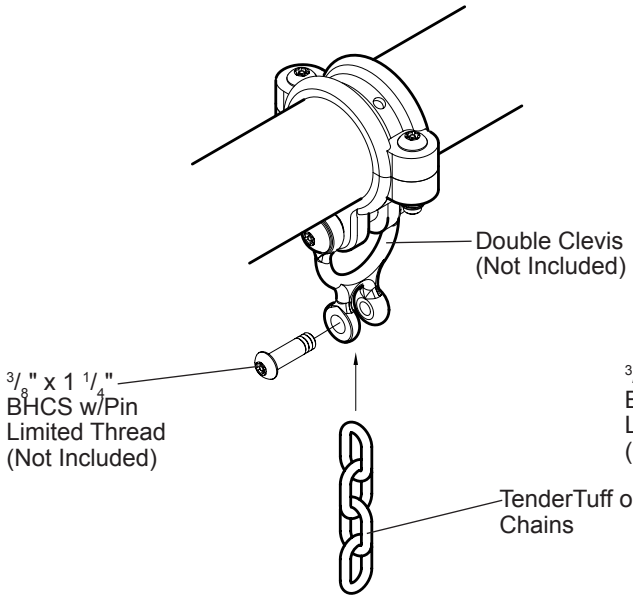
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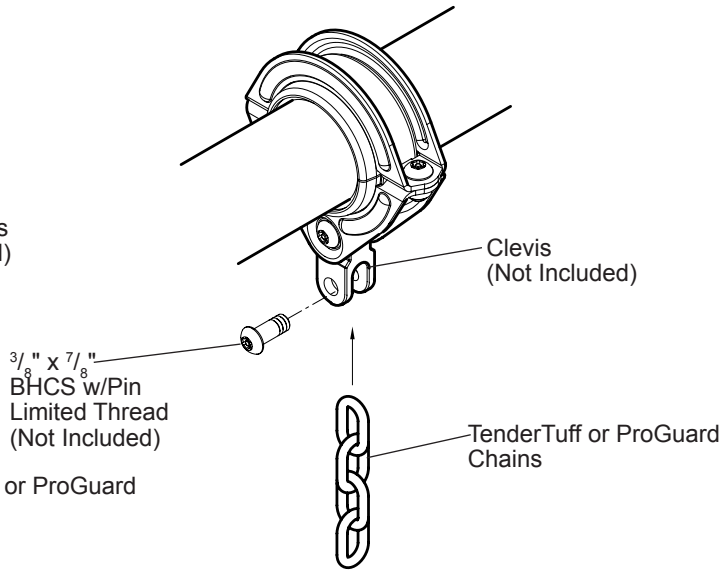
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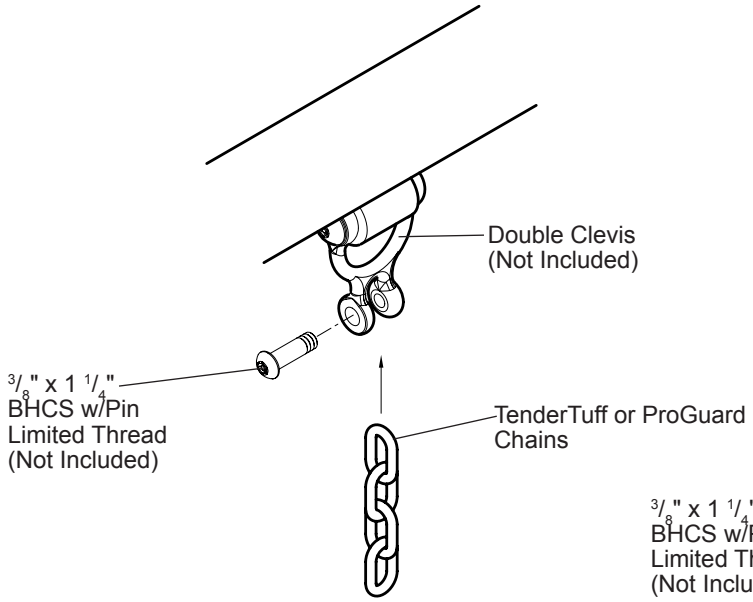
Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

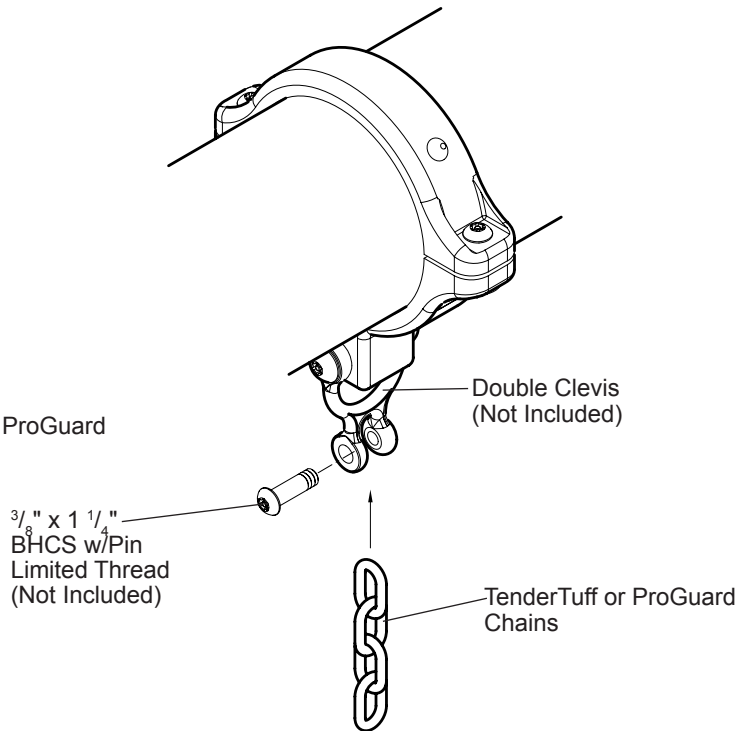
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SWING HANGER OPTIONS









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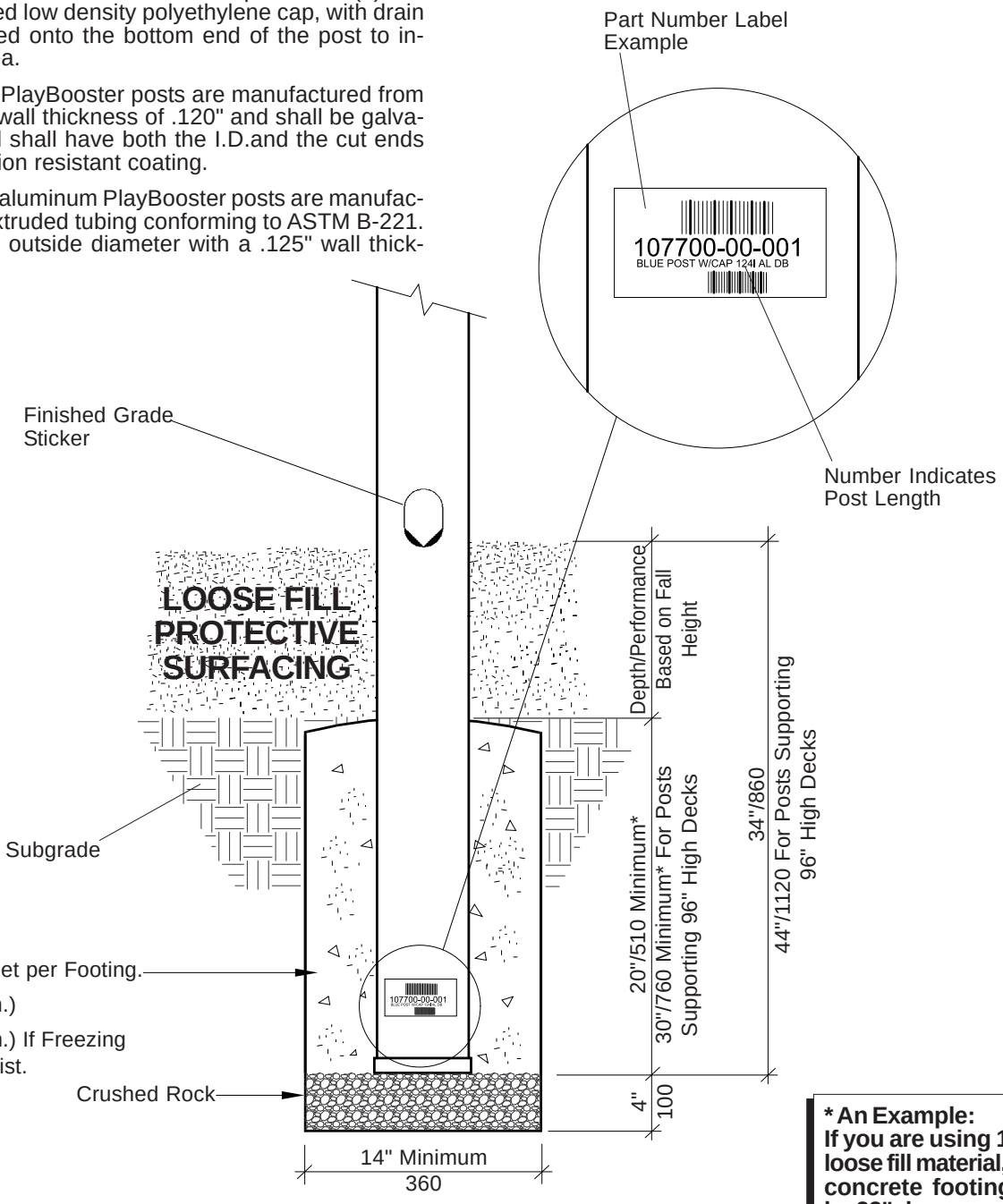
Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*)

13871600

Post Specifications: Post length shall vary depending upon the intended use and shall be a minimum of 42" above the deck height. All posts shall be powdercoated to specified color. All posts shall have a “finished grade marker” positioned on the post identifying the 34" bury line (or 44" bury line for posts for 96" decks) required for correct installation and the top of the loose fill protective surfacing. Top caps for posts shall be aluminum die cast from 369.1 alloy and powdercoated to match the post color. All caps shall be factory installed and secured in place with (3) self sealing rivets. A molded low density polyethylene cap, with drain holes, shall be pressed onto the bottom end of the post to increase the footing area.

Steel Posts: All steel PlayBooster posts are manufactured from 5" O.D. tubing with a wall thickness of .120" and shall be galvanized after rolling and shall have both the I.D.and the cut ends sprayed with a corrosion resistant coating.

Aluminum Posts: All aluminum PlayBooster posts are manufactured from 6005-T5 extruded tubing conforming to ASTM B-221. Posts shall have a 5" outside diameter with a .125" wall thickness.



CONCRETE

- 1.87 Cubic Feet per Footing.
- 2000 PSI (Min.)
- 3000 PSI (Min.) If Freezing Conditions Exist.

*** An Example:**
If you are using 12" of loose fill material, your concrete footing will be 22" deep.

PlayBooster® Concrete Footings, 5" Posts

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Eco #51014 Document #13871600 replaces #13433700. Removed Post Length Sticker.

Document #13871600

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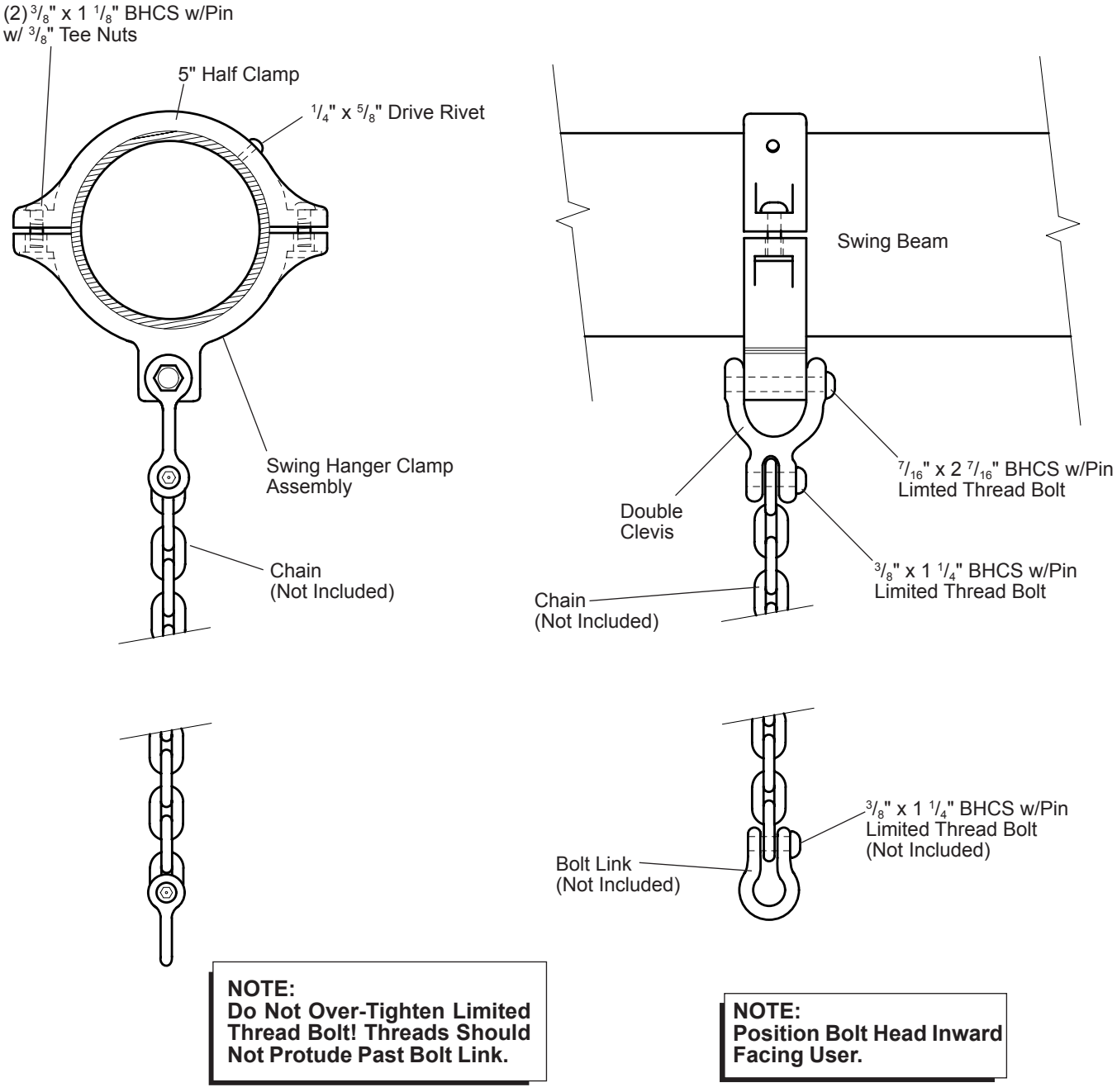
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SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. ASTM F1487.)

13616300



NOTE:
Do Not Over-Tighten Limited Thread Bolt! Threads Should Not Protude Past Bolt Link.

NOTE:
Position Bolt Head Inward Facing User.

Swings

111418 Swing Hanger, Belt Swing

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Swings 111418 Swing Hanger, Belt Swing

Parts List

Part#	Description	Qty.
105327-01	5" Half Clamp, Specify Color	1
100198-00	3/8" x 1 1/8" BHCS w/Pin, SST	2
100351-00	3/8" Tee Nut, SST	2
100610-00	1/4" x 5/8" Drive Rivet, AL/SST	1
100292-00	3/8" x 1 1/4" BHCS w/Pin Ltd. Thread Bolt, SST	1
121291-00	**Swing Hanger Clamp Assy. Specify Color**	1
121289-00	Swing Hanger Clamp, Specify Color	1
127068-00	7/16" x 2 7/16" BHCS w/Pin Ltd. Thread Bolt, SST	1
138917-00	Swing Hanger Double Clevis SST	1
100667-00	Oilite Bushing	1

Specifications

Hanger Clamp Assembly: Cast aluminum. Finish: ProShield®, color specified.

Double Clevis: Stainless Steel.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: Approx. 1/2 man hour

Weight: 6 lbs.

Installation Instructions

1) Locate and mark location of clamp on beam.

2) Attach 5" half clamp and swing hanger clamp to beam using 3/8" x 1 1/8" BHCS w/pin and 3/8" tee nuts. *Tighten evenly.*

3) ***IMPORTANT:*** *Drill through holes in 5" half clamps and into 5" pipe with a 1/4" or "F" (only) drill bit, tap 1/4" x 5/8" drive rivets through 5" half clamps and into pipe, to ensure that clamps remain secure.*

4) Attach swing chain to double clevis using 3/8" x 1 1/4" BHCS w/pin limited thread bolts.

5) Attach swing seat to chains using bolt links with 3/8" x 1 1/4" BHCS w/pin limited thread bolts. **NOTE:** *Do not over-tighten limited thread bolt. Threads should not protrude past bolt link. Position bolt head inward facing user.*

Specifications are subject to change without notice.

ECO #54506 Document #18379700 replaces #13616300. Changed Double Clevis material to Stainless Steel.

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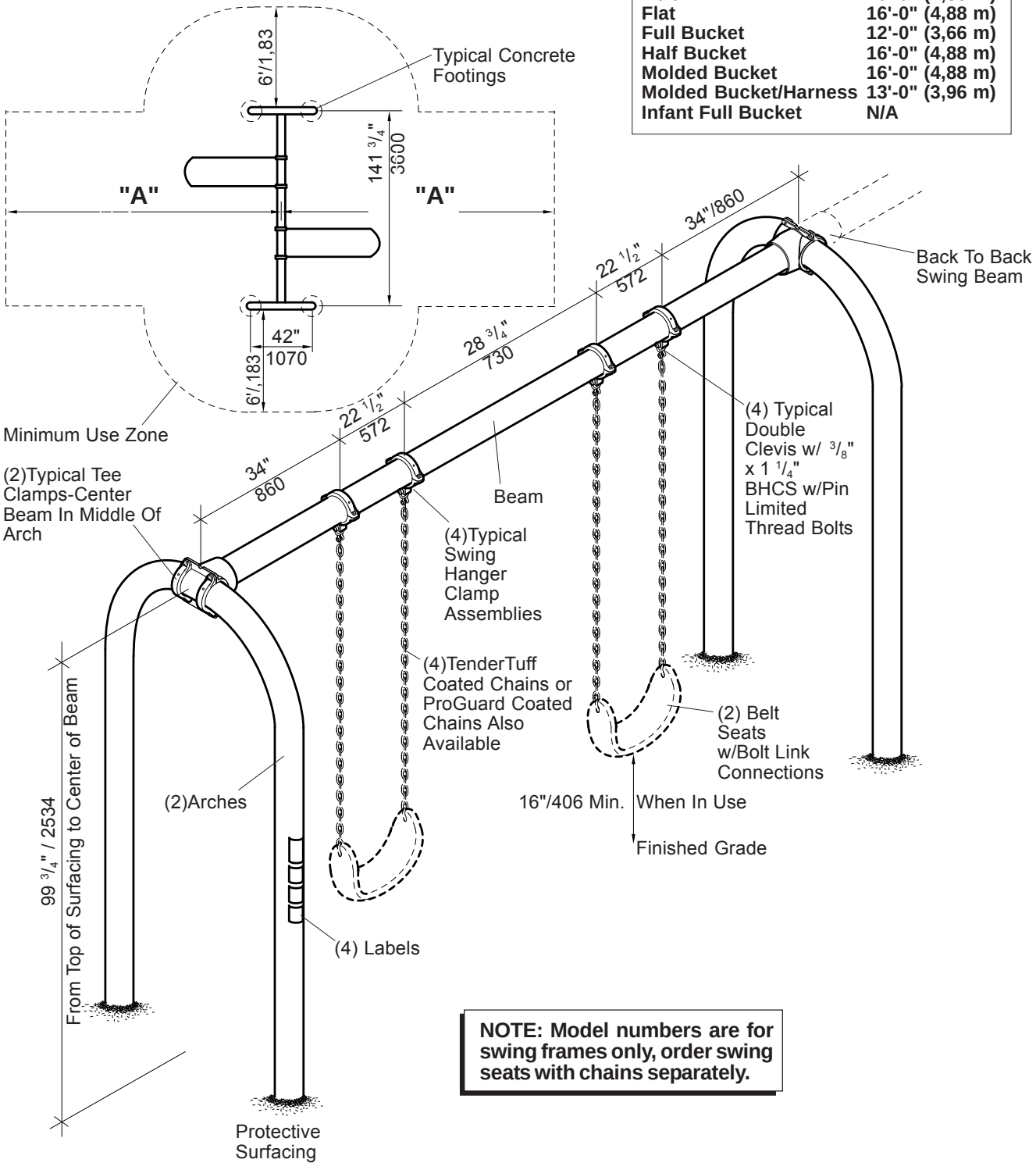
SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

18448000

PLAN VIEW/FOOTING LAYOUT

KEY	
Seat Type	**Dimension "A"**
Belt	**16'-0" (4,88 m)**
Flat	**16'-0" (4,88 m)**
Full Bucket	**12'-0" (3,66 m)**
Half Bucket	**16'-0" (4,88 m)**
Molded Bucket	**16'-0" (4,88 m)**
Molded Bucket/Harness	**13'-0" (3,96 m)**
Infant Full Bucket	**N/A**



NOTE: Model numbers are for swing frames only, order swing seats with chains separately.

Model #177331 Additional Bay

Swings

177330/177331 Arch Belt Swing Frame

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Swings 177330/177331 Arch Belt Swing Frame

Parts List

Part#	Description	Qty. 2 Pl	Add. Bay
126749	Swing Arch, Specify Color	2	1
100610	1/4" x 5/8" Drive Rivet, AL/SST	8	6
105327	5" Half Clamp, Specify Color	8	4*
146160	141 3/4" Swing Beam, Specify Color	1	1
121291	**Swing Hanger Clamp Assy. Specify Color**	4	4
121289	Swing Hanger Clamp, Specify Color	4	4
127068	7/16" x 2 7/16" BHCS w/Pin Ltd. Thread, SST	4	4
138917	Swing Hanger Double Clevis	4	4
100667	Oilite Bushing	4	4
184227	**Arch Swing 5" O.D. Beam Hardware Pkg.**	1	1
100198	3/8" x 1 1/8" BHCS w/Pin, SST	8	8
113027	3/8" x 1 3/8" BHCS w/Pin, SST	8	8
100292	3/8" x 1 1/4"BHCS w/Pin Ltd. Thread, SST	4	4
100351	3/8" Tee Nut, SST	16	16
156846	Play Safe Label, 2-12 Yrs.	1	1
128296	3/8" Hex Jam Nut, SST	8	8
182213	Hot Surface Warning Label	2	1
182212	Entanglement Warning Label	2	1
115176	Hard Surface Warning Label	2	1

*** = 5" Half Clamps From 2 PL. End Of Beam Need To Be Used.**

Specifications

Arch Posts: See PlayBooster® (PB) General Specifications.

Swing Beam: Weldment comprised of tee clamps and 5" O.D. extruded 6005-T5 aluminum alloy tube with a .125" W. Finish: ProShield®, color specified.

Hanger Clamp Assembly: Cast aluminum. Finish: ProShield, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: Approx. 8 man hours
Additional Bay 4 man hours

Concrete Req.: Approx. 7.5 cu. ft.
Additional Bay 3.75 cu. ft.

Area Req.: 24'-2 3/4" x 32' (7,39 m x 9,75 m)
Additional Bay 11'-9 3/4" x 32' (3,60 m x 9,75 m)

Weight: 204 lbs.
Additional Bay 124 lbs.

Fall Height: 96" (2,43 m)

Installation Instructions

1) Dig footings, spaced as shown. Refer to the Concrete Footing Detail.
2) Set arches in footing holes and attach swing beam to center of arches using 5" half clamps with 3/8" x 1 3/8" BHCS w/pin and 3/8" tee nuts with 3/8" jam nuts. Refer to the Tee Clamp Position Detail. Center of beam should be 99 3/4" above finished grade. When installing back to back swing beams refer to the Back To Back Tee Clamps Detail.
3) Level beam and plumb arches and temporarily prop in position. Pour concrete footings and let cure for 72 hours before proceeding.
4) Locate, mark and attach swing hanger clamps to beam in locations shown. Refer to the Typical Swing Hanger Clamp Spec Sheet.
5) **NOTE:** *Refer to specific swing seat installation document for attaching chains and seats.*
6) Install 1/4" x 5/8" drive rivets in all 5" half clamps. Refer to the Typical Offset Hanger Clamp Spec Sheet. Refer to the Back To Back Tee Clamps Detail.
7) Apply Play Safe and Warning Labels, as shown.
8) Install protective surfacing before users are allowed to play on the swing.

Specifications are subject to change without notice.

Eco #54545 Document #18448000 replaces #17744600. Added warning labels to hardware package.

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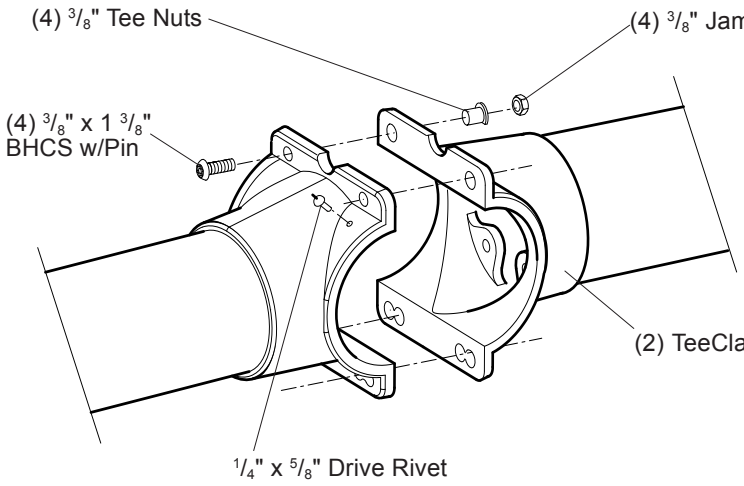
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SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

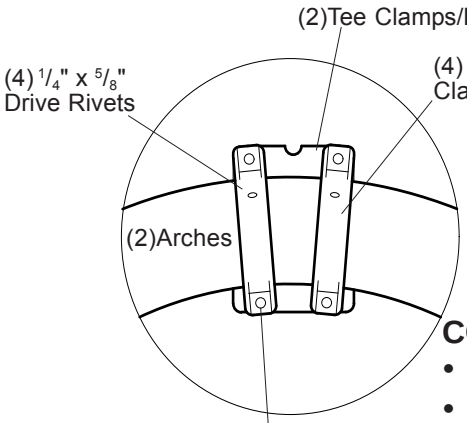
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DETAIL
BACK TO BACK TEE CLAMPS



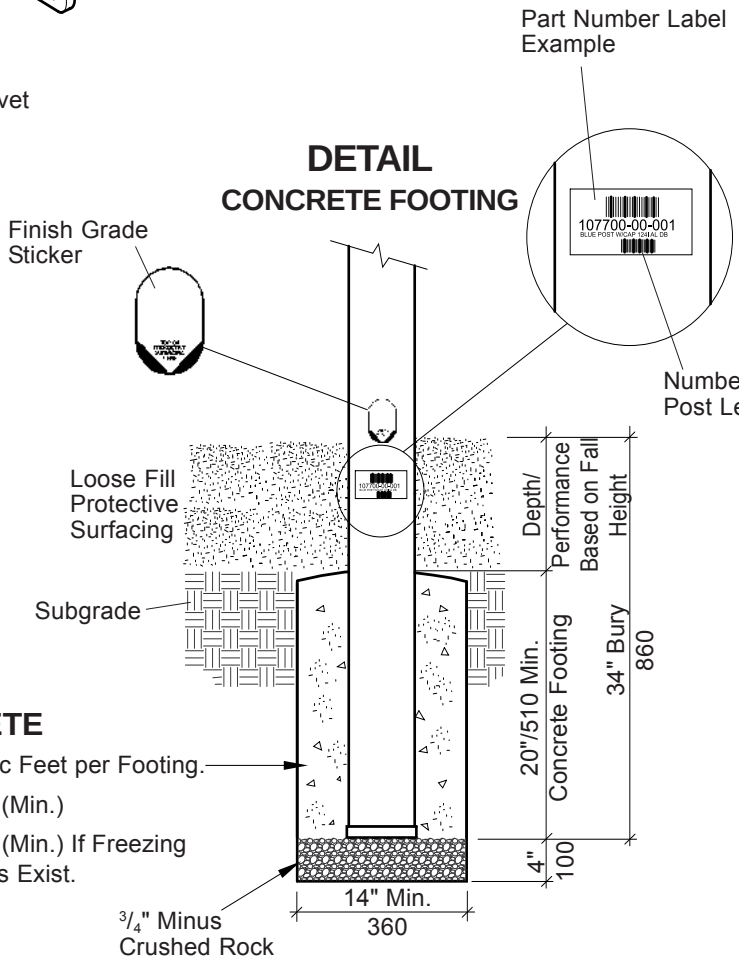
NOTE: Drill 1/4" hole through tee and arch for 1/4" x 5/8" drive rivet when installing back to back tee clamps.

DETAIL
TEE CLAMP POSITION



NOTE: Use Inside Holes For (4) 3/8" x 1 3/8" BHCS w/Pin & 3/8" Tee Nuts w/ 3/8" Jam Nuts

DETAIL
CONCRETE FOOTING



CONCRETE

- 1.87 Cubic Feet per Footing.
- 2000 PSI (Min.)
- 3000 PSI (Min.) If Freezing Conditions Exist.

Swings

177330/177331 Arch Belt Swing Frame

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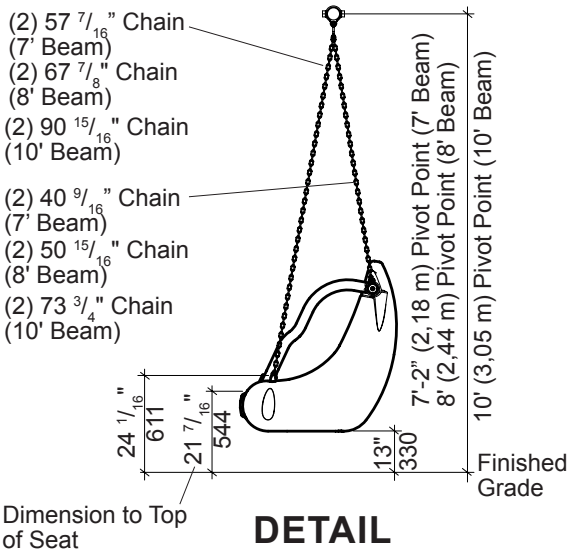
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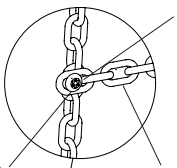
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ELEVATION

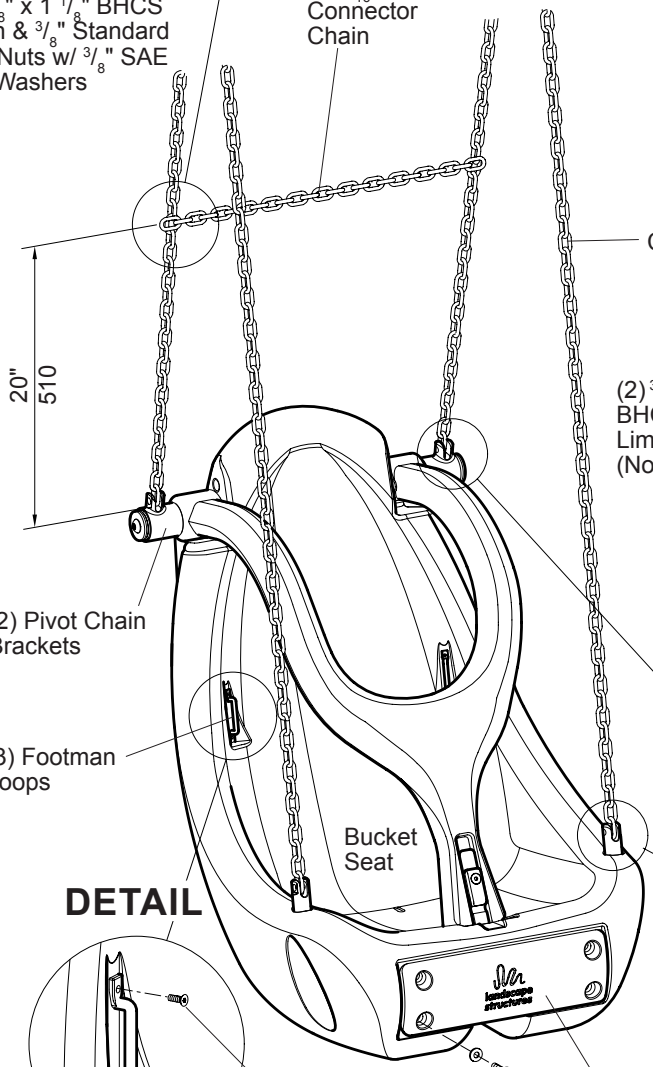


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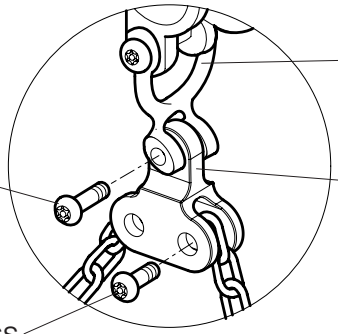


(TenderTuff Chain)
(2) 3/8" x 1 1/8" BHCS w/Pin & 3/8" Standard Hex Nuts w/ 3/8" SAE Flat Washers

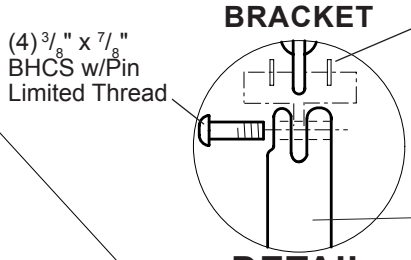
20 7/16" Connector Chain



DETAIL
HANGER ASSEMBLY

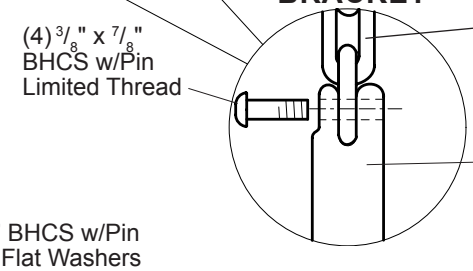


DETAIL
BRACKET

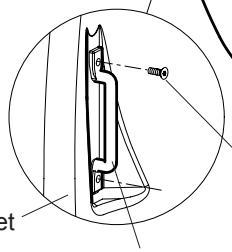


NOTE: For ProGuard chain, insert (8) nylon spacers between chain links & brackets

DETAIL
BRACKET



DETAIL



(4) 3/8" x 7/8" BHCS w/Pin w/ 3/8" SAE Flat Washers

Swings

177351 Molded Bucket Seat, w/Harness

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Document #21059300

Swings 177351 Molded Bucket Seat, w/Harness

Parts List

Part#	Description	Qty.
182025	Molded Bucket Seat Assembly, Specify Color	1
175738	Bumper, Black	1
	7 Ft. High Beam - ProGuard Finished Chains	
178679	57 7/16" Long, (Front)	2
193869	49 9/16" Long, (Back)	2
175653	20 7/16" Long, (Connector)	1
	8 Ft. High Beam - ProGuard Finished Chains	
174404	67 7/8" Long, (Front)	2
175619	50 15/16" Long, (Back)	2
175653	20 7/16" Long, (Connector)	1
	10 Ft. High Beam - ProGuard Finished Chains	
174884	90 11/16" Long, (Front)	2
175623	73 3/4" Long, (Back)	2
175653	20 7/16" Long, (Connector)	1
	7 Ft. High Beam - TenderTuff Chains	
178679	57 7/16" Long, (Front), Specify Color	2
179286	40 9/16" Long, (Back), Specify Color	2
174571	20 7/16" Long, (Connector), Specify Color	1
	8 Ft. High Beam - TenderTuff Chains	
152050	67 7/8" Long, (Front), Specify Color	2
174572	50 15/16" Long, (Back), Specify Color	2
174571	20 7/16" Long, (Connector), Specify Color	1
	10 Ft. High Beam -TenderTuff Chains	
152052	90 11/16" Long, (Front), Specify Color	2
175621	73 3/4" Long, (Back), Specify Color	2
174571	20 7/16" Long, (Connector), Specify Color	1
208039	**Molded Seat w/Yoke Hardware Package**	1
100196	3/8" x 7/8" BHCS w/Pin, SST	6
100198	3/8" x 1 1/8" BHCS w/Pin, SST	2
100290	3/8" x 7/8" BHCS w/Pin Limited Thread, SST	8
100327	3/8" Standard Hex Nut, SST	2
100365	3/8" SAE Flat Washer, SST	6
106035	Seat Mounting Bracket	2
112501	Nylon Spacer	8
128296	3/8" Hex Jam Nut, SST	2
207709	Footman Loop, SST	3
160307	Double Pivot Block Assy.	2
162462	#10-24 x 1/2" Flat Head Screw, SST	6

Specifications

Bucket Seat Assy.: **(Bucket Seat & Yoke)** Rotationally molded from U.V. stabilized linear low density polyethylene, color specified. **(Pipebolt)** Made from 1.125" O.D. 6005-T5 threaded annodized aluminum tube. **(Bearings)** UHMW PE lubricated. **(Brackets)** Made from 356-T6 aluminum.

Chain/ProGuard: Steel 3/16" straight link chain, 800 lb. working load limit. Finish: ProGuard.

Chain/Coated: Steel 3/16" straight link chain, 800 lb. working load limit. Finish: TenderTuff, color specified.

Seat Mounting Bracket: Cast from 535 aluminum magnesium.

Bumper: Molded from U.V. stabilized black EPDM rubber encapsulating 11 GA (.120") HRPO steel sheet.

Dbl. Pivot Block: Fabricated from 6061-T6 Aluminum with bronze oil impregnated bearing.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: Approx. 1 man hour

Weight: 50 lbs. (7 Ft. Beam w/ProGuard Chains)
53 lbs. (7 Ft. Beam w/TenderTuff Chains)
48 lbs. (8 Ft. Beam w/ProGuard Chains)
51 lbs. (8 Ft. Beam w/TenderTuff Chains)
51 lbs. (10 Ft. Beam w/ProGuard Chains)
55 lbs. (10 Ft. Beam w/TenderTuff Chains)

Installation Instructions

1) Insert seat mounting brackets into molded-in holes in front of bucket seat and attach ends of chain, using 3/8" x 7/8" BHCS w/pin limited thread. See Bracket Detail. **NOTE:** *For ProGuard coated chain, insert (4) nylon spacers between chain links and brackets.*

2) Attach ends of chain to pivot chain brackets, using 3/8" x 7/8" BHCS w/pin limited thread. See Bracket Detail. **NOTE:** *For ProGuard coated chain, insert (4) nylon spacers between chain links and brackets.*

3) Attach chains to double pivot blocks, using 3/8" x 7/8" BHCS w/pin limited thread.

4) **(Swing Hangers with Double Clevis)** Attach chains to swing hanger double clevis, using 3/8" x 1 1/4" BHCS w/pin limited thread.

   (Anti-wrap Swing Hangers) Attach chains to anti-wrap swing hanger clevis, using 3/8" x 7/8" BHCS w/pin limited thread.

5) **(ProGuard Chain)** Attach connector chain to back swing chains at dimension shown, using 3/8" x 7/8" BHCS w/pin & 3/8" jam nuts. Refer to Detail.

   (TenderTuff Chain) Attach connector chain to back swing chains at dimension shown, using 3/8" x 1 1/8" BHCS w/pin & 3/8" standard hex nuts with 3/8" SAE Flat Washers. Refer to Detail.

6) Attach footman loops, using #10-24 x 1/2" flat head screws, as shown. Footman loops are used for seat belts (not included).

7) Attach bumper to front of swing seat, using 3/8" x 7/8" BHCS w/pin with 3/8" SAE Flat Washers.

8) Install protective surfacing before users are allowed to play on the structure.

Specifications are subject to change without notice.

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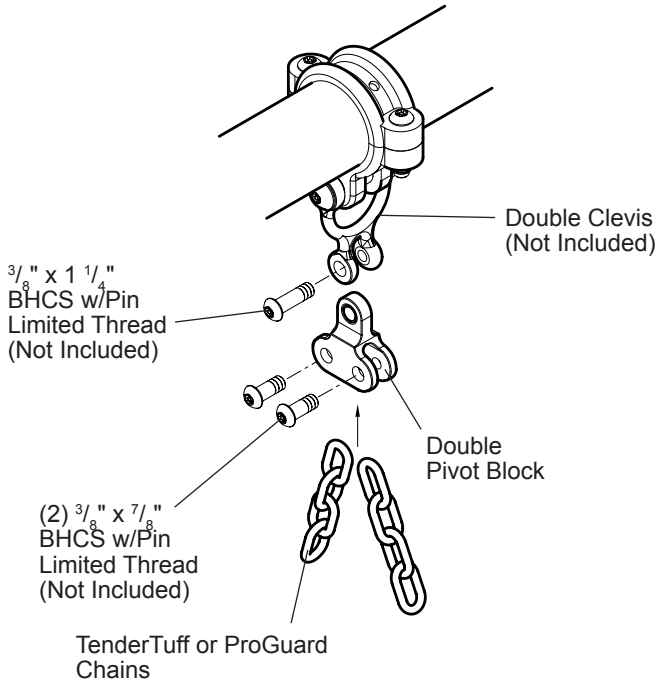
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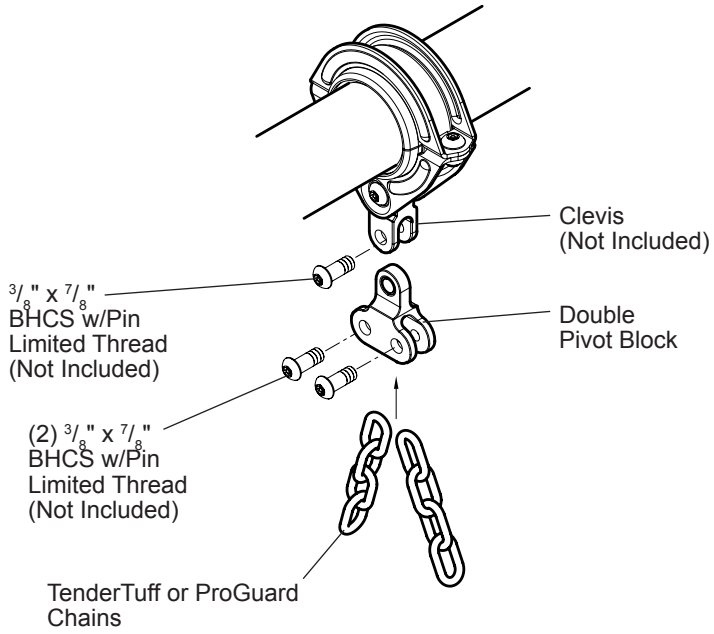
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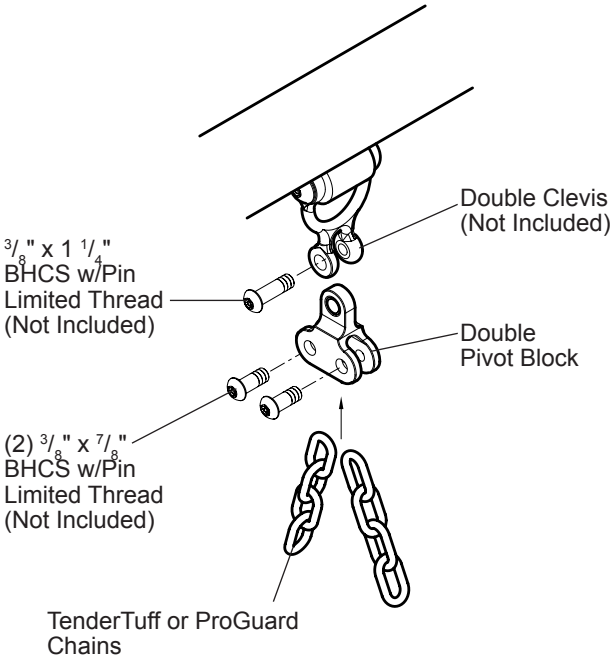
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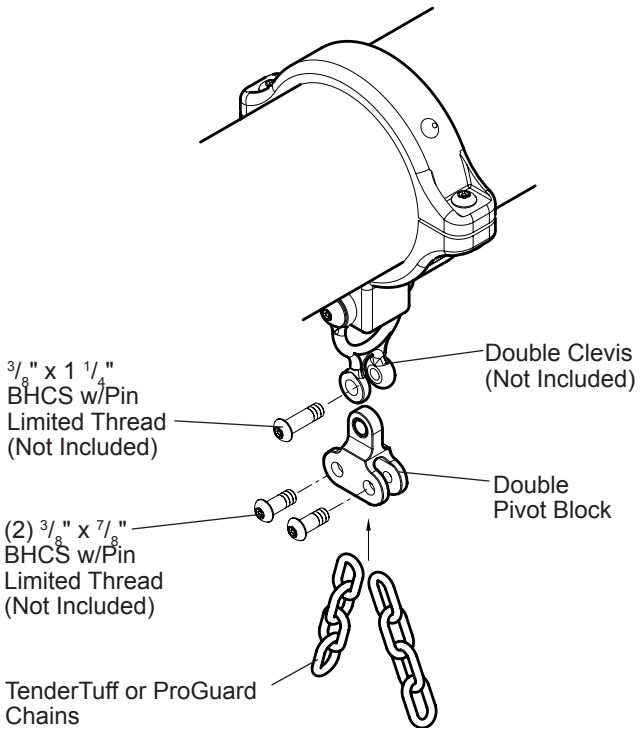
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SWING HANGER OPTIONS









Swings **177351 Molded Bucket Seat, w/Harness**

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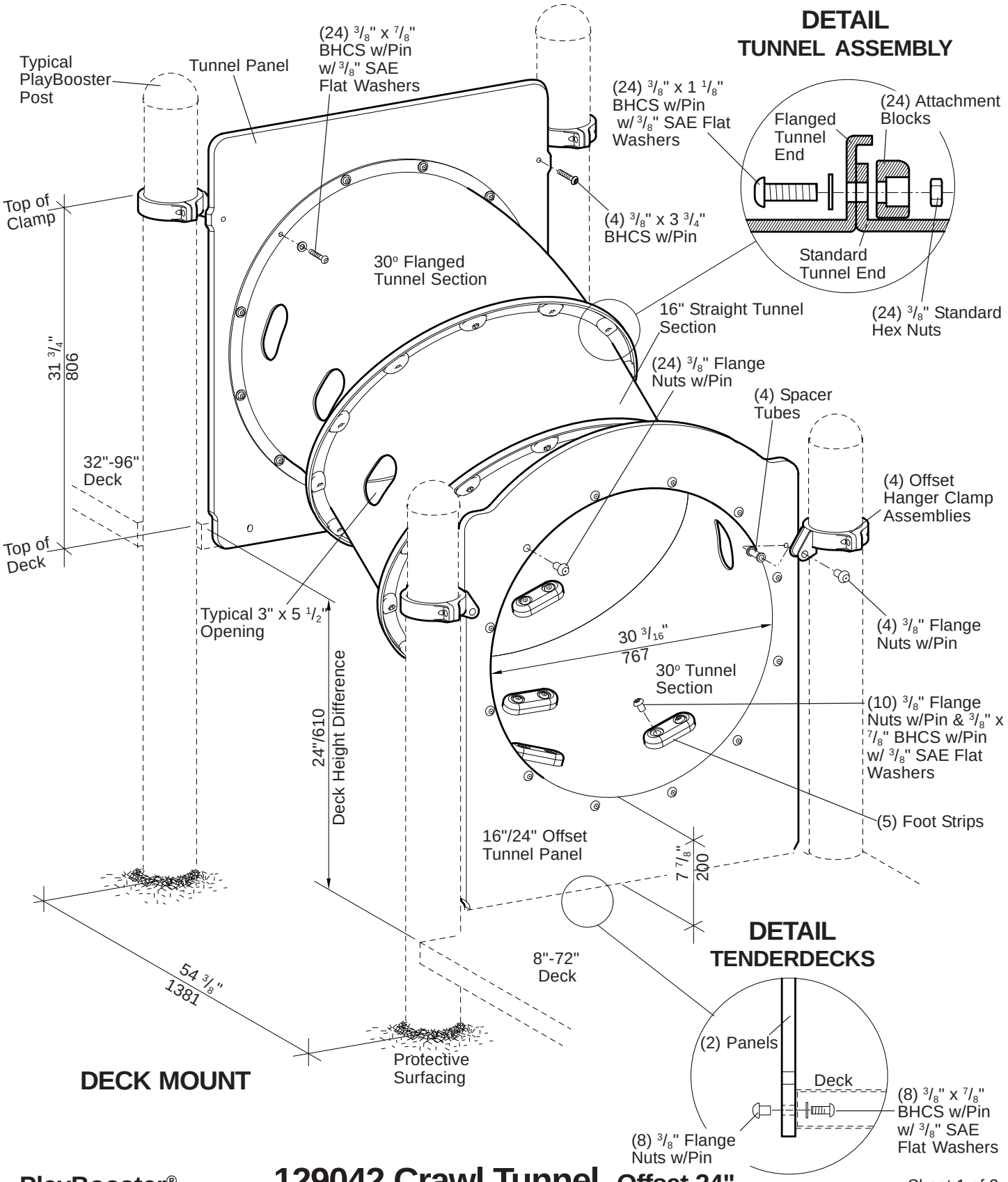
ISO 14001 CERTIFIED

ISO 9001 Certified

SAFETY NOTE

Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

14621000



PlayBooster®

129042 Crawl Tunnel, Offset 24"

601 7TH STREET SOUTH, DELANO, MINNESOTA 55328-8605 888-574-4678 LSI Install Help 888-438-6574 LSI Direct 763-972-5200 Int. FAX (763) 972-3185

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PlayBooster® 129042 Crawl Tunnel, Offset 24"

Parts List

Part#	Description	Qty.
	DECK TO DECK	
116580-00	Tunnel Panel, Specify Color	1
122443-00	Tunnel Panel 16"/24" Offset, Specify Color	1
145617-00	16" Straight Section w/Slots, Specify Color	1
119602-00	30° Tunnel Section Flanged w/Slots, Specify Color	1
145600-00	30° Elbow Section w/Slots, Specify Color	1
145622-00	Foot Strip, Green	5
105327-01	5" Half Clamp, Specify Color	4
113729-00	Offset Hanger Clamp, Specify Color	4
113468-00	Spacer Tube, Specify Color	4
100610-00	1/4" x 5/8" Drive Rivet, AL/SST	4
133047-00	Attachment Block, Specify Color	24
146208-00	**Offset Tunnel 24" Hardware Package**	1
100196-00	3/8" x 7/8" BHCS w/Pin, SST	34
100198-00	3/8" x 1 1/8" BHCS w/Pin, SST	24
100327-00	3/8" Standard Hex Nut, SST	24
100353-00	3/8" Flange Nut w/Pin, SST	34
100365-00	3/8" SAE Flat Washer, SST	58
124900-00	**Tenderdeck Mounting Hardware Package**	2
100196-00	3/8" x 7/8" BHCS w/Pin, SST	8
100198-00	3/8" x 1 1/8" BHCS w/Pin, SST	8
100351-00	3/8" Tee Nut, SST	8
100353-00	3/8" Flange Nut w/Pin, SST	12
100365-00	3/8" SAE Flat Washer, SST	8
124460-00	3/8" x 3 3/4" BHCS w/Pin, SST	4
	FOR GROUND LEVEL, ADD:	
105327-01	5" Half Clamp, Specify Color	2
113729-00	Offset Hanger Clamp, Specify Color	2
113464-00	Angled Panel Bracket, Specify Color	1
124947-00	**Ground Level Mounting Hardware Package**	1
124460-00	3/8" x 3 3/4" BHCS w/Pin, SST	2
100195-00	3/8" x 5/8" BHCS w/Pin, SST	4
100198-00	3/8" x 1 1/8" BHCS w/Pin, SST	8
100203-00	5/8" x 2 1/4" BHCS w/Pin, SST	2
100351-00	3/8" Tee Nut, SST	8
100353-00	3/8" Flange Nut w/Pin, SST	6
100610-00	1/4" x 5/8" Drive Rivet, AL/SST	4

Specifications

Permalene® Panel: Solid color panel measures 35 5/8" wide x 41" high, & 35 5/8" wide x 47 7/8" high, color specified.

Angled Panel Brkt: Weldment comprised of .190" thick 5052 aluminum formed angle with (2) 6061-T6 aluminum threaded tubes 1 1/8" O.D. x 1 1/2" long. Finish: ProShield®, color specified.

Foot Strip: Solid color Permalene, green in color.

Tunnel Section: Rotationally molded from U.V. stabilized linear low density polyethylene, color specified.

Attachment Block: U.V. stabilized high-density polyethylene, color specified.

Spacer Tube: Made from 6061-T6 aluminum 7/8" O.D. x 1 11/16". Finish: ProShield, color specified.

Offset Hanger Clamp Assembly: Cast aluminum. Finish: ProShield, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Specifications are subject to change without notice.

Installation Time: Approx. 2 1/2 man hours Deck To Deck
Approx. 3 1/2 man hours Deck To Ground
Min. Use Zone: 6' (1830 mm)
Weight: 90 lbs. Deck To Deck
93 lbs. Deck To Ground
Concrete: 3.7 Cu. Ft. Deck To Ground
Fall Height: Deck Height Plus 1"

Installation Instructions

DECK MOUNT

1) Fasten tunnel sections together using 3/8" x 1 1/8" BHCS w/pin with 3/8" SAE flat washers and attachment blocks with 3/8" standard hex nuts on standard tunnel end. Refer to the Tunnel Assembly Detail.

2) Attach foot strips to tunnel sections using 3/8" x 7/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" flange nuts w/pin.

3) Attach crawl tunnel to panels using 3/8" x 7/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" flange nuts w/pin, as shown.

4) Attach offset hanger clamps to posts at height shown using 5" half clamps, 3/8" x 1 1/8" BHCS w/pin and 3/8" tee nuts. Refer to the Typical Offset Hanger Clamp Spec Sheet.

5) Attach tunnel assembly and panels to the face of the deck using 3/8" x 7/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" flange nuts w/pin. Refer to the Tenderdeck Detail.

6) Attach panels to the offset hanger clamp assemblies using 3/8" x 3 3/4" BHCS w/pin, spacer tubes and 3/8" flange nuts w/pin, as shown.

7) Install protective surfacing before users are allowed to play on the structure.

GROUND LEVEL

1) Dig footings spaced as shown.

2) Fasten tunnel sections together using 3/8" x 1 1/8" BHCS w/pin with 3/8" SAE flat washers and attachment blocks with 3/8" standard hex nuts on standard tunnel end. Refer to the Tunnel Assembly Detail.

3) Attach foot strips to tunnel sections using 3/8" x 7/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" flange nuts w/pin.

4) Attach crawl tunnel to panels using 3/8" x 7/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" flange nuts w/pin, as shown.

5) Attach offset hanger clamp assemblies to posts at height shown, using half clamps and 3/8" x 1 1/8" BHCS w/pin and with 3/8" tee nuts. Refer To The Typical Offset Hanger Clamp Spec Sheet.

6) Attach angled panel bracket to bottom of 16"/24" offset tunnel panel using 3/8" x 5/8" BHCS w/pin and 3/8" flange nuts w/pin. See Ground Level.

7) Attach tunnel assembly panel to the face of the deck using 3/8" x 7/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" flange nuts w/pin. Refer to the Tenderdeck Detail.

8) Attach angled panel bracket with panel to offset hanger clamp assemblies using 5/8" x 2 1/4" BHCS w/pin. See Ground Level.

9) Attach top of panels to offset hanger clamp assemblies using 3/8" x 3 3/4" BHCS w/pin, spacer tubes and 3/8" flange nuts w/pin. See Ground Level.

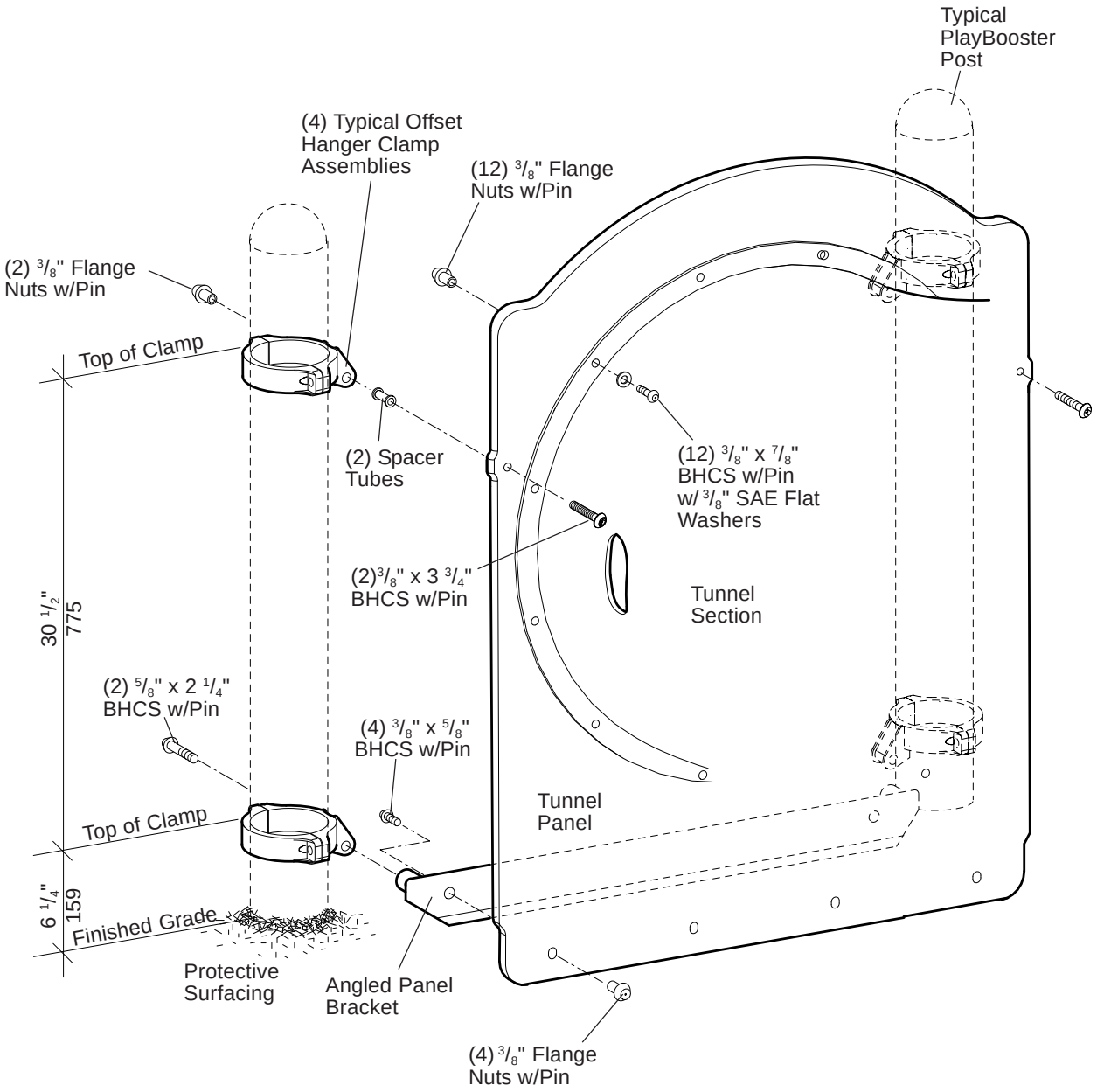
10) Install 1/4" x 5/8" drive rivets in all 5" half clamps. Refer to the Typical Offset Hanger Clamp Spec Sheet.

11) With posts plumb pour concrete footings. Allow concrete footings to cure a minimum of 72 hours before users are allowed to play on the structure.

12) Install protective surfacing before users are allowed to play on the structure.

Eco #52246 Document #14621000 replaces #13831300. Replaced foot strips, 16" straight tunnel section and 30° elbow section.

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GROUND LEVEL

NOTE: Ground level maximum deck height is 24".

PlayBooster® 129042 Crawl Tunnel, Offset 24"

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Document #14621000

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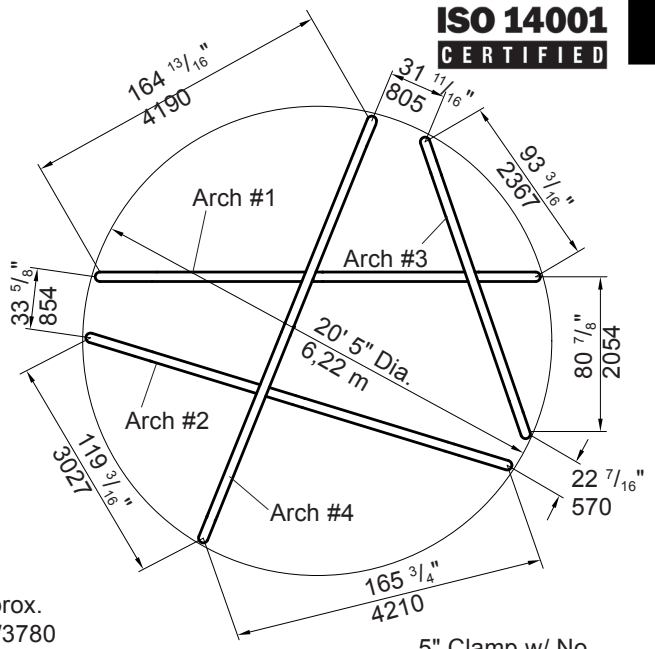
ISO 14001 CERTIFIED

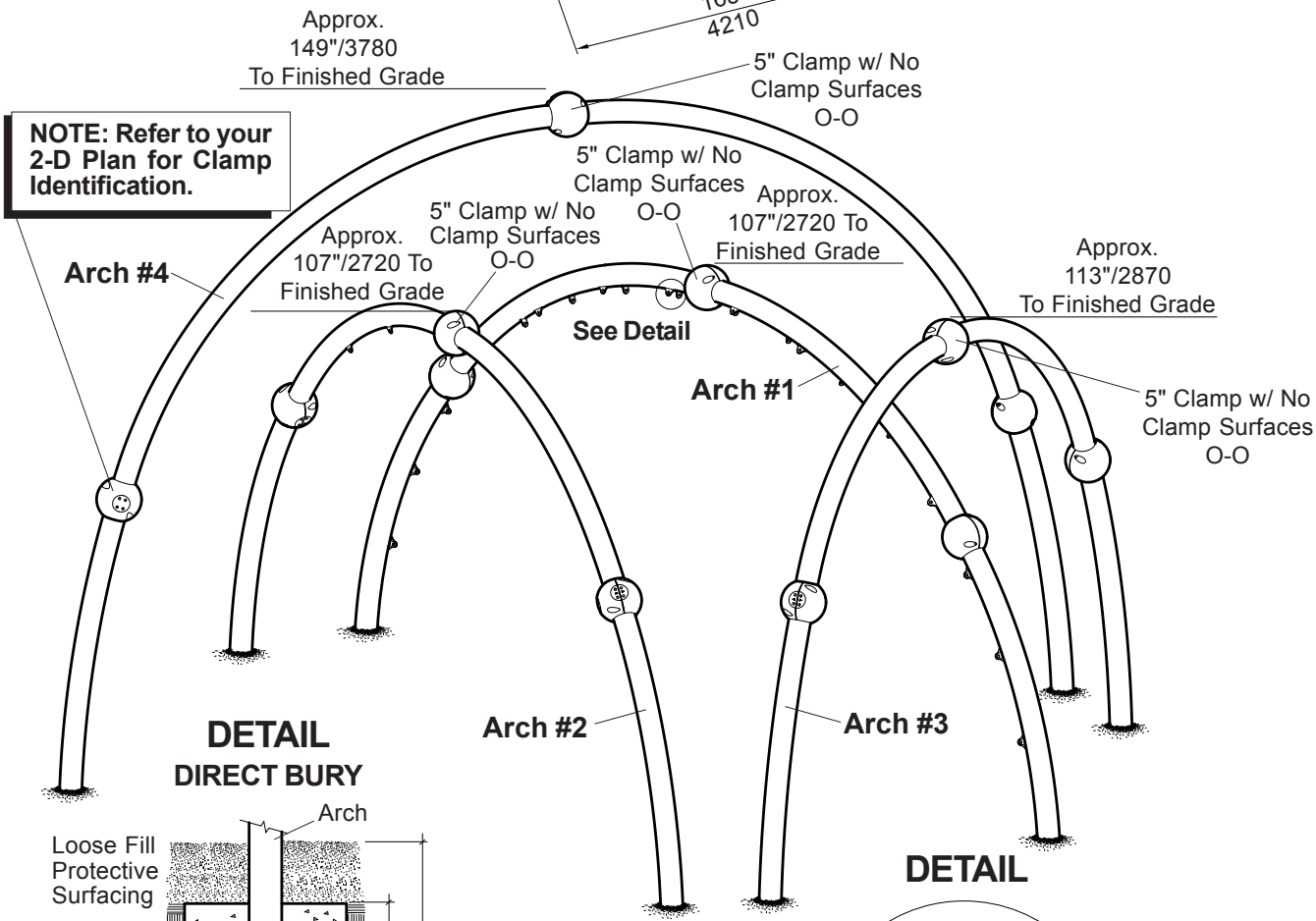
ISO 9001 Certified

SAFETY NOTE

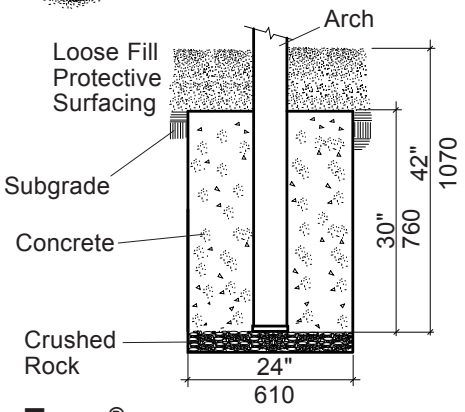
Choose a protective surfacing material that has a Critical Height Value of at least the height of the Highest Accessible Part/Fall Height of the adjacent equipment. (Ref. *ASTM F1487*.)

PLAN VIEW

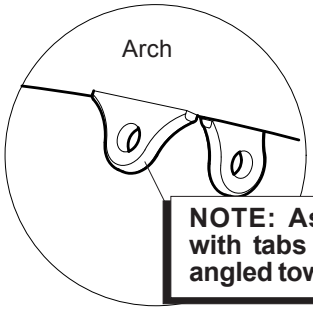




DETAIL
DIRECT BURY



DETAIL



NOTE: Assemble structure with tabs on arches #1 & #2 angled towards each other.

Arches

Evos®

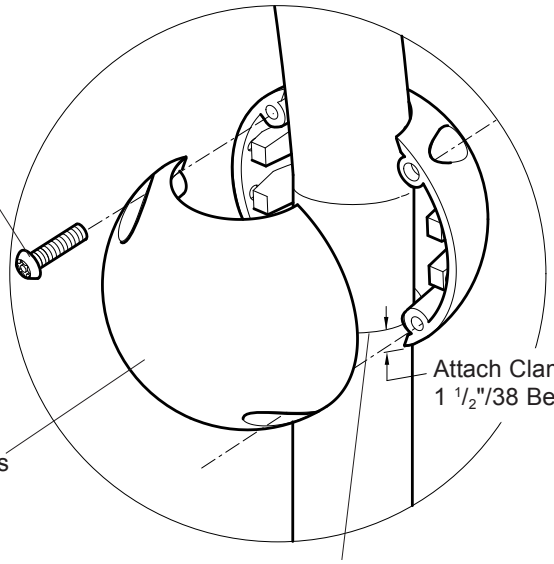
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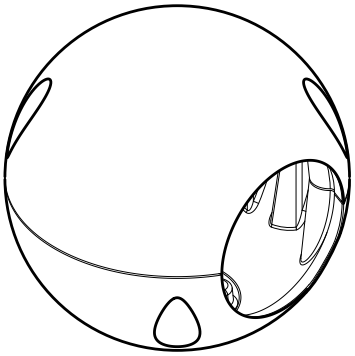
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Document #16814600

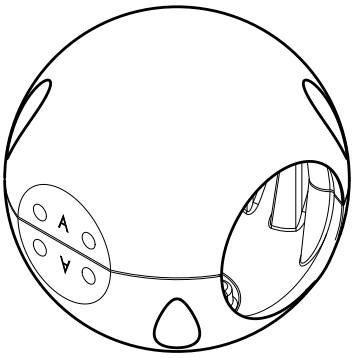
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DETAIL
5" CLAMP ATTACHMENT

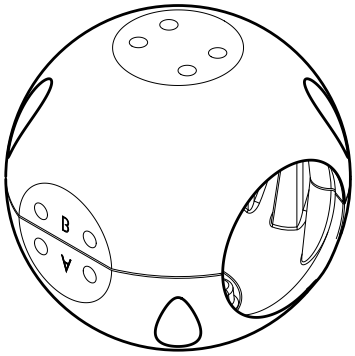




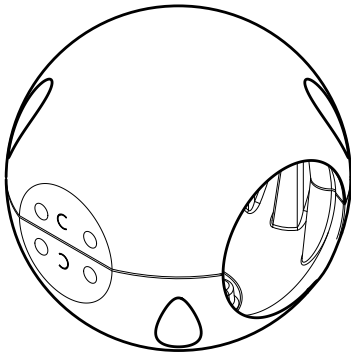
5" Clamp w/ No
Clamp Surfaces
O-O



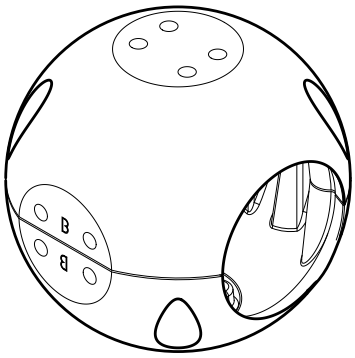
5" Clamp w/ 1
Clamp Surface
A-A



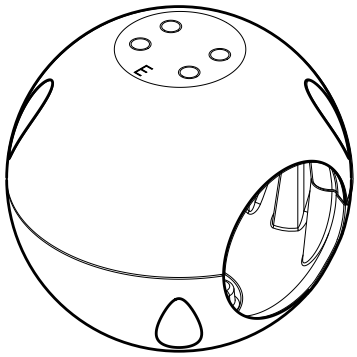
5" Clamp w/ 2 Clamp
Surfaces @ 90°
A-B



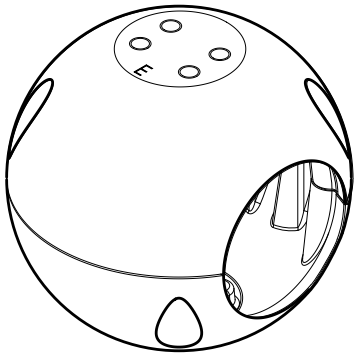
5" Clamp w/ 2 Clamp
Surfaces @ 180°
C-C



5" Clamp
w/ 3 Clamp Surfaces
B-B



5" Clamp
w/ 1 Clamp Surface
O-E



5" Clamp w/ 2 Clamp
Surfaces @ 180°
E-E

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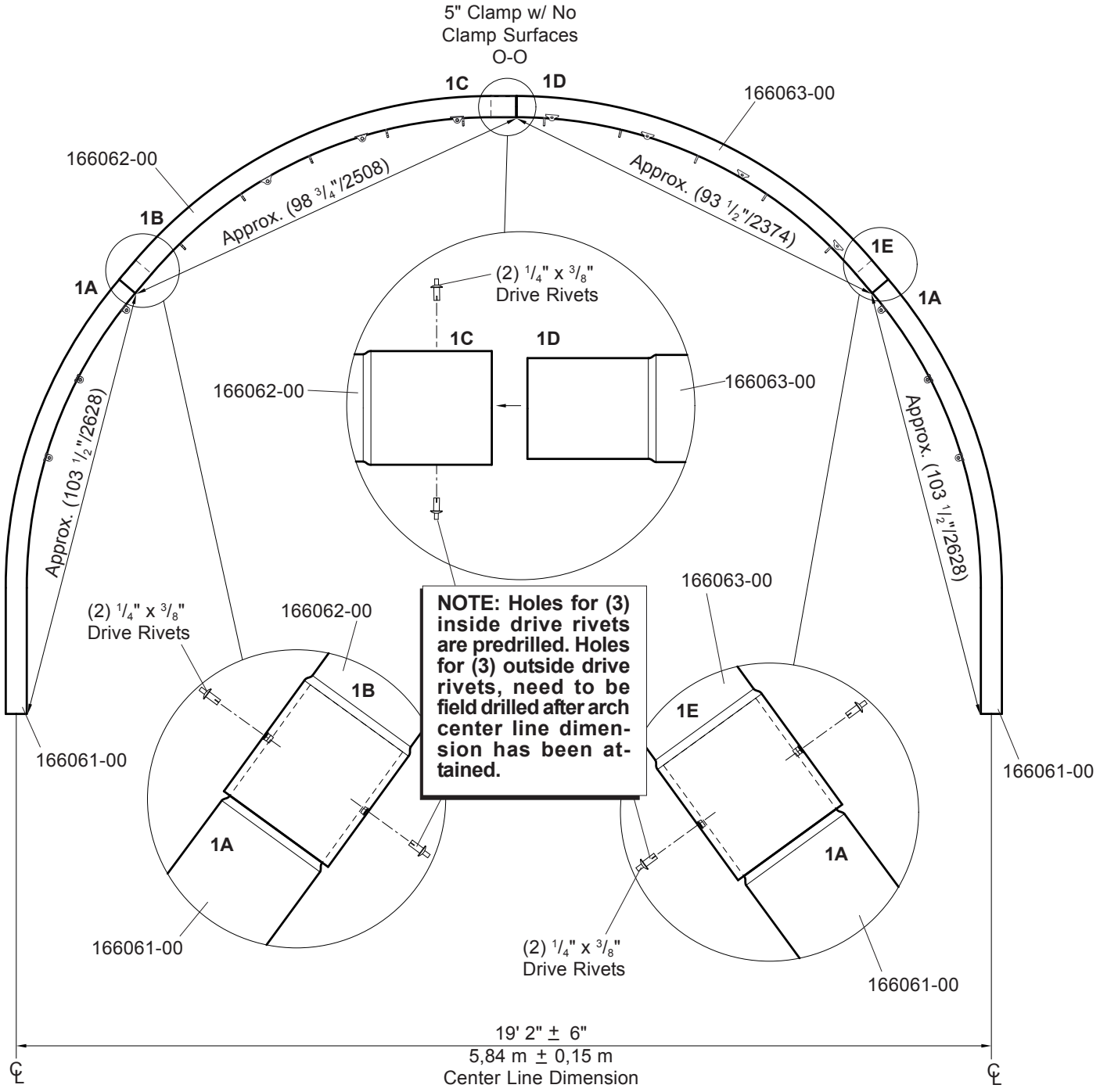
5" Clamps

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ARCH #1 ASSEMBLY



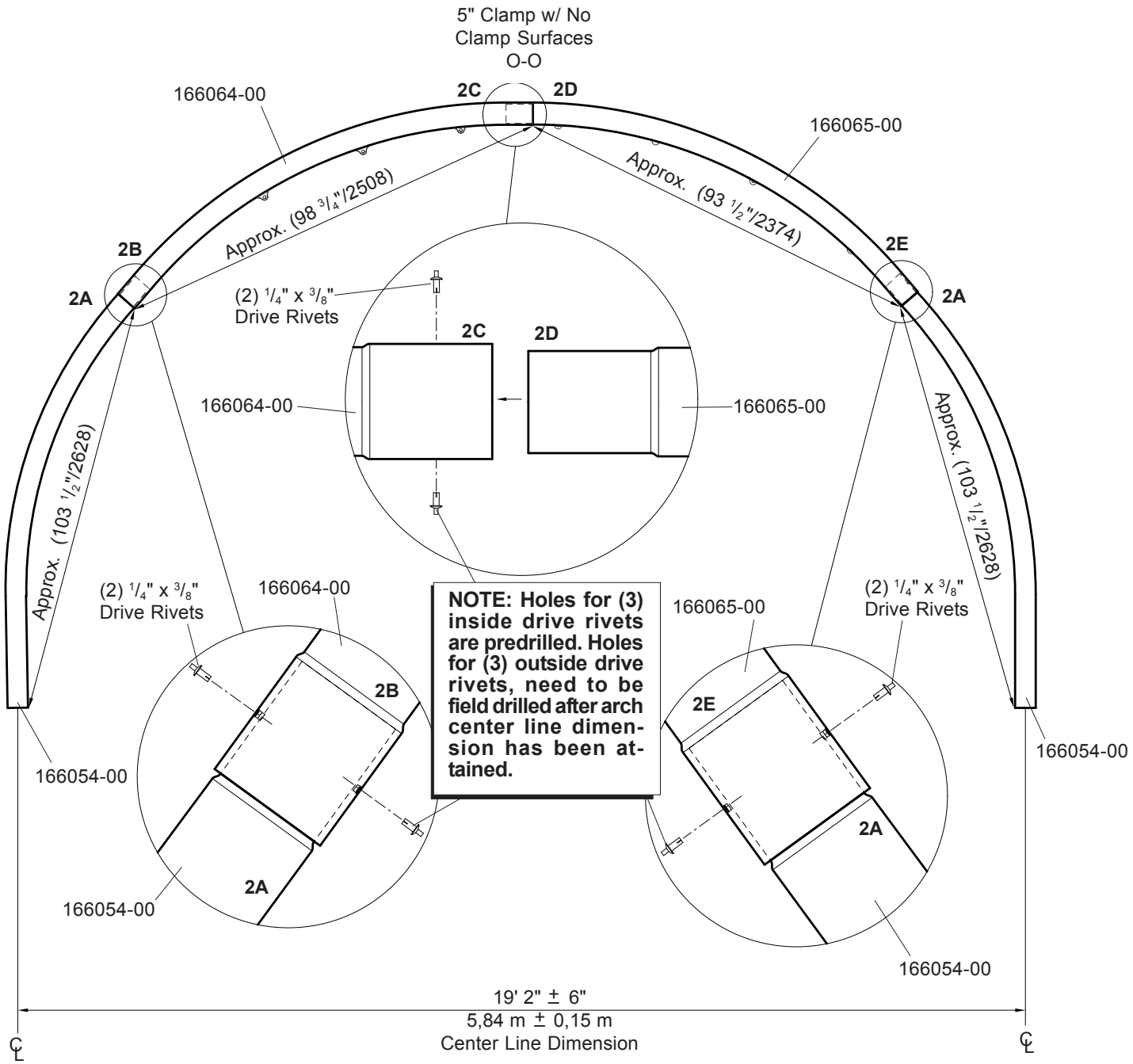
NOTE: Holes for (3) inside drive rivets are predrilled. Holes for (3) outside drive rivets, need to be field drilled after arch center line dimension has been attained.

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ARCH #2 ASSEMBLY



Evos®

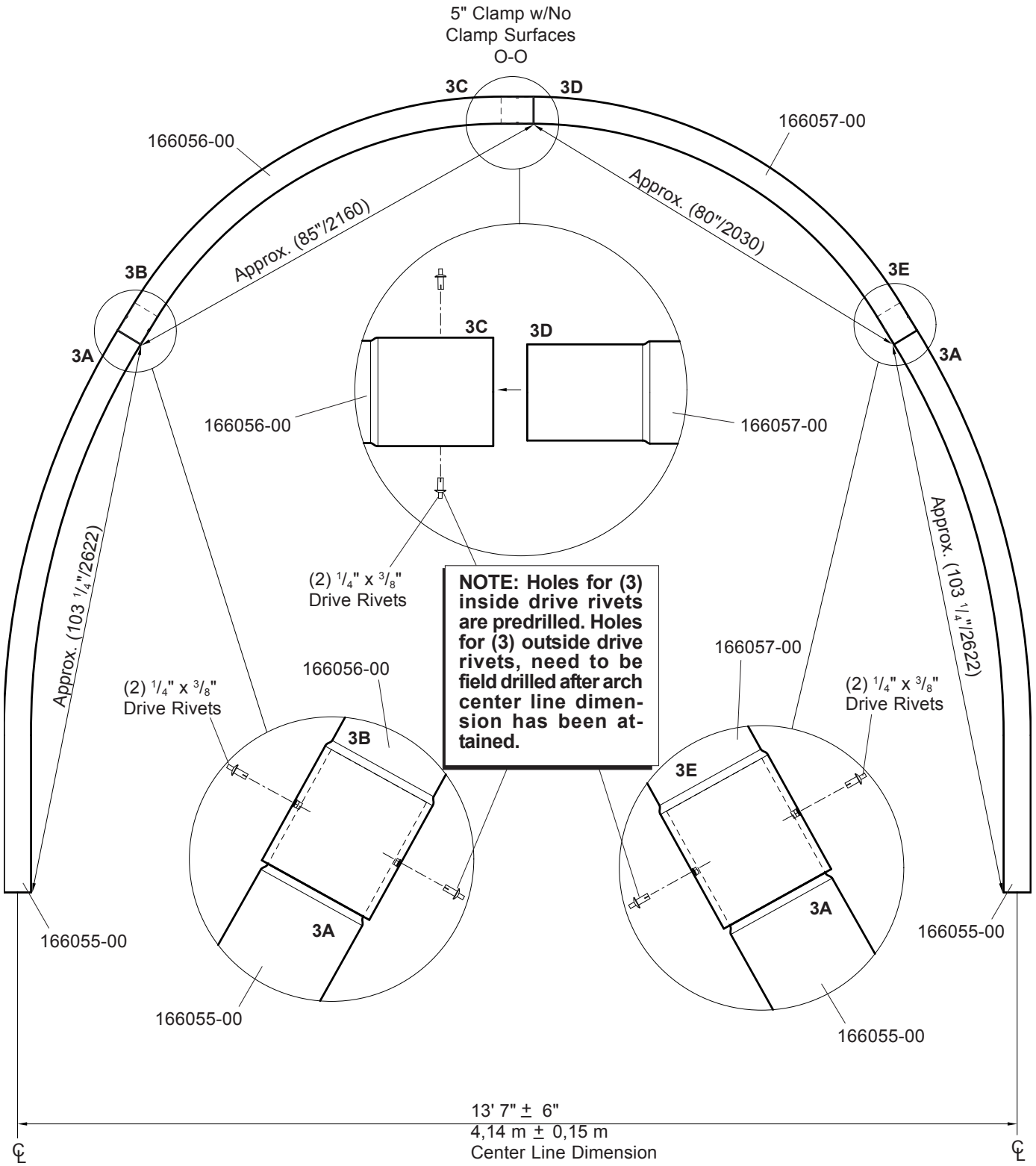
Arch #2

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ARCH #3 ASSEMBLY



Evos®

Arch #3

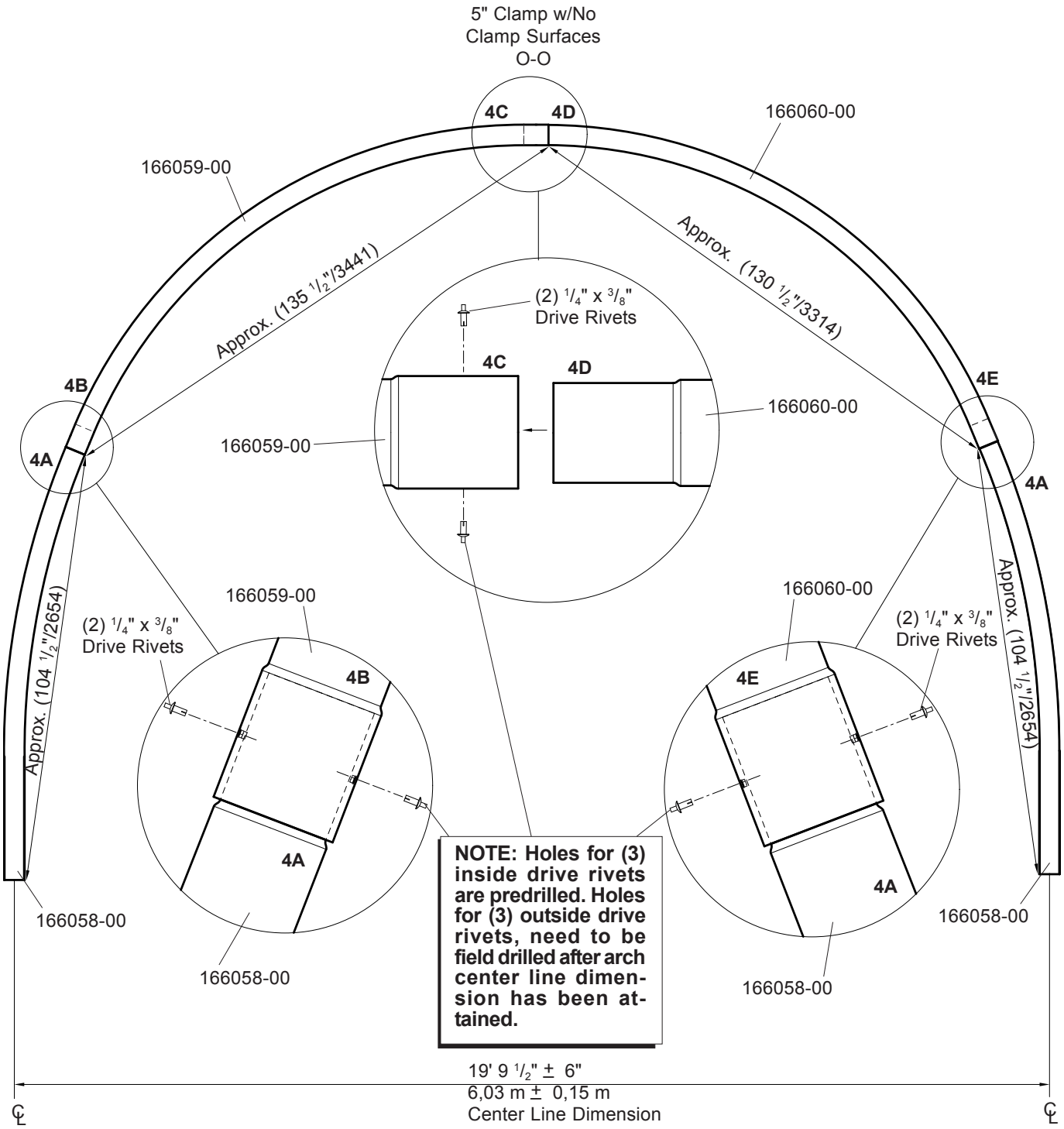
601 7TH STREET SOUTH, DELANO, MINNESOTA 55328-8605 888-574-4678 LSI Install Help 888-438-6574 LSI Direct 763-972-5200 Int. FAX (763) 972-3185

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ARCH #4 ASSEMBLY



Evos®

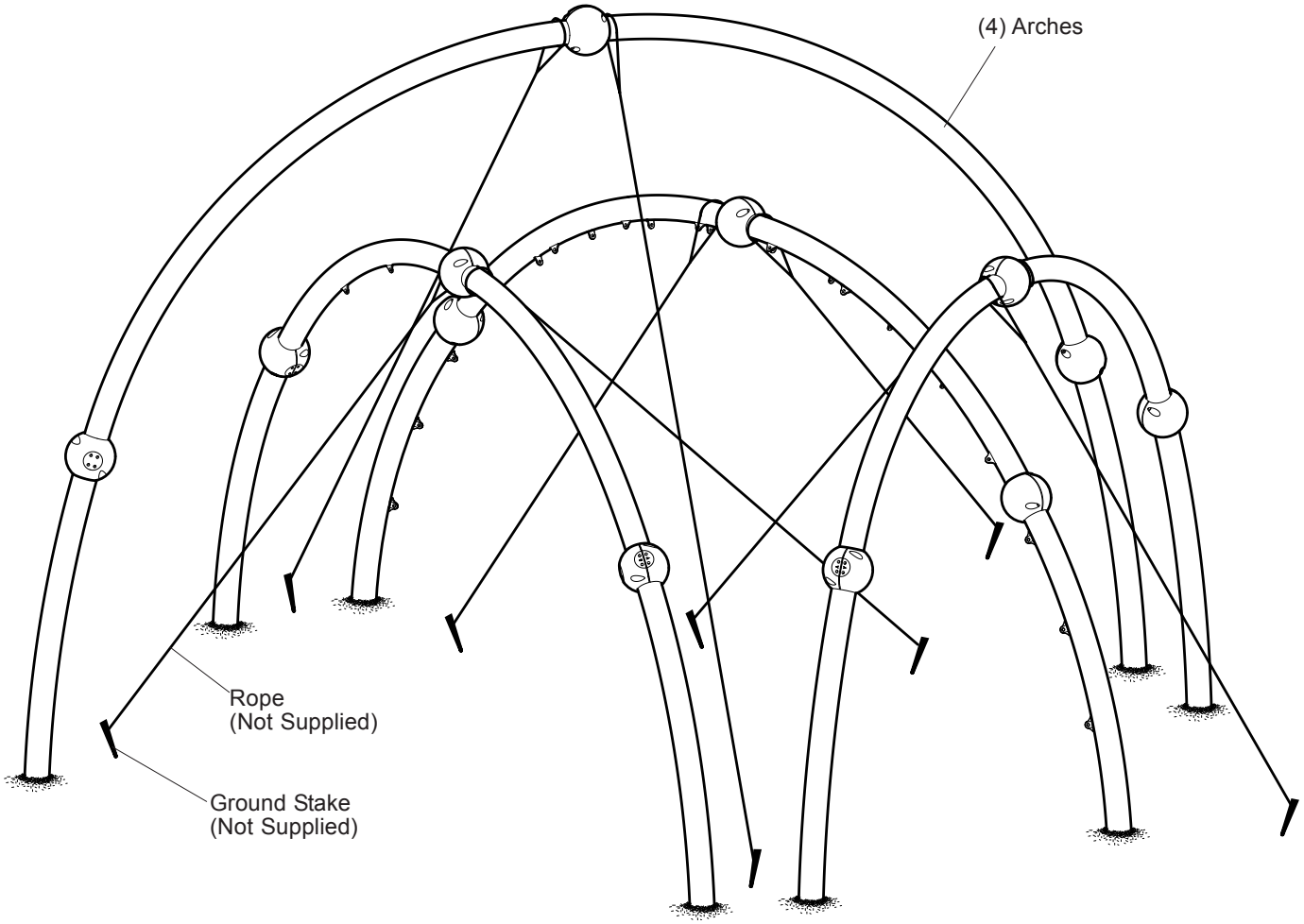
Arch #4

601 7TH STREET SOUTH, DELANO, MINNESOTA 55328-8605 888-574-4678 LSI Install Help 888-438-6574 LSI Direct 763-972-5200 Int. FAX (763) 972-3185

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DETAIL
ROPE/GROUND STAKES



NOTE: ***Rope may be used to tie off the arches. The use of rope will help keep the arches in plumb position, while attaching outriggers. Tie a rope (not supplied) on each side of the top 5" clamp. The rope should be long enough to attach to a ground stake (not supplied). When the arches are in plumb position, pull the ropes tight, and attach to ground stakes.***

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J:\SPECS\168\16814600.P65

Evos® Arches

Parts List

Part#	Description	Qty.
166061-00	Arch 1 A With Net Tabs, Specify Color	*
166054-00	Arch 2 A, Specify Color	*
166062-00	Arch 1B/1C With Tabs, Specify Color	*
166063-00	Arch 1D/1E With Tabs, Specify Color	*
166064-00	Arch 2B/2C With Tabs, Specify Color	*
166065-00	Arch 2D/2E With Tabs, Specify Color	*
166055-00	Arch 3A, Specify Color	*
166056-00	Arch 3B/3C, Specify Color	*
166057-00	Arch 3D/3E, Specify Color	*
166058-00	Arch 4A, Specify Color	*
166059-00	Arch 4B/4C, Specify Color	*
166060-00	Arch 4D/4E, Specify Color	*
166271-00	5" Clamp A, Specify Color	*
166272-00	5" Clamp B, Specify Color	*
166273-00	5" Clamp C, Specify Color	*
166275-00	5" Clamp E, Specify Color	*
166276-00	5" Clamp O, Specify Color	*
100611-00	1/4" x 3/8" Drive Rivet, AL/SST	*
127551-00	5/8" x 1 1/2" BHCS w/Pin, SST	*

*** = Quantity Determined By Your Order**

Specifications

5" Clamps: Cast from 356-T6 aluminum. Finish: ProShield®, color specified.

5" Arch: Steel arch is manufactured from 5" O.D. galvanized tubing with a wall thickness of .120". Finish: ProShield, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: 4 People minimum approx. 6 man hours
Concrete Req.: Approx. 2.25 cu. yds.
Area Req.: 6' (1,83 m) minimum use zone
Weight: 98 lbs.
Fall Height: 75"

Installation Instructions

1) **(Direct Bury) Refer to the Site Plan for footing locations.**

   IMPORTANT! Do not pour concrete footings until all outriggers have been attached to 5" clamps with surfaces.

2) An Evos structure consists of (2-4) arch assemblies, numbered #1 through #4. Each arch assembly consists of (4) arches with part numbers to ensure the arch is assembled correctly.

3) Lay (4) arches on a flat surface. Using the part numbers shown on the detail as a guide, slide arches together as shown. Level arches. **NOTE:** *Lay arches on cardboard to prevent arches from being scratched during assembly.*

4) Line up (3) holes on inside of arches. Insert 1/4" x 3/8" drive rivets into holes and hammer rivet pins in until it is flush with head.

5) Measure center line dimension of lower arches. Position lower arches as needed to attain center line dimension. Drill through (3) outer holes in arches with 1/4" of "F" (only) drill bit. Insert 1/4" x 3/8" drive rivets into holes and hammer rivet pins in until it is flush with head.

6) Using the arch assembly detail as a guide, attach (3) 5" clamps to each arch using 5/8" x 1 1/2" BHCS w/pin (with gray anti-sieze). **NOTE:** *Refer to your 2-D Plan for clamp identification.* The 5" clamps will be positioned on top of the drive rivets and arch ends. Refer to the arch assembly details for proper location of each clamp. **NOTE:** *The 5" clamps with clamp surfaces, will need to be adjusted when outriggers are attached to the structure.*

7) Place the fully assembled arches in footing holes. Refer to the Site Plan for proper location of arches. **NOTE:** *Rope may be used to tie off the arches. The use of rope will help keep the arches in plumb position, while attaching outriggers. Tie a rope (not supplied) on each side of the top 5" clamp. The rope should be long enough to attach to a ground stake (not supplied). When the arches are in plumb position, pull the ropes tight, and attach to ground stakes. Refer to sheet 4.*

Specifications are subject to change without notice.

Eco #53850 Document 16814600 replaces 16620200. Changed 5" clamp part numbers.
6/16/10 Changed arch descriptions.

City of Somerville, Massachusetts
Lincoln Park Improvements- PLAY E□UIPMENT LIST

		□uant.	Model #
LANDSCAPE STRUCTURES, INC.			
1	2 bay Arch Swings	2	#177330 #210157
	_2 belt swings		#174018
	_1 bucket swing		#176038
	_1 Molded Bucket seat with harness		#177351
2	Custom Hillscape Wide bottom Climber	1	
3	Oodle swing	1	#173592
4	Hillside Roller Slide (56")	1	#123333
5	Evos/PlayOdyssey combo	1	
	_Blender		202822
	_powerlifter w/o post		202821
	_o-zone		156448
	_Three Arches		179184
	_swiggle stix		156450
	_helix net		156449
	_Rectangle		156462
	_Hemisphere Climber		156435
	_pod climber 8" and 24" height		120710, 120712
	_Lolliladder		193170
	_Swiggle knots, no decks		193171
	_14 post netplex		193169
	_Tight rope- no decks		193173
	_Skyport climber- 14 post		193175
	_Rushwinder		189313
6	Twirlwind and Powerlifter/Accessible Powerli	1	160216
7	Saddle Spinner	2	#152179
8	Stand Up Spinner	1	#155077
GORIC		1	
1	Integration Carousel	1	E5640030
BERLINER		1	
1	Small Treehouse Play Structure		usp.01130
	Greenville Treehouse Trii1 with slide, net climber, and ladder	1	
2	Large Treehouse Play Structure		usp.01744-3
	_Large Tower	1	
	_Large Slide (Steel)	1	
	_Trii 3 (tall)	2	
	_Trii 2 (medium)	1	
	_Net Tunnel with small mesh	4	
	_Trii 2 Slide	1	
	_Terranos Triangular Net	1	
	_Terranos Layaway Walk	1	
KOMPAN			
1	Multisport court	1	FRE2211
3 Ball Climbing			
1	Little Titans Climbers	45	*INCLUDES SPARE PARTS*

CUSTOM NATURAL

1	Large Log Scramble	1	
2	Concrete steppers	33	
3	Timber Balance Beam	2	

Norwell - E□ercise Equipment http://www.norwelloutdoorfitness.com/images/katalog/ADDACA.pdf

1	Duall Pullup	1	
2	Stretch	1	http://www.norwelloutdoorfitness.com/en/our-lines/adult-exercises/flexibility/stretch
3	Situp	1	http://www.norwelloutdoorfitness.com/en/our-lines/adult-exercises/strength/sit-up
4	Bar	1	http://www.norwelloutdoorfitness.com/en/our-lines/adult-exercises/strength/bar

SECTION 02887

RESILIENT SAFETY SURFACING

PART I - GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment and transportation required for the placement and compaction of resilient play surfacing at children's play lots. The surfacing shall be placed at all locations identified on the Contract Drawings to the indicated grades. The Contractor shall provide processed wood fiber play surfacing over drainage layer and filter fabric provided and installed as part of this contract.

1.02 RELATED WORK:

A. Section 02350, EXCAVATION, BORROW AND BACKFILL

1.03 SUBMITTALS

A. In accordance with Section 01330 of these Specifications submit manufacturer's specification and detail sheets for all materials to be utilized under this section.

B. Provide samples as directed by the Engineer.

1.04 QUALIFICATIONS

A. For installation of the poured-in-place play surface the contractor shall provide evidence of successful completion of three (3) like surfaces installed during the past three (3) years with names of clients and phone numbers.

PART II - MATERIALS

2.01 POURED-IN-PLACE-PLAY SURFACE

A. Poured-in-place play surface shall be "Playbound" by Surface America, or approved equal. Play surface shall meet or exceed current Consumer Product Safety Commission (CPSC) guidelines issued in ‘A Handbook for Public Playground Safety’ (latest edition) for the minimum potential fall height of the play equipment, current Disabilities Act Guidelines (ADA) and current American Society for Testing Materials (ASTM) F-1292-91 requirements.

1. The Base Mat shall be a monolithic poured-in-place cushioned pad, made from a blend of recycled styrene butyrene rubber (SBR) and a polyurethane binder or approved equal. The depth of the SBR mat shall

be such that in conjunction with the specified top-wearing course the total resilient surface system shall provide the required absorbency for the maximum potential fall from the specified play equipment. (Refer to Section 8.01.) SBR shall be mixed with the binder in a ratio of 88% SBR to 12% binder by weight to achieve maximum resilience.

2. The Top Surface shall be a monolithic poured-in-place top surface made from a blend of ethylene propylene diene monomer (EPDM) colored rubber particles measuring 1 to 3 mm and a polyurethane binder. EPDM shall be mixed with the binder in a ratio of 82% EPDM to 18% binder to achieve maximum wearability and resilience. The final color shall be determined through the submittal and sample process, although it shall be equal to three (3) different four- color mix combinations with no black. Top surface shall have a tensile strength of two hundred (200) psi. The urethane binder shall be an aliphatic non-yellowing type and have the lowest VOC content available.

3. Poured-in-place surfacing shall be placed in the limited areas designated on the plans. Depth shall be 2".

4. Prefabricated shock pads will not be considered equal.

2.02 RUBBERIZED TILE SURFACING

A. This work shall consist of furnishing and installing a resilient tile surface in high use zones under swing components and at the base of slides, as recommended by the manufacturer and/or supplier, and as directed by the Engineer. Play surface shall consist of factory-molded interlocking resilient playground tile surfacing.

B. All products shall meet current Consumer Product Safety Commission and Americans with Disabilities Act guidelines, and ASTM F-1292-91 requirements.

C. Rubberized tile surfacing shall be SofTILE KrosLOCK as manufactured by SofSURFACES, (800-263-2363), www.sofsurfaces.com and supplied by J. P. LaRue Inc., 1-800-986-3716, or approved equal. Depth shall be as required by the manufacturer given the fall heights and color shall be standard solid black. Depth shall be 3.5".

2.03 BASE MATERIALS

A. Refer to Section 02350, Section 02350, EXCAVATION, BORROW AND BACKFILL.

2.04 GEOTEXTILE FILTER FABRIC

A. Refer to Section 02350, Section 02350, EXCAVATION, BORROW AND BACKFILL.

2.05 BITUMINOUS CONCRETE BASE

A. Refer to Section 02755, BITUMINOUS CONCRETE PAVING

PART III - EXECUTION

3.01 PROCEDURES

A. The Contractor shall deliver, spread and compact or place safety surfaces to conform to the lines and grades shown on the Contract Drawings. All work shall be done in accordance with the manufacturer's installation recommendations for Resilient Safety Surfaces.

B. The Base Mat for the Poured-in-Place Play Surface shall be installed in accordance with the manufacturer's instructions. The Base Mat shall exhibit a minimum installed thickness necessary to provide the required absorbency for the maximum potential fall from the proposed play equipment. At playlot edges, place a board between the end of the poured-in-place base pour and the concrete edge and remove the board after the base has sufficiently cured. Pour the top course of poured-in-place surfacing and allow material to fill the void created by the board.

C. The Top Surface shall be installed following installation of the cushion course, in accordance with the manufacturer's instructions. The minimum installed thickness of the top wearing course shall be as recommended by the manufacturer. The contractor is responsible for insuring that no foot traffic is allowed on the surface before the curing is complete.

D. Bevel all pathway edges and feature (slides etc.) exit landing areas in accordance with manufacturer's recommendations.

E. Any tests of materials, and/or compaction shall be as ordered by the Engineer, and paid for by the Contractor regardless of results.

F. All safety surface tiles shall be installed according to manufacturer's and/or

suppliers recommendation and/or specifications on a concrete base. Locations and installation methods shall be as shown as determined by the Engineer.

G. WARRANTY: Safety surfacing shall be free of defects due to workmanship or material for a minimum of two (2) years from date of installation.

END OF SECTION

SECTION 02910

SCREENED LOAM BORROW AND TOPSOIL RE-USED

PART 1 - GENERAL

1.01 SCOPE OF WORK:

A. Under this Section, the Contractor shall furnish all labor, materials, equipment and transportation required to furnish and place ½" Screened Loam Borrow as shown on the drawings and as specified. Where proposed tree and shrub planting mix and/or sod or seed is noted on the drawings, it shall be composed of Loam Borrow, or Topsoil Reused in compliance with this specification.

B. Prospective bidders are advised that significant quantities of topsoil are present at the property and presumably available for reuse if compatible with the requirements of this specification. The Contractor shall be responsible for amending topsoil, as required to comply with this specification.

1.02 SAMPLES/TESTS:

A. The Contractor shall furnish a Certified Laboratory Report showing the soils classification and nutrient analysis of representative samples of the proposed Loam to be used, including the extent of lime and fertilizer required. Samples submitted for approval must be representative of the total volume to be furnished, taken in the presence of the Engineer, and delivered to a certified laboratory by the Contractor; all costs for such shall be borne by the Contractor.

B. At least ten (10) days prior to shipment/delivery of materials, the Contractor shall submit to the Owner a one (1) cubic foot representative sample, certifications, certified test results for materials as specified below. The Contractor shall provide a listing of the addresses (locations) identifying the origin of the soil to be delivered. If the origin is from multiple locations, all locations shall be provided at the time of submission of required information specified above. No materials shall be ordered or delivered until the required submittals have been reviewed and approved by the Owner. Delivered materials shall closely match the approved samples. Approval shall not constitute final acceptance. The Owner shall reserve the right to reject, on or after delivery, any material that does not meet these Specifications.

C. If the material does not conform to the above requirements it shall be rejected and additional sources shall be found. Sampling and testing shall be accomplished as specified herein until an approved material is found, all at the Contractor's expense.

D. To assure that materials fulfill specified requirements regarding textural analysis, organic matter content, pH, and fertility testing may be undertaken:

1. Prior to site delivery; at source;

2. At time of delivery; on-site; and/or

3. Immediately following spreading on site. Soil sampling shall also indicate if specified soil was supplied uniformly to the minimum specified depth.

1.03 STANDARDS:

A. ASTM - American Society for Testing and Materials.

1.04 NOTIFICATION:

A. The Contractor shall notify the Owner in writing at least ten (10) days in advance of the time he intends furnishing Screened Loam Borrow stating the location and amount of such deposit, the name and address of the supplier and also shall furnish such facilities, transportation and assistance as the Owner may require for collecting and forwarding samples.

PART 2 - MATERIALS

2.01 LOAM BORROW:

A. In accordance with the specific requirements of this project, existing on-site soil may be re-used as Loam Borrow only if it meets this Specification. Existing topsoil that does not meet this Specification may be re-used only up to the subgrade elevation within the limits of areas to receive new Loam Borrow. The Contractor shall furnish all required Loam Borrow, from off site sources, as necessary, to complete the project.

B. Screened Loam shall be "fine sandy loam" or "sandy loam" determined by mechanical analysis (ASTM D-422) and based on the "USDA" Classification System". Screened Loam has the following mechanical analysis:

Textural Class	Percentage of Total Weight	Average Percentage
Sand (0.05 – 2.0mm)	45 – 75	60
Silt (0.002 – 0.05mm)	15 – 35	25
Clay (Less than 0.002mm)	5 – 20	15

C. Screened Loam shall be a natural product consisting primarily of natural topsoil, free from subsoil, and obtained from an area that has never been stripped, as noted above, the location of the source of the loam must be submitted to the Owner.

Screened Loam shall not contain less than five percent (5%) nor more than ten percent (10%) organic matter as determined by the loss on ignition of oven-dried samples, at 100°C ± 5°C. To adjust organic matter content, the soil may be amended, prior to site delivery, by the addition of composted leaf mold or peat moss. Use of organic amendments is accepted only if random soil sampling indicates a through incorporation of these materials. No mixing or amending of Loam will be permitted on site. The Loam shall not be delivered when in a wet or frozen condition.

D. Screened Loam shall consist of fertile, friable, natural loam capable of sustaining vigorous plant growth. Loam shall be without admixture of subsoil, and refuse, resulting in a homogeneous material free of stones greater than ½" in the longest dimension, be free of lumps, plants, glass, roots, sticks, excessive stone content, debris, and extraneous matter as determined by the Owner. Screened Loam shall be within the pH range of 6.0 to 6.5 except as where noted on plans and details. It shall be uncontaminated by salt water, foreign matter and substances harmful to plant growth. The maximum soluble salt index shall be 100. Screened Loam shall not have levels of aluminum great than 200 parts per million.

E. If limestone is required to amend the screened loam to bring it within a pH range of 6.0 to 6.5 no more than 200 pounds of limestone per 1,000 square feet of loam, incorporated into the soil, or 50 pounds of limestone per 1,000 square feet of loam, surface application, within a single season.

F. The Owner will reject any material delivered to the site that does not meet these Specifications after post-delivery testing. If the delivered screened loam does not meet the specifications stated in this document, the delivered screened loam will be removed by the Contractor at the Contractor's expense and at the time of rejection.

G. The topsoil shall not be handled or moved when in a wet or frozen condition.

H. Topsoil structure shall not be destroyed through excessive and unnecessary handling or compaction. Inappropriate handling leading to the compaction or deterioration of soil structure will result in rejection of topsoil for use.

I. At no time should equipment or material rest on the soil.

J. Loam Borrow shall be free of plants and their roots, debris and other extraneous matter. It shall be uncontaminated by salt water, foreign matter and substances harmful to plant growth. The electrical conductivity (EC2) of a 1:2 soil-water suspension shall be equal to, or less than, 1.0 millimhos/cm. (test material passing #4 sieve).

2.02 REUSE OF EXISTING TOPSOIL:

A. The reuse of topsoil that does not meet the specifications for use as loam borrow

may only be permitted for use as a general fill material to subgrade elevations at the limits of lawn and planting areas.

B. Care shall be taken not to overwork the soil, causing it to break down, utilizing only agricultural equipment such as plows, discs, or harrows and portable quarry sieves, screens, or blenders.

PART 3 - EXECUTION

3.01 PLACEMENT:

A. The Contractor shall furnish and spread Loam Borrow to the depths shown on the contract drawings, which depth shall be the minimum required depth after settlement. No compaction shall be required beyond that extent necessary to place sod or to plant trees and shrubs to ensure against unevenness or settling below accepted growth lines.

3.02 ADDITIVES:

A. The Contractor shall apply all necessary fertilizer and lime to the soil in accordance with the manufacturer and laboratory's recommendations and as required by the sodding, seeding and/or planting specifications referenced elsewhere.

END OF SECTION

SECTION 02911

ROOT ZONE MIX PREPARATION

PART I - GENERAL

1.01 SCOPE OF WORK:

A. Under this Section, the Contractor shall furnish all labor, materials, equipment (including low ground pressure, LGP, equipment) and transportation required to furnish and place, or prepare Root Zone Mix for the field and to perform 'blecavation' operations for the areas shown on the drawings and as specified as "full depth renovation". Refer to Appendix E for acceptable equipment.

B. Prospective bidders are advised that significant quantities of topsoil are present at the property and presumably available for reuse if compatible with the requirements of this specification. The Contractor shall be responsible for amending topsoil, as required to comply with this specification and SECTION 02910 SCREENED LOAM BORROW AND TOPSOIL RE-USED.

C. This work shall consist of preparing a root zone mixture consisting of screened native on site loam, sand and compost and performing blecavation as described in item 'd' below. The root zone mix will be evaluated by using the ASTM test methods for High Performance Sand-based Root Zones for Sports Fields, ASTM F 2396-04 as shown in Appendix E. A sand sample and compost sample shall be submitted to a testing agent for adherence to specifications. Through the blecavation process that uses the blecavator machine set to varying height controls, the compost and sand can be blended with top soil on-site to a desired depth ranging from 6-8" at the construction site.

D. The Contractor shall have the option, at their discretion, to remove all existing turf and loam from the fields and either mix on site or bring in Root Zone Mix that adheres to this specification. The blecavation technique, however, seems to be the most efficient process.

E. The Contractor shall have the option, at their discretion to either remove the existing turf layer prior to re-grading or to re-grade and blecavate the designated area.

F. No heavy duty equipment and vehicular traffic shall be allowed on the prepared areas. While using the blecavator, the contractor shall fine grade soil over the blecavation areas based on the proposed elevations indicated on the site plan.

1.02 SAMPLES/TESTS:

A. The Contractor shall furnish an outline of their approach to the project no less than ten (5) days prior to the start of construction.

B. The Contractor shall furnish a Certified Laboratory Report showing the soils classification and nutrient analysis of representative samples of the Loam that is proposed to be used, including the extent of lime and fertilizer required. Samples submitted for approval must be representative of the total volume to be furnished, taken in the presence of the Engineer, and delivered to a certified laboratory by the Contractor; all costs for such shall be borne by the Contractor.

C. If the material does not conform to the above requirements it shall be rejected and additional sources shall be found. Sampling and testing shall be accomplished as specified herein until an approved material is found, all at the Contractor's expense.

D. To assure that materials fulfill specified requirements regarding textural analysis, organic matter content, pH, and fertility testing may be undertaken:

1. Prior to site delivery; at source;

2. At time of delivery; on-site; and/or

3. Immediately following spreading on site. Soil sampling shall also indicate if specified soil was supplied uniformly to the minimum specified depth.

1.03 RELATED WORK:

A. Section 02910, SCREENED LOAM BORROW AND TOPSOIL RE-USED

B. Section 02290 SEEDING

C. Section 02810, IRRIGATION

1.04 STANDARDS:

A. ASTM - American Society for Testing and Materials.

1.05 NOTIFICATION:

A. The Contractor shall notify the Owner in writing at least ten (10) days in advance of the time he intends furnishing Root Zone Mix or amendments stating the location and amount of such deposit, the name and address of the supplier and also shall furnish such facilities, transportation and assistance as the Owner may require for collecting and forwarding samples.

1.06 QUALITY CONTROL:

A. Root zone mix: A one gallon sample for every 2,000 cubic yards of root zone mix shall be tested by the Owner's Testing Agent for approval.

B. Following installation of irrigation system and prior to installation of sod, contractor shall notify landscape architect or owner and provide the owner with compaction tests along the center line of the field as well as along the side lines to ensure that the root zone mix has not been heavily compacted. Compaction test shall fall within the industry standards for fields and any areas of the field that exceed these standards shall be corrected at the contractor's expense prior to installation of sod.

C. The Contractor or Sub-contractor must have a minimum of five (5) years of experience installing root zone mix based athletic fields of similar size and quality of this project.

PART II - MATERIALS

2.01 LOAM BORROW:

A. Refer to Section 02910, SCREENED LOAM BORROW & TOPSOIL RE-USED.

2.02 SAND:

A. Sand for Root Zone Mix shall conform to ASTM standard F 2396-04 Sand for High Performance Sand-based root zones for Sports Fields or 2mm USGA specification sand for golf coarse fairway top dressing. Refer to Appendix E.

2.03 PEAT OR ORGANIC MATERIAL:

A. Peat moss shall be of a standard brand free of sticks, stones, hay or any other deleterious Matt and meet the following requirements:

Parameter	Specification
Total Ash	15% or less
PH	6.5 to 7.5
% Moisture	30% to 50%
Sieve Criteria	
2.0 mm sieve	0-5% retained
1.0 mm sieve	Less than 20% retained

B. Compost - Compost shall be derived from organic wastes including sawdust, clean ground wood and biosolids that meet all State Environmental Agency requirements.

The product shall be well composted, free of viable weed seeds and contain material of a generally humus nature capable of sustaining growth of vegetation, with no materials toxic to plant growth.

Compost shall have the following properties:

Parameters	Range
pH	6.5 – 7.5
Moisture content	35% - 55%
Soluble Salts	< 4.0 mmhos (dS)
C:N ratio	15 - 30:1
Particle Size	< 1/2”
Organic Matter Content	> 40%
Bulk Density	< 1000 lbs./cubic yard
Foreign Matter	< 1% (dry weight)

Compost generator shall also provide minimum available nitrogen and other macro and micro nutrients to determine fertilizer requirements. Generator shall supply documentation showing state approval for intended use.

C. Fertilizer - Renovate Plus, 3-3-3. Refer to Appendix E.

2.04 ROOT ZONE MIX:

A. Mixing Materials: Mixing of the sand, peat and soil mixture for the root zone mix must be blended by an experienced blending operator.

B. Physical performance Evaluation of the root zone mix will be in accordance with the guidelines set forth in ASTM standard F 2396-04.

PART III EXECUTION

3.01 ROOT ZONE MIX RATIOS:

A. Upon approval of the processed loam, sand and compost components, the owners testing agents shall blend the components to determine the correct ratio of sand and compost to create the root zone mix. This ratio of sand and compost will be based on laboratory testing and performance guidelines established by these specifications.

For bidding purposes assume the mix ratio will contain approximately 65 to 70% Native Screened Loam, 25 to 30% sand and 5 % compost by volume or equal.

B. The root zone mix developed by the owners testing agent will establish the required mix ratio and specifications for approval or rejections of all quality control submittals during construction.

Performance Testing: ASTM testing procedures for sand based athletic fields shall be used for performance testing.

3.01 PLACEMENT:

Root zone Mix Established by the Blecavation method:

A. The Contractor shall furnish and spread 2" thick 90/10 blend ASTM spec sand and ASTM F2396-04 spec compost amendments, distributed by a top-dresser for uniformity.

B. All sport turf areas are to be tilled to a depth of 8" – 10" with a blecavator, conventional tilling is unacceptable. This depth includes the 2" of ASTM spec sand as indicated above.

C. Fine grading shall be accomplished with a fully automated dual plain LGP laser grader.

D. Under no circumstances will loaded rubber tired vehicles in excess of 1 ton be allowed on the gravel base or root zone mix prior to, during or after the spreading of the root zone mix.

E. Finish grades shall be verified by the Contractor using laser operation survey instruments with a tolerance of +/- ¼ inch.

New or Blended Root zone Mix:

F. The Contractor shall furnish and spread Root Zone Mix to the depths shown on the contract drawings, which depth shall be the minimum required depth after settlement. No compaction shall be required beyond that extent necessary to place sod or for the establishment of seed.

G. Root Zone Mix shall be spread in such a manner as to establish a loose, friable seedbed.

H. Under no circumstances will loaded rubber tired vehicles in excess of 1 ton be allowed on the gravel base prior to or during the spreading of the root zone mix.

I. Finish grades shall be verified by the Contractor using laser operation survey instruments with a tolerance of +/- ¼ inch.

3.02 ADDITIVES:

A. The Contractor shall apply all necessary fertilizer and lime to the soil in accordance with the manufacturer's and laboratory's recommendations and as required by the sodding, seeding specifications referenced elsewhere.

END OF SECTION

SECTION 02930

TREES, SHRUBS, GROUNDCOVERS, AND LANDSCAPING

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This Section includes furnishing all labor, materials, equipment, plants, and incidental materials necessary to perform all operations related to the planting of all trees, shrubs, vines, herbaceous plants, ground covers, and for all appurtenant work, complete in place, maintained, and accepted, in accordance with the Contract Drawings and Specifications.

B. The Contractor shall bear the responsibility and cost of furnishing and applying water or any other substances, as necessary to ensure the sustainability of plant materials, as part of the work of this contract.

1.02 RELATED WORK:

A. Section 02329, LOAM BORROW

B. Section 02290, SEEDING

C. Section 02923, SODDING

1.03 SUBMITTALS:

In accordance with requirements of the general specifications, the Contractor shall submit the following:

A. Prior to planting, State nursery inspection certificates for all plant materials shall be submitted to the Engineer for review.

B. Samples and six copies of the manufacturer's product data, as applicable, shall be submitted to the Engineer for review and approval for the following materials:

1. Limestone.

2. Fertilizer.

3. Sphagnum Peat Moss.

4. Humus.

5. Organic Compost.

6. Manure.

7. Mulch.

8. Guying and Staking Apparatus.

9. Crepe Wrapping for tree trunks.

10. Anti-transpirant/Anti-desiccant.

PART 2 - PRODUCTS

2.01 PLANT MATERIALS:

A. The Contractor shall furnish and plant all plant materials as shown on the plans and in the quantities and sizes listed thereon. No substitutions shall be permitted without the written approval of the Engineer.

B. Plants larger than those specified in the Plant List may be used if approved by the Engineer. However, use of such oversized plants shall not be considered grounds for any increase in the contract price. If the use of larger plants is approved, the required spread of roots or ball of earth shall be increased in proportion to the size of the plant and plant pits shall be increased as necessary.

C. All plants shall be certified to have passed all required Federal and State inspection laws requiring ensuring freedom from plant diseases and insect infestations. The Contractor shall obtain clearance from applicable governing agencies, as required by law, before planting any plants delivered from outside the state in which they are to be planted.

D. All plants shall be nursery-grown under climatic conditions and environmental stresses similar to those in the locality of the project. All plants shall originate from nurseries that are no more than one Hardiness Zone higher (as established by the Arnold Arboretum, Jamaica Plain, MA) than where the plant is to be installed. Plants also shall conform to the botanical names and standards of size, culture, and quality for the highest grades and standards as adopted by the American Association of Nurserymen, Inc. in the American Standard for Nursery Stock, ANSI-Z60.1, latest edition. All plants shall be legibly tagged with their proper botanical name.

E. No heeled-in plants or plants from cold storage shall be used. All plants shall be typical of their species or variety and shall have a normal habit of growth. Plants shall be sound, healthy, and vigorous, well branched and densely foliated when in leaf; shall be free of disease, insects, eggs or larvae; and shall have healthy, well-developed root systems. All parts of the plant shall be moist and shall show active green cambium when cut.

F. All nursery plants shall be balled and burlapped or container-grown and shall have been acclimatized for at least one growing season. Container-grown stock shall have been grown in a container long enough for the root system to have developed sufficiently to hold its soil together, firm and whole, after removal from the container. No plants shall be loose in the container. Container-grown plants shall have no girdling roots and shall not be in a root-bound condition. Plants shall remain in their container until planted.

G. Care shall be exercised in digging and preparing field-grown plants for shipment and planting. Balled and burlapped materials shall have solid unbroken balls of earth of sufficient size to encompass all fibrous feeding roots necessary to ensure successful recovery and development of the plants. Balls shall be firmly wrapped in untreated biodegradable burlap and tied securely with wire cages and/or jute twine. Roots or balls of plants shall be adequately protected at all times from sun and drying winds. No plant shall be accepted when the ball of earth surrounding its roots has been badly cracked or broken preparatory to or during planting, or after the burlap, staves, wire cage, rope, or platform in connection with its transplanting have been removed. Soil characteristics (i.e., composition, texture, pH, etc.) of all field-grown plants shall closely match those of the soil where plant materials are to be planted.

H. The height of the trees, measured from the crown of the roots to the top of the top branch, shall not be less than the minimum size designated in the Plant List in the Drawings. The branching height for deciduous trees installed adjacent to or within walks shall be 7 feet minimum, having been pruned to this height at least 1 year prior to transplanting. Except when a clump is designated, the trunk of each tree shall be a single trunk growing from a single, unmutilated crown of roots. No part of the trunk shall be conspicuously crooked as compared with normal trees of the same variety. The trunk shall be free from sunscald, frost cracks, or wounds resulting from abrasions, fire, or other causes. All pruning cuts shall comply with acceptable horticultural practices. No pruning wounds having a diameter of more than 1½-inches shall be present. Any such wounds must show vigorous bark growth on all edges. Evergreen trees shall be branched to within 1 foot of the ground. No tree that has had its leader cut or die shall be accepted.

I. Caliper measurements for tree trunks shall be taken 6-inches above ground for trees up to and including 4-inch caliper size and at 12-inches above ground for larger sizes.

J. Shrubs shall meet the requirements for spread and/or height stated in the Plant List on the Drawings. The measures for height are to be taken from the crown or root flare to the average height of the top of the shrub mass (not the longest branch). The fullness of each shrub shall correspond to the trade classification "No. 1". Single stemmed or thin plants will not be accepted. The side branches must be generous, well-twigged and the plant as a whole must be well-bushed to the ground. The plants must be in a moist, vigorous condition, free from dead wood, bruises or other root or branch injuries.

K. Herbaceous plants, vines and groundcovers shall be of the size, age and/or condition designated in the Plant List on the Drawings.

L. Plants shall be delivered only after preparations for planting have been completed. Plants shall be handled and packed in a horticulturally approved manner and all necessary precautions shall be taken to ensure that plants arrive on-site in a healthy vigorous condition. Trucks used for transporting plants shall be equipped with covers to protect plants from windburn, desiccation, and overheating during transport. Plants that have not been thoroughly watered shall not be accepted at the planting site. Any plants delivered to the site in a dry or wilted condition shall be rejected and replaced at no expense to the Owner. All plant materials shall be protected, watered and otherwise maintained prior to, during, and upon delivery to the site.

M. Plants shall be subject to inspection and approval by the Engineer at the place of growth, or upon delivery, for conformity to specification requirements as to quality, size, variety, and condition. Inspection and selection of plants before digging shall be at the option of the Engineer. The Contractor, or his representative, shall be present, if requested by the Engineer, for inspection of plants at the Nursery. Such approval shall not impair the right of inspection and rejection upon delivery at the site or during the progress of work, for size and condition of balls and roots, disease, insects and latent defects or injuries. Rejected plants shall be removed immediately from the site. Certificates of inspection of plant materials shall be furnished as may be required by Federal, State and other authorities to accompany shipments.

2.02 LOAM BORROW:

Loam Borrow shall be as specified in Section 02329, LOAM BORROW.

2.03 SOIL ADDITIVES AND AMENDMENTS:

A. LIMESTONE:

Lime shall be an approved agricultural limestone containing at least 50 percent total oxides (calcium oxide and magnesium oxide). The material will be ground such that 50 percent of the material will pass through a No. 100 mesh sieve and 98 percent will pass a No. 2 mesh sieve. Lime shall be uniform in composition, dry and free-flowing and shall be delivered to the site in the original sealed containers, each bearing the manufacturer's guaranteed analysis.

B. FERTILIZER:

1. Fertilizer shall be a complete, standard commercial fertilizer, homogeneous and uniform in composition, dry and free-flowing, and shall be delivered to the site in the manufacturer's original sealed containers, each bearing the manufacturer's guaranteed analysis and marketed in compliance with State and Federal Laws. All fertilizer shall be used in accordance with the manufacturer's recommendations.

2. Fertilizer for tree, shrub and groundcover plantings shall contain all major plant nutrients and minor trace elements essential to sustain plant growth and shall have the following analysis:

Nitrogen (N)	Phosphorous (P)	Potassium (K)
10%	10%	10%

3. As approved by the Engineer, a slow release root contact fertilizer installed at the time of planting, may be used in place of the above, at the discretion of the Contractor.

C. Organic Compost shall be a standard commercial product comprised of fully decomposed, 100 percent plant-derived, natural organic matter. Its composition shall furnish ample water holding capacity and cation exchange capacity for the retention of plant nutrients. Compost shall be free of sticks, stones, weed seeds, roots, mineral or other foreign matter and delivered air dry. It shall be free from excessive soluble salts, heavy metals, phytotoxic compounds, and/or substances harmful to plant growth and viability. Organic compost shall have an acidity range of 4.5 to 7.0 pH.

D. Sphagnum Peat Moss shall be a standard commercial product. Its composition shall furnish ample water holding capacity and cation exchange capacity for the retention of plant nutrients. Peat moss shall be free of sticks, stones, weeds or weed seeds, roots, mineral or other foreign matter. It shall be free from toxic substances and/or compounds harmful to plant growth and viability. It shall be delivered air dry in standard bales and shall have an acidity range of 3.5 to 5.5 pH.

E. Humus shall be natural humus, reed peat, or sedge peat. Its composition shall furnish ample water holding capacity and cation exchange capacity for the retention of plant nutrients. Humus shall be free of sticks, stones, weeds, roots, mineral or other foreign matter and/or toxic substances harmful to plant growth and viability. It shall be low in wood content, free from hard lumps and excessive amounts of zinc and delivered air dry in a shredded or granular form. The acidity range for humus shall be 5.5 to 7.5 pH, and the organic matter content shall be not less than 85 percent, as determined by loss on ignition. The minimum water holding capacity shall be 200 percent by weight on an oven-dry basis.

F. Manure shall be well-rotted, leached, cow manure not less than 8 months or more than 2 years old. It shall be free of sawdust, shavings, or refuse of any kind and shall not contain more than 25 percent straw. It shall contain no substances harmful to plant growth. The Contractor shall furnish information regarding chemical disinfectants, if any, that may have been used in storage of the manure.

2.04 PLANTING MIXTURE:

Planting mix shall consist of 7 parts loam borrow and 1 part organic compost, humus, sphagnum peat moss, or manure, thoroughly blended.

2.05 WATER:

Water shall be furnished by the Contractor, unless otherwise specified, and shall be suitable for irrigation and free from ingredients harmful to plant growth and viability. The delivery and distribution equipment required for the application of water shall be furnished by the Contractor, at no additional cost to the Owner.

2.06 MULCH:

Mulch shall be fibrous pliable shredded black organic softbark mulch, not exceeding ½-inch in width. It shall be 98 percent organic matter with a pH range between 3.5 and 4.5 and a moisture content not to exceed 35 percent. It shall be free of weeds, weed seeds, debris, and other materials harmful to plant growth and viability. Organic mulch shall be aged no longer than 2 years.

2.07 MATERIALS FOR STAKING, GUYING, AND WRAPPING:

A. Tree stakes shall be sound, untreated 2 x 3 (nominal) x 8-foot length Douglas Fir reasonably free of knots. No paint or stain shall be used in conjunction with tree stakes. Tying material shall be flexible braided nylon webbing, ¾-inch wide and have a tensile strength of 900 pounds. Webbing shall be 'ArborTie', or approved equal.

B. Drive anchors and guy wire assemblies shall be suitable for protecting trees and shall be sized in accordance with the manufacturer's recommendations. No materials shall be used for guying that will girdle, chafe, or otherwise injure trees.

C. Tree wrap shall be duplex, waterproof kraft paper crinkled to 33-1/3 percent stretch, 4- to 6-inch wide strips. Tying materials shall be jute twine, 2-ply for shrubs and trees less than 3-inch caliper; 3-ply for larger plants.

2.08 TREE PAINT:

Tree paint shall not be used.

2.09 ANTI-TRANSPIRANT/ANTI-DESICCANT:

Anti-transpirant or anti-desiccant shall be 'Wilt-Pruf', as manufactured by Nursery Specialty Products, Inc., Groton Falls, NY, or approved equal. It shall be delivered in original sealed manufacturer's containers and used in accordance with the manufacturer's instructions.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. All plants shall be subject to inspection and approval by the Engineer upon delivery to the site. No materials shall be planted until approval is received.

B. All work shall be performed by skilled workers with a minimum of 2 years planting experience, in accordance with accepted horticultural/nursery practices, under the full-time supervision of a Certified Nurseryman or Arborist.

C. All balled and burlapped plants that cannot be planted immediately upon delivery shall be set on the ground and the root balls shall be well protected with soil, wet moss, or other acceptable material. All foliage shall be protected and covered with perforated shade materials.

D. The planting season for evergreen trees and shrubs shall extend from the time the soil becomes workable in the spring until new growth appears, and from September 15 until November 30 in the fall. Deciduous trees and shrubs shall be planted only when dormant, either prior to bud break and/or before leaves appear in the spring, or subsequent to their leaf drop in the fall. Ground covers shall be planted only after the last frost in the spring through mid-May. Planting season periods may be extended if weather and soil conditions permit only with the written approval of the Engineer. Extended or out-of-season planting requirements shall include application of antitranspirant and extra water as needed. Plant guarantee periods shall remain as stated below. Planting shall not be permitted in frozen ground.

E. All plant locations and outlines for planting beds shall be staked out for review and potential adjustment by the Engineer before any excavation is begun. In the event that rock, underground construction work or obstructions are encountered in any proposed planting pit or bed, the Engineer may select alternate locations. Where locations cannot be changed, the obstruction shall be removed, subject to the Engineer's approval, to a depth of not less than 3 feet below grade and not less than 6-inches below the bottom of the root ball when plant is properly set at the required grade. Removal of boulders or obstructions greater than 1 cubic yard in size shall be subject to approval and will be paid for by the Owner. No ledge will be removed to create planting pits or beds

F. All planting pits shall be excavated with sloped walls, wider at the top than at the bottom, and scarified to eliminate glazing. Tree pits shall be at least 2 feet greater in diameter than the root ball of earth or root system. Shrub pits shall be at least 1 foot greater than the diameter of the root ball. Planting pits shall not be deeper than the height of the root ball.

G. When excavation occurs in areas of heavily compacted earth, stones, concrete chunks or other foreign matter, pits shall be dug at least 3 times the width of the rootball. Excavated material from plant pits shall be disposed of as required.

H. Container plants shall be removed from their growing container before planting. If roots are densely matted, the outer root mass shall be scored, sliced vertically, with a sharp knife to separate roots. All herbaceous plants and groundcovers shall be evenly

spaced to produce a uniform effect and staggered in rows at intervals designated on the contract drawings.

I. Shrubs and trees shall be set in the center of planting pits, plumb and straight, and at such a level that after settlement the crown of the roots will be 1-inch above the surrounding finished grade. Root ball masses shall not be loosened, broken or damaged. When balled and burlapped plants are set, planting mixture shall be compacted around bases of balls to fill all voids. All tying materials, twine and rope shall be cut and removed. Biodegradable burlap shall be laid back or cut away from the top half of the ball. If a wire basket is present, the upper 2/3 of the basket shall be cut away and removed. Do not remove the entire basket. Roots or bare root plants shall be properly spread out and planting mixture carefully worked in among them. Broken or frayed roots shall be cleanly cut.

J. Backfill plant pits with planting mixture in layers of not more than 9-inches and firmly tamp each layer and water to sufficiently settle the backfilled soil before the next layer is put in place. When the planting pit is 2/3 backfilled, the hole shall be flooded and watered thoroughly so that the water level reaches the top of the planting pit. Allow water to soak in, then complete the backfilling operation. Immediately after planting pit is backfilled, a shallow basin 3-inches deep and slightly larger than the pit shall be formed with a ridge of soil for water retention. Form a common basin for plant materials throughout mass planting beds. After planting, lightly till the soil in planting beds between planting pits and rake smooth to eliminate compaction of soils.

K. All planting hole basins shall be flooded with water twice within the first 24 hours of planting, and watered not less than twice per week until final acceptance of the work.

L. All thin barked deciduous trees shall be wrapped after they are planted and before they are staked. Prior to wrapping, inspect trees for injury to trunks or improper pruning. Take corrective measures as necessary. Wrap trunks of all trees spirally from bottom to top with tree wrap and secure top and bottom at 2-foot intervals with jute twine. The wrapping shall overlap and entirely cover the trunk from the ground to the height of the second branches and shall be neat and snug. Overlap shall be approximately 2-inches.

M. Stake trees immediately after planting as detailed. All staking apparatus shall be adequate to hold the tree in a vertical position under severe weather conditions. All staking apparatus and tree trunk wrapping shall be removed and disposed of off-site by the Contractor at the end of one growing season.

N. Immediately after planting and staking operations are complete, all plant pit basins and plant beds shall be covered with approved mulch to the depths designated on the plans. Mulch shall not contact tree bark, cover tree root flares, or shrub crowns. No mulch shall be applied prior to the first watering.

O. The pruning of trees and shrubs shall only be permitted to remove dead or dying branch limbs and tips, sucker growth, water sprouts, crossing or rubbing branches, broken or damaged branches, diseased or insect infested limbs, and to preserve the natural

character of the plant. Plant materials shall be pruned in accordance with American Nurserymen Association Standards and as required by the Engineer. Questionable weak limbs and branch removals that may disfigure the plant shall be left to the discretion of the Engineer. The tree leader shall never be permitted to be cut. Pruning shall be done with clean, sharp tools. All large pruning cuts that are ½-inch in diameter or larger shall be made along the bark branch ridge. Pruning cuts shall not breach or otherwise interfere with the branch collar. All pruning cuts less than ¼-inch diameter shall be made with hand pruners as close to the main stem as possible without damaging the cambium or bud. Tree paint shall not be used to cover pruning cuts.

P. As the work proceeds, the Contractor shall remove all debris from the site, including but not limited to branches, rock, paper, and rubbish. All areas shall be kept clean, neat and in an orderly condition at all times. Prior to final acceptance, the Contractor shall cleanup the entire area to the satisfaction of the Engineer.

3.02 MAINTENANCE:

A. Maintenance shall begin immediately after each plant is planted and shall continue until completion of the guarantee period and final acceptance of the project. Plants shall be watered, pruned, sprayed, fertilized, cultivated and otherwise maintained and protected. Tree guys and stakes shall be tightened and repaired. Defective work shall be corrected as soon as possible after it becomes apparent and weather and season permit.

B. Settled plants shall be reset to proper grade and position, planting pits and common basins restored, and dead materials removed and replaced. Planting beds and individual basins shall be neat in appearance, maintained to their original layout lines and kept free of weeds. Mulch shall be replaced as required to maintain proper depths.

C. Contractor shall make arrangements to provide sufficient water to maintain all trees, shrubs and plant materials until final acceptance. Plants shall be sprayed with anti-transpirant or anti-desiccant if required by seasonal conditions or as required by the Engineer.

D. Planting areas shall be protected against trespass and damage of any kind during the maintenance period. This shall include the furnishing and installation of approved temporary fencing if necessary. If any plants become damaged during the maintenance period, they shall be treated or replaced as required by the Engineer at no additional cost to the Owner.

3.03 INSPECTION AND PRELIMINARY ACCEPTANCE:

A. Contractor shall provide written notice to the Engineer not less than 10 days before the anticipated date of inspection for preliminary acceptance. The Engineer shall recommend preliminary acceptance of the work of this Section only after completion and re-inspection of all necessary repairs, renewals or replacements.

B. Inspection and acceptance of plantings may be requested and granted in part, provided the areas for which acceptance is requested are relatively substantial in size, and with clearly definable boundaries. Acceptance and use of these areas by the Owner shall not waive any other provisions of this Contract.

3.04 GUARANTEE:

A. All plant materials shall be guaranteed for a period of one year after the date of completion of the specified maintenance period and preliminary acceptance of the project by the Owner.

B. When the work is accepted in part, the guarantee period shall extend from each partial acceptance to the terminal date of the last guarantee period. All guarantee periods terminate at one time.

C. Plants shall be healthy, free of pests and disease. Plants shall exhibit vigorous growth, shall bear foliage of normal density, size and color and shall have no less than seventy-five percent (75%) of their branches alive at the end of the guarantee period. If the leader of any single-leader species is dead, the entire plant shall be considered dead.

D. Any plant required under this Contract that is dead or unsatisfactory, as determined by the Engineer, shall be removed from the site. These shall be replaced as soon as weather permits during the specified planting season, at no additional cost to the Owner, until the plants live through one year.

E. All replacements shall be plants of the same kind and size as specified on the Plant List. They shall be furnished and planted as specified above.

F. The guarantee of all replacement plants shall extend for an additional one-year period from the date of their acceptance as replacement.

G. Guarantee shall not apply to the replacement of unacceptable plants resulting from the removal, loss, or damage due to occupancy of the project in any part; vandalism or acts of neglect on the part of others; physical damage by animals, vehicles, etc.; and Acts of God, including but not limited to, catastrophic fire, hurricanes, riots, war, etc.

H. In the instance of curtailment of water by local water authorities (when supply was to be furnished by the Owner), the Contractor shall furnish all necessary water by water tanker, the cost of which will be approved and paid for by the Owner.

3.05 FINAL INSPECTION AND FINAL ACCEPTANCE:

A. At the end of the guarantee period, the Contractor shall provide written notice to the Engineer not less than 10 days before the anticipated date of final inspection for final acceptance.

B. The Engineer shall recommend final acceptance of the work of this Section only after completion and re-inspection of all necessary repairs, renewals or replacements.

END OF SECTION

Document1267

SECTION 03100

CONCRETE FORMWOR□

PART 1 - GENERAL

1.01 WOR□ INCLUDED:

This section of the specifications covers the furnishing and installation of forms for cast-in-place concrete.

1.02 RELATED WOR□:

A. Section 03200, CONCRETE REINFORCEMENT

B. Section 03300, CAST-IN-PLACE CONCRETE

1.03 REFERENCES:

The following standards form a part of this specification:

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 301 Standard Specifications for Structural Concrete

ACI 347 Recommended Practices for Concrete Formwork

U.S. ARMY CORPS OF ENGINEERS (CE)

CE 03300 Cast-in-Place Concrete

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Forms for exterior and interior surfaces which will be exposed to view after the work is completed, whether such surfaces are painted or unpainted, shall be new plywood stock, steel, tempered masonite, or other materials which will provide smooth concrete surfaces without subsequent surface plastering. Plastic or plastic-faced forms shall not be used, except with the prior approval of the Engineer.

B. Formliner shall be applied as called out in construction drawings. Formliner shall be Pattern 16021 1.5” Wide Plank Random Depth Vac U Form by Fitzgerarld Formliners or approved equal.

C. Form Ties

1. Provide factory-fabricated, adjustable length, removable or snap off metal form ties, designed to prevent form deflection and to prevent spalling of concrete surfaces upon removal.

2. Provide ties so that the portion remaining within concrete after removal of exterior parts is at least 1-1/2 inches from the outer concrete surface. Provide form ties, which will not leave a hole larger than one inch diameter in the concrete surface.

D. Form release agent shall be a non-staining, non-yellowing, non-toxic liquid free from kerosene and resins of the type recommended by the manufacturer of the forming system being used such as EZ strip by L&M Construction Chemicals, Omaha, NB and "Magic □ote" by Symons Corp., Des Plaines, IL or approved equal.

E. Where steel adjacent to vertical faces of forms cannot be otherwise secured, mortar doughnuts shall be used to prevent steel from lying too close to the finish vertical faces of the concrete.

PART 3 - E□ECUTION

3.01 PREPARATION:

Surfaces of forms to be in contact with concrete shall be greased with non-staining form release compound. Wetting will not be accepted as a substitute. Approval of the Engineer shall be obtained before use of coated materials or liners in lieu of form release compound, except as modified herein.

3.02 CONSTRUCTION:

A. For concrete surfaces which will be visible after completion of the structure, painted or unpainted, the type and the precise location of form ties, nails joints between form members, and any other features which will leave a visible trace in the finished concrete, will be subject to the approval of the Engineer.

B. Formwork shall be so constructed, braced, or tied that the formed surfaces of the concrete will be perfectly true, smooth, and to the dimensions shown on the drawings. All forms used for circular sections shall be true arcs as indicated on the drawings. Short chords will not be acceptable. Form line shall present an uninterrupted surface conforming to radii indicated on the drawings.

C. Forms shall be sufficiently tight to prevent leakage of mortar, and when necessary shall have temporary openings as required for thorough cleaning, and as required for introduction of concrete to avoid excessive free fall. Panels damaged in stripping or otherwise shall not be reused.

D. Unless otherwise noted on the design drawings, forms shall be filleted and chamfered at all sharp corners, and exposed edges with a 3/4-inch chamfer. Chamfer shall not be used where masonry or other material will subsequently be installed flush with one of the adjacent surfaces of the concrete. Where a wash or slope is indicated on the drawings no additional chamfer is required.

3.03 REMOVAL OF FORMS

A. REMOVING FORMS AND SUPPORTS:

1. Removal of forms shall take place in accordance with ACI 347, Section 3.6. Except as otherwise specifically authorized by the Engineer, forms shall not be removed until the concrete has aged for the following number of day-degrees or attained 50 percent strength. (Day-degrees equals the total of number of days times the average daily air temperature at the surface of concrete. For example, 5 days at a daily average temperature of 60□F. equals 300 day-degrees.)

Location	Day-Degrees
Beams and Slabs	500
Walls and Vertical Surfaces	200

B. Where beams, girder, columns, walls and similar vertical forms are adequately supported on shores, the side forms may be removed after 24 hours of cumulative curing time provided the side forms support no loads other than the lateral pressure of the plastic concrete. Cumulative curing time represents the sum of time intervals, not necessarily consecutive, during which the temperature of the air surrounding the concrete is above 50 deg. F in accordance with American Concrete Institute standards.

C. Shoring shall not be removed until the concrete has attained at least 70 percent of the specified strength and sufficient strength to support safely its own weight and the construction live loads upon it.

D. Forms shall be removed in such a manner as not to impair safety and serviceability of the structure. Concrete exposed by form removal shall have sufficient strength not to be damaged by the removal operation.

END OF SECTION

FITZGERALD FORMLINERS

FORMING THE FUTURE™

VACUFORM-ULTRA

TECHNICAL DATA SHEET

Properties	Method	Units	Typical Values
Specific Gravity	D792	g/cc	1.12
Melt Flow, 230/2.16	D1238	g/10 min	0.60
Tensile Strength @ Yield	D638	psi	3,555
Flexural Modulus - Chord, 0.05 in/min	D790	psi	307,000
Impact Strength Notched Izod @ 73°F Notched Izod @ -22°F	ASTM D-256	ft-lb/in	 15.6 1.2
Impact Strength Instrumented Impact @-22°F	ASTM D-3763	in-lbs	51 Ductile
Heat Deflection Temperature .125 @ 66psi (unannealed)	D-648	°F	213
Heat Deflection Temperature .125” @ 264psi (unannealed)	D648	°F	138
C.L.T.E. -22 to 176°F	E228	in/in/°F	0.000027

Note: These typical results are based on test procedures, which are believed to be reliable. Due to variable conditions or methods of processing. NO GUARANTEES OR WARRANTIES ARE EXPRESSED OR IMPLIED INCLUDING THE IMPLIED WARRANTY OF MERCHANTABILITY AND FITNESS FOR A SPECIFIC PURPOSE, nor any recommendations made to infringe on any patents. 1/2015

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INTRODUCTION

This Application Guideline has been published to ensure proper use and installation of ***Fitzgerald Formliners*** Vac-U-Form products. It is recommended that all personnel involved with the use of ***Fitzgerald Formliners*** Vac-U-Form products read this Application Guideline.

Vac-U-Form formliners are available in either single-use polystyrene or multi-use ABS plastic. Both are rigid plastic liners that are ideal for tilt-up or cast-in-place concrete. Vac-U-Form formliners are made in a wide range of gauge or thickness.

CARE AND HANDLING

Plastic formliners should be covered with a tarpaulin when not in use. Most plastics degrade when exposed to intense sunlight for extended periods of time. Degradation will affect the life of the liner, and in some cases, cause discoloration of the concrete surface. In addition, a surface temperature in excess of 140□F will cause permanent thermal distortion and diminish by 70-80□ all physical properties of the formliner.

Once attached to the formwork, formliners should be stored on edge to prevent liner damage.

TRIMMING PLASTIC FORMLINERS

Vac-U-Form formliners are available in 4' x 8' and 4' x 10' sheets. Because the surface to be textured with the formliner is usually not exactly 4' x 8' or 4' x 10", trimming may be required.

Prior to trimming, the effects of temperature should be considered. Thermal expansion and contraction of Vac-U-Form plastic formliners occurs as ambient temperature changes during the day. The amount of expansion can be estimated. As a rule of thumb, the liner will expand or contract approximately 1/16 inch in 10 feet with each 20□change in temperature during the placement of concrete.

Vac-U-Form liners trim easily with a circular handsaw and a fine-tooth plywood blade, such as the type used for cutting veneer paneling. If the liner is to be butted against a rustication strip or reveal, the blade angle should be set so that the liner is cut at the same angle as the reveal. These operations should be performed with the liner securely clamped to a steady workbench to prevent any □chatter" that could fracture the formliner surface. Formliners with minimal relief can be trimmed by scoring with a sharp knife and breaking off the excess.

Proper ventilation practices must be followed when cutting formliner material.

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ATTACHMENT TO FORMWORK

Vac-U-Form formliners are tagged to identify the concrete side of the liner. Before attaching the formliner, be sure to identify this side. The concrete side can also be identified by a roughened, "hair-cell" texture or as the side with the highest resolution in the pattern.

CAST-IN-PLACE

Level and square the formwork to ensure proper alignment of the liner. Dimensions should be marked to square edges, patterns and joints. Working with one sheet at a time, position the formliner against the formwork so that edges and joints are square.

Screw the liner to the wood or steel formwork or casting bed with screws spaced approximately 6" to 12" on center around the perimeter and 18" to 24" on center throughout the field. Tek drywall screws work well because they are self-drilling and easy to install. Seal seams with ABS or plumber's glue and joints as required. Do not use silicone. Some deeper patterns may require wood back-up strips to prevent formliner deflection.

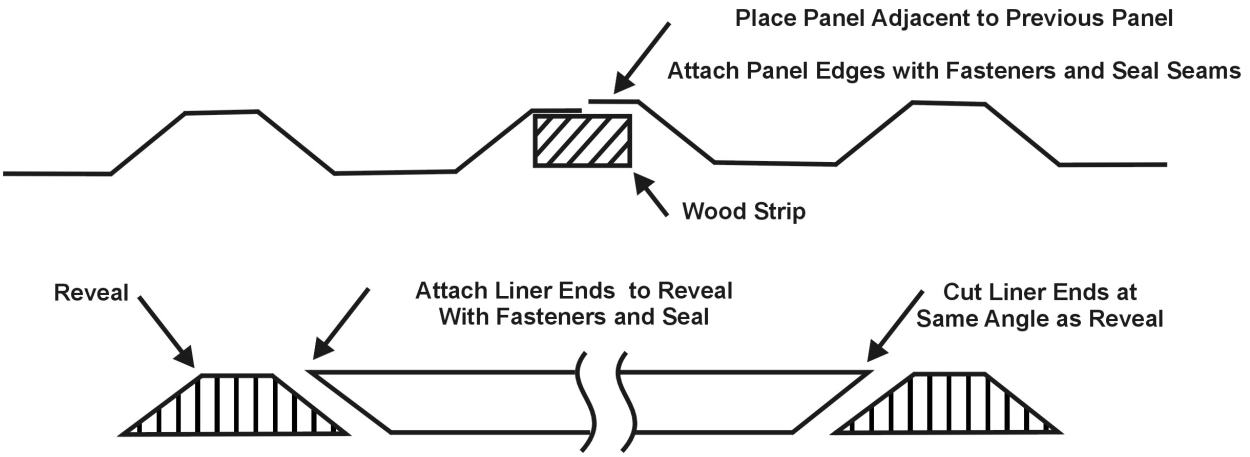
TILT-UP WALL

In tilt-up wall applications, a common method of formliner attachment is to place the liner on the slab, drill a hole through the formliner and into the concrete, place a wooden dowel into the drilled hole, break the dowel off flush with the surface, and then use a large-headed roofing nail to hold the liner in place.

It is important that the formliner is contained on all four sides so that concrete cannot move under it. The field area of the formliner must be held flat against the casting surface, ensuring that no deformations (blisters) are present in the formliner. Do not allow the formliner to move around freely. Load concrete onto the formliner from the centers, moving the concrete towards the outside perimeter with rakes. Do not allow concrete to be pushed under the formliner at panel-to-panel joint locations.

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FORM RELEASE AGENT

The application of a good quality, reactive-type form release agent prior to the first use and after each subsequent re-use is critical to the performance of the formliner. Clean the formliner after each pour to remove any loose debris. The form release agent must be worked into the surface of the liner to ensure adequate coverage. Release agents should be sprayed on the liner as close to the time of concrete placement as possible.

A water-based release agent works well for either single-use or multi-use plastic or extended-use elastomeric urethane formliners. ***Most solvents and petroleum-based form release agents attack both plastic and elastomeric urethane liners.*** It is recommended that the form release agent be tested against a small area on the form side of the liner for compatibility. Should the test area become tacky, the release agent is not compatible with the liner material and cannot be used. Consult with your form release manufacturer for specific information, such as coverage rates, drying time and compatibility.

FITZGERALD FORMLINERS TAKES NO RESPONSIBILTY FOR ANY DAMAGE TO OUR LINERS DUE TO THE IMPROPER USE OR APPLICATION OF A FORM RELEASE AGENT. IF UNSURE OF THE RELEASE AGENT'S COMPATIBILITY WITH ANY OF OUR LINERS, CONSULT WITH THE CHEMICAL MANUFACTURER PRIOR TO USE.

PLACING CONCRETE

Most plastic formliners cannot withstand a rate of pour in excess 600 □ 750 psf. Generally, the more texture or relief on the formliner, the slower the concrete must be placed. If a plasticizer is used, the rate of pour may have to be reduced to limit form pressure.

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A test panel using the selected material should be poured simulating actual jobsite conditions and procedures, including: pour rate, height of wall, tie holes, reveals, joints in formliner panels, etc. Actual construction should proceed using the same method and materials throughout the project.

Architectural concrete should be placed using a pump and an elephant trunk to avoid mix separation, splatter and trapped air. Placement should be in two-foot lifts with no horizontal movement to avoid flow lines in the finished surface.

To avoid cold joints, architectural concrete placement should never be stopped part way up the pattern. The cold joint will be very apparent in the finished surface of the pattern.

STRIPPING FORMWORK

If possible, forms should be stripped within 24 hours of concrete placement. This is important because:

1. **The heat of concrete hydration can degrade formliner material over an extended period of time.**

2. **When using multi-use liners, the liner can be shortened if forms are not stripped as soon as is practical.**

3. **Concrete may darken the longer the liner is in contact with the formliner surface.**

Formliners should always be stripped with an equal time interval between lifts. This will result in consistent concrete color on jobs requiring multiple pours.

Formwork should always be stripped at 90-degree angles to the form, if possible. Ribbed or fractured textures will require special care to avoid breaking off fins from the concrete or the liner. A low profile pattern will be easier to strip than a high profile pattern.

Allow extra time stripping formwork when formliners are part of the job requirement. The added care in properly stripping formliners is much less expensive than repair of the concrete surface or replacement of the liner.

MANUFACTURING TOLERANCES

Width / length: □ 1/8 inch at time of manufacture. Normal shrinkage and expansion is approximately 1/16” in 10 feet with each 20□F change in temperature.

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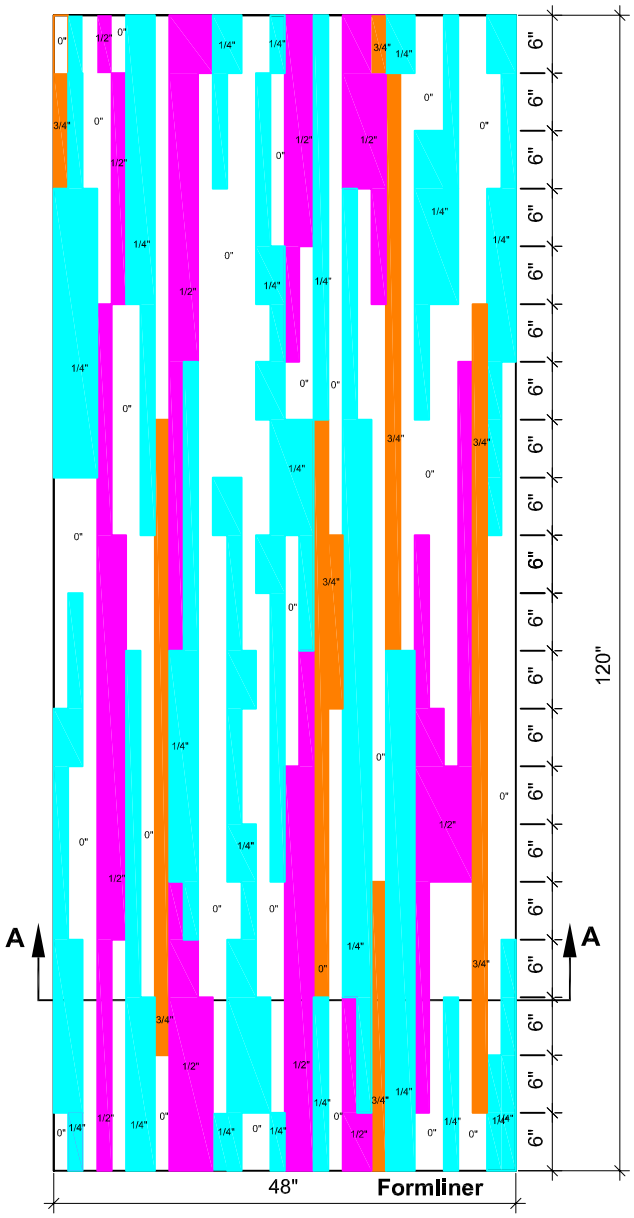
Forming The Future ™

PATTERN 16021
1.5" Wide Plank, Random Depth

Wooden Plank
Part Size: 48" W x 120" H
Max Depth: 0.75"
Draft: 5°

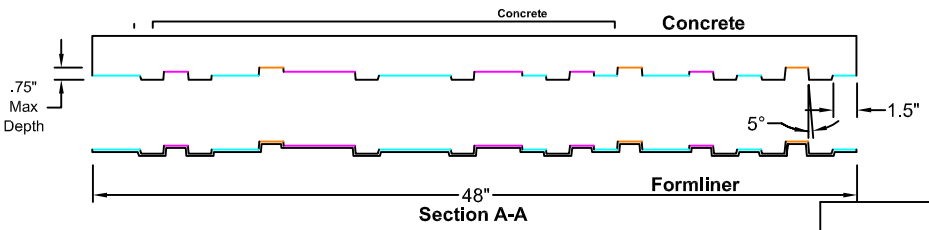
Vac-U-Form™

Styrene - Single Use.
ABS Plastic - Up to 15 reuses.



Board Heights

Formliner	Concrete
0"	.75"
.25"	.50"
.50"	.25"
.75"	0"



Section A-A

CUSTOMER APPROVAL SIGNATURE	DATE

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Pattern can be requested in AutoCad format.

SECTION 03111

CONCRETE FORMWORK (SKATE PARK)

PART 1 – GENERAL

1.0 SPECIALTY SKATE PARK CONSTRUCTION

A. All work contained in this Section is considered specialty skate park construction. Only those firms that meet the minimum experience requirements contained in the QUALITY ASSURANCE Section may perform this work as specified herein.

1.1 GENERAL CONDITIONS

A. Requirements of the Contract Documents, including but not limited to, the General, Special, and Technical Provisions, apply to work in this Section with the same force and effect as though repeated in full herein.

1.2 SCOPE OF WORK

A. Furnish materials, labor, transportation, services, and equipment necessary to install all concrete formwork related to the skate park as indicated on the Drawings complete as shown and as specified herein.

B. Provide all formwork and accessories for construction of Portland Cement Concrete paving for the skate park.

C. Related Work:
   1. Section 03 20 00 – Concrete Reinforcement (Skate Park)
   2. Section 03 30 00 – Cast-In-Place Concrete (Skate Park)
   3. Section 03 37 00 – Shotcrete (Skate Park)

1.3 REFERENCES

A. Comply with the applicable reference specifications as specified in the GENERAL PROVISIONS and in accordance with applicable laws, codes and regulations required by City of Somerville, LA.

B. Comply with the current provisions of the following Codes and Standards:
   1. ASTM – American Society for Testing and Materials.
   2. IBC – International Building Code.
   3. ACI – American Concrete Institute.
   4. Standard Specifications (as specified in the General Provisions).

1.4 QUALITY ASSURANCE

A. Design Criteria: Conform to ACI 347, Chapter I.

B. Allowable Tolerances: Conform to ACI 117 and 347.

C. CONTRACTOR Samples:
   1. CONTRACTOR shall prepare 4-foot x 4-foot samples for each paving type indicated on Drawings. CONTRACTOR may pour each type as part of the finished project, and if approved by the Architect may remain in place as finished product. If the sample is not approved, CONTRACTOR must remove and replace another sample for approval.
   2. Mock-Ups shall be completed to the satisfaction of the ENGINEER including aggregates, texture, color, and finishes.
   3. These mock-ups will become the standard of quality by which future paving samples and work will be judged.
   4. Mock-ups to remain on-site and be protected during the course of construction, as a means to compare work in progress. If Mock-ups are damaged or removed, CONTRACTOR shall repair/replace in-kind immediately.

D. Concrete Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

E. CONTRACTOR Experience: Provide evidence to indicate successful experience in providing cast-in-place concrete work for skate parks similar in scope to that specified - herein and can demonstrate successful experience through past project documentation and references.
   1. Required Experience: CONTRACTOR or Subcontractor must have completed 3 public concrete skate park facilities with a minimum size of 6, 000 square feet, in the last 2 years. Parks must be open and in good operating condition for at least one year. Only those projects where the complete construction of the facility has been the sole responsibility of your firm will be considered acceptable projects.

   2. Evidence of Experience: CONTRACTOR or Subcontractor shall submit to Architect satisfactory documentation of the aforementioned experience and qualification. If a CONTRACTOR cannot provide this information or if it is unverifiable, work under this Section and any other related Section cannot be completed by CONTRACTOR. This submission must contain the Project Name & Location, OWNER's Name & Contact Information, Architect Name & Contact Information, Project Size, Contract Value, Completion Date, and Supervisor and/or Key Personnel responsible for this experience for each of the qualifying projects.

   3. Installer: Provide evidence to indicate successful experience in providing cast-in-place concrete work for skate parks similar to that specified herein and can demonstrate successful experience through past project documentation and

references

4. Skilled Workers: Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.

Safety and Performance Guidelines: Comply with all safety and performance requirements and all applicable references as specified in the ASTM F2480 Standard Guide for In-ground Skate Parks.

1.5 STORAGE OF MATERIALS

A. Store materials on and under protective sheeting.

1.6 COORDINATION

A. Notify responsible trades of schedules of concrete pours to allow time for installation and coordination.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Forms:

1. Flatwork and Bond Beam: 1" Exterior Masonite Siding for all Tangents. 7/16" Exterior Masonite Siding for all radii. Create true arc to tangent connections as per layout plan. No kinks will be accepted.

2. Vertical and Custom Work: Exterior grade Standard Douglas Fir (or equal plywood), minimum three ply, one smooth side sufficiently thick to sustain loads, or steel forms.

B. Form Oil: Non staining, paraffin-base oil having a specific gravity of between 0.8 and 0.9.

C. Form Ties: Bolts, rods, or patented devices having tensile strength of 3000 lbs., adjustable length, free of lugs which would leave a hole larger than 5/8" diameter and having a full one-inch depth of break-back.

PART 3 – EXECUTION / CONSTRUCTION

3.1 CONSTRUCTION AND ERECTION

A. Construct forms in accordance with ACI 347.

B. Build forms to shapes, lines and dimensions of detailed members of concrete construction. Set to line and grade, brace and secure to withstand placing of concrete and maintain their shape and position.

C. Construct forms with care to produce concrete surfaces without unsightly or objectionable form marks in exposed concrete surfaces.

D. Thoroughly clean surfaces of form material and remove nails before reuse. Do not reuse damaged or worn forms. Coat contact surfaces of forms with non-staining form oil prior to placing metal reinforcement.

E. Immediately before placing concrete, clean forms of chips, sawdust, and debris. Immediately after removal of forms, remove form ties, wires, and defects and patch.

3.2 INSERTS AND ACCESSORIES

A. Make provisions for required installation of accessories, bolts, hangers, sleeves, anchor slots and inserts cast in concrete. Obtain suitable templates or instructions for installation of items. Place expansion joints where detailed and required.

3.3 REMOVAL OF FORMS AND SHORING

A. Remove forms and shores in accordance with ACI 347.

3.4 CLEANUP

A. Upon completion of the concrete formwork, remove surplus construction materials, loose earth, trash and debris so that the job site is left in a neat and orderly condition.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section of the specification covers the furnishing and installation of reinforcement for cast-in-place concrete.

1.02 RELATED WORK:

A. Section 03100, CONCRETE FORMWORK

B. Section 03300, CAST-IN-PLACE CONCRETE

1.03 SYSTEM DESCRIPTION:

Materials and construction shall conform to ACI 3l8 and ACI 350 unless otherwise noted on the design drawings or modified herein.

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

A. The Contractor shall furnish the Engineer with complete checked, reinforcing steel shop drawings and bar lists. Shop drawing shall include grade of steel used as well as splice lengths.

B. Mill test reports shall accompany drawings. Fabrication shall not commence until the drawings and mill test reports have been released by the Engineer.

C. When fiber reinforcement is used, contractor shall submit manufacturer's data confirming that material meets the specification.

1.05 REFERENCES:

A. The following standards form a part of these specifications:

American Concrete Institute (ACI)

ACI	318	Building Code Requirements for Structural Concrete
ACI	347	Recommended Practice for Concrete Formwork
ACI	350	Code Requirements for Environmental Engineering Concrete Structures

ACI SP-66 ACI Detailing Manual

American Society for Testing and Materials (ASTM)

ASTM A185 Standard Specification for Welded Steel Wire Fabric for Concrete Reinforcement

ASTM A497 Specification for Welded Deformed Steel Wire Fabric for Concrete Reinforcement

ASTM A6l5 Deformed Billet-Steel Bars for Concrete Reinforcement

ASTM A775 Epoxy-coated Reinforcing Steel Bars

ASTM A884 Epoxy-coated Welded Wire Fabric

American Welding Society (AWS)

AWS 12.1 Recommended Practices for Welding Reinforcing Steel, Metal Inserts and Connections in Reinforced Concrete Construction

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Steel reinforcing bars shall conform to ASTM A6l5, Grade 60, and A775 if epoxy-coated bars are specified.

B. Welded steel wire fabric shall conform to ASTM A185 or ASTM A497 and ASTM A884 if epoxy-coated fabric is specified. Gauge and spacing of wires shall be as indicated on the drawings.

C. Reinforcing steel shall be detailed in accordance with ACI SP-66 modified as applicable to conform to ACI 350.

D. Reinforcement shall be accurately formed to the dimensions indicated on the drawings. Bars shall be shipped to the site with bars of the same size and shape, fastened in bundles with securely wired-on metal identification tags listing both size and mark.

E. Any bar showing cracks after bending shall be discarded.

F. Steel failing to meet the requirements of this specification or the drawings will be rejected and shall be removed from the site immediately.

2.02 FIBER REINFORCEMENT

When called for on the drawings, concrete engineered reinforcing fibers shall be polypropylene, collated, fibrillated fibers from Fibermesh Co., 4019 Industry Drive, Chattanooga, TN; Forta Corporation, One Hundred Forta Drive, Grove City, PA; or approved equal. Only fibers designed and manufactured specifically for use in concrete from virgin polypropylene and so certified by the manufacturer shall be acceptable.

PART 3 - EXECUTION

3.01 STEEL INSTALLATION:

A. Before being placed in position, reinforcement shall be thoroughly cleaned of loose mill and rust scale, dirt, and other coatings (including ice), that reduce or destroy bond. When there is a delay in depositing concrete after reinforcement is in place, bars shall be reinspected and cleaned as necessary.

B. After forms have been oiled, but before concrete is placed, all steel shall be securely wired in the exact position called for, and shall be maintained in that position until all concrete is placed and compacted. Chair bars and supports shall be provided in a number and arrangement satisfactory to the Engineer.

C. Concrete blocks having a minimum bearing area of 2-inches by 2-inches and equal in quality to that specified for the slab, shall be used for supporting reinforcing bars for slabs on grade. Wood blocks, stones, brick chips, etc., shall not be used to support reinforcement.

D. Metal supports shall be of types that will not penetrate the surface of formwork or slab and which will not show through or stain surfaces that are to be exposed to view, painted or unpainted.

E. Welding of reinforcing bars will be permitted only where permission of the Engineer has been obtained in advance. Such welding shall be performed only under conditions established by the Engineer, and in accordance with AWS 12.1.

F. Reinforcement, which is to be exposed for a considerable length of time after having been placed, shall be painted with a heavy coat of cement grout, if required by the Engineer.

3.02 FIBER INSTALLATION:

A. Fibermesh fibers shall be used in concrete as indicated on the drawings or as specified and in strict accordance with the manufacturer's recommendations as to type and amount. The fiber manufacturer or approved distributor shall provide the services of a qualified employee for pre-job meeting and initial job start up.

END OF SECTION

SECTION 03201

CONCRETE REINFORCEMENT (SKATE PARK)

PART 1 - GENERAL

1.1 GENERAL CONDITIONS

A. Requirements of the Contract Documents, including but not limited to, the General, Special, and Technical Provisions, apply to work in this Section with the same force and effect as though repeated in full herein.

1.2 SCOPE OF WORK

A. Furnish materials, labor, transportation, services, and equipment necessary to install all concrete reinforcement related to the skate park as indicated on the Drawings complete as shown and as specified herein.

B. Provide all steel reinforcement for construction of Portland Cement Concrete paving for the skate park.

C. Related Work:
   1. Section 03300 – Cast-In-Place Concrete (Skate Park)
   2. Section 03371 – Shotcrete (Skate Park)

1.3 REFERENCES

A. Comply with the applicable reference specifications as specified in the GENERAL PROVISIONS and in accordance with applicable laws, codes and regulations required by City of Somerville, LA.

B. Comply with the current provisions of the following Codes and Standards:
   1. ASTM - American Society for Testing and Materials.
   2. Standard Specifications – Agency Specified
   3. IBC – International Building Code

C. American Concrete Institute (ACI):

   1. ACI 315, Manual of Standard Practice for Detailing Reinforced Concrete Structures.
   2. ACI 318, Building Code Requirements for Reinforced Concrete.

D. American Society for Testing and Materials (ASTM - latest editions):

   1. ASTM A233 - Mild Steel Arc Welding Electrodes.
   2. ASTM A615 - Deformed Billet-Steel Bars for Concrete Reinforcement.
   3. ASTM A706 - Low-Alloy Steel Deformed Bars for Concrete Reinforcement.
   4. ASTM F2480 – Standard Guide for In-ground Concrete Skate Park.

E. Concrete Reinforcing Steel Institute (CRSI): Manual of Standard Practice, latest edition.

F. American Welding Society (AWS): Reinforcing Steel Welding Code, D1.4, including latest revisions.

1.4 DELIVERY AND STORAGE

A. Store materials in dry and protected locations and protect from damage. Stack reinforcing steel in staggered tiers. Mark each length, size, shape and location. Maintain reinforcement free of dirt, mud, paint or rust.

1.5 SUBMITTALS

A. In accordance with the Contract Documents, General, Special and Technical Provisions.

B. Shop Drawings: Indicate complete reinforcing method for each concrete member including materials, sizes, bends, dimensions, stirrup spacing, and placing details not shown on drawings. Architect may elect to waive this requirement if necessary.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel Reinforcement: Conforming to ASTM A615, Grade 60, clean and free of rust, dirt, grease or oils.

B. Welded Steel Reinforcement: Deformed low-alloy steel, ASTM A706, carbon content not exceeding 0.30% and manganese content not exceeding 0.60%. Identify and tag with manufacturer's heat identification number.

C. Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing bars in place.

2.2 FABRICATION

A. Fabricate to sizes, shapes, and lengths detailed in accordance with requirements of ACI 318 and ACI 315.

PART 3 – EXECUTION / CONSTRUCTION

3.1 INSTALLATION

A. Comply with Concrete Reinforcing Steel Institute’s recommended practice for “Placing Reinforcing Bars” for placing and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover over reinforcement.

D. Accurately place reinforcing steel in accordance with drawings. Thoroughly clean reinforcement of any coating which would reduce bonding. Do not heat, cut, or bend bars without the Skate Park Designer's approval. Do not splice reinforcement at points of maximum stress. Stagger splices in adjacent bars and provide a minimum overlap of 30-bar diameters at splices unless specifically noted otherwise on Drawings.

E. Securely saddle tie intersections with No. 18 gauge black annealed wire. Rigidly secure reinforcement in place. Provide concrete coverage as shown on Drawings.

3.2 WELDING REINFORCEMENT

A. Weld deformed steel reinforcement bars in strict accordance with AWS 12.1, using recommended pre-heat temperature and electrode for type of steel being welded.

B. Do not weld steel reinforcement bars without proper heat identification of bars.

3.3 CLEANUP

A. Upon completion of the concrete reinforcement work, remove surplus construction materials, loose earth, trash and debris so that the job site is left in a neat and orderly condition.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 -GENERAL

1.01 GENERAL PROVISIONS:

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 – GENERAL REQUIREMENTS, which are hereby made part of this Section of the Specifications.

1.02 DESCRIPTION OF WORK:

A. Work Included: This Section specifies cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes for the following:

1. Footings
2. Foundation walls
3. Exterior slabs-on-grade, sidewalks
4. Grout

B. Items To Be Installed Only: Foundation connection hardware provided by prefabricated building manufacturer.

C. Items To Be Furnished Only: Not applicable.

D. Related Work: The following items are not included in this Section and will be performed under the designated Sections:

1. Section 01450, STRUCTURAL TESTS AND INSPECTIONS
2. Section 02350, EXCAVATION BORROW AND BACKFILL
3. Section 03100, CONCRETE FORMWORK

1.03 SUBMITTALS:

A. Refer to Section 01330, SUBMITTALS for submittal provisions and procedures.

B. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, water-stops, joint systems, curing compounds, dry-shake finish materials, and others if requested by the Engineer or SER.

C. Shop drawings for reinforcement detailing, fabricating, bending, and placing concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures". Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing and supports for concrete.

D. Submit shop drawings for all formwork for Architecturally Exposed Concrete (Concrete Exposed to View) showing cone tie patterns.

E. Concrete mix design for each mix specified. Supporting test data shall be submitted if requested.

1. Submit alternate mix designs when the characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
2. Indicate the amounts of mixing water to be withheld for later addition at the Project site.

F. Proposed method of curing and associated products.

G. Proposed precautions for hot weather and cold weather concreting.

H. Samples: For waterstops and vapor retarder.

1. Submit samples of materials as requested by the Engineer or SER, including names, sources, and descriptions.

I. Laboratory test reports for concrete materials and mix design test.

J. Material test reports for the following, from a qualified testing agency, indicating compliance with specification requirements:

1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

K. Material certificates for each of the following, signed by the manufacturers:

1. Cementitious material.
2. Admixtures
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Non-metallic shrinkage resistant grout.
6. Waterstops.
7. Curing compounds.

8. Floor and slab treatments.
9. Bonding agents.
10. Adhesives.
11. Vapor retarders.
12. Semi-rigid joint filler.
13. Joint-filler strips.
14. Repair materials.

L. Floor surface flatness and levelness measurements to determine compliance with specified tolerances.

M. Qualification Data: For Installer and Manufacturer.

N. Minutes of pre-installation conference

1.04 QUALITY ASSURANCE:

A. Installer Qualifications: A qualified installer who employs on the Project personnel qualified as ACI certified Flatwork Technician and Finisher and a supervisor who is an ACI certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mix concrete products that complies with ASTM C 94 requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Testing Agency for Mix Design Qualifications: An independent agency, registered in the Commonwealth of Massachusetts as an approved testing agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician – Grade 1. The Testing Agency Laboratory supervisor shall be an ACI certified Concrete Laboratory Testing Technician – Grade II.

D. Source Limitations: Obtain each type of class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.

E. ACI Publications:

1. Comply with the following unless modified by requirements in the Contract Documents:
   a. ACI 117, “Standard Specifications for Tolerances for Concrete Construction and Materials.”
   b. ACI 211.1, “Recommended Practice for Selecting Proportions for Normal and Heavyweight Concrete.”
   c. ACI 214, “Evaluation of Strength Test Results of Concrete.”
   d. ACI 301, “Specification for Structural Concrete.”
   e. ACI 304, “Guide for Measuring, Mixing, Transporting and Placing Concrete.”
   f. ACI 305, “Hot Weather Concreting.”
   g. ACI 306, “Cold Weather Concreting.”
   h. ACI 308, “Guide to Curing Concrete.”
   i. ACI 309, “Guide for Consolidation of Concrete.”
   j. ACI 311.1, “ACI Manual of Concrete Inspection.”
   k. ACI 315, “Details and Detailing of Concrete Reinforcement.”
   l. ACI 318, “Building Code Requirements for Structural Concrete and Commentary.”
   m. ACI 347, “Guide for Formwork for Concrete.”
2. Where the language in any of the documents referred to herein is in the form of a recommendation or suggestion, such recommendations or suggestions shall be deemed to be mandatory under this Contract.

F. American Society for Testing and Materials (ASTM):

1. ASTM C309 "Liquid Membrane-Forming Compounds for Curing Concrete."
2. ASTM C494 "Standard Specification for Chemical Admixtures for Concrete."
3. ASTM C979 "Standard Specification for Pigments for Integrally Colored Concrete."

G. American Association of State Highway and Transportation Officials (AASHTO):

1. AASHTO M194 "Chemical Admixtures."

H. Pre-installation Conference: Conduct a conference at the Project site to comply with requirements in Division 1 Section “Project Management and Coordination.”

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend including the following:
    a. Contractor's superintendent.
    b. Independent testing agency responsible for concrete design mixtures.
    c. Ready-mix concrete manufacturer.
    d. Concrete subcontractor.
    e. Structural Engineer.
    f. Independent testing agency responsible for field testing.
    g. Owner's Authorized Representative.
    h. Engineer.
2. Review inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint filler strips, semi-rigid joint fillers, forms and form removal limitations, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor slab and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.05 DELIVERY, STORAGE, AND HANDLING:

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.01 FORM-FACING MATERIALS:

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. For standard finish use plywood, metal, or other approved panel materials.
2. See 03100 Concrete Formwork for formliner information.

B. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or

abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

C. Chamfer Strips: Wood, metal, PVC, or rubber strips, ¾-inch by ¾-inch, minimum.

D. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

E. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

F. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral earth pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

G. Furnish units that will leave no corrodible metal closer than 1-inch to the plane of exposed concrete surface.

H. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.02 STEEL REINFORCEMENT:

A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.

B. Plain Steel Wire: ASTM A 82, as drawn.

C. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

2.03 NON-METALLIC SHRINKAGE RESISTANT GROUT:

A. Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, non-staining, mixed with water to consistency suitable for application and a 30-minute working time. The minimum ultimate compressive strength of the grout shall be 5000 psi at 7 days and 7500 psi at 28 days.

2.04 REINFORCEMENT ACCESSORIES:

A. Joint Dowel Bars: ASTM A 615, Grade 60, plain-steel bars, cut bars true to length with ends square and free of burrs.

B. Bar Supports: Bolster, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice", of greater of compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless steel bar supports.
2. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs. Concrete bricks may be used to support reinforcing steel where application allows.

2.05 CONCRETE MATERIALS:

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout the Project:

1. Portland Cement: ASTM C 150, Type I/II. Supplement with the following:

B. Fly Ash: ASTM C 618, Class C or F.

C. Ground Granulated Blast Furnace Slag: ASTM C 989, Grade 100 or 120.

D. Cementitious Materials: Percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:

1. Fly Ash or Ground Granulated Blast Furnace Slag: 25 percent, minimum.
2. Combined Fly Ash and Pozzolan: 35 percent, maximum.
3. Ground Granulated Blast Furnace Slag: 50 percent, maximum.
4. Combined Fly Ash or Pozzolan and Ground Granulated Blast Furnace Slag: 50 percent Portland cement minimum, with fly ash or pozzolan not exceeding 35 percent.

E. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse Aggregate Size: ¾-inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

F. Water: ASTM C 94 and potable.

2.06 ADMIXTURES:

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494, Type A.
2. Retarding Admixture: ASTM C 494, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.

C. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor,; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494, Type C.

1. Products:
2. Euclid Chemical Company; Eucon CIA.
3. Grace Construction Products, W.R. Grace & Co.; DCI.
4. BASF Admixtures, Inc.; Rheocrete CNI.
5. Sika Corporation; Sika CNI.

D. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

1. Products:
    a. Grace Construction Products, W.R. Grace & Co.; DCI-S.

2.07 WATERSTOPS:

A. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, ¾-inch by 1-inch.

1. Colloid Environmental Technologies Company; Volclay Waterstop-RX.
2. Concrete Sealants, Inc.; Conseal CS-231.
3. Greenstreak; Swellstop.
4. Henry Company, Sealants Division; Hydro-Flex.

5. Progress Unlimited, Inc.; Superstop.
6. TCMiraDRI; Mirastop.

B. Self-Expanding Rubber Strip Waterstops: Manufactured rectangular or trapezoidal strip, bentonite-free hydrophilic polymer modified chloroprene rubber, for adhesive bonding to concrete, 3/8-inch by ¾-inch.

1. Deneef Construction Chemicals; Swellseal.
2. Greenstreak; Hydrotite.
3. Mitsubishi International Corporation; Adeka Ultra Seal.
4. Progress Unlimited, Inc.; Superstop.

C. Waterstops: Provide ribbed, dumbbell type or center bulb type waterstops at construction joints and other joints as indicated.

1. Polyvinyl Chloride Waterstops: Corps of Engineers CRD-C 572.

2.08 VAPOR RETARDERS:

A. Plastic Vapor Retarder: ASTM E 1745, Class B. Include manufacturer's recommended adhesive or pressure-sensitive tape.

1. Products:
   a. Fortifiber Corporation; Moistop Ultra.
   b. Raven Industries, Inc.; Vapor Block 10.
   c. Stego Industries, LLC; Stego Wrap, 15 mils.

2.09 FLOOR AND SLAB TREATMENTS:

A. Unpigmented Mineral Dry-Shake Floor Hardener: Factory-packaged dry combination of Portland cement, graded quartz aggregate, and plasticizing admixture.

1. Products:
   a. Burke by Edoco; NonMetallic Floor Hardener.
   b. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Conshake 500.
   c. Dayton Superior Corporation; Quartz Tuff.
   d. Euclid Chemical Company; Surflex.
   e. Lambert Corporation; Colorhard.
   f. L&M Construction Chemicals, Inc.; Quartzpalte FF.
   g. Scofield, L.M. Company; Lithochrome Color Hardener.

h. Symons Corporation, a Dayton Superior Company; Hard Top.

B. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; colorless; that penetrates, hardens, and densifies concrete surfaces.

1. Products:
   a. Burke by Edoco; Titan Hard.
   b. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Intraseal.
   c. Curecrete Distribution Inc.; Ashford Formula.
   d. Dayton Superior Corporation; Day-Chem Sure Hard.
   e. Euclid Chemical Company; Euco Diamond Hard.
   f. Kaufman Products, Inc.; SureHard.
   g. L&M Construction Chemicals, Inc.; Seal Hard.
   h. Meadows, W.R., Inc.; Liqui-Hard.
   i. Symons Corporation, a Dayton Superior Company; Buff Hard.

2.10 CURING MATERIALS:

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz. /sq. yd. when dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, 18 to 25 percent solids, non-dissipating, certified by curing compound manufacturer to not interfere with bonding of floor coverings.

1. Products:
   a. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; High Seal.
   b. Dayton Superior Corporation; Safe Cure and Seal (J-19).
   c. Euclid Chemical Company; Diamond Clear VOX.
   d. Lambert Corporation; Glazecote Sealer-20.
   e. L&M Construction Chemicals, Inc.; Dress & Seal WB.
   f. Meadows, W.R., Inc.; Vocomp-20.
   g. Nox-Crete Products Group, Kinsman Corporation; Cure & Seal 200E.

h. Sonneborn, Div. Of ChemRex; Kure-N-Seal.

i. Symons Corporation, a Dayton Superior Company; Cure & Seal 18 Percent E.

E. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

1. Products:

a. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Sealcure 1315 WB.

b. Euclid Chemical Company; Super Diamond Clear VOX.

c. Lambert Corporation; UV Safe Seal.

d. L&M Construction Chemicals, Inc.; Lumiseal WB Plus.

e. Meadows, W.R., Inc.; Vocomp-30.

f. Symons Corporation, a Dayton Superior Company; Cure & Seal 31 Percent E.

2.11 RELATED MATERIALS:

A. Expansion and Isolation Joint Filler Strips: ASTM D 1752, cork or self-expanding cork.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D 2240.

C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

E. Reglets: Fabricate reglets of not less than 0.0217-inch thick, galvanized steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

B. Dovetail Anchor Slots: Hot-dip galvanized steel sheet, not less than 0.0336-inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.12 CONCRETE MIXTURES, GENERAL:

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:

1. Fly Ash: 25 percent.
2. Combined Fly Ash and Pozzolan: 25 percent.
3. Ground Granulated Blast-Furnace Slag: 50 percent.
4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing, high-range water reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water cementitious materials ratio below 0.50.
4. Use retarding admixture in combination with Set accelerating Corrosion Inhibitor. Retarder is not required for non-set accelerating corrosion inhibitor.
5. Use corrosion inhibiting admixture in concrete mixtures where indicated.

2.13 CONCRETE MIXTURES FOR BUILDING ELEMENTS:

A. Footings and Foundation Walls: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.45.

3. Slump Limit: 4-inches for concrete with verified slump of 2-inch to 4-inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1-inch.
4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.

B. Exterior slabs-on-grade and sidewalks: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4500 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.40.
3. Slump Limit: 4-inches for concrete with verified slump of 2-inch to 4-inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1-inch.
4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size
5. Corrosion Inhibiting Admixture: Apply to all slabs at a rate of 4 gallons per cubic yard of concrete.

2.14 FABRICATING REINFORCEMENT:

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice".

2.15 CONCRETE MIXING:

A. Ready-Mix Concrete: Measure, batch, mix, and deliver concrete according to ASTM C94, and furnish batch ticket information.

B. When air temperature is between 85 and 90 degrees F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 degrees F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.01 GENERAL:

A. Coordinate the installation of joint materials, vapor retarder/barrier, and other related materials with placement of forms and reinforcing.

3.02 FORMWORK:

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:

1. Class A, 1/8-inch for smooth-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like for easy removal.
2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspections ports where interior area formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.03 EMBEDDED ITEMS:

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges".
2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

B. Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting type screeds.

3.04 REMOVING AND REUSING FORMS:

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 degrees F for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form removal operations and curing and protection operations are maintained.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by the Engineer.

3.05 VAPOR RETARDERS:

A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.

B. Lap joints 6-inches and seal with manufacturer's recommended tape.

3.06 STEEL REINFORCEMENT:

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire ties.

3.07 JOINTS:

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or approved by the Engineer.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form keyed joints as indicated. Embed keys at least 1-1/2-inches into concrete.
3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
4. Locate horizontal joints in walls and columns at the underside of floors, slabs, beams, and girders and at the top of footings and floor slabs.
5. Space vertical joints in walls at 60-feet on center maximum. Locate joints besides piers integral with walls, near corners, and in concealed locations where possible.
6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge joint to a radius of 1/8-inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Terminate full-width joint filler strips not less than ½-inch or more than 1-inch below finished concrete surface where joint sealants, specified in Division 7 Section "Joint Sealants", are indicated.
2. Install joint filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.08 CONCRETE PLACEMENT:

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Engineer.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed

continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6-inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in continuous operation, within limits of construction joints, until placement of panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 degrees F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

G. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 degrees F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, providing water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing of concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.09 FINISHING FORMED SURFACES:

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with minimum number of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth finish with texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.10 FINISHING FLOORS AND SLABS:

A. General: Comply with ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Re-straighten, cut down high spots, and fill low spots. Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces to receive trowel finish.

C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and re-straightening until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film finish coating system.
2. Finish surfaces to the following tolerances, according to ASTM E 1155 for a randomly trafficked floor surface:
3. Specified overall values of flatness, F(F) 25; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and of levelness, F(L) 15.

D. Broom Finish: Apply a broom finish to exterior platforms, steps, and ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Engineer before application.

3.11 MISCELLANEOUS CONCRETE ITEMS:

A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

3.12 CONCRETE PROTECTING AND CURING:

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

C. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Curing all slabs in the project with moisture curing. Keep surfaces continually moist for not less than seven days with the following materials:
   a. Water.
   b. Continuous water-fog spray.
   c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
2. Moisture-Retaining Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in the widest practicable width, with sides and ends lapped at least 12-inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
   a. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subject to heavy rainfall within three hours after initial applications. Maintain continuity of coating and repair damage during curing period.
   a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.
4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subject to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply second coat. Maintain continuity of coating and repair damage during curing period.

D. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for the full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

3.13 JOINT FILLING:

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least one month. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

3.14 CONCRETE SURFACE REPAIRS:

A. Defective Concrete: repair and patch defective areas when approved by the Engineer. Remove and replace concrete that cannot be repaired and patched to the Engineer's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part Portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than ½-inch in any dimension in solid concrete, but not less than 1-inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush coat holes and voids with bonding agent. Fill and compact patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white Portland cement and standard Portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.

3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by the Engineer.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, pop outs, honeycombs, rock pockets, crazing and cracks in excess of 0.01-inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14-days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Repair defective areas, except random cracks and single holes 1-inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least ¾-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
6. Repair random cracks and single holes 1-inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72-hours.

E. Perform structural repairs of concrete, subject to Engineer's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to the Engineer's approval.

3.15 FIELD QUALITY CONTROL:

A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Inspections:

1. Steel reinforcement placement.
2. Steel reinforcement welding.
3. Headed bolts and studs.
4. Verification of use of required design mixture.
5. Concrete placement, including conveying and depositing.
6. Curing procedures and maintenance of curing temperature.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample of each day's pour of each concrete mixture exceeding 5 cubic yards, but less than 25 cubic yards, plus one set for each additional 50 cubic yards or fraction thereof.
2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 degrees F and below and when 80 degrees F and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C 31.
6. Cast and laboratory cure five standard cylinder specimens for each composite sample.
7. Compressive Strength Tests: ASTM C 39; test one set of two-laboratory-cured specimens at 7 days and one set of two specimens at 28 days. Test remaining specimen at 28 days if previous results are satisfactory or retain this specimen for 56 day testing if results are not satisfactory.
8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive strength tests equals or exceeds

specified compressive strength and no compressive strength test value falls below specified compressive strength by more than 500 psi.

D. Test results shall be reported in writing to the Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7 and 28 day tests.

1. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Engineer but will not be used as the sole basis for approval or rejection of concrete.
2. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as required by the Engineer. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as required by the Engineer.
3. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
4. Correct deficiencies in the Work that test reports and inspections indicate does not comply with the Contract Documents.

E. Measure floor and slab flatness and levelness according to ASTM E 1155 within 24 hours of finishing.

3.16 GROUTING:

A. Mix grout in accordance with the approved manufacturer's instructions to a consistency which will permit placement. Place grout so as to ensure complete bearing and elimination of air pockets.

END OF SECTION

SECTION 03301

CAST-IN-PLACE CONCRETE (SKATE PARK)

PART 1 – GENERAL

1.0 SPECIALTY SKATE PARK CONSTRUCTION

A. All work contained in this Section is considered specialty skate park construction. Only those firms that meet the minimum experience requirements contained in the QUALITY ASSURANCE Section may perform this work as specified herein.

1.1 GENERAL CONDITIONS

A. Requirements of the Contract Documents, including but not limited to, the General, Special, and Technical Provisions, apply to work in this Section with the same force and effect as though repeated in full herein.

1.2 SCOPE OF WORK

A. Furnish materials, labor, transportation, services, and equipment necessary to install all Portland Cement Cast-In-Place Concrete related to the skate park as indicated on the Drawings complete as shown and as specified herein.

B. Related Work:
   1. Section 03 11 00 – Concrete Formwork (Skate Park)
   2. Section 03 20 00 – Concrete Reinforcement (Skate Park)
   3. Section 03 37 00 – Shotcrete (Skate Park)
   4. Section 03 39 00 – Concrete Curing (Skate Park)

1.3 REFERENCES

A. Comply with the applicable reference specifications as specified in the GENERAL PROVISIONS and in accordance with applicable laws, codes and regulations required by City of Somerville, LA. Comply with the current provisions of the following Codes and Standards:

B. ASTM - American Society for Testing and Materials:
   1. ASTM C33 – Concrete Aggregates.
   2. ASTM C94 – Ready-Mixed Concrete.
   3. ASTM C143 – Test for Slump of Portland Cement Concrete.
   4. ASTM C150 – Portland Cement.
   5. ASTM C260 – Air-Entraining Admixtures for Concrete.
   6. ASTM C494 – Chemical Admixtures for Concrete.
   7. ASTM C618 – Fly Ash and Raw or Calcined Natural Pozzalans for Use in Portland Cement Concrete

8. ASTM F2480 – Standard Guide for In-ground Concrete Skate Park.

C. ACI – American Concrete Institute:
   1. ACI 211.1– Recommended Practice for Selecting Proportions for Normal-Weight Concrete.
   2. ACI 211.2 – Recommended Practice for Selecting Proportions for Lightweight Concrete.
   3. ACI 301 – Specifications for Structural Concrete for Buildings.
   4. ACI 305 – Recommended Practice for Hot Weather Concreting.
   5. ACI 306 – Recommended Practice for Cold Weather Concreting.
   6. ACI 318 – Building Code Requirements for Reinforced Concrete.

D. IBC – International Building Code

E. AWS – American Welding Society
   1. AWS 3.0 – Standard Qualifications Procedure.
   2. AWS D1.4 – Structural Welding Code – Reinforcement.
   3. AWS D12.1 – Reinforced Concrete Construction.

F. CRSI – Concrete Reinforcing Steel Institute: MSP-1 – Manual of Standard Practice

1.4 SUBMITTALS

A. Design of Concrete Mixes:
   1. CONTRACTOR shall be responsible for and pay for design of concrete mixes. Design of concrete mixes shall be performed by a Testing Laboratory selected by CONTRACTOR and approved by the OWNER. Design methods to be in accordance with ACI 318.

   2. Make three trial mixes using aggregate proposed.

   3. Make advance tests of trial mixes with proposed materials. Test four cylinders in accordance with ASTM C39 at 7 days and 28 days. Do not place concrete on project until laboratory reports and breaks of confirmations cylinders indicate that the proposed mixes will meet the strength requirements as indicated on the drawings.

   4. Check mix design and revise, if necessary, wherever changes are made in aggregate or in surface water content of aggregate or workability of concrete. Slump shall be the minimum to produce workable mix. Laboratory shall prescribe minimum quantity of water.

   5. If Portland Cement reducers or other additives are used, submit control mix design without reducers or additives as well as mix exactly proposed to be used. Submit W.R. Grace Co. recommendations for retarder and shrinkage compensation of slab on grade.

6. Sample of Workmanship: Provide on-site, minimum 48”x48” sample (not part of finished project) of each flatwork finish.

7. Forward two copies of design mix to ENGINEER for approval.

B. Submit product data and manufacturer's instructions for:
1. Color admixture.
2. Expansion joint fill material.
3. Curing compound.
4. Dowel aligners/caps.
5. Waterstop.
6. Crack repair materials.
7. Form facing materials.
8. Proprietary cleaning agents.
9. Plastic film for curing.
10. Surface retarders.

C. Samples:
1. Samples for Color Selection: Submit color additive manufacturer's color chart & sample chip set; indicate color additive number and required dosage rate. Samples indicate general color and may vary from concrete finished in field according to Specifications.
2. Expansion Joint Fill Material: Submit one 12-inch length.

D. Test Reports: Compressive strength of concrete test cylinders taken upon delivery of concrete.

E. Delivery Documentation: Batch tags for each load of concrete, for informational purposes.

1.5 QUALITY ASSURANCE

A. Pre-Bid Conference (if applicable): Prior to submitting bid, attend pre-bid conference with ENGINEER to review mock-up requirements and artistic effect desired.

B. Regulatory Requirements: Meet requirements of applicable laws, codes, and regulations required by authorities having jurisdiction over Work.

C. CONTRACTOR Mock-ups:
1. CONTRACTOR shall prepare 4-foot x 4-foot samples for each paving type indicated on Drawings. CONTRACTOR may pour each type as part of the finished project, and if approved by the Architect may remain in place as finished product. If the sample is not approved, CONTRACTOR must remove and replace another sample for approval.
2. Mock-Ups shall be completed to the satisfaction of the ENGINEER including aggregates, texture, color, and finishes.

3. These mock-ups will become the standard of quality by which future paving samples and work will be judged.
4. Mock-ups to remain on-site and be protected during the course of construction, as a means to compare work in progress. If Mock-ups are damaged or removed, CONTRACTOR shall repair/replace in-kind immediately.

D. Concrete Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

E. CONTRACTOR Experience: **Provide evidence to indicate successful experience in providing cast-in-place concrete work for skate parks similar in scope to that specified herein and can demonstrate successful experience through past project documentation and references**.

1. Required Experience: CONTRACTOR or Subcontractor must have completed 3 public concrete skate park facilities with a minimum size of 6,000 square feet, in the last 2 years. Parks must be open and in good operating condition for at least one year. Only those projects where the complete construction of the facility has been the sole responsibility of your firm will be considered acceptable projects.

2. Evidence of Experience: CONTRACTOR or Subcontractor shall submit to Architect satisfactory documentation of the aforementioned experience and qualification. If a CONTRACTOR cannot provide this information or if it is unverifiable, work under this Section and any other related Section cannot be completed by CONTRACTOR. This submission must contain the Project Name & Location, OWNER's Name & Contact Information, Architect Name & Contact Information, Project Size, Contract Value, Completion Date, and Supervisor and/or Key Personnel responsible for this experience for each of the qualifying projects.

3. Installer: Provide evidence to indicate successful experience in providing cast-in-place concrete work for skate parks similar to that specified herein and can demonstrate successful experience through past project documentation and references

4. Skilled Workers: Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.

Safety and Performance Guidelines: Comply with all safety and performance requirements and all applicable references as specified in the ASTM F2480 Standard Guide for In-ground Skate Parks.

F. ACI Requirements: Meet all requirements of ACI 301.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials in dry and protected locations and protect from damage.

B. Do not change brand of cement or source of aggregate during course of Work, without prior approval from the Architect.

1.7 SITE CONDITIONS

A. Environmental Requirements:
   1. Submit plan to monitor wind velocity, relative humidity, temperature, and concrete temperature in order to maintain specified maximum rate of evaporation.
   2. Do not place concrete when sub base surface temperature is less than 40 degrees F, nor when surface is wet.
   3. Protect concrete against extreme cold and heat, frost, rapid drying, and damage by rain.

B. Coordination:
   1. Coordinate schedules of concrete placement to allow adequate time for installation of other related work.
   2. Verify that anchor bolts and other embedded steel items to be cast into concrete are properly placed.
   3. Coordinate size and location of mechanical and electrical equipment concrete pads.
   4. Coordinate earthwork and soils report requirements with placement requirements.
   5. Coordinate with form-work and finishes sections to provide finish floor levelness and flatness as specified herein. Slope to drains at grades and percent slope shown on contract documents.
   6. Ensure that irrigation sleeves, electrical conduit, drainage lines and other utility elements are accommodated and as-built located prior to placing concrete.

1.8 WARRANTY

A. General Description: In addition to manufacturer's warranties, warrant Work for a period of one year from the Date of Final Completion against defects in materials and workmanship.

B. Additional Items Covered: Warranty shall also cover repair of damage to other materials and workmanship resulting from defects in materials and workmanship.

C. Exceptions: CONTRACTOR shall not be held responsible for failures due to ordinary wear, neglect by OWNER, vandalism, or other causes beyond the CONTRACTOR's control.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Ready Mixed Concrete: Batched, mixed and transported in accordance with ASTM C94 – Specifications for Ready Mixed Concrete.

B. Portland Cement: Refer to Drawings for specific paving type and finish required and conform to ASTM C-150, Type II. Use same brand of cement from single source throughout entire project for each paving type, unless approval from Architect states otherwise.

C. Fine Aggregate (washed concrete sand): Clean, hard, durable, uncoated washed natural sand, free from silt, loam or clay, and conforming to ASTM C33.

D. Coarse Aggregate: Clean, hard, durable, un-coated coarse aggregate conforming to ASTM C33. Use same coarse aggregate from single source throughout entire project.

E. Water: Potable and free from deleterious materials such as oils, acids, and organic matter.

F. Admixture: Cement-dispersing, water-reducing compound, ASTM C 494, Type A, as made by Master Builders, Sika, or Gifford-Hill Co., or equal. Depending upon weather conditions at time of placing, ASTM C 494, Type D (water-retarding) or Type E (water-reducing, accelerating) may be used if approved by ENGINEER.

G. Curing Materials:
   1. Water: Domestic Quality, clear and potable with no chemical content.
   2. Sheet Material: Comply with ASTM C171. Moisture loss maximum .055 g/cm sq. Color: White.
   3. Curing Compounds/Sealer: Curing compound shall comply with ASTM C309 and be approved by color additive manufacturer for use with colored concrete

2.2 PROPORTIONS AND MIXING

A. Proportions and Design: In accordance with approved mix design. Minimum allowable compressive strength at 28 days is 4000 psi (as marked per plan).

B. Admixture: No admixtures without approval. Introduce admixtures in quantities and according to methods recommended by admixture manufacturer. Add air-entraining agent to concrete as scheduled.

C. Slump: Not to exceed 3 ½”

D. Mixing: Ready mixed concrete in accordance with ASTM C-94. Do not transport or use concrete after 1-1/2 hours have elapsed from time of initial mixing. Supplier of transit-mixed concrete shall have a plant of sufficient capacity, and adequate transportation facilities to assure continuous delivery at required rate, to provide continuous concrete placement throughout a pour.

E. Grout and Dry Pack: Non-Shrink, Non-Metallic: U.S. Grout Corp or equal. “Five Star Grout” ASTM C-877, C-191, and C-109, 5,000 PSI.

PART 3 – EXECUTION / CONSTRUCTION

3.1 INSPECTION

A. Inspect subgrade, forms, reinforcing steel, pipes, conduits, sleeves, hangers, anchors, inserts, and other work required to be built into concrete and report any discrepancies. Notify ENGINEER at least 5 working days in advance of scheduled placement.

B. Correct unsatisfactory work prior to placing concrete.

C. Remove rubbish from formwork immediately prior to placing concrete.

3.2 INSTALLATION

A. Placing Concrete:
   1. Convey and place concrete allowing no separation of ingredients in accordance with ACI 304 and as specified below.
   2. Maximum height of concrete free fall - five feet.
   3. Regulate rate of placement to maintain plasticity and flow into position.
   4. Deposit concrete continuously until panel or section is completed.
   5. Place concrete in horizontal layers 18" maximum thickness.

B. Consolidation:
   1. Use mechanical vibrating equipment for consolidation.
   2. Vertically insert and remove hand-held vibrators at 18" O.C. for 10 to 15 seconds.
   3. Do not use vibrators to transport concrete in forms.
   4. Provide vibrators with minimum speed of 8000 RPM and with amplitude to consolidate effectively.
   5. Thoroughly consolidate concrete and work around reinforcement, embedded items and into corners of forms. Thoroughly consolidate layers of concrete with previous layers.

C. Construction Joints:
   1. Unless otherwise shown on Drawings, each footing, wall, beam, and slab shall be considered as a single unit of operation and shall be monolithic in construction.
   2. Where construction joints are absolutely unavoidable, locate joints at or near quarter points of spans where approved by ENGINEER and/or shown on plan.
   3. Saw Cut joints, Expansion Joints and Key Joints as detailed in contract documents.

D. Expansion Joint Fillers:
   1. Refer to Drawings for Expansion Joint locations and details.
   2. Finish joint material flush with concrete surface.

E. Hot Weather Placement:
   1. Prevent high temperature in fresh concrete during hot weather in accordance with ACI 305.
   2. Use water reducing set retarding admixtures in such quantities as especially recommended by manufacturer to assure that concrete remains workable and lift lines will not be visible.

F. Flatwork:
   1. Cast slabs-on-grade in alternate sections, unless permanent forms are used. Wait 48 hours between all adjacent concrete castings.
   2. Plane Surface Tolerance: Exterior- Class AX, 3/16" in 10' with no ponding.
   3. Maximum 1:500 slope from indicated plane at any point.

G. Finish:
   1. Smooth Trowel finish to match approved Mock-Up finish.
   2. After surface water disappears and floated surfaces have sufficiently hardened, steel trowel then retrowel the surface to a smooth and consistent finish.
   3. After concrete has set enough to provide edge troweling, retrowel edges to a smooth and uniform finish.

H. Cracking:
   1. Cracking from inadequate curing is not allowed. Sawcut joints and construction joints are shown on drawings. CONTRACTOR may, with approval of ENGINEER, recommend and detail other joints required to prevent cracking.

3.3 REPAIRS AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, defective, or does not meet the requirements of this Section or conformance with ASTM F 2480 - Standard Guide for In-ground Skate Parks.

B. Protect concrete from damage until Final Payment. Exclude traffic from paving for at least 28 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

C. Maintain concrete paving free of stains, discoloration, dirt, wax, and other foreign material until Final Payment.

3.5 TOLERANCES

A. Minor variations in appearance of colored concrete, which are similar to natural variations in color and appearance of uncolored concrete, are acceptable but subject to approval by ENGINEER.

3.6 CLEAN UP

A. At completion of Work, remove concrete stains from adjacent work, including but not limited to dissimilar paving types, walls, columns, railing posts, light fixtures, plant materials, to satisfaction of ENGINEER.

END OF SECTION

SECTION 03302

FIELD CONCRETE

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This Section covers concrete and all related items necessary to place and finish the concrete work.

B. Concrete thrust, and anchor blocks, to be provided at all water main bends, tees, plugs and wyes and at other locations required by the Engineer shall be installed in accordance with the details shown on the drawings and as specified in this section.

C. Concrete encasement for piping with shallow cover and for encasement of telephone, and electrical duct bank when specified shall be installed in accordance with the details shown on the drawings and as specified in this section.

1.02 RELATED WORK:

A. Section 02222, ABANDONMENT OF SEWERS AND DRAINS

B. Section 02350, EXCAVATION BORROW AND BACKFILL

1.03 REFERENCES:

A. The following standards form a part of this specification:

American Concrete Institute (ACI)

ACI 304	Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete.
ACI 305	Recommended Practice for Hot Weather Concreting
ACI 306	Recommended Practice for Cold Weather Concreting
ACI SP-66 ACI	Detailing Manual
ACI 318	Building Code Requirements for Reinforced Concrete

American Society for Testing and Materials (ASTM)

ASTM A615 Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

ASTM C33 Concrete Aggregates

ASTM C94 Ready-Mixed Concrete

ASTM C143 Test for Slump of Portland Cement Concrete

ASTM C150 Portland Cement

ASTM C260 Air Entraining Admixtures for Concrete

ASTM C494 Chemical Admixtures for Concrete

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

Six copies of the statement of materials constituting the design of mixes for each size aggregate as required by ASTM C94 shall be submitted to the Engineer within one week following award of the Contract.

PART 2 - PRODUCTS

2.01 CONCRETE:

A. All concrete, reinforced or non-reinforced shall have a 28 day compressive strength of 3000 psi unless otherwise noted on the design drawings. A minimum of 5.5 sacks of cement per cubic yard and a maximum water cement ratio of 6.9 gallons per sack shall be used.

B. Concrete shall conform to ASTM C94. The Contractor shall be responsible for the design of the concrete mixtures. Slump shall be a maximum of 4-inches and a minimum of 2-inches, determined in accordance with ASTM C143.

C. Admixtures shall be as specified in subsection 2.05. No additional admixtures shall be used unless approved by the Engineer.

D. No additional water, except for the amount indicated by the design mix shall be added to the concrete without the prior permission of the Engineer.

2.02 CEMENT:

The cement shall be an approved brand of American manufactured Portland Cement, Type II conforming to the applicable requirements of ASTM C150.

2.03 AGGREGATES

A. Except as otherwise noted, aggregate shall conform to the requirements of ASTM C33.

B. Maximum size aggregate shall be 3/4-inch.

2.04 ADMIXTURES:

A. All concrete (unless otherwise directed) shall contain an air entraining agent. Air entrained concrete shall have air content by volume of 4 to 8 percent for 3/4-inch aggregate.

B. Air entraining agent shall be in accordance with ASTM C260 and shall be Darex AEA, as manufactured by W.R. Grace & Company; Placewel (air entraining Type), as manufactured by Johns Manville; Sika AER as manufactured by Sika Chemical Company; or an approved equal product.

C. Water reducing agent shall be WRDA, as manufactured by W.R Grace & Company; Placewel (non-air entraining Type), as manufactured by Johns Manville; Sika Plastiment as manufactured by Sika Chemical Company; or an approved equal product.

D. Water reducing agent-retarder shall be "Daratard," as manufactured by W.R. Grace & Company; Sika Plastiment as manufactured by Sika Chemical Company; or an approved equal product.

2.05 WATER:

A. Water for concrete shall be potable, free of deleterious amounts of oil, acid, alkali, organic matter and other deleterious substances.

PART 3 - EXECUTION

3.01 PREPARATION:

A. Before placing concrete, forms and the space to be occupied by the concrete shall be thoroughly cleaned, and reinforcing steel and embedded metal shall be free from dirt, oil, mill scale, loose rust, paint or the material which would tend to reduce the bond.

B. Earth, concrete, masonry, or other water permeable material against which concrete is to be placed shall be thoroughly saturated with water immediately before concrete is placed.

C. No concrete shall be placed until the consolidation of the ground and the arrangement and details of forms and reinforcing have been inspected and approved by the Engineer.

3.02 THRUST AND ANCHOR BLOCKS:

A. Minimum bearing areas for thrust blocks and dimensions of anchor blocks shall be as shown on the drawings.

B. Concrete for thrust and anchor blocks shall be placed against undisturbed earth, and wooden side forms shall be used to provide satisfactory lines and dimensions. Felt roofing paper shall be placed to protect joints. No concrete shall be placed so as to cover joints, bolts or nuts, or to interfere with the removal of the joints.

3.03 FILL CONCRETE:

A. Fill concrete shall be placed in those locations as indicated on the design drawings. Fill concrete shall consist of materials as previously specified, with a minimum 28-day compressive strength of 3000 psi.

B. Before fill concrete is placed, the following procedures shall be used to prepare surfaces; all dirt, scum and laitance shall be removed by chipping and washing. The clean, roughened base surface shall be saturated with water, but shall have no free water on the surface. A coat of 1:2 cement-sand grout, approximately 1/8-inch thick, shall be well scrubbed into the thoroughly dampened concrete base. The concrete fill shall be placed immediately, before grout has dried or set.

C. Fill concrete shall be brought to lines and grades as shown on the design drawings.

3.04 CONCRETE PLACING DURING COLD WEATHER:

A. Concrete shall not be placed on frozen ground, and no frozen material or material containing ice shall be used. Materials for concrete shall be heated when temperature is below 40^{o}F, or is expected to fall to below 40^{o}F, within 73 hours, and the concrete after placing shall be protected by covering, heat, or both.

B. All details of Contractor's handling and protecting of concrete during freezing weather shall be subject to the approval of the Engineer. All procedures shall be in accordance with provisions of ACI 306.

3.05 CONCRETE PLACING DURING HOT WEATHER:

A. Concrete just placed shall be protected from the direct rays of the sun and the forms and reinforcement just prior to placing, shall be sprinkled with cold water. The Contractor shall make every effort to minimize delays, which will result in excessive mixing of the concrete after arrival on the job.

B. During periods of excessively hot weather (90^{o}F or above), ingredients in the concrete shall be cooled insofar as possible and cold mixing water shall be used to maintain the temperature of the concrete at permissible levels all in accordance with the provisions of ACI 305. Any concrete with a temperature above 90^{o}F, when ready for placement, will not be acceptable, and will be rejected.

3.06 FIELD QUALITY CONTROL:

A. Concrete inspection and testing shall be performed by the Engineer or by an inspection laboratory, designated by the Engineer, engaged and paid for by the Owner. Testing equipment shall be supplied by the laboratory, and the preparation of samples and all testing shall be performed by the laboratory personnel. Full assistance and cooperation, concrete for samples, and such auxiliary personnel and equipment as needed shall be provided by the Contractor.

B. At least 4 standard compression test cylinders shall be made and tested and 1 slump test from each day's placement of concrete. A minimum of four compression test cylinders shall be made and tested for each 100 cubic yards of each type and design strength of concrete placed. One cylinder shall be tested at 7 days, and two at 28 days. The fourth cylinder from each set shall be kept until the 28 day test report on the second and third cylinders in the same set has been received. If the average compressive strength of the two 28 day cylinders do not achieve the required level, the Engineer may elect to test the fourth cylinder immediately or test it after 56 days. If job experience indicates additional cylinder tests or other tests are required for proper control or determination of concrete quality, such tests shall be made.

C. The Engineer shall have the right to reject concrete represented by low strength tests. Rejected concrete shall be promptly removed and replaced with concrete conforming to the specification. The decision of the Engineer as to whether substandard concrete is to be accepted or rejected shall be final.

END OF SECTION

SECTION 03320

REINFORCED CEMENT CONCRETE MOW CURB

PART I - GENERAL

1.01 SCOPE OF WORK

The work to be done in this section shall be to construct a cast in place reinforced concrete mower strip as located and detailed in the plans and as specified herein. The Contractor shall furnish all labor, material, equipment and transportation necessary to accomplish this task.

1.02 REFERENCE STANDARDS

a. References herein to any technical society, organization, group of body are made in accordance with the following abbreviations.

AASHTO	American Association of State Highway and Transportation Officials
ANSI	American National Standards Institute
ASTM	American Society for Testing Materials

b. "Massachusetts State Specifications" refers to the Standard Specifications for Highways and Bridges, l988 Edition and all supplements thereto, as published by the Commonwealth of Massachusetts, Department of Public Works.

PART II - MATERIALS

2.01 Gravel base shall conform to Section 02300 of these Specifications.

2.02 Forms, reinforcing steel and cement concrete cast-in-place shall conform to Section 03300 of these Specifications.

2.03 All fence posts shall be set into place in accordance with shop drawings and fencing layout; mower strip to be poured between post footings with tooled construction joints.

2.04 Cement Concrete shall conform to Section 03300 of these Specifications.

2.05 Preformed expansion joint filler shall be of a non-extruding and resilient non-bituminous type conforming to AASHTO-M135.

PART III- EXECUTION

3.01 Excavation shall conform to Section 02300 of these Specifications.

3.02 Placement and compaction of processed gravel shall conform to Section 02355 of these Specifications.

3.03 Placement of reinforcing steel shall conform to Section 03300 of these Specifications; coordinate with fencing sections; cast cement concrete against post footings and tool joints.

3.04 Placement and Finish of Cement Concrete: The concrete shall be placed in such quantity that after being thoroughly consolidated in place it shall be six (6) inches or twelve (12) inches in depth as designated on the plans and details. No finishing operation shall be performed until all bled water and water sheen has left the surface and the concrete has started to stiffen. After water sheen has disappeared, edging operations where required shall be completed. All tool marks shall be eliminated. After edging and jointing operations, the surface shall be floated with aluminum or magnesium floats. If necessary, tooled construction joints and edges shall be rerun to maintain uniformity.

3.05 Curing of cement concrete shall conform to Section 03300 of these Specifications.

END OF SECTION

SECTION 03360

INTEGRALLY COLORED CONCRETE

PART 1 - GENERAL

1.01 SUMMARY

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to Work of this Section.

B. Section Includes:

1. Integrally colored concrete.
2. Curing of integrally colored concrete.

C. Related Sections:

1. Division 3 Section "Cast-In-Place Concrete" for general applications of concrete and coordination of sample submittal and color selection.
2. Division 7 Section "Joint Sealants" for colored sealant for joints.

1.02 REFERENCES

A. American Concrete Institute (ACI):

1. ACI 301 "Specification for Structural Concrete."
2. ACI 302 IR "Recommended Practice for Concrete Floor and Slab Construction."
3. ACI 303.1 "Standard Specification for Cast-In-Place Architectural Concrete."
4. ACI 304 "Recommended Practice for Measuring, Mixing, Transporting and Placing of Concrete."
5. ACI 305R "Recommended Practice for Hot Weather Concreting."
6. ACI 306R "Recommended Practice for Cold Weather Concreting."

B. American Society for Testing and Materials (ASTM):

1. ASTM C309 "Liquid Membrane-Forming Compounds for Curing Concrete."
2. ASTM C494 "Standard Specification for Chemical Admixtures for Concrete."

3. ASTM C979 "Standard Specification for Pigments for Integrally Colored Concrete."

C. American Association of State Highway and Transportation Officials (AASHTO):

1. AASHTO M194 "Chemical Admixtures."

D. Portland Cement Association

1. PCA PA124 - Finishing Concrete Slabs with Color and Texture.
2. PCA SP021 - Color and Texture in Architectural Concrete.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's complete technical data sheets for the following:

1. Colored admixture.
2. Curing compound.

B. Design Mixes: For each type of integrally colored concrete.

C. Samples for Initial Selection: Manufacturer's color charts showing full range of colors available.

D. Qualification Data: For firms indicated in "Quality Assurance" Article, including list of completed projects.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer with 10-years of experience in the production of specified products.

B. Installer Qualifications: An installer with 5 years of experience with work of similar scope and quality.

C. Comply with the requirements of ACI 301.

D. Obtain each specified material from same source and maintain high degree of consistency in workmanship throughout Project.

E. Notification of manufacturer's authorized representative shall be given at least 1-week before start of Work.

F. Integrally Colored Concrete Mockups:

1. Provide under provisions of Division 1 Section "Quality Control."

2. At location on Project selected by Landscape Architect, place and finish 10 feet by 10 feet area.
3. For accurate color, the quantity of concrete mixed to produce the sample should not be less than 3 cubic yards or not less than 1/3 the capacity of the mixing drum on the ready-mix truck and should always be in full cubic yard increments. Excess material shall be discarded according to local regulations.
4. Construct mockup using processes and techniques intended for use on permanent work, including curing procedures. Include samples of control, construction, and expansion joints in sample panels. Mockup shall be produced by the individual workers who will perform the work for the Project.
5. Retain samples of cements, sands, aggregates and color additives used in mockup for comparison with materials used in remaining work.
6. Accepted mockup provides visual standard for work of Section.
7. Mockup shall remain through completion of work for use as a quality standard for finished work.
8. Remove mockup when directed.

1.05 DELIVERY, STORAGE AND HANDLING

A. Colored Admixture: Comply with manufacturer's instructions. Deliver colored admixtures in original, unopened packaging. Store in dry conditions.

1.06 PROJECT CONDITIONS

A. Integrally Colored Concrete Environmental Requirements:

1. Schedule placement to minimize exposure to wind and hot sun before curing materials are applied.
2. Avoid placing concrete if rain, snow, or frost is forecast within 24-hours. Protect fresh concrete from moisture and freezing.
3. Comply with professional practices described in ACI 305R and ACI 306R.

B. Schedule delivery of concrete to provide consistent mix times from batching until discharge. Mix times shall meet manufacturer’s written recommendations.

1.07 PRE-JOB CONFERENCE

A. One week prior to placement of integrally colored concrete a meeting will be held to discuss the Project and application materials.

B. It is suggested that the Landscape Architect, Engineer, General Contractor, Construction Manager, Subcontractor, Ready-Mix Concrete Representative, and a Manufacturer's Representative be present.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURER

A. L. M. Scofield Company, Douglasville, Georgia and Los Angeles, California

1. Phone (800) 800-9900 or
2. Local contact: John Glover telephone number (508) 353-0709

B. Davis Colors 3700 East Olympic Blvd, Los Angeles, CA 90023
Phone: 800-356-4848 or 323-269-7311.

C. Butterfield Color: 625 West Illinois Avenue, Aurora, IL 60506
Phone: (800) 282-3388

2.02 MATERIALS

A. Colored Admixture for Integrally Colored Concrete:

1. Chromix P® Admixture and Chromix ML®; L. M. Scofield Company;
2. Davis Colors – Powder Pigment or Mix Ready.
3. Butterfield Color: Uni-Mix® Integral Concrete Colorant.
4. Admixture shall be a colored, water-reducing, admixture containing no calcium chloride with coloring agents that are limeproof and ultra-violet resistant.
5. Colored admixture shall conform to the requirements of ACI 303.1, ASTM C979, ASTM C494 and ASSHTO M194.

B. Curing Compound for Integrally Colored Concrete: Curing compound shall comply with ASTM C309 and be of same manufacturer as colored admixture, for use with integrally colored concrete.

1. Exterior Integrally Colored Concrete: Lithochrome® Colorwax; L. M. Scofield Company. Use to cure exterior flatwork that will be allowed to cure naturally with only occasional maintenance.
2. Curing Compound for Flatwork: Davis Colors W-1000 Clear Cure & Seal or Color Seal II, tinted to match integrally colored concrete, as approved by the

Landscape Architect; complying with ASTM C309 and designed for use on integrally colored concrete.

3. Butterfield Curing & Sealing compound: Clear Guard® Cure and Seal
4. Moist Curing Blankets: Disposable curing blankets specially designed for use on colored or decorative concrete and to keep surface of concrete moist for seven days.

C. SUBSTITUTIONS: The use of products other than those specified will be considered providing that the Contractor requests its use in writing within 14-days prior to bid date. This request shall be accompanied by the following:

1. A certificate of compliance from material manufacturer stating that proposed products meet or exceed requirements of this Section, including standards ACI 303.1, ASTM C979, ASTM C494 and AASHTO M194.
2. Documented proof that proposed materials have a 10-year proven record of performance, confirmed by at least 5 local projects that Landscape Architect can examine.

2.03 COLORS

A. Concrete Colors:

1. Cement: Color shall be gray or white, as approved by the Landscape Architect. Selected to match existing adjacent concrete plaza.
2. Sand: Color shall be locally available natural sand or be manufactured white sand to match Landscape Architect's sample.
3. Aggregate: Concrete producer's standard aggregate complying with specifications
4. Colored Admixture: As selected by Landscape Architect from manufacturer’s Color Chart. One premium color maybe selected.

B. Curing Compound: Color to match integrally colored concrete.

2.04 CONCRETE MIX DESIGN

A. Provide cement content required to achieve 4,000 psi concrete strength.

1. Refer to SECTION 03300 CAST IN PLACE CONCRTE.

B. Slump of concrete shall be consistent throughout Project at 4-inches or less. At no time shall slump exceed 5-inches.

C. Do not add calcium chloride to mix as it causes mottling and surface discoloration.

D. Supplemental admixtures shall not be used unless approved by manufacturer.

E. Do not add water to the mix in the field.

F. Add colored admixture to concrete mix according to manufacturer's written instructions.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install concrete according to requirements of Division 3 Section "Cast-In-Place Concrete."

B. Do not add water to concrete mix in the field.

C. Surfaces shall be finished uniformly with a selected finish to match the existing adjacent concrete plaza as required by Landscape Architect:

1. Broomed: Pull broom across freshly [floated] [troweled] concrete to produce [fine] [medium] [coarse] texture in [straight] [wavy] lines perpendicular to main line of traffic. Do not dampen brooms.
2. Trowel: Precautions should be taken to ensure that the surface is uniformly troweled so that it will not be slippery. Do not over-trowel or burnish the surface.

3.02 CURING

A. Integrally Colored Concrete: Apply curing and sealing compound for integrally colored concrete according to manufacturer's instructions using manufacturer’s recommended application techniques. Apply curing and sealing compound at consistent time for each pour to maintain close color consistency.

B. Curing compound shall be same color as the colored concrete and supplied by same manufacturer of the colored admixture.

C. Precautions shall be taken in hot weather to prevent plastic cracking resulting from excessively rapid drying at surface as described in CIP 5 *Plastic Shrinkage Cracking* published by the National Ready Mixed Concrete Association.

D. Do not cover concrete with plastic sheeting.

3.03 TOLERANCES

A. Minor variations in appearance of integrally colored concrete, which are similar to natural variations in color and appearance of uncolored concrete, are acceptable.

3.04 APPLICATORS

A. For a list of qualified contractors, contact a Scofield representative, John Glover telephone number (508) 353-0709; Davis Colors (800) 356-4848; Butterfield Color (800) 282-3388.

END OF SECTION

SECTION 03370

CEMENT CONCRETE PAVEMENT

PART I - GENERAL

1.01 SCOPE OF WORK

A. The work under this Section shall include the furnishing and construction of cement concrete pavement areas and pads for mounting site furnishings to the lines and grades shown on the plans and in accordance with these Specifications.

B. Cement concrete pavements shall match the widths, lines and cross sections of existing cement concrete walks to be retained.

C. Specialty Concrete Pavements shall contain additional architectural score joint patterning beyond typical score joint locations as defined by the drawings.

1.02 REFERENCE STANDARDS AND SPECIFICATIONS

A. Reference to the standards, specifications and tests of technical societies, organizations, and governmental bodies is made in the Contract Documents.

1. AASHTO - American Association of State Highway and Transportation Officials (tests or specifications).

2. ASTM - American Society for Testing and Materials.

3. Mass. Standard Specs. - Latest edition of the Standard Specifications for Highways, Bridges and Waterways, 1988 Edition, the Commonwealth of Massachusetts, Department of Public Works, hereinafter referred to as "the MDPW Standard Specifications."

PART II - MATERIALS

2.01 GRAVEL BORROW

A. Gravel Base as specified in Section 02350 of these Specifications.

2.02 CEMENT CONCRETE

A. Cement Concrete as specified in Section 03300 of these Specifications.

2.03 EXPANSION JOINTS

A. Premoulded non-extruding resilient non bituminous type filler conforming to

AASHTO-M135 per Section 9.01 of these Specifications.

2.04 SEALANT

A. Clear, matte-finish polyurethane sealant per Section 09980 of these Specifications.

2.05 CURING COMPOUND

A. Type 2 liquid membrane forming compound for curing concrete ASTMC-309-58.

PART III - EXECUTION

3.01 SUBGRADE

A. The subgrade shall be shaped to a true surface conforming to the proposed slope of the walk, thoroughly rolled at optimum moisture content and tamped with a power roller weighing not less than one (1) ton and not more than five (5) tons. All depressions occurring shall be filled with suitable material and again rolled or tamped until the surface is smooth and hard.

3.02 BASE

A. After the subgrade has been prepared as herein before specified, a base of gravel borrow, at optimum moisture content, shall be placed upon it and shall be thoroughly rolled by a power roller and tamped.

3.03 FORMS

A. The forms for one (1) course sidewalks shall be smooth, free from warp, of sufficient strength to resist springing out of shape, and of depth to conform to the thickness of the proposed walk. All mortar or dirt shall be completely removed from forms that have been previously used. The forms shall be well stacked and thoroughly braced and set to the established lines with their upper edge conforming to the grade of the finished walk, which will have sufficient pitch from the outside to the edge of the walk to provide for surface drainage, but which shall be three-eighths (3/8) inch per one (1) foot unless shown otherwise on the plans or directed by the Supervisor. Before the concrete is placed the subbase shall be thoroughly dampened so that it is moist throughout, but without puddles of water. The concrete shall be placed to as under to the final a position as practicable with precautions taken not to overwork it while it is still plastic. The concrete shall be thoroughly spaded along the forms or screeded to eliminate voids or honeycombs at the edges.

3.04 EXPANSION JOINTS

A. Expansion joints shall be located as shown on the plans and details and as directed by the Owner's Representative, but at a minimum will be not more than 30' on center for any areas of concrete pavement and walking surface.

3.05 CONCRETE

A. On the base specified above, the concrete shall be thoroughly consolidated in place. Concrete shall be placed to the limits and to the depths indicated on the details. Install concrete haunches at all designated locations. In conveying the concrete from the place of mixing to the place of deposit, the operation must be conducted in such a manner so that no mortar will be lost, and the concrete must be so handled that the concrete will be of uniform composition throughout, showing neither excess nor lack of mortar in any one place. The concrete materials shall be mixed to produce a concrete of such consistency that the water will flush to the surface under heavy tamping. Retampering of the concrete will not be permitted. The application of neat cement to the surface in order to hasten hardening is prohibited. Experienced and competent cement finishers approved by the Engineer shall do the finishing of concrete surface.

3.06 FINISH

A. No finishing operation shall be performed until all bled water and water sheen has left the surface and the concrete has started to stiffen. After water sheen has left the surface and the concrete has started to stiffen, edging operations where required shall be completed. All tool marks shall be eliminated. After edging and jointing operations, the surface shall be floated with aluminum or magnesium floats. Immediately following floating, the surface shall be steel-troweled. After trowelling, the Contractor shall draw a fine nylon push broom lightly over the surface to produce a non-slip condition. If necessary, tooled joints and edges shall be rerun before and after trowelling to maintain uniformity and all tool marks shall be eliminated by brooming.

3.07 CURING

A. Type 2 pigmented liquid membrane-forming curing compound shall be applied immediately following final finishing before any marked dehydration of the concrete or surface checking occurs. The compound shall be applied in one or two applications, as directed by the Engineer. When the compound is applied in two applications, the second shall follow the first within thirty (30) minutes. The compound shall be applied in a continuous film by means of power-operated pressure spraying equipment at a rate not less than one gallon per two hundred (200) square feet of surface. Sufficient pressure shall be applied to the spray machine to force the compound to leave the nozzle as a fine spray. The material shall adhere to the surface and make a tight bond to the concrete but shall have a

fugitive dye. The compound shall form a uniform continuous coherent film that will not check, crack, or peel, and be free from pinholes or other imperfections.

B. Whenever the atmospheric temperature is ninety degrees F (90^{o}F) or more, the Engineer shall have the right to require a second application of compound at no expense to the Town. Any section damaged by rain or in any other way before the compound has dried to a stable coating shall be retreated by the Contractor at no additional expense to the Town.

C. Concrete surfaces to which the compound has been applied shall be protected for a period of at least three (3) days. All vehicular and pedestrian traffic is considered injurious to the film of the applied compound. Any damage to the film within the three (3) day period shall be promptly repaired by application of the compound. Adequate protection shall be provided where temperatures of forty degrees F (40^{o}F) or lower occur during placing of concrete and during the early curing period. The minimum temperature of fresh concrete after placing and for the first three (3) days shall be maintained above fifty-five degrees F (55^{o}F). In addition to the above requirements, an additional three (3) days of protection from freezing shall be maintained.

END OF SECTION

SECTION 03371

SHOTCRETE (SKATE PARK)

PART 1 – GENERAL

1.0 SPECIALTY SKATE PARK CONSTRUCTION

A. All work contained in this Section is considered specialty skate park construction. Only those firms that meet the minimum experience requirements contained in the QUALITY ASSURANCE Section may perform this work as specified herein.

1. Provide sprayed-on concrete (concrete conveyed into place by air pressure through a flexible tube or gun with controlled nozzle) referred to herein as shotcrete, complete as shown and as specified.

2. Application, cutting, and sculpting and finish work related to this Work is deemed sole source specialty work within the Contract Documents.

3. All work related to this application, cutting, sculpting, and installation shall be coordinated with ENGINEER of Record prior to project start.

1.1 GENERAL CONDITIONS

A. Requirements of the Contract Documents, including but not limited to, the General, Special, and Technical Provisions, apply to work in this Section with the same force and effect as though repeated in full herein.

1.2 SCOPE OF WORK

A. Furnish materials, labor, transportation, services, and equipment necessary to install all Shotcrete related to the skate park as indicated on the Drawings complete as shown and as specified herein.

B. Refer to Drawings for specific locations of shotcrete.

C. Related Work:
   1. Section 03111 – Concrete Formwork (Skate Park)
   2. Section 032010 – Concrete Reinforcement (Skate Park)
   3. Section 03301 – Cast-In-Place Concrete (Skate Park)
   4. Section 03391 – Concrete Curing (Skate Park)

1.3 REFERENCES

A. Comply with the applicable reference specifications as specified in the GENERAL PROVISIONS and in accordance with applicable laws, codes and regulations required by

City of Somerville, LA. Comply with the current provisions of the following Codes and Standards:

B. ASTM - American Society for Testing and Materials:
   1. ASTM C33 – Concrete Aggregates.
   2. ASTM C39 – Test Method of Compressive Strength of Cylindrical Concrete Specimens.
   3. ASTM C94 – Ready-Mixed Concrete.
   4. ASTM C143 – Test for Slump of Portland Cement Concrete.
   5. ASTM C150 – Portland Cement.
   6. ASTM C260 – Air-Entraining Admixtures for Concrete.
   7. ASTM C494 – Chemical Admixtures for Concrete.
   8. ASTM C979 – Pigments for Integrally Colored Concrete.
   9. ASTM C618 – Fly Ash and Raw or Calcined Natural Pozzalans for Use in Portland Cement Concrete.
   10. ASTM F2480 – Standard Guide for In-ground Concrete Skate Park.

C. ACI – American Concrete Institute:
   1. ACI 211.1 – Recommended Practice for Selecting Proportions for Normal-Weight Concrete.
   2. ACI 211.2 – Recommended Practice for Selecting Proportions for Lightweight Concrete.
   3. ACI 301 – Specifications for Structural Concrete for Buildings.
   4. ACI 305 – Recommended Practice for Hot Weather Concreting.
   5. ACI 306 – Recommended Practice for Cold Weather Concreting.
   6. ACI 318 – Building Code Requirements for Reinforced Concrete.

D. IBC – International Building Code

E. AWS – American Welding Society
   1. AWS 3.0 – Standard Qualifications Procedure.
   2. AWS D1.4 – Structural Welding Code – Reinforcement.
   3. AWS D12.1 – Reinforced Concrete Construction.

F. CRSI – Concrete Reinforcing Steel Institute: MSP-1 – Manual of Standard Practice

1.4 SUBMITTALS

A. Manufacturer's Data: Current printed specifications with application and installation instruction for proprietary materials including concrete admixtures.

B. Shop Drawings: Radial templates cut to exact radii shown on drawings to insure exact radii from flat bottom of Skate Park to face of coping. Template shall be fabricated from steel or ¾" Plywood. Architect may elect to waive this requirement if necessary.

C. Design of Concrete Mixes:

1. CONTRACTOR shall be responsible for and pay for design of concrete mixes for each type of concrete specified. Design of concrete mixes shall be performed by a Testing Laboratory selected by CONTRACTOR and approved by the OWNER. Design methods to be in accordance with ACI 318.
2. Make three trial mixes using aggregate proposed.
3. Make advance tests of trial mixes with proposed materials. Text four cylinders in accordance with ASTM C-39 at 7 days and 28 days. Do not place concrete on project until laboratory reports and breaks of confirmation cylinders indicate that proposed mixes will develop required strengths.
4. Check mix design and revise, if necessary, wherever changes are made in aggregate or in surface water content of aggregate or workability of concrete. Slump shall be the minimum to produce workable mix. Laboratory shall prescribe minimum quantity of water.
5. If Portland cement reducers or other additives are used, submit control mix design without reducers or additives as well as mix exactly proposed to be used. Submit W.R. Grace Co. recommendations for retarders and shrinkage compensation of slab on grade.
6. Sample of Workmanship: Provide on-site, minimum 48”x48” sample (not part of finished project) of each flatwork finish and color.
7. Forward two copies of design mix to ENGINEER for approval.

D. Submit product data and manufacturer's instructions for:
1. Color admixture.
2. Expansion joint fill material.
3. Curing compound.
4. Dowel aligners/caps.
5. Crack repair materials.
6. Form facing materials.
7. Form release agents.
8. Proprietary cleaning agents
9. Plastic film for curing.
10. Surface retarders.

E. Shotcrete Sample:
1. Provide representative samples of materials for material testing, mix proportion testing, and finish.
2. Provide onsite, minimum (1) 6’ x 6’ x 6” sample of shotcrete with a radius and the same reinforcement and coping type as the highest elevation and largest radii on the project for finish inspection and approval. Sample may be part of the finished product and if approved by the ENGINEER may remain in place as finished product. If the sample is not approved, CONTRACTOR must remove and replace another sample for approval.

F. Placement Schedule:
a. CONTRACTOR to indicate on plans the locations to be shot within a day’s work and not exceeding 40 cubic yards per day for quality control and inspection schedules.

b. Schedule and sequence to be reviewed and approved by ENGINEER prior to starting this Work.

G. Test Reports: Compressive strength of concrete test cylinders taken upon delivery of concrete.

H. Delivery Documentation: Batch tags for each load of concrete, for informational purposes.

1.5 QUALITY ASSURANCE

A. Concrete Testing:
1. Prepare test specimens by each application crew using the equipment, materials and mix proportions proposed for the ENGINEER shall observe preparation of test panels noting placement of shotcrete by applications crew.
2. Test panel shall be at least 6'x6'x6' with the same reinforcement as in the proposed structure. A testing CITY shall take at least (3) cores from the specimen and test them in accordance with ASTM C42.
3. Secure and protect Test Panels during construction and test for compliance with Specifications.
4. Test strength of the shotcrete as work progresses as follows:
    a. Cut cores from the structure and test in accordance with ASTM C42.
    b. A set of three (3) cores shall be taken not less than once each shift nor less than one for each 50 cubic yards of shotcrete placed through the nozzle.
    c. Cores shall be soaked in water for a minimum of 40 hours before testing.

5. When the length of a core is less than twice the diameter, apply the correction factors given in ASTM C42 to obtain the compressive strength of individual cores. The average compressive strength of three cores taken from the structure, representing a shift or 50 cubic yards of shotcrete, must equal or exceed 0.85f'c with no individual core less than 0.75f'c.

B. Certification: Nozzleman certification shall be in accordance with ACI 506.3R

C. Pre-Bid Conference (if applicable): Prior to submitting bid, attend pre-bid conference with ENGINEER to review sample requirements and artistic effect desired.

D. Regulatory Requirements: Meet requirements of applicable laws, codes, and regulations required by authorities having jurisdiction over Work.

E. CONTRACTOR Mock-Ups:
    a. CONTRACTOR shall prepare a mock-up for each paving type indicated on Drawings, prior to installation.
    b. Mock-Ups shall be completed to the satisfaction of the Architect, Landscape Architect, and OWNER including aggregates, texture, color, and finishes.

c. These mock-ups will become the standard of quality by which future paving samples and work will be judged.
d. Mock-Ups to remain on-site and be protected during the course of construction, as a means to compare work in progress. If mock-ups are damaged or removed, CONTRACTOR shall repair/replace in-kind immediately.

F. Concrete Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

G. CONTRACTOR Experience: Provide evidence to indicate successful experience in providing cast-in-place concrete work for skate parks similar in scope to that specified herein and can demonstrate successful experience through past project documentation and references.

1. Required Experience: CONTRACTOR or Subcontractor must have completed 3 public concrete skate park facilities with a minimum size of 6,000 square feet, in the last 2 years. Parks must be open and in good operating condition for at least one year. Only those projects where the complete construction of the facility has been the sole responsibility of your firm will be considered acceptable projects.
2. Evidence of Experience: CONTRACTOR or Subcontractor shall submit to Architect satisfactory documentation of the aforementioned experience and qualification. If a CONTRACTOR cannot provide this information or if it is unverifiable, work under this Section and any other related Section cannot be completed by CONTRACTOR. This submission must contain the Project Name & Location, OWNER's Name & Contact Information, Architect Name & Contact Information, Project Size, Contract Value, Completion Date, and Supervisor and/or Key Personnel responsible for this experience for each of the qualifying projects.
3. Installer: Provide evidence to indicate successful experience in providing cast-in-place concrete work for skate parks similar to that specified herein and can demonstrate successful experience through past project documentation and references

4. Skilled Workers: Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.

Safety and Performance Guidelines: Comply with all safety and performance requirements and all applicable references as specified in the ASTM F2480 Standard Guide for In-ground Skate Parks.

H. ACI Requirements: Meet all requirements of ACI 506, Chapter 13, Wet Method and Chapter 5, Shotcrete Crew.

1.6 DELIVERY, HANDLING, AND STORAGE

A. Properly deliver and handle materials to prevent contamination, segregation or damage to materials.

B. Store cement in weathertight enclosures to protect against dampness and contamination.

C. Prevent segregation and contamination of aggregates by proper arrangement and use of stockpiles.

E. Store admixtures properly to prevent contamination, evaporation, or other damage.

F. Do not change brand of cement or source of aggregate during course of Work.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

A. Portland Cement: ASTM C150, Type I or II, one brand only.

B. Normal Weight Aggregates: ASTM C33 and as herein specified. Aggregate shall comply with gradation No. 2 as shown in ACI 506R Table 2.1. If the CONTRACTOR can show satisfactory performance of an alternate grading under similar conditions of use, the ENGINEER may waive the requirement for gradation No. 2.

Combined gradation of coarse and fine aggregate as follows:

Sieve Size U.S. Standard Square Mesh	Percent by Weight Passing Individual Sieves
3/8 in	90-100
No. 4	70-85
No. 8	50-70
No. 16	35-55
No. 30	20-35
No. 50	8-20
No. 100	2-10

2. Batch fine coarse aggregates separately to avoid segregation.
3. Aggregates shall be free from clay, mud, loam, or other deleterious substances.
4. Dune sand, bank run sand, and manufactured sand are not acceptable for fine aggregate.
5. Coarse aggregate shall be clean, un-coated, heavy media processed aggregate of crushed stone or river washed aggregate.

2.2 ACCESSORIES

A. Water: Fresh, clean, potable, and free of deleterious acids, mixing, and curing water, as available from OWNER. Transport as required.

B. Admixtures: Use only accepted admixtures meeting the following requirements:
   1. Chemical Admixtures: ASTM C494
   2. Water reducing, retarding or accelerating admixtures shall conform to ASTMC.
   3. Air-entraining Admixtures: ASTM C1141. Air entraining prior to shooting shall be 7% with a +/- 1-1/2% tolerance.
   4. The use of Calcium Chloride shall not be permitted. The CONTRACTOR shall submit details of proposed admixtures with the concrete mix design.

C. Key-Joints: See Cast-In-Place Concrete - Section 03310.

2.3 PROPORTIONING AND DESIGN OF CONCRETE MIXES

A. Mix: Prepare design mix to achieve an in-place 28 day compressive strength of 4,000 pounds per square inch and an air content of 4% at 28 days. Maximum aggregate size shall not exceed 3/8 inch. Unit weight of in-place shotcrete shall be 494 pounds per cubic yard. Use an independent Testing CITY acceptable to the County to prepare and report the proposed mix design. Testing is at the cost of the CONTRACTOR.

B. Test Data: Submit for acceptance proportioning and test data from prior experience if available. If data from prior experience are not available or accepted, make and have tested specimens from three or more different mix proportions in accordance with pre-construction testing requirements of this Specification.

C. Strength: Selected mix proportions on the basis of compressive strength tests of specimens shall be cut from the shotcrete test panels not earlier than 5 days after placing. For mix acceptance purposes, average core strengths shall be least equal to f'c for cores with L/D of 2.0. For cores with L/D between 1.0 and 2.0, use correction factors given in ASTM C42.

D. Review: Mix design shall be reviewed for acceptance by ENGINEER.

2.4 CONCRETE APPLICATION EQUIPMENT

A. For Wet Mix Shotcrete:
   1. Mixing Equipment: Capable of thoroughly mixing aggregate, cement and water in sufficient quantity to maintain continuous placement.
   2. Ready-mixed Concrete: ASTM C94, except that it may be delivered to the site in the dry state if the equipment is capable of adding the water and mixing it satisfactorily with the dry ingredients.
   3. Air Supply: Clean air adequate for maintaining sufficient nozzle velocity for parts of work, and for simultaneous operation of blow pipe for cleaning away rebound.
   4. Delivery Equipment: Capable of discharging aggregate-cement-water mixture accurately, uniformly, and continuously through delivery hose.

PART 3 –EXECUTION / CONSTRUCTION

3.1 INSPECTION

A. Examination: Examine concrete formwork and verify that it is true to line and dimension, adequately braced against vibration, and constructed to permit escape of air and rebound but to prevent leakage during shotcreting. Correct deficiencies.

B. Inspection: Inspect reinforcement steel and items to be embedded in concrete. Correct any deviations from the accepted shop drawings.

C. Notification: Notify other trades involved in ample time to permit the proper installation of their work. Cooperate in setting such work.

D. Existing Surfaces: Examine existing concrete surfaces for unsound material. Correct deficiencies.

3.2 PREPARATION FOR INSTALLATION OF CONCRETE

A. Forms: Use a form-coating material on removable forms to prevent absorption of moisture and to prevent absorption of moisture and to prevent bond with shotcrete.

3.3 CONCRETE BATCHING AND MIXING

A. Proportions: Mix proportions shall be controlled by weight batching. CONTRACTOR's Testing Laboratory shall maintain quality control records during shotcrete production and make those records available to ENGINEER.

3.4 CONCRETE PLACEMENT

A. Placement: Use suitable delivery equipment and procedures that will result in shotcrete in place meeting the requirements of this Specification. Determine operating procedures for placement in, extended distances, and around any obstructions where placement velocities and mix consistency must be adjusted.

B. Placement Techniques: Do not place shotcrete if drying or stiffening of the mix takes place at any time prior to delivery to the nozzle.
   1. Control thickness, method of support, air pressure, and/or water content of shotcrete to preclude sagging or sloughing off. Discontinue shotcreting or provide suitable means to screen the nozzle stream if wind or air currents cause separation of the nozzle stream during placement.
   2. Hold nozzle as perpendicular to surface as work will permit, to secure maximum compaction with minimum rebound.
   3. In shotcreting walls, begin application at bottom. Ensure work does not sag.
   4. Layering:
      a. Build up layers by making several passes of nozzle over work area.

b. Broom or scarify the surface of freshly placed shotcrete to which, after hardening, additional layers of shotcrete are to be bonded. Dampen surface just prior to application of succeeding layers.
c. Allow each layer of shotcrete to take initial set before applying succeeding layers.
d. Use radial templates to insure exact radii from flat bottom of Skate Park to face of coping. Template shall be fabricated from steel or ¾" Plywood. Check every horizontal foot when applying shotcrete for conformance of intended wall radii. Brace template and place levels at arc to tangent connections to insure no kinks will be formed. Kinks at the bottom of bowls will not be acceptable. Slumping of the shotcrete causing coping setback will not be acceptable.

5. Placement Around Reinforcement:
   a. Hold the nozzle at such distance and angle to place materials behind reinforcement before any material is allowed to accumulate on its face. In the dry-mix process, additional water may be added to the mix when encasing reinforcement to facilitate a smooth flow of material behind the bars.
   b. Test to ascertain if any void or sand pockets have developed around or behind reinforcement by probing with an awl or other pointed tool after the shotcrete has achieved its initial set, by removal of randomly selected bars, or coring or other suitable standards.

C. Access: Allow easy access to shotcrete surfaces for screening and finishing, permitting uninterrupted application.

3.5 REMOVAL OF SURFACE DEFECTS IN CONCRETE

A. General: Remove and replace shotcrete which lacks uniformity, exhibits segregation honeycombing, or lamination, or which contains any dry patches, slugs, voids, or pockets. Remove defective areas.

B. Sounding: Sound work with hammer for voids. Remove and replace damaged in-place Shotcrete.

3.6 CONCRETE FINISH

A. Finish-General: Smooth form finish shall consist of a smooth, hard, uniform texture with a minimum of seams

B. Radial Wall Finish: Float finish on radial face of wall shall consist of a smooth, hard, uniform surface of smooth steel trowel. Level to a tolerance of ¼" inch in 10 feet when tested with a 10-foot steel straightedge placed on the surface horizontally and vertically with radial template with the appropriate radii. Grinding the surfaces will not be an acceptable means of achieving the intended radii. Concrete finish work shall match the approved sample poured on site.

3.7 CONCRETE JOINTS

A. Cleaning: The entire joint shall be thoroughly cleaned and wetted prior to the application of additional shotcrete.

B. Reinforcement: Make joints perpendicular to the main reinforcement. Continue reinforcement across joints.

3.8 CONCRETE CURING AND PROTECTION

A. Curing Agent: Apply curing agent, blankets, or plastic after final finish is achieved. Submit proposed product to ENGINEER for approval. CONTRACTOR to remove cure agent at end of cure period and power wash all walls prior to final acceptance.

3.9 CLEAN UP

A. At completion of Work, remove concrete stains from adjacent work, including but not limited to dissimilar paving types, walls, columns, railing posts, light fixtures, plant materials, to satisfaction of ENGINEER.

B. Efflorescence: Remove efflorescence [as soon as practical after it appears] as part of final cleaning.

C. Use least aggressive cleaning techniques possible.

D. Wear protective eye wear, gloves, and clothing suitable to work and as required by cleaner manufacturer.

E. If proprietary cleaning agents are used, pre-wet wall, test cleaning agent on a small, inconspicuous area, and check effects prior to proceeding. Begin cleaning at the top and work down. Thoroughly rinse wall afterwards with clean water. Follow cleaner manufacturer's instructions.

F. Do not use muriatic (hydrochloric) acid on colored concrete.

END OF SECTION

SECTION 03391

CONCRETE CURING (SKATE PARK)

PART 1 – GENERAL

1.0 SPECIALTY SKATE PARK CONSTRUCTION

A. All work contained in this Section is considered specialty skate park construction. Only those firms that meet the minimum experience requirements contained in the QUALITY ASSURANCE Section may perform this work as specified herein.

1.1 GENERAL CONDITIONS

A. Requirements of the Contract Documents, including but not limited to, the General, Special, and Technical Provisions, apply to work in this Section with the same force and effect as though repeated in full herein.

1.2 SCOPE OF WORK

A. Furnish materials, labor, transportation, services, and equipment necessary to install all Concrete Curing related to the skate park as indicated on the Drawings complete as shown and as specified herein.

B. Related Work:
   1. Section 03301 – Cast-In-Place Concrete (Skate Park)
   2. Section 03371 – Shotcrete (Skate Park)

1.3 REFERENCES

A. Comply with the applicable reference specifications as specified in the GENERAL PROVISIONS and in accordance with applicable laws, codes and regulations required by City of Somerville, LA. Comply with the current provisions of the following Codes and Standards:

B. ASTM - American Society for Testing and Materials:
   1. ASTM C94 – Ready-Mixed Concrete.
   2. ASTM C150 – Portland Cement.
   3. ASTM C271 – Sheet Materials for Curing Concrete.
   4. ASTM C309 – Liquid Membrane-Forming Compounds for Curing Concrete.
   5. ASTM F2480 – Standard Guide for In-ground Concrete Skate Park.

C. ACI – American Concrete Institute:
   1. ACI 301 – Specifications for Structural Concrete for Buildings.
   2. ACI 305 – Recommended Practice for Hot Weather Concreting.
   3. ACI 306 – Recommended Practice for Cold Weather Concreting.

4. ACI 318 – Building Code Requirements for Reinforced Concrete.

D. IBC – International Building Code

1.4 SUBMITTALS

A. In accordance with Contract Documents, General, Special and Technical Provisions.

1.5 QUALITY ASSURANCE

A. Concrete Testing:
   1. Prepare test specimens by each application crew using the equipment, materials and mix proportions proposed for the ENGINEER shall observe preparation of test panels noting placement of shotcrete by applications crew.
   2. Test panel shall be at least 6'x6'x6' with the same reinforcement as in the proposed structure. A testing CITY shall take at least (3) cores from the specimen and test them in accordance with ASTM C42.
   3. Secure and protect Test Panels during construction and test for compliance with Specifications.
   4. Test strength of the shotcrete as work progresses as follows:
      a. Cut cores from the structure and test in accordance with ASTM C42.
      b. A set of three (3) cores shall be taken not less than once each shift nor less than one for each 50 cubic yards of shotcrete placed through the nozzle.
      c. Cores shall be soaked in water for a minimum of 40 hours before testing. Test strength of the shotcrete as work progresses as follows:
   5. When the length of a core is less than twice the diameter, apply the correction factors given in ASTM C42 to obtain the compressive strength of individual cores. The average compressive strength of three cores taken from the structure, representing a shift or 50 cubic yards of shotcrete, must equal or exceed 0.85f'c with no individual core less than 0.75f'c.
   6. Shotcrete core grade 2 required.

B. Acceptance: Final acceptance of the shotcrete will be based upon the results obtained from cores. Amean core grade of 2.5 or less is acceptable. Individual shotcrete cores with a grade greater than 3 are unacceptable. Use of data obtained from impact devices will not be permitted for final acceptance of the shotcrete. However, this data may be useful for determining uniformity of the shotcrete.

C. Certification: Nozzleman certification shall be in accordance with ACI 506.3R

D. Regulatory Requirements: Meet requirements of applicable laws, codes, and regulations required by authorities having jurisdiction over Work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials in dry and protected locations and protect from damage.

1.7 SITE CONDITIONS

A. Environmental Requirements: Protect concrete against extreme cold and heat, frost, rapid drying, and damage by rain.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Curing Compound: ASTM C 309, non-staining, all resin type, white-pigmented, compatible with color admixture.
B. Acceptable Product: Burke Spartan-Cote Cure or Evercrete Deep Penetrating Sealer (DPS). Curing Compound Application Rate: 350 sq. ft./U.S. Gallon (12.5m sq./L)

PART 3 – EXECUTION / CONSTRUCTION

3.1 CURING

A. Protect concrete surfaces against rapid drying. Keep sealed with cure agent for necessary amount of time to reach concrete strength and inhibit moisture loss after placing per manufacturer's recommendation.

B. Apply to exposed surface of concrete as soon as manufacturer recommends with an airless sprayer.

C. Apply to sides of concrete paving upon removal of form boards.

D. Meet requirements of manufacturer's current printed application instructions.

E. Uniformly apply 2 coats and apply the second coat at right angle to first coat.

F. Apply compound to form a continuous, uniform, coherent film that will not check, crack, or peel.

G. Do not apply to concrete that is still bleeding, or has a visible water sheen on the surface.

H. Protect paving surfaces from foot traffic with scuff-proof paper.

I. Immediately re-coat damaged areas of curing compound.

J. Protect surface from water, adjacent shotcrete work and debris.

3.2 CLEANUP

A. CONTRACTOR to remove all cure agent from concrete surface with power washing equipment and soft brush not causing abrasion to finish work surface prior to final inspection. No Cure Agent shall be present on any surfaces for final inspection acceptance. Remove debris and trash resulting from specified work.

END OF SECTION

SECTION 04400
DRY-PLACED BOULDERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The General Documents, as listed in the Table of Contents, and applicable parts of Division 1, General Requirements shall be included in and made a part of this Section.

B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this trade.

1.02 SCOPE OF WORK

A. The work of this Section shall consist of sourcing, transporting and placing granite boulders as shown on the Drawings and as directed by the Owner's Representative. Please note, the Owner's Representative is working with MassDOT to secure granite boulders from their stockpile in Saugus. While this resource is not a guarantee, the contractor should consider it while bidding. The work includes, but is not limited to, the following boulder types:

1. Rounded Boulders
2. Rectangular Boulders
3. Stone Steps

1.03 RELATED WORK UNDER OTHER SECTIONS

A. The following items of related work are specified and included in other Sections of the Specifications:

1. Section 02350, EXCAVATION BORROW AND BACKFILL

1.04 EXAMINATION OF CONDITIONS

A. The Contractor shall fully inform himself of existing conditions of the site before submitting his bid, and shall be fully responsible for carrying out all site work required to fully and properly execute the work of the Contract, regardless of the conditions encountered in the actual work. No claim for extra compensation or extension of time will be allowed on account of actual conditions inconsistent with those assumed.

B. Plans, surveys, measurements and dimensions under which the work is to be performed are believed to be correct to the best of the Owner's Representative's knowledge, but the Contractor shall have examined them for himself during the bidding period, as no allowance will be made for any errors or inaccuracies that may be found therein.

1.05 SCHEDULING

A. The Contractor shall submit to the Owner's Representative, for approval by the Owner, a progress schedule for all work as specified herein.

1.06 QUALITY ASSURANCE

A. Materials and methods of construction shall comply with the following standards:

1. ASTM: American Society for Testing and Materials
2. AASHTO - American Association of State Highway and Transportation Officials (tests or specifications). AASHTO or AASHO
3. Massachusetts Department of Transportation (MassDOT) Standard Specifications for Highways and Bridges.

B. Qualifications of Workers: Use adequate numbers of skilled workers who are trained in the necessary crafts and who are completely familiar with the specified requirements and methods needed for the proper performance of the work of this Section.

C. Layout: After staking out the work, and before beginning final construction, obtain the Owner's Representative's approval for layout. Contractor shall make adjustments as determined by the Owner's Representative. Owner's

Representative may make adjustments to layout as is required to meet existing and proposed conditions without additional cost to the contract price.

1.07 SUBMITTALS

A. Samples of all new materials proposed for the project shall be submitted to the Owner's Representative for review. Size of the samples shall be as approved by the Owner's Representative.

B. The Contractor shall submit shop drawings on the stone steps.

PART 2 - MATERIALS

2.01 BOULDERS

A. Approximately two (2) weeks prior to anticipated transport, the Contractor shall notify the Owner's Representative to field select each boulder to be reused. The Contractor shall coordinate with the Owner's Representative such that she/he is present while blocks are loaded onto trucks. Rough-cut boulders shall be of an approved size and shape with dimensions as noted below, in the amounts shown on the drawings:
   a. Rectangular boulders dimensions shall be approximately 12-24-inches high by 12-24-inches wide by 36-60-inches long.
   b. Rounded boulders shall range in size from two (2) feet to four (4) feet in both diameter and height. Boulders shall be smooth and rounded in shape with no sharp corners or angular projections greater than fifteen (15) degrees.

B. Stone steps shall be sized in the dimensions as indicated on the contract drawings. If salvaged stones in the correct dimensions are not available, the Contractor has the option to source new rough cut boulders in the dimensions indicated on the contract drawings.

C. The Contractor should expect to handle each stone a minimum of three times: 1) to move from current location into classification piles, 2) to mock up in final location to ensure fit, and 3) to install in final location. In most cases it is expected that steps two and three are combined and fitting can be done in place, but the Contractor must be aware the project calls for dealing with boulders that will need to be carefully placed for best fit.

D. Boulders shall contain no sharp corners or angular projections, to a fifteen (15) degree angle maximum, and shall be field approved by the Owner's Representative.

E. The Contractor shall notify the Owner's Representative when site preparation is complete. Spacing and location of the boulders shall be as shown on the plans or as required by the Owner's Representative. Preliminary placement of boulders shall be "dry" (without mortar). The Contractor shall make adjustments in the boulder placement as required by the Owner's Representative. After the arrangement of boulders is approved by the Owner's Representative, the Contractor shall set the boulders into grade on a compacted gravel base as necessary to set the boulders in a stable position and to prevent future removal or displacement of the boulders.

F. All existing rectangular boulders located on site and those retrieved from the Franklin Park Maintenance Yard shall be pressure-washed prior to installation. The Contractor shall pressure-wash all boulders again at the end of the Contract work, just prior to project completion. All boulders shall be cleaned free from marks or scars caused by construction equipment.

PART 3 - EXECUTION

3.01 INSTALLATION

A. The Contractor is also responsible for retrieving, loading, and hauling stockpiled granite blocks and installing them in their final location in accordance with the Contract Drawings.

B. The installer shall examine previous work, related work, and conditions under which this work is to be performed and notify the Contractor in writing of all deficiencies and conditions detrimental to the proper completion of this work. Beginning work means installer accepts substrates, subgrades, previous work, and conditions.

- END OF SECTION -

SECTION 05000

MISCELLANEOUS METALS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. All of the Contract Documents, including the General and Supplementary Conditions and Division 0 – Bidding Documents, Contract Forms, and Conditions of the Contract and Division 1 – General Requirements, apply to the work of this Section.

B. Carefully examine all the Contract Documents for requirements which affect the work of this Section. The exact scope of this Section cannot be determined without a thorough review of all specification sections and other Contract Documents.

1.02 REFERENCES

A. The General Documents, as listed on the Table of Contents, and applicable parts of Division 1, GENERAL REQUIREMENTS, shall be included in and made a part of this Section.

B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this trade.

1.03 WORK INCLUDED

A. The work of this Section consists of all miscellaneous site metals and related items as indicated on the Drawings and/or as specified herein and includes, but is not limited to, the following:

1. Hand Railings
2. Hammock Posts with custom connections to match Corocord fixture
3. Angle Iron for raise community and school garden beds
4. Metal Post for yard hydrant

B. Under work of this Section provide color finish for material items furnished under SITE FURNISHINGS Section.

1.04 RELATED WORK UNDER OTHER SECTIONS

A. The following items of related work are specified and included in other Sections of the Specifications:

1. Site Furnishings
2. Concrete

1.05 STANDARDS

A. The following standards including all current amendments form a part of these Specifications:

1. American Society for Testing and Materials (ASTM):

A36	Structural Steel
A53	Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless
A120	Pipe, Steel, Black and Hot-Dipped Zinc Coated (Galvanized), Welded and Seamless, for Ordinary Uses
A307	Carbon Steel Externally and Internally Threaded Standard Fasteners
A325	High Strength Bolts for Structural Steel Joints
A500	Cold Formed Welded and Seamless Carbon Steel Structural Tubing Rounds and Shapes

2. American Welding Society (AWS):
D1.1 Structural Welding Code

3. Steel Structures Painting Council (SSPC):
SSPC Surface Preparation Specifications

1.06 SAMPLES AND SUBMITTALS

A. At least thirty days prior to intended use, the Contractor shall provide the following samples and submittals for approval in conformance with requirements this specification. Do not order materials until Landscape Architect's approval of samples, certifications or test results have been attained. Delivered materials shall closely match the approved samples.

1. Shop Drawings: Submit detailed shop drawings for each item required to be fabricated or installed under work of this Section. Include plans, sections, and details as required to show completely materials, layout, jointing, clearances and connections for all items required. Shop drawings for handrails at stairs and at other site conditions requiring accurate dimensional relationships to as-built construction shall be prepared following a review and confirmation of as-built measurements and conditions for areas scheduled to receive miscellaneous metal items. Submit shop drawings for the following:

a. Handrails
b. Angle iron bracing at community and school garden bed
c. 4” diam Hammock posts
d. 4” diam yard hydrant posts

2. Material Samples: Submit samples for each material for the following:

a. Railing tube material and finishes – submit one (1) sample
b. Sheet metal material and finishes – submit three (3) samples of finishes for brushed stainless steel per manufacturer’s recommendation and Owner’s direction.
c. Paint chip of PANTONE # 375 which is the finish for all items above

3. Manufacturer's Literature: Submit three (3) copies each of manufacturer's material descriptions and installation instructions for the following:

a. Non-shrink cement grout,
b. Sealant.

4. Finishing Schedule: Submit a complete schedule outlining all items to be color finished under work of this Section together with a breakdown of surface preparation techniques and primer and color finish materials to be applied.

PART 2 - PRODUCTS

2.01 STEEL PIPE HANDRAILS

A. Steel pipe for straight sections and for pipe sleeves shall be schedule 40 circular seamless steel pipe in accordance with ASTM A120.

B. Steel pipe for all railings with curved sections shall be Schedule 40, circular, seamless steel pipe in accordance with ASTM A53 requirements. Curves shall be formed to maintain uniform cross-section of pipe and to produce smooth and continuous alignments.

C. Square or rectangular steel tubing as required, shall conform to requirements for ASTM A500, Grade B, structural steel tubing. Wall thickness shall be one-eighth inch (1/8") or as detailed.

D. Steel hardware for designated structural purposes shall conform to ASTM A325 requirements for galvanized hardware.

E. Handrail, guardrail, and tubular steel pipe size shall be one and one-half inches (1.5") O.D. unless designated otherwise on the details.

F. Fabrication: Steel railings shall be fabricated in accordance with details, specifications and approved shop drawings. Steel fabrication shall be accomplished using the highest standards of workmanship. Individual steel pieces shall be saw-cut, formed with "fish-mouth" joints, and shall be full seam welded, ground smooth and sanded to produce a high standard of surface smoothness. No grinding marks shall be visible in the finished work.

G. Welding shall be in conformance to AWS code.

H. Following fabrication, pipe rails shall be painted in accordance with metal finishing in Section 09900 PAINTING.

I. Cement grout for anchoring of railings shall be a pourable, quick-setting, non-metallic and non-shrinking hydraulic cement grout equal to "Por-Rok Cement" supplied by Waldo Bros., Roslindale, MA, "Rockite" as manufactured by Hartline Co., Cleveland, OH, "Wedj-Rok" as manufactured by Metalcrete Manufacturing Co., Cleveland, OH, or approved equal.

J. Sealants shall be polyurethane-based, one component, elastomeric sealants complying with Fed. Spec. TT-S-00230C, Class A, Type 2. Color to be selected by Landscape Architect. Sealants shall be non-sag, gun-grade type, equal to the following:

a. Vulkem 116, as manufactured by Mameko International, Cleveland, OH.

b. Sikaflex 1-a, as manufactured by Sika Corp., East Hartford, CT.

c. Dynatrol 1, as manufactured by Pecora Corporation and supplied by Waldo Brothers, Boston, MA.

K. Poured-in-place concrete footings, where required, shall conform to requirements for twenty-eight (28) day compressive strength 3,000 psi, three-quarter inch (3/4") aggregate concrete, in accordance with requirements of Section 03300, CAST-IN-PLACE CONCRETE.

L. FINISHES shall be as follows: Cold galvanizing compound shall be a single component zinc rich compound yielding a dry film of at least 85% pure zinc. Galvanizing compound shall meet or exceed the requirements of Federal Specification MIL-P-21035, TT-P-641d primer for zinc rich compounds. Finish color coating shall be Color Galvanized PANTONE #375 as provided by Duncan Galvanizing, Inc., or approved equal.

2.02 ANCHORING CEMENT

A. Cement for anchoring posts in sleeves embedded in concrete walls or walkway

haunches shall be "SUPER POR-ROK", as manufactured by Hallemite (Lehn and Fink Industrial Products Division of Sterling Drugs, Inc.), Montvale, New Jersey, or approved equal.

2.04 MISCELLANEOUS HARDWARE

A. Steel dowels for anchoring or aligning concrete and granite work described under Other Sections shall be fabricated of AISI Type 304 stainless steel, meeting requirements of ASTM A276.

B. Miscellaneous stainless steel hardware as required for the project shall be 18-8 stainless steel (AISI Type 304).

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C. Bolts: 3/8" Dia. SS Kwik Bolt II Expansion Anchor – Countersunk Version by HILTI Inc., PO Box 21148, Tulsa, OK, 74121

PART 3 - EXECUTION

3.01 STEEL PIPE HANDRAILS

A Fabrication of rail sections shall be in strict conformance with the approved shop drawings.

B All welding shall conform to the requirements of structural welding code AWDS1-1-79.

C. All welds shall be ground smooth, and all sharp edges, burrs, and other potentially hazardous irregularities shall be ground smooth and otherwise removed prior to cold galvanizing

3.02 RAIL ERECTION

A. Post sleeves, in the appropriate sizes, as shown on the drawings shall have been placed during the construction of the stairs in accordance with the details shown on the drawings and the pertinent provisions of Section 9.01 of these specifications.

B. After the ramp and stairs have sufficiently set and cured, as determined by the Engineer, the handrail posts shall be positioned in the sleeves and temporarily wedged in place so that the handrail is vertically plumb and horizontally straight for its complete length.

C. After the handrail has been satisfactorily positioned, the sleeves shall be filled with the approved anchoring cement with care taken not to create voids between the post and sleeves nor spill excess cement on adjacent concrete. The fence shall be braced in position until the cement has properly set. Any movement caused by

the Contractor's negligence shall be remedied as directed by the Engineer.

3.03 TOUCH-UP OF SURFACES

A. After erection, all scratches or abrasions in the color galvanized surface shall be repaired or replaced to the satisfaction of the Engineer.

B. Fabricate and install steel pipe handrails in conformance to details, and approved shop drawings. Measure on-site conditions to receive rails prior to preparing shop drawings.

C. For railings longer than twenty feet (20'), provide an internal sleeved expansion coupling joint at approximately fifteen foot on center (15' o.c.) intervals, using a six inch (6") length of internally sleeved pipe welded to one side of joint.

D. At stairways and at other locations as directed, install railings within cored holes. Grout rails to within one-half inch (1/2") of top surface and provide a sealant joint to finished grade. Sealant color to be approved by Landscape Architect.

3.05 MISCELLANEOUS HARDWARE

A. Furnish dowels and other miscellaneous hardware items for work of other Sections as specified and/or as required on the Drawings.

B. All anchoring systems employed shall be vandal-proof.

END OF SECTION

SECTION 05010

PARK SIGNAGE

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. All of the Contract Documents, including the General and Supplementary Conditions and Division 0 – Bidding Documents, Contract Forms, and Conditions of the Contract and Division 1 – General Requirements, apply to the work of this Section.

B. Carefully examine all the Contract Documents for requirements which affect the work of this Section. The exact scope of this Section cannot be determined without a thorough review of all specification sections and other Contract Documents.

1.1 REFERENCES

A. The General Documents, as listed on the Table of Contents, and applicable parts of Division 1, GENERAL REQUIREMENTS, shall be included in and made a part of this Section.

B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this trade.

1.2 WORK INCLUDED

A. The work of this Section consists of all park signage and related items as indicated on the Drawings and/or as specified herein and includes, but is not limited to, the following:

1. Signage with posts
2. Park Plaques

B. Under work of this Section provide color finish for material items furnished under SITE FURNISHINGS Section.

1.3 RELATED WORK UNDER OTHER SECTIONS

A. The following items of related work are specified and included in other Sections of the Specifications:

1. Cast-in-Place Concrete

1.4 STANDARDS

A. The following standards including all current amendments form a part of these Specifications:

1. American Society for Testing and Materials (ASTM):

A36	Structural Steel
A53	Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless
A120	Pipe, Steel, Black and Hot-Dipped Zinc Coated (Galvanized), Welded and Seamless, for Ordinary Uses
A307	Carbon Steel Externally and Internally Threaded Standard Fasteners
A325	High Strength Bolts for Structural Steel Joints
A500	Cold Formed Welded and Seamless Carbon Steel Structural Tubing Rounds and Shapes

2. American Welding Society (AWS):
   D1.1 Structural Welding Code

3. Steel Structures Painting Council (SSPC):
   SSPC Surface Preparation Specifications

1.5 SAMPLES AND SUBMITTALS

A. At least thirty days prior to intended use, the Contractor shall provide the following samples and submittals for approval in conformance with requirements this specification. Do not order materials until Landscape Architect's approval of samples, certifications or test results have been attained. Delivered materials shall closely match the approved samples.

1. Shop Drawings: Submit detailed shop drawings for each item required to be fabricated or installed under work of this Section. Include plans, sections, and details as required to show completely materials, layout, jointing, clearances and connections for all items required. Shop drawings for handrails at stairs and at other site conditions requiring accurate dimensional relationships to as-built construction shall be prepared following a review and confirmation of as-built measurements and conditions for areas scheduled to receive miscellaneous metal items. Submit shop drawings for the following:

   a. Park signage and posts
   b. Park name plaque

2. Material Samples: Submit samples for each material for the following:

   a. Railing tube material and finishes – submit one (1) sample
   b. Sheet metal material and finishes – submit three (3) samples of finishes for brushed stainless steel per manufacturer's recommendation and Owner's direction.

3. Manufacturer's Literature: Submit three (3) copies each of manufacturer's material descriptions and installation instructions for the following:

   a. Non-shrink cement grout,
   b. Sealant.

4. Finishing Schedule: Submit a complete schedule outlining all items to be color finished under work of this Section together with a breakdown of surface preparation techniques and primer and color finish materials to be applied.

PART 2 - PRODUCTS

2.1 SIGNS

A. The contractor shall furnish and install all signs included in the schedule below. Shop drawings for each sign will be produced for review, comment and approval prior to final manufacturing.

City of Somerville, Massachusetts
Lincoln Park Improvements-signage LIST

	Quant.	dimension
Custom Park Entry Sign- Type 1	3	5'x 12'
Custom Park Entry Sign- Type 2	3	4'x8'
Relocated Plaque	1	3' x 4' (est with granite)
dedication medallions	2	18" diameter
City Of Somerville Standard		
Skate Park Rules	1	18"x18"
Relocated Existing Traffic Sign	7	existing
Softball Field Rules	2	18"x18"
Dog Park Rules	2	18"x18"
Playground Rules	2	18"x18"
Community Garden Rules	2	18"x18"
Fitness equipment use	1	18"x18"
Park Rules/Hours	2	18"x24"
Parkour Sign	1	18"x18"
Relocated "tow zone"	1	existing
Relocated H.C. Parking Sign	2	existing
Relocated fire lane sign	4	existing

2.2 STEEL PIPE SIGN POSTS

A. Steel pipe for straight sections and for pipe sleeves shall be schedule 40 square seamless steel pipe in accordance with ASTM A120.

B. Square or rectangular steel tubing as required, shall conform to requirements for ASTM A500, Grade B, structural steel tubing. Wall thickness shall be one-eighth inch (1/8") or as detailed.

C. Steel hardware for designated structural purposes shall conform to ASTM A325 requirements for galvanized hardware.

D. Fabrication: Steel posts shall be fabricated in accordance with details, specifications and approved shop drawings. Steel fabrication shall be accomplished using the highest standards of workmanship. Individual steel pieces shall be saw-cut, formed with "fish-mouth" joints, and shall be full seam welded, ground smooth and sanded to produce a high standard of surface smoothness. No grinding marks shall be visible in the finished work.

E. Welding shall be in conformance to AWS code.

F. Following fabrication, pipe rails shall be painted in accordance with metal finishing in Section 09900 PAINTING.

G. Cement grout for anchoring of railings shall be a pourable, quick-setting, non-metallic and non-shrinking hydraulic cement grout equal to "Por-Rok Cement" supplied by Waldo Bros., Roslindale, MA, "Rockite" as manufactured by Hartline Co., Cleveland, OH, "Wedj-Rok" as manufactured by Metalcrete Manufacturing Co., Cleveland, OH, or approved equal.

H. Sealants shall be polyurethane-based, one component, elastomeric sealants complying with Fed. Spec. TT-S-00230C, Class A, Type 2. Color to be selected by Landscape Architect. Sealants shall be non-sag, gun-grade type, equal to the following:

a. Vulkem 116, as manufactured by Mameko International, Cleveland, OH.

b. Sikaflex 1-a, as manufactured by Sika Corp., East Hartford, CT.

c. Dynatrol 1, as manufactured by Pecora Corporation and supplied by Waldo Brothers, Boston, MA.

I. Poured-in-place concrete footings, where required, shall conform to requirements for twenty-eight (28) day compressive strength 3,000 psi, three-quarter inch (3/4") aggregate concrete, in accordance with requirements of Section 03300, CAST-IN-

PLACE CONCRETE.

2.3 MISCELLANEOUS HARDWARE

A. Steel dowels for anchoring or aligning concrete and granite work described under Other Sections shall be fabricated of AISI Type 304 stainless steel, meeting requirements of ASTM A276.

B. Miscellaneous stainless steel hardware as required for the project shall be 18-8 stainless steel (AISI Type 304).

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C. Bolts: 3/8" Dia. SS Kwik Bolt II Expansion Anchor – Countersunk Version by HILTI Inc., PO Box 21148, Tulsa, OK, 74121

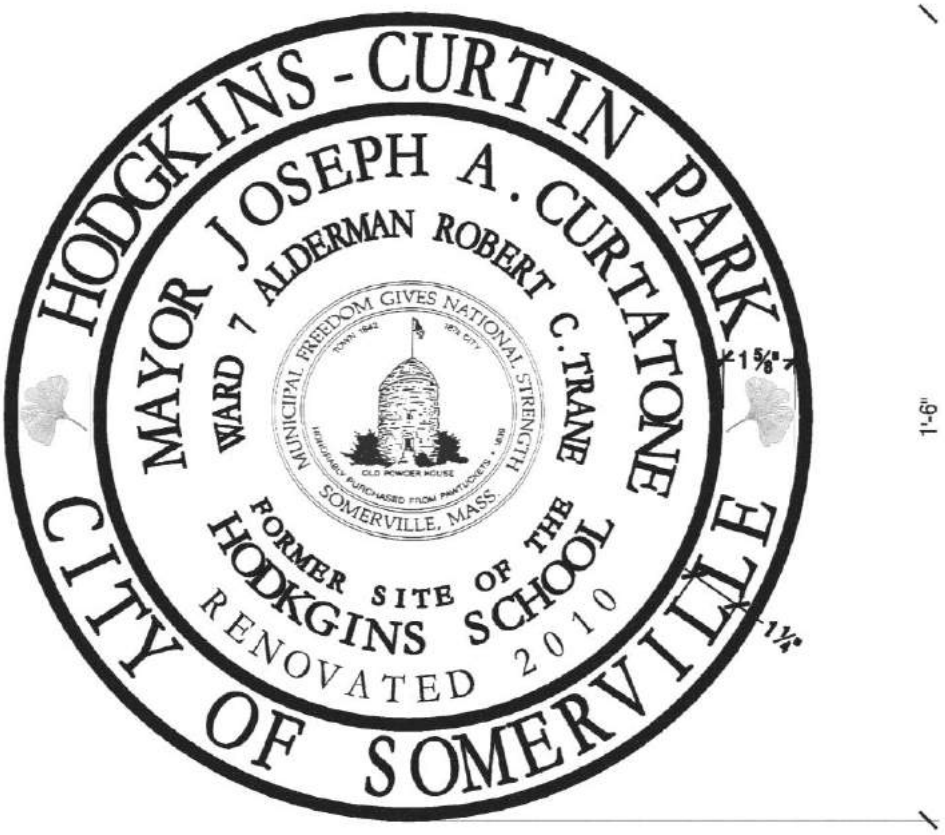
2.4 PIPE AND ACCESSORIES

A. Only weld and seamless galvanized steel pipe shall be utilized.

B. All steel for handrails shall conform to ASTM-A53-67A and all galvanizing shall conform to ASTM-A-123.

2.5 PARK NAME PLAQUES

A. Contractor shall provide and install two (2) new brushed stainless steel 18 inch round dedication plaque which shall be installed flush to grade in the sidewalk at the main park entrance off of Holland Street. The plaque design shall be approximately ¾ inch thick and shall be anchored with an approved bolting system. The Plaque layout shall be provided by the City, however the vendor shall provide a proof of the graphic before it is ordered.



SAMPLE PLAQUE LAYOUT

2.6 GETTYSBURG ADDRESS PLAQUE

A. The Contractor shall transport an existing plaque from City Hall to be installed in a granite block on site. See contract drawings for details. Contractor shall be responsible for carving a suitable setting bed within the granite block so the plaque sits securely, flat and flush and does not protrude beyond the face of the granite block.

PART 3 - EXECUTION

3.1 STEEL PIPE SIGN POSTS

A. Fabricate and install steel sign posts in conformance to details, and approved shop drawings. Measure on-site conditions to receive posts prior to preparing shop drawings.

B. At sidewalks, pavements and at other locations as directed, install posts within cored holes. Grout posts to within one-half inch (1/2") of top surface and provide a sealant joint to finished grade. Sealant color to be approved by Landscape

Architect.

3.2 MISCELLANEOUS HARDWARE

A. Furnish dowels and other miscellaneous hardware items for work of other Sections as specified and/or as required on the Drawings.

B. All anchoring systems employed shall be vandal-proof.

3.3 COLOR FINISHING

A. Color finishing as referenced shall include surface preparation, sanding, and color finishing system as outlined in Section 09900 PAINTING.

3.4 TOUCH-UP OF SURFACES

A. After erection, all scratches or abrasions in the color galvanized surface shall be repaired or replaced to the satisfaction of the Engineer

- - - END OF SECTION - - -

SECTION 05501

METAL FABRICATIONS (SKATE PARK)

PART 1 – GENERAL

1.1 GENERAL CONDITIONS

A. Requirements of the Contract Documents, including but not limited to, the General, Special, and Technical Provisions, apply to work in this Section with the same force and effect as though repeated in full herein.

1.2 SPECIALTY CONSTRUCTION

A. Custom Coping/ Metal Fabrication:
   1. The custom coping and specialty metal fabrication consisting of rolling to specified radii, cutting, piecing, sleeves, anchors, welding and setting to horizontal and vertical elevations is deemed sole source specialty work within the Contract Documents.
   2. All work related to the custom coping, metal fabrication and installation shall be coordinated with ENGINEER, the Skate Park Designer, and the pre-qualified "Sole Source Specialty Builder," prior to project start.
   3. All custom fabricated steel coping and rails to be manufactured and supplied by **Raw Edge Steel**, (Available at Thompson Building Materials, Fontana, CA) or approved equal.

1.3 SCOPE OF WORK

A. Furnish materials, labor, transportation, services, and equipment necessary to install all Metal Fabrications for the skate park as indicated on the Drawings complete as shown and as specified herein.

B. Related Work:
   1. Section 03111 – Concrete Formwork (Skate Park)
   2. Section 03211 – Concrete Reinforcement (Skate Park)
   3. Section 03301 – Cast-In-Place Concrete (Skate Park)
   4. Section 03371 – Shotcrete (Skate Park)

1.4 REFERENCES

A. Comply with the applicable reference specifications as specified in the GENERAL PROVISIONS and in accordance with applicable laws, codes and regulations required by City of Somerville, LA. Comply with the current provisions of the following Codes and Standards:

B. ASTM - American Society for Testing and Materials:
   1. ASTM A36 – Structural Steel.

2. ASTM A120 – Steel Pipe and Tubing.
3. ASTM F2480 – Standard Guide for In-ground Concrete Skate Park.

C. IBC – International Building Code

D. AWS – American Welding Society
   1. AWS D1.1 – Structural Welding Code (latest edition)

E. CRSI – Concrete Reinforcing Steel Institute: "Manual of Standard Practice," latest edition.

F. AISC – American Institute of Steel Construction, Inc: "Specifications of Architecturally Exposed Structural Steel," latest edition.

1.5 QUALITY ASSURANCE

A. Qualifications of Fabricators: Experienced in fabrication of miscellaneous metals.

B. Qualifications of Welders: Welding shall be done only by certified welding operators currently qualified according to AWS D1.1.

C. Qualifications of Workmen: Provide at least one person who shall be present at all times during execution of this portion of the Work, and who shall be thoroughly familiar with the type of materials being installed, the referenced standards, the requirements of this Work, and who shall direct all work performed under this Section. Welds indicated may be made in shop or field with approval.

1.6 SUBMITTALS

A. Shop Drawings:
   1. Submit shop drawings for all custom fabricated items under this section. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners and accessories. Indicate welded connections using standard AWS welding symbols.

   2. Verification: Verify all measurements at the job. Show dimensions, sizes, thicknesses, gauges, finishes, joining, attachments, and relationship of work to adjoining construction. Where items must fit and coordinate with finished surfaces and/or constructed spaces, take measurements at site and not from drawings.

B. Samples: Required for all Coping and Edging of concrete work. Submit finish metal samples for final finish selection. Submit prior to delivery to site. Attach name, address of manufacturer and/or supplier to each sample.

1.7 DELIVERY, STORAGE AND HANDLING

A. Storage of Materials: Materials which are stored at the project site shall be above ground on platforms, skids, or other supports. Protect steel from corrosion. Store other materials in a weather-tight and dry place until ready for use.

B. Protection:
   1. Use all means necessary to protect miscellaneous metals before, during and after installation and to protect the installed work and materials of all other trades.
   2. Protect any adjacent materials or areas below from damage due to weld splatter or sparks during field welding.

C. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the ENGINEER and at no additional cost to the OWNER.

1.8 JOB CONDITIONS

A. Examine existing conditions in which the work is to be installed. Notify ENGINEER if conditions are unacceptable to begin work.

B. Do not proceed with the work until unsatisfactory conditions have been corrected.

1.9 COORDINATION

A. Templates and Built-ins: Furnish all anchors, fastenings, sleeves, setting templates and layouts affecting or installed in the work of other trades.

B. Delivery: Where items must be incorporated or built into adjacent work, deliver to trade responsible for such work in sufficient time that progress of work is not delayed. Be responsible for proper location of such items.

C. Coordination: Coordinate with work of Cast-In-Place Concrete Section 03310.

1.10 JOB SITE SAMPLE

A. CONTRACTOR to provide fabricated, onsite sample of metal item(s), complete with approved finish, for review by ENGINEER before fabrication of total quantities. Any fabrication of project item(s) by CONTRACTOR before OWNER review and approval is subject to rejection.

B. Approved sample(s) shall be used as the standard of workmanship and shall remain on site until work has been completed and approved by the ENGINEER.

PART 2 - PRODUCTS

2.1 MATERIALS

A. 2" ROUND STEEL PIPE COPING: HSS 2.375 X 0.154, ASTM A-500 GRADE B.

B 5" STEEL C-CHANNEL: C 5.000 X 1.885 X 0.325, ASTM A-36, Hot Rolled Steel

C 5" STEEL FLAT PLATE: HR 5.000 X 0.125, ASTM A-569, Hot Rolled Steel Plate.

D. WELDING RODS: E-70 series low hydrogen unless otherwise noted on drawings.

2.2 GROUT: Non-shrinking Master Builder's "Embedco", Conrad Sovig's "Metel-Mxs Grout", Sonneborn's "Ferrolith G Redi-Mixed Grout"' or approved equal.

2.3 OTHER MATERIALS: All other materials, not specifically described but required for a complete and proper installation of miscellaneous metals, shall be new, first quality of their respective kinds and subject to the approval of the ENGINEER.

PART 3 - EXECUTION

3.1 EXISTING CONDITIONS

A. Inspection: Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

B. Discrepancies: In the event of discrepancy, immediately notify the ENGINEER.

3.2 COORDINATION

A. General: Carefully coordinate with all other trades to insure proper and adequate interface of the work of other trades with the Work of this Section.

B. Delivery: Insure timely delivery of all metal fabrications which must be installed in other work so as not to delay that work.

3.3 INSTALLATION

A. General:
1. Install metal fabrications in strict accordance with the Drawings, the approved Shop Drawings, and all applicable codes, regulations and standards.
2. Obtain ENGINEER review prior to site cutting or making adjustments which are not parts of the scheduled work.
3. Install items square and level, accurately fitted and free from distortion or defects.
4. Align all metal fabrications as shown on the Drawings, and where vertical or horizontal members are shown. Align them straight, plumb and level within tolerance.
5. Make provisions for erection stresses by temporary bracing. Keep work in alignment.
6. Replace items damaged in course of installation.

7. Perform field welding in accordance with AWS D1.1
8. After installation, grind smooth and touch-up field welds.

3.4 WORKMANSHIP

A. Layout: Set all work plumb, true, rigid, and neatly trimmed out. Miter corners and angles of exposed molding and frames unless otherwise noted.

B. Fitting: Fit exposed connections accurately together to form tight hairline joints.

C. Labor: Employ only workmen specifically skilled in such work.

3.5 FABRICATION

A. Shop assemble in largest practicable dimensions, making members true to length so assembling may be done without fillers.

B. Provide all surfaces free of file marks, dents, hammer marks, wire edges or any unsightly surface defects.

C. STEEL PIPE COPING: Roll pipe to conform with top radius curve of each bowl and ledge as shown on drawings. Refer to drawings for relational tolerance to concrete surface and other steel.

3.6 ATTACHMENTS AND REINFORCEMENTS

A. Do all cutting, shearing, drilling, punching, threading, tapping, etc., required for site metalwork or for attachment of adjacent work. If applicable, drill or punch holes; do not use cutting torch.

3.7 OTHER CONNECTORS: Make all permanent connections in ferrous metal surfaces using welds where at all possible; do not use bolts or screws.

3.8 WELDING

A. Preparation: Remove all rust, paint, scale and other foreign matter. Wire brush all flame-cut edges. Clamp members as required and alternate welds, all as necessary to prevent warping or misalignment.

C. Exposed Welds: Uniformly grind smooth (no tolerance) all welds normally exposed to view and feel in the finished work.

D. Faulty and Defective Welding: Chip out and replace all welding showing cracks, slag inclusion, lack of fusion, bad undercut or other defects ascertained by visual or other means of inspection. Replace and re-weld at no cost to OWNER.

E. Field Welding:

1. Procedure: Comply with AWS code of manual shielded metal-arc welding, appearance and quality of welds made, and methods used in correcting welding work.
2. Protection: Protect all adjacent surfaces from damage due to weld sparks, spatter, or tramp metal.

3.9 SURFACE TREATMENT AND PROTECTIVE COATINGS

A. Cleaning:
   1. Thoroughly clean all mill scale, rust, dirt, grease and other foreign matter from ferrous metal prior to any galvanizing, or painting.
   2. Conditions which are too severe to be removed by hand cleaning, shall be cleaned using appropriate methods for solvent cleaning, power tool cleaning and brush-off blast cleaning.

B. Exterior Ferrous Metal:

   1. Grind smooth all welds, burrs, and rough surfaces. Clean all coping from grease.
   2. Shop coat iron metal items; using anti-rust primer (red color).

   3. All welds to be painted with primer after appropriate connections and grinding has taken place. Touch-up all scratched primer prior to shotcrete application.

3.10 CLEAN-UP

A. Keep all areas of work clean, neat and orderly at all times. Keep paved areas clean during installation.

B. Clean up and remove all debris from the entire work area prior to Final Acceptance to satisfaction of ENGINEER.

END OF SECTION

SECTION 06100

ROUGH CARPENTRY

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This Section covers tools, equipment, labor, and materials necessary to perform rough carpentry work complete and miscellaneous carpentry items not specified elsewhere including fasteners and supports.

B. Nails, screws, bolts, anchors, brackets, and other hardware for fastening and securing items provided under this section of the specification shall be furnished under this section.

1.02 RELATED WORK:

A. Section 03301, CAST-IN-PLACE CONCRETE

1.03 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

Three sets of certificates of wood treatment upon delivery of treated wood product. Treated wood product shall bear appropriate American Wood Preservers Bureau (AWPB) quality mark.

1.04 DELIVERY:

Lumber, plywood, and other wood material shall be delivered to the job dry, and shall be protected from injury, dirt, dampness, and extreme changes of temperature and humidity at all times.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. LUMBER:

1. The grades of all materials under this section shall be defined by the rules of the recognized associations of lumber manufacturers producing the material specified, but the maximum defects and blemishes permissible in any specified grades shall not exceed the limitations of the American Lumber Standards.

2. Lumber shall bear the grade and trademark of the association under whose rules it is produced, and a mark of mill identification. Lumber shall be of sound stock, thoroughly seasoned, kiln dried to a moisture content not exceeding 15 percent.

3. Exposed surfaces of wood which are to be painted shall be free from defects or blemishes that will show after the second coat of paint is applied.

4. All lumber for nailers, furring, and blocking shall be seasoned No. 1 Dimension of Common pine, fir, or spruce, S4S.

5. Framing Lumber for joists, rafters, plates, headers, stair stringers and carriages, and sleepers shall be Spruce-Pine-Fir (SPF) No. 2 or better, unless noted otherwise.

6. Materials not specifically listed shall be of an accepted grade dictated by good practice.

B. WOOD PRESERVATION TREATMENT:

1. All framing exposed to weather shall be pressure treated with a pentachlorophenol preservative solution. The pentachlorophenol shall meet the requirements of the American Wood-Preserver's Association, AWPA Standard P-8, "Standards for Oil-Borne Preservatives." The solvent carrier shall meet the requirements of AWPA Standard P-9 "Standard for Hydrocarbon Solvents for Oil-Borne Preservatives." The preservative solution shall be equivalent to five percent of pure pentachlorophenol.

2. The treatment shall be applied in accordance with AWPA Standard C-2 (lumber, timber, etc.), C-9 (plywood) or C-28 (lumber treated before laminating). Penetration of pentachlorophenol shall be determined using the penta check method, Section 5, AWPA Standard A-3. Retention of pentachlorophenol shall be a minimum of 0.40 pounds per cubic foot of wood for in ground exposures. The treating company shall furnish a notarized certificate of treatment that indicates all pertinent details of the treatment.

3. Before the preservative treatment is applied, the lumber to be treated shall be sawed to exact lengths required, and bored ready for use in the work so far as practicable, in order to reduce to a minimum cutting or boring of lumber after treatment. Only lumber of the same kind and approximately the same size and seasoning shall be treated in any one charge. All surfaces of treated lumber cut after treatment shall receive two heavy brush coats of pentachlorophenol solution before the lumber is placed in the work.

C. WOOD FIRE RETARDANT TREATMENT:

1. Exposed wood blocking and sheeting shall receive fire-retardant treatment conforming to American Wood Preservers Association, AWPA Standard C20 for lumber and AWPA C27 for plywood.

2. Fire retardant treated lumber shall bear UL label and shall have UL Fire-Hazard Classification "FR-S", when tested in accordance with ASTM E84.

PART 3 - EXECUTION

3.01 CONSTRUCTION:

A. Work shall be erected plumb, true and square.

B. Coordinate delivery and erection of prefabricated components. Field applied items shall be installed in accordance with good trade practices. Cutting and carpentry for other trades shall be performed. Cut ends of lumber previously treated with preservative specified shall be brush coated with the same material.

D. Minimum length of nails shall be twice the thickness of wood being fastened and in accordance with the Massachusetts code requirements for wood frame construction.

E. Furring, blocking, nailers, and similar items shall be provided wherever required for the support, proper erection, fastening, or installation of carpentry or other materials, and as shown on the drawings.

END OF SECTION

SECTION 06200

FINISH CARPENTRY

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This section of the specification covers furnishing tools, equipment, labor and materials necessary to perform finish carpentry work (exterior) complete, and miscellaneous carpentry items not specified elsewhere including fasteners and supports.

B. Metal fasteners, plates, brackets, and accessories connected directly into woodwork shall be a part of this section of the specification. Nails, screws, bolts, anchors, brackets, and other similar hardware for fastening and securing woodwork and other items provided under this section of the specification shall be furnished under this section.

1.02 RELATED WORK:

A. Section 06100, ROUGH CARPENTRY

1.03 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

A. Six sets of manufacturer's literature of the materials of this section shall be submitted to the Engineer for review.

B. Three sets of samples of paneling shall be submitted to the Engineer for selection of colors.

C. Three sets of certificate of wood treatment upon delivery of treated wood product. Treated wood product shall bear appropriate American Wood Preservers Bureau (AWPB) quality mark.

1.04 DELIVERY AND STORAGE:

Finish carpentry material shall be delivered by others to the jobsite. Contractor is responsible for acceptance of delivery and safe storage of all finish carpentry materials until installation. Materials shall be protected from injury, dirt, dampness and extreme changes of temperature and humidity at all times.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. The grades of all materials under this section shall be defined by the rules of the recognized associations of lumber manufacturers producing the material specified, but the maximum defects and blemishes permissible in any specified grades shall not exceed the limitations of the Composite Lumber Standards. Materials not specifically listed shall be of an accepted grade dictated by good practice.

1. Composite lumber shall be Trex Transcend Profiles or approved equal. Decking shall be 2.54cm Square Edge Board in color chosen by the Owners Representative. Contractor is responsible to furnish all stock as well as fasteners required for installation.

B. Composite Lumber shall bear the grade and trademark of the association under whose rules it is produced, and a mark of mill identification. Finished stock shall be of sound stock without defect in a color chosen by the Owner's Representative.

C. Finish carpentry and millwork, in general, shall comply with the following sections or equivalent for composite lumbuer as applicable, of the Architectural Woodwork Quality Standards, Guide Specifications and Quality Certification Program as published by the Architectural Woodwork Institutes for Material and Work of "Custom Grade":

Section l00	Lumber
Section 300	Trim

D. Trim shall be solid stock, in commercial long lengths.

PART 3 - EXECUTION

3.01 CONSTRUCTION:

A. Work shall be erected plumb, true and square. Finish work shall be accurately mitered or butted to meet in straight hairline joints, in accordance with the best commercial practice.

B. Finish nails shall be used on all exposed trim. Stainless steel pre-drilled screws shall be used on all exterior finish decking. **Screw and nail patterns shall be straight, consistent and evenly spaced throughout and marked by chalk line prior to installation.**

C. Minimum length of nails shall be twice the thickness of wood being fastened. Nail heads in finished work shall be sunk neatly with a nail set.

D. Work abutting masonry or other finish materials shall be scribed and fitted as tightly to abutting material as is possible without damaging it.

END OF SECTION

TREX® DECKING

PRODUCT SPECIFICATIONS & PROFILES

DECKING	DESCRIPTION	ITEM NUMBER	COLORS
1" (2.54 cm) Square Edge Board Actual Dimensions: 1" x 5.5" (2.54 cm x 13.97 cm)	1 x 6 x 12' Transcend 1 x 6 x 16' Transcend 1 x 6 x 20' Transcend	XX010612TS48 XX010616TS48 XX010620TS48	TH, VL, GP, FP, SR, LR
	1 x 6 x 12' Enhance 1 x 6 x 16' Enhance 1 x 6 x 20' Enhance	XX010612ES48 XX010616ES48 XX010620ES48	BD, CS
	1 x 6 x 12' Escapes 1 x 6 x 16' Escapes 1 x 6 x 20' Escapes	XX010612ES48 XX010616ES48 XX010620ES48	AC, PW
	1 x 6 x 12' Accents 1 x 6 x 16' Accents 1 x 6 x 20' Accents	XX010612AS48 XX010616AS48 XX010620AS48	WG, WB, MB, SD
1" (2.54 cm) Grooved Edge Board Actual Dimensions: 1" x 5.5" (2.54 cm x 13.97 cm)	1 x 6 x 12' Transcend 1 x 6 x 16' Transcend 1 x 6 x 20' Transcend	XX010612TG48 XX010616TG48 XX010620TG48	TH, VL, GP, FP, SR, LR
	1 x 6 x 12' Enhance 1 x 6 x 16' Enhance 1 x 6 x 20' Enhance	XX010612EG48 XX010616EG48 XX010620EG48	BD, CS
	1 x 6 x 12' Escapes 1 x 6 x 16' Escapes 1 x 6 x 20' Escapes	XX010612EG48 XX010616EG48 XX010620EG48	AC, PW
	1 x 6 x 12' Accents 1 x 6 x 16' Accents 1 x 6 x 20' Accents	XX010612AG48 XX010616AG48 XX010620AG48	WG, WB, MB, SD
1" x 8' (2.54 cm x 2.44 m) Fascia Actual Dimensions: .75" x 7.25" x 12' (1.90 cm x 18.42 cm x 3.66m)	1 x 8 x 12' Transcend	XX010812TS60	TH, VL, GP, FP, SR, LR
	1 x 8 x 12' Enhance	XX010812ES60	BD, CS
	1 x 8 x 12' Smooth	XX010812OS60	WG, WB, MB, SD
1" x 12' (2.54 cm x 3.66 m) Fascia Actual Dimensions: .75" x 11.375" x 12' (1.90 cm x 28.89 cm x 3.66m) Escapes .5" x 11.25" x 12" (1.27 cm x 28.58 cm x 3.66m)	1 x 12 x 12' Transcend	XX011212TS40	TH, VL, GP, FP, SR, LR
	1 x 12 x 12' Enhance	XX011212ES40	BD, CS
	1 x 12 x 12' Smooth	XX011212OS40	WG, WB, MB, SD
	1 x 12 x 12' Escapes	XXH1212B	AC, PW
2" (5.08 cm) Square Edge Board Actual Dimensions: Transcend 2x4: 1.375" x 3.5" (3.49 cm x 8.9 cm) Transcend 2x6: 1.375" x 5.5" (3.49 cm x 13.97 cm) Smooth 2x4: 1.5" x 3.5" (3.81 cm x 8.89 cm) Accents 2x6: 1.5" x 5.5" (3.81 cm x 13.97 cm)	2 x 4 x 12' Transcend 2 x 4 x 16' Transcend	XX020412TS48 XX020416TS48	FP, VL, TH, GP
	2 x 6 x 12' Transcend 2 x 6 x 16' Transcend 2 x 6 x 20' Transcend	XX020612TS32 XX020616TS32 XX020620TS32	FP, VL, TH, GP
	2 x 4 x 16' Smooth	XX020416OS120	WG, WB, MB, SD
	2 x 6 x 12' Accents 2 x 6 x 16' Accents 2 x 6 x 20' Accents	XX020612AS72 XX020616AS72 XX020620AS72	WG, WB, MB, SD
1" Grooved Porch Floor Board Actual Dimensions: 1" x 4.25" (2.54 cm x 13.97 cm)	1 x 4.25 x 10' Transcend 1 x 4.25 x 12' Transcend 1 x 4.25 x 16' Transcend	XX010510TP48 XX010512TP48 XX010516TP48	SR, FP, GP
			

XX = COLOR PREFIX:

VL Vintage Lantern
TH Tree House
BD Beach Dune
GP Gravel Path
FP Fire Pit
CS Clam Shell
SR Spiced Rum
LR Lava Rock
WB Woodland Brown
SD Saddle
WG Winchester Grey
MB Madeira
AC Acorn
PW Pewter

SECTION 09900

PAINTING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. All of the Contract Documents, including the General and Supplementary Conditions and Division 0 – Bidding Documents, Contract Forms, and Conditions of the Contract and Division 1 – General Requirements, apply to the work of this Section.

B. Carefully examine all the Contract Documents for requirements which affect the work of this Section. The exact scope of this Section cannot be determined without a thorough review of all specification sections and other Contract Documents.

1.02 RELATED WORK

A. Section 05000 - Miscellaneous Metals
B. Section 02825 – Steel Picket Fence and Gates

1.03 QUALITY ASSURANCE

A. Codes and Standards: Comply with the standards of the following associations except as otherwise required:

1. SSPC (Steel Structures Painting Council):

a. SSPC-PA2: Paint Thickness Measurement.
b. SSPC-PAL: Paint Application Specification No. 1.
c. SSPC-SP1: Solvent Cleaning.
d. SSPC-SP2: Hand Tool Cleaning.
e. SSPC-SP3: Power Tool Cleaning.
f. SSPC-SP6: Commercial Blast Cleaning.
g. SSPC-SP7: Brush Off Blast Cleaning.

B. Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer, within recommended limits and in accordance with manufacturer's directions.

C. Include on label of containers: manufacturer's name, type of paint, manufacturer's stock number, color, batch number, instruction for reducing where applicable, label analysis.

D. Coordination of Work: Review other Sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information or characteristics of finish materials provided for use, to ensure compatible prime coats are used.

E. Field Quality Control: Request review of first finished item of each color scheme required by Landscape Architect for color, texture and workmanship.

F. All colors and paint finishes shall be as selected by Landscape Architect. Perform no painting until such color samples have been approved. Primer color coat shall be sufficiently different than final coat color. Obtain approval prior to purchase and delivery.

1.05 SUBMITTALS

A. Complete list of the coating materials proposed for use, both factory and job mixed, to Landscape Architect before commencing any work. Provide manufacturer's name, product name and product line number for each material. Provide manufacturer's technical data sheet for each coating giving descriptive data, curing time, mixing, thinning, and application instructions, and shelf life.

B. Samples of manufacturer's latest color chips for selection by Landscape Architect. Up to 2 different colors for each material may be selected for use on the project.

C. Prepare color samples (12"x12") for each color and finish required. Apply finishes on identical type materials to which they will be applied on the job.

1. Identify each sample as to finish, formula, color name and number, and sheen names and gloss units.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original containers with seals unbroken and labels legible and intact including instructions for mixing and /or reducing.

B. Storage of Materials: Store only acceptable project materials on project materials on project site, in a suitable protected and ventilated location within temperature range recommended by manufacturer. Comply with health and fire regulations.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Comply with manufacturer's recommendations as to environmental conditions under which coatings and coating system can be applied. Do not apply exterior paint when the temperature weather until the surface is thoroughly dry. Do not apply urethane finishes when the temperature is below 60 degrees F.

B. Apply coatings only when work areas are reasonably free of airborne dust at time of application and when coating drying.

C. Protection: Cover or otherwise protect finished work of other trades and surfaces not being painted concurrently or not to be painted.

D. Apply protective coating to dry surfaces during clear weather.

1.08 PROJECT CONDITIONS

A. All applicators shall wear protective clothing for use with mineral spirit based materials. Avoid prolonged breathing of vapors.

B. Limit overspray on other nearby surfaces. Prevent overspray from coming into contact with persons, motor vehicles, trees, surrounding buildings and other objects not intended for treatment.

1.09 MAINTENANCE MATERIALS

A. Provide Owner with not less than five (5) one-gallon containers of each color and material used in clean, unopened, tightly sealed and clearly labeled containers.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Paint for Steel Fencing: The following products of the Tnemec Company, Inc., Amercoat, Carboline, or approved substitute. Finish coat must be compatible with prime coats.

1. Prime Coat material for New Cast Iron and Steel: Tnemec-Zinc, Series 90-97, Amercoat, Carboline, or approved equal conforming to the following requirements:
   a. Type: One package organic epoxy zinc rich primer.
   b. Metallic zinc content by weight in dry applied film: 83% minimum.
   c. Dry time: 60 minutes @ 75 degrees F.
   d. Recoat time: 4 hours @ 75 degrees F.
   e. Minimum Temperature: Surface temperature of 40 degrees F. and 5 degrees F. above dew point.

2. Finish Coat material: Tnemec Series 73 Endura-Shield Amercoat, Carboline, or approved equal conforming to the following requirements:
   a. Type: 100% acrylic.
   b. Gloss: Semi-gloss.
   c. Dry time: 30 minutes @ 75°F.
   d. Recoat Time: 2 hours @ 75°F.
   e. Minimum Temperature: Surface temperature of 50° F. and 5° F. above dew point.

3. Application: Brush or spray application. Brush application only for touch up areas for finish coat.

4. Application Thickness of New Cast Iron and Steel

	Dry Film Thickness- Mils
Prime Coat	2.5-3.5
Finish Coat [High Build]	3.0-5.0
Total Dry Film Thickness	5.5-8.5

5. Colors to be selected by Landscape Architect.

2.02 MIXING AND THINNING

A. Do not use any material older than manufacturer's recommended shelf life. Mix and thin material according to manufacturer's latest printed instructions. Do not use mixed material beyond manufacturer's recommended pot life.

B. Deliver paints and enamels ready mixed to project site. Accomplish job mixing and job tinting only when acceptable to Landscape Architect. Mix only in mixing pails placed in suitably sized on-ferrous or oxide resistant metal pans. Use tinting colors recommended by manufacturer for the specific type of finish.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine surfaces to be coated for defects that cannot by corrected by the procedures specified herein and report any conditions that would adversely affect the appearance or performance of the coating systems. Do not proceed with surface preparation or material application until conditions are suitable. Commencing installation implies acceptance of surfaces and job conditions.

3.02 PROTECTION

A. Exercise great care not to deface adjacent work. Cover or otherwise protect surfaces not being painted concurrently or not to be painted and the finished work of other trades. Remove removable device plates, escutcheons and similar items before painting and replace these items after paint has dried. Apply masking tape over UL labels before painting the item on which they occur. Remove protective covering, masking tape, etc., when painting of surfaces or items is completed.

3.03 SURFACE PREPARATION

A. Clean surfaces free of all dust, dirt, oil, rust, wax efflorescence and any other surface contaminants that may adversely affect adhesion, penetration or appearance. Prepare specific surfaces as follows:

1. Shop Primed Metal: Hand or Power Tool Clean field connections, welds, burned and abraded areas to remove rust and contaminants and touch up with specified primer before further rusting occurs in accordance with SSPC-SP2 and SSPC-SP3.
2. New Ferrous Metal: Prepare surfaces by Commercial Blast Cleaning in accordance with SSPC-SP6. Reblast to specification any surface that is not primed the same day, or that becomes contaminated or visibly rusts before primer is applied.
3. Galvanized and other Non-Ferrous Metal: Remove protective mill coating, oil and grease by solvent cleaning in accordance with SSPC-SP1. Remove white rust by hand or power brushing. Remove rust from old galvanized steel in accordance with SSPC-SP2 and SSPC-SP3. Exercise care not to damage or remove galvanizing.
4. Wood: Hand or Power Tool sand all painted surfaces to remove loose and flaking paint. Fill large surface imperfections with exterior-grade wood epoxy filler, allow to fully cure and sand flat.
5. Masonry Surfaces: All surfaces must be clean, dry, free of any loose material and fully cured. Allow stucco and masonry to cure 30 days before painting and wash thoroughly. Remove all loose or peeling paint. Powerwash to remove chalk. Remove dirt and grease, and mildew stains. Refer to product labels for specific instructions. Repair all surface imperfections. During application, fill and seal hairline cracks by working a generous amount of material into void. Cracks and gaps wider than 1/16" should be routed open, dusted, primed and packed with an elastomeric patching compound prior to product application. Bridge the crack approximately 2" on both sides and center crown directly over crack 1/32" to allow for thermal movement. Scuff sand glossy surfaces before priming. Prime all chalky, glossy or bare surfaces with Exterior 100% acrylic latex Primer & Sealer by Behr, Sherwin Williams, Olympic or approved substitute.

3.04 MOISTURE CONTENT

A. Do not apply coating until moisture content of surface is within limitations recommended by paint manufacturer. Test with a moisture meter.

3.05 APPLICATION FOR METALS

A. Perform all work in a workmanlike manner by skilled mechanics. Apply at rates recommended by manufacturer. Do no exceed application rate recommended for the surface involved. Use materials without adulteration and only with thinning agents recommended by manufacturer in printed instructions.

B. Apply materials at specified film thickness by method recommended by manufacturer. Apply materials with suitable brushes, rollers or spray equipment. Keep equipment clean, free from contaminants and suitable for the finish required.

C. Successive coats of paint shall differ sufficiently in shade so as to be readily distinguishable.

D. Comply with the recommendation of the material manufacturer for drying time between succeeding coats. Unless otherwise specified, allow at least 72 hours between coats.

E. Apply samples of paint colors to surfaces on the job in sizes and locations as directed by Landscape Architect. Change samples until desired colors are obtained. Do not paint out or destroy samples without expressed permission of Landscape Architect.

F. Sand and dust each coat to remove defects visible from a distance of 5 feet.

G. Cut all materials in neatly to spread evenly, flow on smoothly, free from brush marks, hair, streaks, laps, pile-up of paint, runs, sags, holidays, air bubbles and excessive roller stipple. Make edges of paint adjoining other materials or colors clan and sharp with no overlapping. Apply additional finish coats to entire surface if undercoats show through and correct any defect. Make finish coats smooth and uniform in color.

H. Measure dry film thickness using magnetic film thickness gauge in accordance with SSPC-PA2.

3.05 APPLICATION FOR WOOD SURFACES

A. Perform all work in a workmanlike manner by skilled mechanics. Apply at rates recommended by manufacturer. Do no exceed application rate recommended for the surface involved. Use materials without adulteration and only with thinning agents recommended by manufacturer in printed instructions.

B. Prime wood surfaces with an oil-based primer suitable for blocking staining like Kilz Brand or approved equal.

C. Contractor shall apply a minimum of two oil-based finish coats, or more as required to provide complete coverage so that no primer is visible. Color and gloss levels to be approved by Owner's Representative prior to the purchase of any materials. Color to be Hunter Green in Satin Finish.

3.06 APPLICATION FOR MASONRY SURFACES:

A. Thinning is not recommended. When working with more than one container of the same color, intermix all cans of same product to ensure color uniformity. Stir paint before and occasionally during application.

B. For best results, use product when surface and air temperatures are between 50-90°F (10-32°C). Do not apply if temperature is below 50ºF or if rain or heavy dew is expected within 24 hours. Avoid applying in direct sunlight to a hot surface. If temperature exceeds 90ºF, hose down surface and allow to dry to a damp condition before painting.

C. For rough textured surfaces, apply at a spread rate of about 250-300 sq. ft. (23-28m²) per gallon using a 3/4"-1" long nap roller. For smooth surfaces, apply at a spread rate of about 400 sq. ft. (37m²) per gallon using a nylon brush, short nap roller or a quality airless sprayer. For sprayer, use a .015-.017 size tip and follow manufacturer's recommendations for water-based coatings.

D. For the second coat, spread rate is approximately 500 sq. ft. (46m²) per gallon on smooth surfaces; 300 sq. ft. (28m²) per gallon on rough surfaces. Maintain a wet edge to avoid lap marks. Do not re-spread or re-work paint.

3.07 CLEANING

A. Remove all equipment, materials and debris caused by work of this Section and leave the site of the work in a clean condition insofar as this work is concerned.

B. Rectify any damage to adjacent work caused by painting operations. Touch up and restore finishes where damaged. Remove spilled, splashed or spattered paint from all surfaces. Repaint entire item where portion of finish has been damaged or is unacceptable.

3.09 COMPLETION

A. Protect all painted surfaces against damage until the date of substantial completion. All finished work under this Section shall have perfect surfaces when completed work is ready for inspection for substantial completion. Repair or retouch all areas that do not comply with the requirements of this Section for any reason whatsoever to the satisfaction of Landscape Architect at no additional cost to Owner.

- - - END OF SECTION - - -

SECTION 09911

PAINTING (SKATE PARK)

PART 1 – GENERAL

1.1 GENERAL CONDITIONS

A. Requirements of the Contract Documents, including but not limited to, the General, Special, and Technical Provisions, apply to work in this Section with the same force and effect as though repeated in full herein.

1.2 SCOPE OF WORK

A. Furnish materials, labor, transportation, services, and equipment necessary to install all Painting for the skate park as indicated on the Drawings complete as shown and as specified herein.

B. This Section includes surface preparation and field painting of the following:
   1. Miscellaneous exposed exterior items and surfaces.

C. Paint exposed surfaces, except where the paint schedules indicate that a surface or material is not to be painted or is to remain natural. If the paint schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces whether or not schedules indicate colors. If the schedules do not indicate color or finish, the ENGINEER will select from standard colors and finishes available.
   1. Painting includes field painting of exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment.

D. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
   1. Finished metal surfaces include the following if used:
      a. Stainless steel.
      b. Bronze and brass.
      c. Iron

   2. Labels: Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

B. Related Work:
   1. Section 05501 – Metal Fabrications (Skate Park)

1.3 REFERENCES

A. Comply with the applicable reference specifications as specified in the GENERAL PROVISIONS and in accordance with applicable laws, codes and regulations required by City of Somerville, LA. Comply with the current provisions of the following Codes and Standards:

B. ASTM - American Society for Testing and Materials

C. IBC – International Building Code

D. SSPC – Society for Protective Coatings: "Steel Structures Painting Manual," latest edition.

1.4 DEFINITIONS

A. General: Standard coating terms defined in ASTM D 16 apply to this Section.
   1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
   2. Eggshell refers to low-sheen finish with a gloss range between 5 and 20 when measured at a 60-degree meter.
   3. Satin refers to low-sheen finish with a gloss range between 15 and 35 when measured at a 60-degree meter.
   4. Semigloss refers to medium-sheen finish with a gloss range between 30 and 65 when measured at a 60-degree meter.
   5. Full gloss refers to high-sheen finish with a gloss range more than 65 when measured at a 60-degree meter.

1.5 SUBMITTALS

A. Product Data: For each paint system specified. Include block fillers and primers.
   1. Material List: Provide an inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
   2. Manufacturer's Information: Provide manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material proposed for use.
   3. Certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).

B. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for each type of finish-coat material indicated.
   1. After color selection, the ENGINEER will furnish color chips for surfaces to be coated.

C. Samples for Verification: Of each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.
   1. Provide stepped Samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.
   2. Provide a list of materials and applications for each coat of each sample. Label each sample for location and application.
   3. Submit Samples on the following substrates for the ENGINEER's review of color and texture only:
      a. Ferrous Metal: Provide two 4-inch- (100-mm-) square samples of flat metal and two 8-inch- (200-mm-) long samples of solid metal for each color and finish.

D. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of ENGINEERs and OWNERs, and other information specified.

1.6 QUALITY ASSURANCE

A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to that indicated for this Project with a record of successful in-service performance.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:
   1. Product name or title of material.
   2. Product description (generic classification or binder type).
   3. Manufacturer's stock number and date of manufacture.
   4. Contents by volume, for pigment and vehicle constituents.
   5. Thinning instructions.
   6. Application instructions.
   7. Color name and number.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain containers used in storage in a clean condition, free of foreign materials and residue.

C. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.8 PROJECT CONDITIONS

A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 and 90 deg F (10 and 32 deg C).

B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 and 95 deg F (7.2 and 35 deg C).

C. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

1.9 EXTRA MATERIALS

A. Furnish extra paint materials from the same production run as the materials applied in the quantities described below. Package paint materials in unopened, factory-sealed containers for storage and identify with labels describing contents. Deliver extra materials to the OWNER.
   1. Quantity: Furnish the OWNER with an additional 5 percent, but not less than 1 gal. (3.785 L) or 1 case, as appropriate, of each material and color applied.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in the paint schedules.

2.2 MATERIALS

A. Material Compatibility: Provide fillers, primers, undercoats, and finish-coat materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
   1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

C. Colors: Black and PANTONE #375

PART 3 – EXECUTION / CONSTRUCTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with the Applicator present, under which painting will be performed for compliance with paint application requirements.

1. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
2. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
1. Notify the ENGINEER about anticipated problems using the materials specified over substrates primed by others.

3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting.
1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

B. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease before cleaning.
1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer’s written instructions for each particularl substrate condition and as specified.
1. Provide barrier coats over incompatible primers or remove and reprime.
2. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
    a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill

holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with the Steel Structures Painting Council's (SSPC) recommendations.
    a. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.

D. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
    1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
    2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
    3. Use only thinners approved by paint manufacturer and only within recommended limits.

3.3 APPLICATION

A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
    1. Paint colors, surface treatments, and finishes are indicated in the schedules.
    2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
    3. Provide finish coats that are compatible with primers used.
    4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, covers, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
    5. Sand lightly between each succeeding enamel or varnish coat.

B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
    1. The number of coats and the film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
    2. Omit primer on metal surfaces that have been shop primed and touchup painted.
    3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give

special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.

4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.

C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
   1. Brushes: Use brushes best suited for the type of material applied. Use brush of appropriate size for the surface or item being painted.
   2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.
   3. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.

D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.

E. Fillers: Apply fillers at a rate to ensure complete coverage of pores filled.

F. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn through or other defects due to insufficient sealing.

G. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

H. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.4 CLEANING

A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

B. After completing painting, clean paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

3.5 PROTECTION

A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by ENGINEER.

B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.
   1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.6 EXTERIOR PAINT SCHEDULE

A. Ferrous Metal: Provide the following finish systems over exterior ferrous metal. Primer is not required on shop-primed items.
   1. Semigloss, Acrylic-Enamel Finish: 2 finish coats over a rust-inhibitive primer.
      a. Primer: Rust-inhibitive metal primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.3 mils (0.033 mm).
         1) Dura Clad 55 High Solids Universal Alkyd Primer by Duron.
         2) 433 RustPlate Rust Inhibitive Primer by Kurfees Coating.
         3) Fuller: 621-04 Blox-Rust Alkyd Metal Primer.
         4) Glidden: 5205 Glid-Guard Tank & Structural Primer, Red.
         5) Moore: IronClad Retardo Rust-Inhibitive Paint #163.
         6) PPG: 6-208 Speedhide Interior/Exterior Rust Inhibitive Steel Primer.
         7) P & L: S/D 1009 Suprime "9" Interior/Exterior Alkyd Metal Primer.

      b. First and Second Coats: Semigloss, exterior, acrylic-latex enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.6 mils (0.066 mm).
         1) Devoe: 17XX Wonder-Shield Semi-Gloss Exterior Acrylic Latex House and Trim Paint.
         2) Fuller: 664-XX Weather King II Semi-Gloss House & Trim Paint.
         3) Glidden: 6600 Series Spred Ultra Exterior Gloss Latex House & Trim Paint.
         4) Moore: MoorGlo Latex House & Trim Paint #096.
         5) PPG: 78 Line Sun-Proof Semi-Gloss Acrylic Latex House and Trim Paint.
         6) P & L: Z/F 3100 Series Aqua Royal Latex House & Trim Finish.

END OF SECTION

SECTION 16010

ELECTRICAL WORK - GENERAL PROVISIONS

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. The work covered by this section of the specifications consists of furnishing all labor, equipment, appliances, materials and incidentals in connection with the installation of the complete electrical systems as herein specified and as shown on the drawings.

B. It is not the intent that the drawings shall show every junction box, conduit, wire, fitting, device, accessory, etc., but the Contractor shall be required to furnish without additional expense all transportation, labor and materials necessary to complete the electrical systems in accordance with the best practice of the trade.

C. Unless otherwise specified, materials of the same classifications, used for the same purpose shall be the product of the same manufacturer.

D. The work shall include furnishing and installing the following items:

1. Underground Primary and Secondary Services
2. Transformers
3. Lighting Fixtures
4. Grounding System
5. Handholes
6. Bonding materials
7. Cabinets
8. Panelboards
9. Raceways
10. Feeder and Branch Circuit Conductors
11. Hangers and Supports
12. Solderless Lugs and Connectors

13. Conduit and wire for equipment and controls furnished under other divisions of the specifications, when shown on the electrical plans, with the exception of the instrumentation low voltage signal wiring.

E. Electric Service and Metering

The power company serving this project is Eversource.

1. At each transformer the Contractor shall furnish and install a 4-inch steel conduit from the riser pole to the primary side of the transformer. A spare conduit of the same size shall be furnished and installed for each primary feeder.

2. Secondary metering will be by the Contractor.

3. Arrangements shall be made with the power company for obtaining service. All cost for overhead line extensions and work required for these services including metering cost shall be obtained from the power company. The Contractor shall include in his bid and shall pay this money to the power company. All work involving the service and metering shall be as approved by the power company.

F. Interpretation of Drawings

1. The Drawings are diagrammatic only and are not intended to show exact locations of outlets and conduit runs.

2. All three-phase circuits shall be run in separate conduits unless otherwise shown on the Drawings.

3. The Contractor shall verify with the Engineer the exact locations and mounting heights of lighting fixtures, switches and receptacles prior to installation.

4. Any work installed contrary to Contract Documents, or without approval by the Engineer, shall be changed or replaced as required by the Engineer and no extra compensation will be allowed the Contractor for making these changes.

5. The locations of equipment, fixtures, and similar devices shown on the Drawings are approximate only. Exact locations shall be as approved by the Engineer during construction. The Contractor shall obtain in the field all information relevant to the placing of electrical work and in case of any interference with other work, shall proceed as required by the Engineer

and shall furnish all labor and materials necessary to complete the work in an approved manner.

6. Surface mounted panel boxes, junction boxes, conduit, etc., shall be supported by spacers to provide a clearance between wall and equipment.

7. The number of conductors shown on the Drawings are not necessarily the correct number required. As many conductors as are required in each case shall be installed.

8. The ratings of motors and other electrically operated devices together with the size shown for their branch circuit conductors and conduits are approximate only and are indicative of the probable power requirements insofar as can be determined in advance of the purchase of equipment. The ratings shown for motor branch circuit protective devices are the maximum ratings permitted. Lower ratings may be used where approved as being proper for the dynamic characteristics of the motor and its connected load.

9. Unless otherwise specified, all conduits, wires, and cables and the support systems for the conduits and cables that are required to make the electrical connections to equipment shall be furnished and installed. All connections to equipment shall be made as shown, specified, and required and in accordance with the approved shop and setting drawings.

10. The Contractor shall verify, in the field, all measurements necessary for his work and shall assume responsibility for their accuracy.

1.02 LOCAL CONDITIONS:

A. The Contractor shall provide and place all sleeves for conduits penetrating floors, walls, slabs, etc. The Contractor shall locate all necessary slots for his work and these shall be formed before concrete is poured.

B. All cutting and patching shall be done in a thoroughly workmanlike manner.

C. Before submitting proposals, the Contractor is expected to inspect the site and survey the conditions to be encountered in the performance of the work. Failure to familiarize himself with the conditions shall not relieve the Contractor's responsibility for full completion of the work in accordance with the provisions of the Contract.

1.03 PERMITS AND INSPECTION:

A. Permits, fees and notices shall be in accordance with the General Conditions.

B. All work shall meet or exceed the latest requirements of all national, state, county, municipal and other authorities exercising jurisdiction over electrical construction at this project.

C. All required permit and inspection certificates shall be obtained, paid for, and given to the Owner at the completion of the work.

1.04 CODES AND STANDARDS:

A. Unless indicated or specified otherwise, materials and workmanship shall conform with the latest editions of the following codes, standards and specifications.

1. Massachusetts Electrical Code

2. National Bureau of Standards Handbook H-30 National Electrical Safety Code

3. State and Local Codes, and all other authorities having jurisdiction

4. Underwriter's Laboratories, Inc. (UL)

5. American National Standards Institute, Inc.

6. Institute of Electrical and Electronic Engineers (IEEE)

7. National Electrical Manufacturers Association (NEMA)

8. National Board of Fire Underwriters

9. International Municipal Signal Association (IMSA)

10. Insulated Power Cable Engineers Associated Specifications

11. American Society for Testing Materials Specifications

1.05 REVIEW OF MATERIALS:

A. Material and Equipment Schedules. As soon as practicable and within thirty days after the date of notice to proceed and before commencement of installation of any materials or equipment, the Contractor shall submit to the Engineer six (6) complete Brochures for approval of materials, fixtures, and equipment to be incorporated in the work. The list shall include manufacturer's name, catalog numbers, cuts, diagrams, drawings, and such other descriptive data as may be

required. No consideration will be given to a partial submittal from time to time. Approval of materials will be based on manufacturer's published ratings. Any materials, fixtures and equipment listed that are not in accordance with the specification requirements will be rejected.

B. Substitutions: Substitution of material or equipment shall be in accordance with the General Conditions.

C. Shop Drawings. Shop drawings shall be submitted to the Engineer for review in accordance with the Division 1. Shop drawings shall be submitted for, but not limited to the following:

1. Panelboards
2. Lighting fixtures
3. Transformers
4. Bonding materials
5. Wire and Cable
6. Hangers and Supports
7. Raceways

D. Submit the following information with all equipment shop drawings.

1. Manufacturer's certified scale drawings, cuts, or catalogs, including installation details and manufacturer's name.
2. Manufacturer's specifications, including certified performance characteristics and capacity ratings.
3. Electrical wiring diagrams and controls, where applicable.
4. Certificate of compliance with Code, where applicable.

E. Equipment shop drawings and wiring diagrams must be prepared specifically for this installation. Standard factory wiring diagrams with a revision marked in ink for this installation will be accepted.

F. All control and wiring diagrams shall be complete with the following description:

1. Sequence of operation

2. Sequence of interlocking

3. Operation of alarms

4. Legend

5. Wiring Numbers

G. All equipment shop drawings shall be properly identified and indicate the Article number of the specifications or the Drawing number which applies to the submitted item.

H. Shop drawings for the items listed above shall be submitted for approval in accordance with the preceding paragraphs. The Engineer, however, reserves the right to require submittal of shop drawings on any other material or equipment to be installed under this Section not specifically listed above.

1.06 MINOR DEVIATIONS:

A. The work as shown on the drawings is diagrammatic and is intended to show the work included and the arrangement of the various systems.

B. It is not intended that the accompanying plans and specifications cover every detail of the required installation. Furnish and install equipment, materials and labor as shown or specified, as are usually furnished, or as are needed to make a complete and satisfactory operating installation, whether mentioned or not, omitting only those items which are specifically excluded.

C. Locations and mounting heights of equipment and/or devices as shown are approximately correct. The Engineer reserves the right to relocate any equipment or device prior to actual installation at no extra cost to the Owner.

D. No deviation from layout shall be made without written approval from the Engineer.

1.07 TEMPORARY LIGHT AND POWER:

A. The Contractor shall provide temporary light and power and pay all energy charges as described in Division 1.

1.08 ELECTRICAL REFERENCE SYMBOLS:

A. Symbols shown on the drawings shall approximate location of fixtures, outlet boxes, and conduit runs, and other equipment, unless otherwise detailed. The exact location shall be governed by field conditions and obstructions. This is not

to be construed to permit redesigning systems. All outlets shall be interconnected as shown on the drawings. Locate and install all boxes and equipment where they will be readily accessible.

1.09 PHASE IDENTIFICATION:

A. The entire system of wiring shall be phased by color code as follows:

1. Wires No. 6 AWG and smaller shall have a continuous colored outer covering.

2. Wires larger than No. 6 AWG shall be identified at all points of termination by gummed tape, plastic tape, etc., applied to the wire.

3. Bus bars in motor control centers and panelboards shall be properly identified by color as herein specified.

4. Code colors for 120/208 volt systems shall be:

a. Phase A - Black

b. Phase B - Red

c. Phase C - Blue

5. Code colors for 277/480 volt systems shall be:

a. Phase A - Brown

b. Phase B - Orange

c. Phase C - Yellow

6. Neutral wires shall be white or grey.

7. Equipment ground wires shall be green.

8. The same colors shall be used for the same phases throughout the entire project.

1.10 PROTECTION AND CLEANING OF EQUIPMENT:

A. All electrical equipment, upon receipt, shall be adequately stored and protected from damage.

B. After installation, all electrical equipment shall be protected to prevent damage during the construction period. Openings in conduits and boxes shall be closed to prevent entrance of foreign materials.

C. The interior of boxes and cabinets shall be left clean. Exposed surfaces shall be cleaned and plate surfaces polished.

1.11 OPERATION AND MAINTENANCE MANUALS:

A. The Contractor shall furnish the Owner with three (3) copies of complete operating and maintenance manuals. Manuals shall include all equipment, maintenance instruction, parts list, warranties, schematic diagrams of control systems, and lubrication charts.

B. Manuals shall contain only that information which specifically applies to this project, and all unrelated material shall be deleted. During the instruction period, herein specified, this manual shall be used and explained. Each copy of manual shall be clearly indexed and include a directory of all subcontractors and maintenance contractors, indicate the area of their responsibility, and list the name and telephone numbers of the responsible member of each organization. This material shall have a clear plastic protective shield over each sheet of data.

C. Each manual shall be bound in an expandable plastic covered hard bound binder. Binders shall be three (3) straight post type. Ring type binders will not be acceptable. The manual's front cover and side cover shall be gold-leaf stamped "Operation and Maintenance Manual -- Electrical Systems" along with the project title.

1.12 OPERATING AND MAINTENANCE INSTRUCTIONS:

A. A competent Engineer shall be provided by the Contractor to instruct operating personnel in the operation and maintenance of equipment and systems.

1.13 SPARE PARTS DATA:

A. The Contractor shall furnish a complete list of recommended spare parts and supplies for the equipment furnished with current unit prices and source of supply.

1.14 TESTS:

A. The Electrical Subcontractor shall perform all tests at the completion of the work and the results furnished to the Owner and Engineer in writing. Tests shall include, but not be limited to: all systems test free of shorts or grounds, proper neutral connections, ground system resistance, secondary voltages at main

distribution panel, power panels and lighting panels, all lighting fixtures with lamps in place for 10 hours.

B. Upon completion of all work, the Electrical Subcontractor shall furnish, in duplicate, certificates of inspections from all inspectors and authorities having jurisdiction, notarized letters from the manufacturers stating that authorized Factory Engineers or agents have inspected and tested the installation of their respective systems and found same to be in satisfactory operating condition.

C. Furnish all labor, material, instruments, supplies and services and bear all costs for the accomplishment of the tests.

1.15 GUARANTEE:

A. The Contractor shall guarantee equipment and performance of the installation and equipment in accordance with the GENERAL CONDITIONS.

B. Lamps shall be furnished and installed in Pedestrian lighting fixture as soon as fixtures are properly installed. Replace all lamps that fail within ninety (90) days after final acceptance at no additional cost. If the Contractor fails to replace lamps during the guarantee period, after a second request the Owner may replace lamps and back-charge Contractor.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. The materials used in all systems shall be new, unused and as hereinafter specified. All materials where not specified shall be of the very best of their respective kinds. Samples of materials or manufacturer's specification shall be submitted for approval as required by the Engineer.

B. Materials and equipment used shall be U.L. listed wherever such approved materials and equipment is available.

C. Electrical equipment shall at all times during construction be adequately protected against mechanical injury or damage by water. If any apparatus has been damaged, such damage shall be repaired by the Contractor at his cost and expense. If any apparatus has been subject to possible damage by water, it shall be thoroughly dried out and put through such special tests as required by the Engineer, at the cost and expense of the Contractor, or shall be replaced by the Contractor at his own expense.

PART 3 EXECUTION

3.01 INSTALLATION

A. All work shall be executed in full accordance with the Massachusetts Electrical Code and local rulings. Should any work be performed contrary to said rulings, ordinances and regulations, this Contractor shall bear full responsibility for such violations and assume all costs arising therefrom.

B. Load Balance. Check the load balance on the phases of the various systems and reconnect where necessary as approved by the Engineer to provide equal division of the loads between the phases of the various systems.

C. Before starting the work, confer with all other trades relative to the location of pipes, and apparatus or fixtures to be installed by them and select locations for the work which will avoid possible conflicts with the work of other trades involved. All differences or conflicting conditions concerning the work shall be called to the attention of the Engineer for adjustment before starting work. For such work performed or materials installed in violation of the above clause the work shall be readjusted to the complete satisfaction of the Engineer at the sole expense of the Electrical Subcontractor.

D. Cleanup

1. This Contractor shall cooperate with other workmen and with the General Contractor in the daily removal of debris from the work site.

2. This Contractor shall leave "broom clean" all areas where he has interrupted or completed his work.

3. He shall cooperate with the General Contractor in good housekeeping procedures.

4. At the completion of his work, prior to the final inspection, this Contractor shall clean all devices, plates, fixtures, glassware, switches, cabinets, exposed conduits, fittings, etc. and shall have the premises in a thoroughly clean condition.

END OF SECTION

SECTION 16050

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following:

1. Raceways.
2. Building wire and connectors.
3. Supporting devices for electrical components.
4. Electrical identification.
5. Electricity-metering components.
6. Concrete equipment bases.
7. Cutting and patching for electrical construction.
8. Touchup painting.

1.03 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. FMC: Flexible metal conduit.

C. IMC: Intermediate metal conduit.

D. LFMC: Liquidtight flexible metal conduit.

E. RNC: Rigid nonmetallic conduit.

F. RSC: Rigid Steel Conduit.

1.04 SUBMITTALS

A. Product Data: For electricity-metering equipment.

B. Shop Drawings: Dimensioned plans and sections or elevation layouts of electricity-metering equipment.

C. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.05 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

1.06 COORDINATION

A. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work.

B. Coordinate electrical service connections to components furnished by utility companies.

1. Coordinate installation and connection of exterior underground and overhead utilities and services, including provision for electricity-metering components.
2. Comply with requirements of authorities having jurisdiction and of utility company providing electrical power and other services.

C. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.

PART 2 - PRODUCTS

2.01 RACEWAYS

A. EMT: ANSI C80.3, zinc-coated steel, with set-screw or compression fittings.

B. FMC: Zinc-coated steel.

C. IMC: ANSI C80.6, zinc-coated steel, with threaded fittings.

D. LFMC: Zinc-coated steel with sunlight-resistant and mineral-oil-resistant plastic jacket.

E. RNC: NEMA TC 2, Schedule 40 PVC, with NEMA TC3 fittings.

F. Raceway Fittings: Specifically designed for the raceway type with which used.

2.02 CONDUCTORS

A. Conductors, No. 10 AWG and Smaller: Solid or stranded copper.

B. Conductors, Larger Than No. 10 AWG: Stranded copper.

C. Insulation: Thermoplastic, rated at 75 deg C minimum.

D. Wire Connectors and Splices: Units of size, ampacity rating, material, type, and class suitable for service indicated.

2.03 SUPPORTING DEVICES

A. Material: Cold-formed steel, with corrosion-resistant coating acceptable to authorities having jurisdiction.

B. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel.

C. Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click-type hangers.

D. Pipe Sleeves: ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.

E. Cable Supports for Vertical Conduit: Factory fabricated assembly consisting of threaded body and insulating wedging plug for non-armored electrical cables in riser conduits. Plugs have number and size of conductor gripping holes as required to suit individual risers. Body constructed of malleable-iron casting with hot-dip galvanized finish.

F. Expansion Anchors: Carbon-steel wedge or sleeve type.

G. Toggle Bolts: All-steel springhead type.

H. Powder-Driven Threaded Studs: Heat-treated steel.

2.04 ELECTRICAL IDENTIFICATION

A. Identification Devices: A single type of identification product for each application category. Use colors prescribed by ANSI A13.1, NFPA 70, and these Specifications.

B. Raceway and Cable Labels: Comply with ANSI A13.1, Table 3, for minimum size of letters for legend and minimum length of color field for each raceway and cable size.

1. Type: Pre-tensioned, wraparound plastic sleeves. Flexible, preprinted, color-coded, acrylic band sized to suit the diameter of the item it identifies.
2. Type: Preprinted, flexible, self-adhesive, vinyl. Legend is over laminated with a clear, weather- and chemical-resistant coating.
3. Color: Black letters on orange background.
4. Legend: Indicates voltage.

C. Colored Adhesive Marking Tape for Raceways, Wires, and Cables: Self-adhesive vinyl tape, not less than 1 inch wide by 3 mils thick.

D. Underground Warning Tape: Permanent, bright-colored, continuous-printed, vinyl tape with the following features:

1. Not less than 6 inches wide by 4 mils thick.
2. Compounded for permanent direct-burial service.
3. Embedded continuous metallic strip or core.
4. Printed legend that indicates type of underground line.

E. Tape Markers for Wire: Vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.

F. Color-Coding Cable Ties: Type 6/6 nylon, self-locking type. Colors to suit coding scheme.

G. Engraved-Plastic Labels, Signs, and Instruction Plates: Engraving stock, melamine plastic laminate punched or drilled for mechanical fasteners 1/16-inch minimum thickness for signs up to 20 sq. in. and 1/8-inch minimum thickness for larger sizes. Engraved legend in black letters on white background.

H. Interior Warning and Caution Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145. Preprinted, aluminum, baked-enamel-finish signs, punched or drilled for mechanical fasteners, with colors, legend, and size appropriate to the application.

I. Exterior Warning and Caution Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch, galvanized-steel backing, with colors, legend, and size appropriate to the application. 1/4-inch grommets in corners for mounting.

J. Fasteners for Nameplates and Signs: Self-tapping, stainless-steel screws or No. 10/32 stainless-steel machine screws with nuts and flat and lock washers.

2.05 EQUIPMENT FOR UTILITY COMPANY'S ELECTRICITY METERING

A. Current-Transformer Cabinets: Comply with requirements of electrical power utility company.

B. Meter Sockets: Comply with requirements of electrical power utility company.

2.06 CONCRETE BASES

A. Concrete Forms and Reinforcement Materials: As specified in Division 3 Section "Cast-in-Place Concrete."

B. Concrete: 3000-psi, 28-day compressive strength as specified in Division 3 Section "Cast-in-Place Concrete."

2.07 TOUCHUP PAINT

A. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.

B. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

PART 3 - EXECUTION

3.01 ELECTRICAL EQUIPMENT INSTALLATION

A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom.

B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.

C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.

D. Right of Way: Give to raceways and piping systems installed at a required slope.

3.02 RACEWAY APPLICATION

A. Use the following raceways for outdoor installations:

1. Exposed: IMC.
2. Concealed: IMC.
3. Underground, Single Run: RNC.
4. Underground, Grouped: RNC.
5. Connection to Vibrating Equipment: LFMC.
6. Boxes and Enclosures: NEMA 250, Type 3R or Type 4.

B. Use the following raceways for indoor installations:

1. Exposed: EMT.
2. Concealed: EMT.
3. Connection to Vibrating Equipment: FMC; except in wet or damp locations, use LFMC.
4. Damp or Wet Locations: IMC.

5. Boxes and Enclosures: NEMA 250, Type 1, unless otherwise indicated.

3.03 RACEWAY AND CABLE INSTALLATION

A. Use temporary raceway caps to prevent foreign matter from entering.

B. Make conduit bends and offsets so ID is not reduced. Keep legs of bends in the same plane and straight legs of offsets parallel, unless otherwise indicated.

C. Use raceway and cable fittings compatible with raceways and cables and suitable for use and location.

D. Install pull wires in empty raceways. Use No. 14 AWG zinc-coated steel or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of the pull wire.

E. Install telephone and signal system raceways, 2-inch trade size and smaller, in maximum lengths of 150 feet and with a maximum of two 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements, in addition to requirements above.

F. Connect motors and equipment subject to vibration, noise transmission, or movement with a maximum of 72-inch flexible conduit. Install LFMC in wet or damp locations. Install separate ground conductor across flexible connections.

3.04 WIRING METHODS FOR POWER, LIGHTING, AND CONTROL CIRCUITS

A. Feeders: Type THHN/THWN insulated conductors in raceway.

B. Underground Feeders and Branch Circuits: Type THWN or single-wire, Type UF insulated conductors in raceway.

C. Branch Circuits: Type THHN/THWN insulated conductors in raceway.

D. Remote-Control Signaling and Power-Limited Circuits: Type THHN/THWN insulated conductors in raceway for Classes 1, 2, and 3, unless otherwise indicated.

3.05 WIRING INSTALLATION

A. Install splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than un-spliced conductors.

B. Install wiring at outlets with at least 12 inches of slack conductor at each outlet.

C. Connect outlet and component connections to wiring systems and to ground. Tighten electrical connectors and terminals, according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

3.06 ELECTRICAL SUPPORTING DEVICE APPLICATION

A. Damp Locations and Outdoors: Hot-dip galvanized materials or nonmetallic, U-channel system components.

B. Dry Locations: Steel materials.

C. Support Clamps for PVC Raceways: Click-type clamp system.

D. Selection of Supports: Comply with manufacturer's written instructions.

E. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four; minimum of 200-lb design load.

3.07 SUPPORT INSTALLATION

A. Install support devices to securely and permanently fasten and support electrical components.

B. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.

C. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.

D. Size supports for multiple raceway installations so capacity can be increased by a 25 percent minimum in the future.

E. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.

F. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.

G. Simultaneously install vertical conductor supports with conductors.

H. Install metal channel racks for mounting cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices unless components are mounted directly to structural elements of adequate strength.

I. Install sleeves for cable and raceway penetrations of concrete slabs and walls unless core-drilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.

J. Securely fasten electrical items and their supports to the building structure, unless otherwise indicated. Perform fastening according to the following unless other fastening methods are indicated:
   1. New Concrete: Concrete inserts with machine screws and bolts.
   2. Instead of expansion bolts, threaded studs driven by a powder charge and provided with lock washers may be used in existing concrete.
   3. Steel: Welded threaded studs or spring-tension clamps on steel.
      a. Field Welding: Comply with AWS D1.1.
   4. Welding to steel structure may be used only for threaded studs, not for conduits, pipe straps, or other items.
   5. Light Steel: Sheet-metal screws.
   6. Fasteners: Select so the load applied to each fastener does not exceed 25 percent of its proof-test load.

3.08 IDENTIFICATION MATERIALS AND DEVICES

A. Install at locations for most convenient viewing without interference with operation and maintenance of equipment.

B. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated in the Contract Documents or required by codes and standards. Use consistent designations throughout Project.

C. Self-Adhesive Identification Products: Clean surfaces before applying.

D. Identify raceways and cables with color banding as follows:
   1. Bands: Pre-tensioned, snap-around, colored plastic sleeves or colored adhesive marking tape. Make each color band 2 inches wide, completely encircling conduit, and place adjacent bands of two-color markings in contact, side by side.
   2. Band Locations: At changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
   3. Colors: As follows:
      a. Telecommunication System: Green and yellow.

E. Tag and label circuits designated to be extended in the future. Identify source and circuit numbers in each cabinet, pull and junction box, and outlet box. Color-coding may be used for voltage and phase identification.

F. Install continuous underground plastic markers during trench backfilling, for exterior underground power, control, signal, and communication lines located directly above power and communication lines. Locate 6 to 8 inches below finished grade. If width of multiple lines installed in a common trench or concrete envelope does not exceed 16 inches, overall, use a single line marker.

G. Color-code 208/120-V system secondary service, feeder, and branch-circuit conductors throughout the secondary electrical system as follows:

1. Phase A: Black.
2. Phase B: Red.
3. Phase C: Blue.

H. Color-code 480/277-V system secondary service, feeder, and branch-circuit conductors throughout the secondary electrical system as follows:

1. Phase A: Brown.
2. Phase B: Orange.
3. Phase C: Yellow.

I. Install warning, caution, and instruction signs where required to comply with 29 CFR, Chapter XVII, Part 1910.145, and where needed to ensure safe operation and maintenance of electrical systems and of items to which they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.

3.09 UTILITY COMPANY ELECTRICITY-METERING EQUIPMENT

A. Install equipment according to utility company's written requirements. Provide grounding and empty conduits as required by utility company.

3.10 CONCRETE BASES

A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger, in both directions, than supported unit. Follow supported equipment manufacturer's anchorage recommendations and setting templates for anchor-bolt and tie locations, unless otherwise indicated. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 3 Section "Cast-in-Place Concrete."

3.11 FIELD QUALITY CONTROL

A. Inspect installed components for damage and faulty work, including the following:

1. Raceways.

2. Building wire and connectors.
3. Supporting devices for electrical components.
4. Electrical identification.
5. Electricity-metering components.
6. Concrete bases.
7. Cutting and patching for electrical construction.
8. Touchup painting.

3.12 REFINISHING AND TOUCHUP PAINTING

A. Refinish and touch up paint. Paint materials and application requirements are specified by manufacturer.

1. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.
2. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.
3. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
4. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.13 CLEANING AND PROTECTION

A. On completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.

B. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 16061

ELECTRICAL BONDING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. All of the Contract Documents, including General and Supplementary Conditions and Division 1, General Requirements, are hereby made a part of the work of this Section. Where paragraphs of this Section conflict with Division 1, the more stringent requirements shall govern.

B. All work shall comply with all federal, state and local codes and any other authorities having jurisdiction including any special requirements of the Owner or Architect.

C. Furnish all labor, materials, and equipment necessary to complete all work as shown on drawings and specified. This work is to include but not limited to the following: furnish and install splash pad bonding grid, wire and bonding to splash pad equipment as indicated on contract drawings.

1.02 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

B. Additional division 16 sections as applicable.

C. Reference Drawings: The Work of this Section is shown on the Contract Drawings.

1.03 REFERENCES

A. All work shall conform to the 2014 NEC National Electrical Code, Massachusetts Electric Code, and all Federal, State and Local Codes as applicable.

B. NEC Article 680 Swimming Pools, Fountains, and Similar Installations applies to this work.

C. All products shall be UL listed.

1.04 QUALITY ASSURANCE

A. Demonstrate the correct operation of all installed equipment and circuits to the satisfaction and requirements of the engineer.

PART 2-PRODUCTS

2.01 WIRE

A. Aluminum conductors shall not be used.

B. Single conductors in shall be bare copper.

2.02 SPLICES

A. Where splices are required, provide using one of the two following methods:

B. Compression connectors of approved pattern

C. Exothermic welded connections.

D. Provide approved manufacturers watertight splice kits to insulate all splices.

2.03 IDENTIFICATION

A. Underground buried electric wire marking tape shall be heavy-duty 0.0045", metal detection tape, 2" wide supplied in continuous lengths up to 1000'. Tape shall have red with black lettering, continuously duplicated, wording equal to "CAUTION BURIED ELECTRIC LINE BELOW".

PART 3 - EXECUTION

3.01 COORDINATION

A. Coordinate for connection of all reinforcing steel and splash pad equipment bonds before surface is applied.

B. Coordinate installation of splash pad bonding at beginning of project. Electrician must be present to perform his work before concrete is applied.

3.02 UNDERGROUND WIRES OUTSIDE OF PAD PERIMETER

A. Provide red marking tape buried 6" to 10" below surface indicating any buried bond wires below that extend beyond me perimeter of the pad.

3.03 INSTALLATION, SPLASH PAD BOND

SYSTEM

A. Furnish and install any Code required ground rods.

B. Contractor to provide #8 CU bond wire for pad steel, any metal drains, splash pad equipment and all other metallic components within 5’-0” as prescribed in NEC article 680.26.

C. Provide and install 600 volt bonding conductors throughout the bonding system with connection to each item of equipment, etc. No conductors shall be exposed above the deck.

D. Bonding conductors shall be continuous, where ever possible.

E. Insulate any splices with approved insulation kit and makeup water tight to protect from corrosion and maintain the integrity of the splice.

END OF SECTION

SECTION 16123

CONDUCTORS AND CABLES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

1.03 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Qualification Data: For testing agency.

1.04 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

2.02 CONDUCTORS AND CABLES

A. Available Manufacturers:

1. Alcan Aluminum Corporation; Alcan Cable Div.
2. American Insulated Wire Corp.; a Leviton Company.
3. General Cable Corporation.
4. Senator Wire & Cable Company.
5. Southwire Company.

B. Refer to Part 3 "Conductor and Insulation Applications" Article for insulation type, cable construction, and ratings.

C. Conductor Material: Copper.

D. Conductor Insulation Types: THHN-THWN complying with NEMA WC 5 or 7.

E. Multi-conductor Cable: Type USE with ground wire.

2.03 CONNECTORS AND SPLICES

A. Available Manufacturers:

1. AFC Cable Systems, Inc.
2. AMP Incorporated/Tyco International.
3. Hubbell/Anderson.
4. O-Z/Gedney; EGS Electrical Group LLC.
5. 3M Company; Electrical Products Division.

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.01 CONDUCTOR AND INSULATION APPLICATIONS

A. Service Entrance: Type XHHW, USE single conductors in raceway.

B. Exposed Feeders: Type THHN-THWN, single conductors in raceway

C. Exposed Branch Circuit: Type THHN-THWN, single conductors in raceway.

D. Underground Feeders and Branch Circuits: Type UF multiconductor cable.

3.02 INSTALLATION

A. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

B. Use pulling means; including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway.

C. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

D. Support cables according to Division 16 Section "Basic Electrical Materials and Methods."

E. Identify and color-code conductors and cables according to Division 16 Section Basic Electrical Materials and Methods.

3.03 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches (300 mm) of slack.

3.04 FIELD QUALITY CONTROL

A. Testing: Perform the following field quality-control testing:

1. After installing conductors and cables and before electrical circuitry has been energized, test for compliance with requirements.
2. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.3.1. Certify compliance with test parameters.

B. Test Reports: Prepare a written report to record the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

END OF SECTION

SECTION 16442

PANELBOARDS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes load centers and panelboards, overcurrent protective devices, and associated auxiliary equipment rated 600 V and less for the following types:

1. Lighting and appliance branch-circuit panelboards.

1.03 DEFINITIONS

A. GFCI: Ground-fault circuit interrupter.

B. TVSS: Transient voltage surge suppressor.

1.04 SUBMITTALS

A. Product Data: For each type of panelboard, overcurrent protective device, TVSS device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

1. Dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings. Include the following:

a. Enclosure types and details for types other than NEMA 250, Type 1.
b. Bus configuration, current, and voltage ratings.
c. Short-circuit current rating of panelboards and overcurrent protective devices.
d. UL listing for series rating of installed devices.
e. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

2. Wiring Diagrams: Diagram power, signal, and control wiring and differentiate between manufacturer-installed and field-installed wiring.

C. Qualification Data: Submit data for testing agencies indicating that they comply with qualifications specified in "Quality Assurance" Article.

D. Field Test Reports: Submit written test reports and include the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

E. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.

F. Maintenance Data: For panelboards and components to include in maintenance manuals specified in Division 1. In addition to requirements specified in Division 1 Section "Contract Closeout," include the following:

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.

1.05 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NEMA PB 1.

C. Comply with NFPA 70.

1.06 COORDINATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, and encumbrances to workspace clearance requirements.

1.07 EXTRA MATERIALS

A. Keys: Six spares of each type of panelboard cabinet lock.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Panelboards, Overcurrent Protective Devices, Controllers, Contactors, and Accessories:

a. Eaton Corp.; Cutler-Hammer Products.
b. General Electric Co.; Electrical Distribution & Control Div.
c. Siemens Energy & Automation, Inc.
d. Square D Co.

2. TVSS Panelboards:

a. Current Technology, Inc.
b. Liebert Corporation.

2.02 FABRICATION AND FEATURES

A. Enclosures: Surface mounted cabinets. NEMA PB 1, Type 1, to meet environmental conditions at installed location.
1. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

B. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.

C. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.

D. Finish: Manufacturer's standard enamel finish over corrosion-resistant treatment or primer coat.

E. Directory Card: With transparent protective cover, mounted inside metal frame, inside panelboard door.

F. Bus: Hard-drawn copper, 98 percent conductivity.

G. Main and Neutral Lugs: Compression type suitable for use with conductor material.

H. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment ground conductors; bonded to box.

I. Service Equipment Label: UL labeled for use as service equipment for panelboards with main service disconnect switches.

J. Future Devices: Mounting brackets, bus connections, and necessary appurtenances required for future installation of devices.

K. Skirt for Surface-Mounted Panelboards: Same gage and finish as panelboard front with flanges for attachment to panelboard, wall, and ceiling or floor.

L. Gutter Barrier: Arrange to isolate individual panel sections.

M. Feed-through Lugs: Compression type suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.

2.03 PANELBOARD SHORT-CIRCUIT RATING

N. Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.04 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

B. Doors: Front mounted with concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.05 OVERCURRENT PROTECTIVE DEVICES

C. Molded-Case Circuit-Breaker Features and Accessories. Standard frame sizes, trip ratings, and number of poles.

1. Lugs: Mechanical or Compression style, suitable for number, size, trip ratings, and material of conductors.
2. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.

2.06 ACCESSORY COMPONENTS ACCESSORY COMPONENTS AND FEATURES

A. Accessory Set: Tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.

B. Portable Test Set: To test functions of solid-state trip devices without removal from panelboard.

C. Fungus Proofing: Permanent fungicidal treatment for panelboard interior, including overcurrent protective devices and other components.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install panelboards and accessories according to NEMA PB 1.1.

B. Mounting Heights: Top of trim 74 inches above finished floor, unless otherwise indicated.

C. Mounting: Plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish.

D. Circuit Directory: Create a directory to indicate installed circuit loads after balancing panelboard loads. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

E. Install filler plates in unused spaces.

F. Wiring in Panelboard Gutters: Arrange conductors into groups and bundle and wrap with wire ties after completing load balancing.

3.02 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 16 Section Basic Electrical Materials and Methods.

B. Panelboard Nameplates: Label each panelboard with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.

3.03 CONNECTIONS

A. Install equipment grounding connections for panelboards with ground continuity to main electrical ground bus.

B. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.04 FIELD QUALITY CONTROL

A. Prepare for acceptance tests as follows:

1. Test continuity of each circuit.

B. Testing: After installing panelboards and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

1. Procedures: Perform each visual and mechanical inspection and electrical test indicated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

C. Balancing Loads: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes as follows:

1. Measure as directed during period of normal system loading.
2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data-processing, computing, transmitting, and receiving equipment.
3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.
4. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

3.05 ADJUSTING

A. Set field-adjustable switches and circuit-breaker trip ranges.

3.06 CLEANING

A. On completion of installation, inspect interior and exterior of panelboards. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

END OF SECTION

SECTION 16461

DRY-TYPE TRANSFORMERS (600 V AND LESS)

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following types of dry-type transformers rated 600 V and less, with capacities up to 1000 kVA:

1. Distribution transformers.

1.03 SUBMITTALS

A. Product Data Include rated nameplate data, capacities, weights, dimensions, minimum clearances, installed devices and features, and performance for each type and size of transformer indicated.

B. Shop Drawings: Wiring and connection diagrams.

1.04 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with IEEE C 57.12.91.

C. Energy-Efficient Transformers Rated 15 kVA and Larger: Certified as meeting NEMA TP 1, Class 1 efficiency levels when tested according to NEMA TP 2.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Temporary Heating: Apply temporary heat according to manufacturer's written instructions within the enclosure of each ventilated-type unit, throughout periods during which equipment is not energized and when transformer is not in a space that is continuously under normal control of temperature and humidity.

1.06 COORDINATION

A. Coordinate installation of wall-mounting and structure-hanging supports.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Challenger Electrical Equipment Corp.; a division of Eaton Corp.
2. GE Electrical Distribution & Control.
3. Siemens Energy & Automation, Inc.
4. Sola/Hevi-Duty Electric.
5. Square D/Groupe Schneider NA.

2.02 MATERIALS

A. Description: Factory-assembled and -tested, air-cooled units for 60-Hz service.

B. Cores: Grain-oriented, non-aging silicon steel.

C. Coils: Continuous windings without splices, except for taps.

1. Internal Coil Connections: Brazed or pressure type.
2. Coil Material: Copper.

2.03 DISTRIBUTION TRANSFORMERS

A. Comply with NEMA ST 20, and list and label as complying with UL 1561.

B. Provide transformers that are internally braced to withstand seismic forces specified in Division 16 Section "Seismic Controls for Electrical Work."

C. Cores: One leg per phase.

D. Enclosure: Ventilated, NEMA 250, Type 2.

E. Indoor Transformer Enclosure Finish: Comply with NEMA 250 for Indoor Corrosion Protection."

1. Finish Color: Gray.

F. Insulation Class: 220 deg C, UL-component-recognized insulation system with a maximum of 150 deg C rise above 40 deg C ambient temperature.

G. Taps for Transformers 25 kVA and Larger: Two 2.5 percent taps above and two 2.5 percent taps below normal full capacity.

H. Wall Brackets: Manufacturer's standard brackets.

I. Fungus Proofing: Permanent fungicidal treatment for coil and core.

J. Low-Sound-Level Requirements: Minimum of 3 dBA less than NEMA ST 20 standard sound levels when factory tested according to IEEE C57.12.91.

K. Low-Sound-Level Requirements: Maximum sound levels, when factory tested according to IEEE C57.12.91, as follows:

1. 30 to 50 kVA: 45dB

2.04 SOURCE QUALITY CONTROL

A. Test and inspect transformers according to IEEE C57.12.91.

B. Factory Sound-Level Tests: Conduct sound-level tests on equipment for this Project.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine conditions for compliance with enclosure- and ambient-temperature requirements for each transformer.

B. Verify that field measurements are as needed to maintain working clearances required by NFPA 70 and manufacturer's written instructions.

C. Examine walls and floors for suitable mounting conditions where transformers will be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install wall-mounting transformers level and plumb with wall brackets fabricated by transformer manufacturer.

3.03 CONNECTIONS

A. Ground equipment according to Division 16 Section.

B. Connect wiring according to Division 16 Section "Conductors and Cables."

C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.04 ADJUSTING

A. Record transformer secondary voltage at each unit for at least 48 hours of typical occupancy period. Adjust transformer taps to provide optimum voltage conditions at secondary terminals. Optimum is defined as not exceeding nameplate voltage plus 10 percent and not being lower than nameplate voltage minus 5 percent. Submit recording and tap settings as test results.

B. Output Settings Report: Prepare a written report recording output voltages and tap settings.

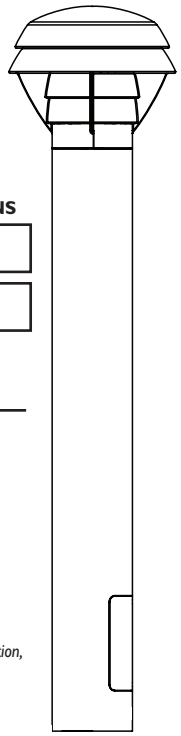
END OF SECTION

Job:
Type:
Notes:

Bollard LED

Round Full Cutoff Bollard
BR840 Series, Including Motion Response

The Philips Gardco LED Bollard family features the round full cutoff bollard, the BR840 series. This sleek series features LEDs concealed below cast louvers to provide down lighting for landscape and pathway applications. The BR840 series features 4" diameter extruded aluminum shafts. Available mountings include the standard shaft, with a welded cast base mounted firmly to anchor bolts. The BR840 series also is available with a galvanized steel base tenon reinforced shaft (BR842) for applications requiring additional support, such as schools. BR840 series bollards provide full cutoff performance.



PREFIX	HEIGHT	LED CONTROL	LED SELECTION	LIGHTED COVERAGE / LED WATTAGE	VOLTAGE	FINISH	OPTIONS

Enter the order code into the appropriate box above. Note: Gardco reserves the right to refuse a configuration. Not all combinations and configurations are valid. Refer to notes below for exclusions and limitations. For questions or concerns, please consult the factory.

PREFIX / HEIGHT

BR840	Standard Shaft	**42" 36" 30"**
BR841	Head Only	**7.1"**
BR842	School Bollard Reinforced Shaft with Galvanized Steel Tenon	**42" 36" 30"**

LED CONTROL

CWL Constant Wattage Full Light Output
Full wattage and light output only.

DIM 0 - 10V Dimming
Dimming controls by others. The dimming driver utilized permits dimming control via a potentiometer (by others) or via 0 - 10V control (by others.) Consult installation instructions for more information.

MR Motion Response
Featuring two (2) integral Passive Infrared (PIR) sensors. In the absence of motion, luminares operate at 20% of normal power and light output (80% dimmed.) See page 3 for more information on Motion Response luminaires.

LED SELECTION

CW *5,700°K , 75CRI*
NW *4,000°K , 75CRI*
WW *3,000°K , 75CRI*

LIGHTED COVERAGE / LED WATTAGE

360° lighted louvers - 14 LEDs

360 -10	10 watts at 225mA
360 -18	18 watts at 350mA
360 -26	26 watts at 500mA

Note: A variation of LED wattage (+/- 8%) may occur due to LED manufacturer's forward volt specification and ambient temperature.

180° lighted louvers - 7 LEDs[1,2] *(Provides reduced backside light.)*

180 -10	10 watts at 450mA
180 -18	18 watts at 700mA

1. 180° achieved by populating half of LEDs.
2. 180° distributions include an internal house side shield to limit the amount of backlight.

VOLTAGE

120
208
240
277
UNIV *120V through 277V, 50hz to 60hz input.*

FINISH

BRP Bronze Paint
BLP Black Paint
WP White Paint
NP Natural Aluminum Paint

OC Optional Color Paint
Specify RAL designation as ex: OC-RAL7024.

SC Special Color Paint
Specify. Must supply color chip.

OPTIONS

PCB[3,4] Button Photocontrol
SPR Surge Protection for 120V through 277V Input meeting ANSI C62.41.2

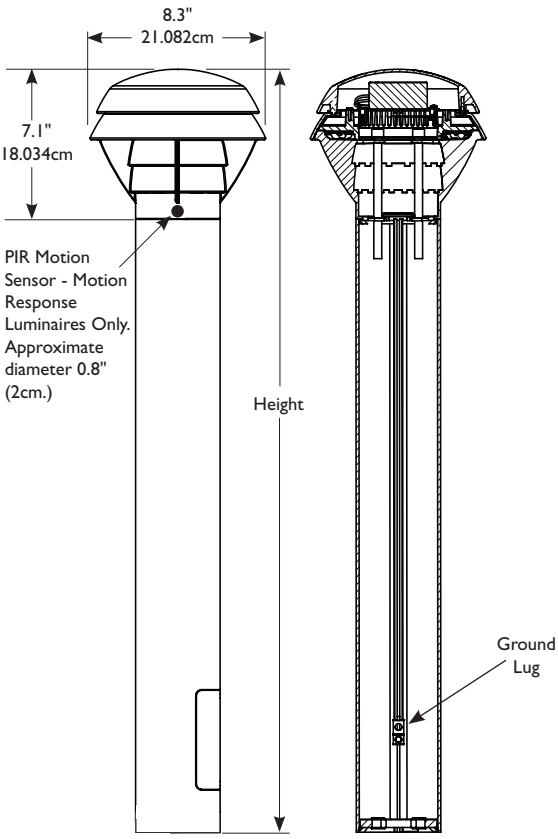
3. Not available in BR841.
4. Must provide specific input voltage.

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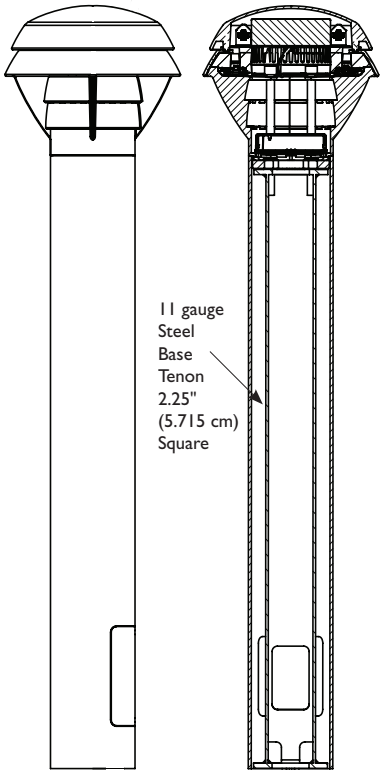
PHILIPS
GARDCO

DIMENSIONS

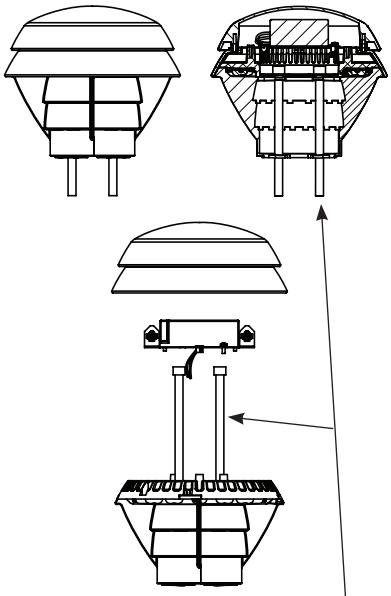
BR840

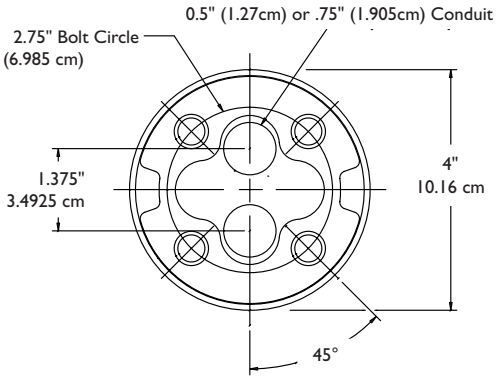


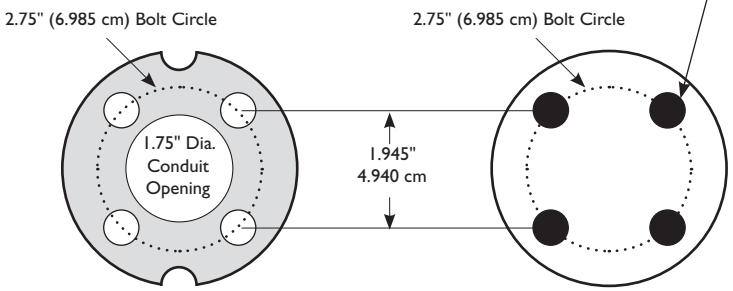
BR842
School Bollard with Steel Base Tenon



BR841
Head Only







NOTE: Factory supplied template must be used when setting anchor bolts. Philips Gardco will not honor any claim for incorrect anchorage placement from failure to use factory supplied templates.

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SPECIFICATIONS

UPPER HOUSING: Die cast aluminum upper housing featuring shielding louvers to provide down light.

LOWER HOUSING:

BR840 : The lower housing assembly consists of a .140" wall by 4" diameter high strength 6063-T6 extruded aluminum section incorporating a flush, weather-tight gasketed hand hole cover.

BR41 : Louver head assembly is suitable for attachment to architectural elements (by others).

BR842 : The lower housing assembly consists of a .140" wall by 4" diameter high strength 6063-T6 extruded aluminum section, incorporating a flush, weather-tight gasketed hand hole cover, for placement over the galvanized steel tenon support structure. Tenon support structure is made from a .12" thick wall, 11 gauge steel, 2.25" square tube, welded to top and bottom round steel support plates. The steel tenon support structure includes an opening aligned with the aluminum shaft hand hole to permit wiring. The entire steel tenon support structure is hot dipped galvanized after fabrication.

LED PERFORMANCE:

PREDICTED LUMEN DEPRECIATION DATA[4]		
Ambient Temperature °C	Driver mA	L_{70} Hours[5]
25 °C	225	230,000
	350	220,000
	450 / 500	165,000
	700	150,000
40 °C	225	212,000
	350	188,000
	450 / 500	150,000
	700	137,000

4. Predicted performance derived from LED manufacturer's data and engineering design estimates, based on IESNA LM-80 methodology. Actual experience may vary due to field application conditions.
5. L_{70} is the predicted time when LED performance depreciates to 70% of initial lumen output.

OPTICAL SYSTEM: Philips Gardco LED Bollards feature advanced Philips Gardco LED technology, assuring maxmimized light output. LED arrays are replaceable.

ANCHORAGE:

BR840: Base assembly consists of an internal welded cast ring section that provides for mounting to the foundation with four (4) 3/8" X 8" X 1½" anchor bolts on a 2¾" bolt circle.

BR841: The luminaire head mounts to a concrete structure utilizing four (4) 3/8" #16 hex head bolts inserted into threaded concrete inserts (provided by others) on a 2¾" bolt circle.

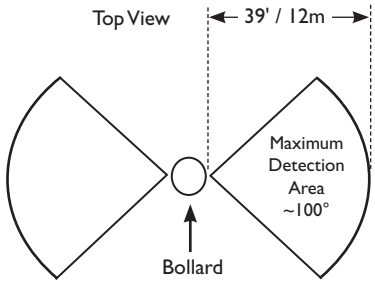
BR842: A high strength steel mounting tenon, hot-dip galvanized after fabrication, is secured to the concrete footing with (4) 3/8" x 8" x 1 1/2" anchor bolts on a 2¾" bolt circle.

IP RATING: IP66 is the rating for the optical compartment.

ELECTRICAL: The LED power supply is located within the bollard head. Bollards accept from 120 Volts through 277 Volts, 50hz to 60 hz, input. supply. The LED driver is located in the upper dome. LED drivers are replaceable. LEDs provided as specified. Power factor is not less than 90%. Luminaires consume 0.0 watts in the off state.

MOTION RESPONSE LUMINAIRES: Each Motion Response (MR) luminaire includes two (2) Panasonic EKMB1203112 Passive Infrared (PIR) sensors to detect motion. When motion is not detected for a 5 minute period, luminaires automatically dim to 20% power and light, gradually over a 2 minute period. Once Motion is detected, luminaires immediately ramp to full power and light output until motion is not detected for a 5 minute period.

PIR sensors are able to detect motion in the approximate patterns shown below:



Note: Motion sensors rely on specific zonal crossings to detect motion. It is possible for a person to directly approach the bollard motion sensor without crossing between zones until 15 feet from the motion sensor. The actual motion detection distance may vary based on specific application characteristics.

LUMINAIRE FINISH: Each luminaire receives a fade and abrasion resistant, electrostatically applied, thermally cured textured powdercoat finish

LABELS: All luminaires bear UL or CUL (where applicable) Wet Location labels.

WARRANTY: Philips Gardco luminaires feature a 5 year limited warranty. Philips Gardco LED luminaires with LED arrays or modules feature a 5 year limited warranty covering the LED arrays or modules. LED drivers carry a 5 year limited warranty. See Warranty Information on www.sitelighting.com for complete details and exclusions.

FULL CUTOFF PERFORMANCE: Full cutoff performance means a luminaire distribution where zero candela intensity occurs at an angle at or above 90° above nadir . Additionally, the candela per 1000 lamp lumens does not numerically exceed 100 (10 percent) at a vertical angle of 80° above nadir. This applies to all lateral angles around the luminaire.

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Philips Lighting
North America Corporation
200 Franklin Square Drive
Somerset, NJ 08873
Tel. 855-486-2216

Imported by: Philips Lighting,
A division of Philips Electronics Ltd.
281 Hillmount Rd,
Markham, ON, Canada L6C 2S3
Tel. 800-668-9008

12V | Covelum™ Outdoor

CAT:	FEET:
TYPE:	PROJECT:



Wet listed 12V DC fixture for outdoor cove and pocket illumination in standard lengths with flexible water-tight connection for straight runs and segmented curves.

Features

- Standard fixtures are factory assembled with lens, LEDs and outdoor connection system.
- Plug & Play connections are set back from fixture end for smooth illumination without shadowing or scalloping between fixtures.

Mounting
Swivel mounting feet come attached to fixture base every 12".

Applications
Ideal for exterior wet cove illumination.

Warranty
3 years

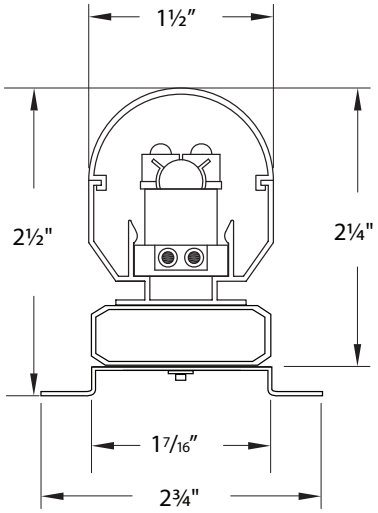
MADE IN USA IP65 DIMMABLE

Technical Information

LED Spacing	2.5"
*Lumens/ft	398
*Watts/ft	4.3
*Lumen/watt	92
CRI	>80/TYP 83
Kelvin Temp	2200°K, 2500°K, 2700°K, 3000°K, 3500°K, 4000°K (±80°K) 3SDCM
Rated Life	75,000 hrs.
Max Run Length	13'/60W
Order Increments	1', 2', 4', 6', 8'
Cut Increments	2.5"
Operating Voltage	12V DC
Power Supply	Class 2
Dimmable	Yes

* 3000°K Sample

Profile Dimensions



Factory Service

Covelum LED Outdoor is a sealed unit and must be serviced by factory.

CLL-LB-SERV
In-house service charge (per fixture).

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www.tivolilighting.com tel: 714-957-6101 fax: 714-427-3458

Recommended Power Supplies

CAT NO	APPLICATION	PRIMARY AND SECONDARY	TOTAL WATTAGE / AMPS PER BREAKER	LISTING	DIMENSIONS	ELECTRONIC OR AC MAGNETIC
ADNM-80-1-5-12-D	Outdoor	120-277V AC / 12V DC	60W / 1X5A	cULus	12"W X 12"L X 4"D	Electronic
ADNM-150-2-5-12-D		120-277V AC / 12V DC	120W / 2X5A	cULus	12″W X 12″L X 4″D	Electronic
ADNM-240-3-5-12-D		120-277V AC / 12V DC	180W / 3X5A	cULus	12″W X 12″L X 4″D	Electronic
ADNM-320-4-5-12-D		120-277V AC / 12V DC	240W / 4X5A	cULus	12″W X 12″L X 4″D	Electronic
ADNM-240-1-15-12-D		120-277V AC / 12V DC	180W / 1X15A	cULus	12″W X 12″L X 4″D	Electronic
MT-60-1-5-12-D	Indoor/Outdoor	120V AC / 12V DC	60W / 1X5A	cULus	2.50″W X 12.32″L X 1.56″D	Electronic
MT-60-1-5-12-DD		120V AC / 12V DC	60W / 1X5A	cULus	2.50″W X 12.32″L X 1.56″D	Electronic
JT-60-1-5-12-D		120V AC / 12V DC	60W / 1X5A	cETLus	4.25″W X 8.50″L X 3.25″D	Magnetic
JTH-60-1-5-12-D		277V AC / 12V DC	60W / 1X5A	cETLus	4.25″W X 8.50″L X 3.25″D	Magnetic
JT-240-4-5-12-D		120V AC / 12V DC	240W / 4X5A	cETLus	8.50″W X 16.00″L X 4.50″D	Magnetic
JTH-240-4-5-12-D		277V AC / 12V DC	240W / 4X5A	cETLus	8.50″W X 16.00″L X 4.50″D	Magnetic

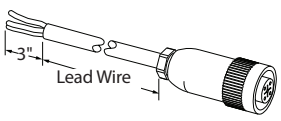
Dimming Interface

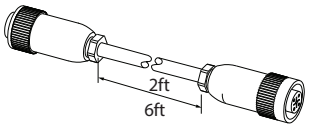
DESCRIPTION	CAT NO	APPLICATION	PRIMARY VOLTAGE	SECONDARY VOLTAGE	MAX LOAD	CIRCUIT BREAKERS	CIRCUIT CAPACITY	DIMENSION
DIM-OT	DIM-OT-1-4-5-D	Indoor	12V/24V	12V/24V	96W	1	5A /4A	7″L X 1½″W X ¾″H

Ordering Information

PRODUCT CODE		LED TYPE		LENS		COLOR TYPE		CONNECTOR		LENGTH		REQUIRED POWER SUPPLY
CLL	-	LB	-		-		-		-		-	PSU
Covelum™		LB = LiteBar		C = Clear F = Frosted		22 = 2200°K 25 = 2500°K 27 = 2700°K 30 = 3000°K 35 = 3500°K 40 = 4000°K		MD = Male/Dead End MF = Male/Female		1 = 1′ 2 = 2′ 4 = 4′ 6 = 6′ 8 = 8′		See above

Wiring Accessories





FEMALE LEAD WIRE
CLL-LB-F-LW-1
1' Lead Wire
CLL-LB-F-LW-8
8' Lead Wire
CLL-LB-F-LW-16
16′ Lead Wire
CLL-LB-F-LW-25
25′ Lead Wire
CLL-LB-F-LW-40
40′ Lead Wire

FEMALE/MALE CONNECTORS
CLL-LB-FM-2
2' Female/Male connector
CLL-LB-FM-6
6' Female/Male connector

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www.tivolilighting.com tel: 714-957-6101 fax: 714-427-3458

Control System Summary

Project Specific Notes:

Project Information

Project #:	159842
Project Name:	Lincoln Park
Date:	02/12/16
Project Engineer:	JBrown
Sales Representative:	Mike Berry
Control System Type:	Control and Monitoring
Communication Type:	Digital Cellular
Scan:	159842JBR3
Document ID:	159842P1V5-0212160452
Distribution Panel Location or ID:	
Total # of Distribution Panel Locations for Project:	1
Design Voltage/Hertz/Phase:	480/60/3
Control Voltage:	120

Equipment Listing

DESCRIPTION	APPROXIMATE SIZE
1.Control and Monitoring Cabinet	24 X 72

	QTY	SIZE
Total Contactors	10	30 AMP
Total Off/On/Auto Switches:	3	

Preliminary Plans
Confirm all Details - voltage,
# of distribution panels, etc.

Materials Checklist

Contractor/Customer Supplied:

- ❑ A single control circuit must be supplied per distribution panel location.
  - — If the control voltage is NOT available, a control transformer is required.
- ❑ Electrical distribution panel to provide overcurrent protection for circuits
  - — Thermal/Magnetic circuit breaker sized per full load amps on Circuit Summary by Zone Chart
- ❑ Wiring:
  - — Dedicated control power circuit
  - — Power circuit to and from lighting contactors
  - — Harnesses for cabinets at remote locations
  - — Means of grounding, including lightning ground protection
- ❑ Electrical conduit wireway system
  - — Entrance hubs rated NEMA 4: must be die-cast zinc, PVC, or copper-free die-cast aluminum
- ❑ Mounting hardware for cabinets
- ❑ Control circuit lock-on device to prevent unauthorized power interruption to control power
- ❑ Anti-corrosion compound to apply to ends of wire, if necessary

Call Control-Link Central ™ operations center at 877/347-3319 to schedule activation of the control system upon completion of the installation. Note: Activation may take up to 1 1/2 hours

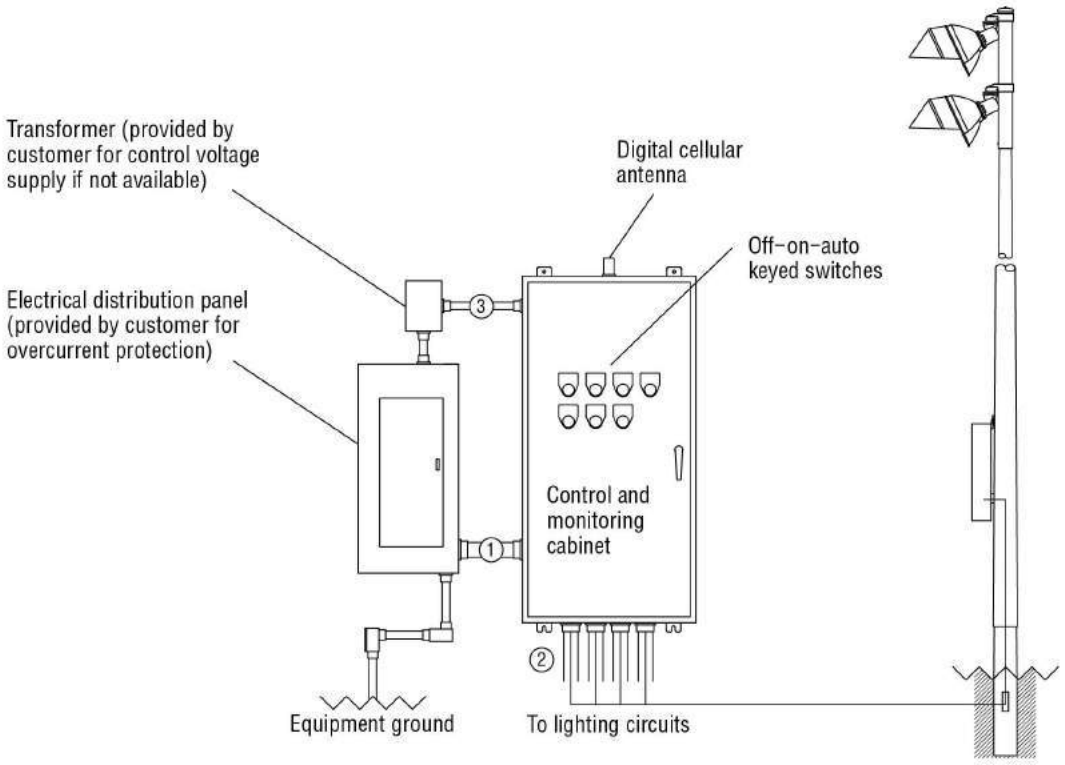
IMPORTANT NOTES

1. Please confirm that the design voltage listed above is accurate for this facility. Design voltage/phase is defined as the voltage/phase being connected and utilized at each lighting pole's ballast enclosure disconnect. Inaccurate design voltage/phase can result in additional costs and delays. Contact your Musco sales representative to confirm this item.
2. In a 3 phase design, all 3 phases are to be run to each pole. When a 3 phase design is used Musco's single phase luminaires come pre-wired to utilize all 3 phases across the entire facility.
3. One contactor is required for each pole. When a pole has multiple circuits, one contactor is required for each circuit. All contactors are UL 100% rated for the published continuous load. All contactors are 3 pole.
4. If the lighting system will be fed from more than one distribution location, additional equipment may be required. Contact your Musco sales representative.
5. A single control circuit must be supplied per control system.
6. Size overcurrent devices using the full load amps column of the Circuit Summary By Zone chart- Minimum power factor is 0.9.

NOTE: Refer to Installation Instructions for more details on equipment information and the installation requirements

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Control•Link® Control and Monitoring System



Wire	Description	# of Wires	Typ. Wire Size (AWG)	Max. Wire Length (FT)	Wire from Musco	Notes
1	Line power to contactors, and equipment grounding conductor	Note A	Note B	27	No	A – E
2	Load power to lighting circuits	Note A	Note B	N/A	No	A – D
3	Control power (dedicated, 20A)	3	12	N/A	No	C, D

R60-32-00_C

Notes:
A. Voltage and phasing per the notes on cover page.
B. Calculate per load and voltage drop.
C. All conduit diameters should be per code.
D. Refer to control and monitoring system installation instructions for more details on equipment information and the installation requirements.
E. Contact Musco if maximum wire length from circuit breaker to contactor exceeds value in chart.

IMPORTANT: Control (3) wires must be in separate conduit from line and load power wiring (1, 2).

Control System Summary

SWITCHING SCHEDULE

Field/Zone Description	Zones
Soccer	**1**
Softball 200'	**2**
Basketball/Parkour	**3**

CONTROL POWER CONSUMPTION	
120V Single Phase	
VA loading of Musco Supplied Equipment	INRUSH: 3038.0
	SEALED: 350.8

CIRCUIT SUMMARY BY ZONE

POLE	CIRCUIT DESCRIPTION	# OF FIXTURES	# OF DRIVERS	*FULL LOAD AMPS	CONTACTOR SIZE (AMPS)	CONTACTOR ID	ZONE
S1	Soccer	6	3	**5.9**	30	C1	1
S2	Soccer	6	3	**5.9**	30	C2	1
S3	Soccer	6	3	**5.9**	30	C3	1
S4	Soccer	6	3	**5.9**	30	C4	1
A1	Softball 200'	5	3	**8.0**	30	C5	2
A2	Softball 200'	5	3	**8.0**	30	C6	2
B1	Softball 200'	9	5	**11.4**	30	C7	2
B2	Softball 200'	9	5	**11.4**	30	C8	2
B3	Basketball/Parkour	5	3	**4.3**	30	C9	3
B4	Basketball/Parkour	3	3	**3.7**	30	C10	3

*Full Load Amps based on amps per driver.

Control System Summary

PANEL SUMMARY

CABINET #	CONTROL MODULE LOCATION	CONTACTOR ID	CIRCUIT DESCRIPTION	FULL LOAD AMPS	DISTRIBUTION PANEL ID (BY OTHERS)	CIRCUIT BREAKER POSITION (BY OTHERS)
1	1	C1	Pole S1	5.89		
1	1	C2	Pole S2	5.89		
1	1	C3	Pole S3	5.89		
1	1	C4	Pole S4	5.89		
1	1	C5	Pole A1	8.03		
1	1	C6	Pole A2	8.03		
1	1	C7	Pole B1	11.43		
1	1	C8	Pole B2	11.43		
1	1	C9	Pole B3	4.28		
1	1	C10	Pole B4	3.71		

ZONE SCHEDULE

			CIRCUIT DESCRIPTION	
ZONE	SELECTOR SWITCH	ZONE DESCRIPTION	POLE ID	CONTACTOR ID
Zone 1	1	Soccer	S1 S2 S3 S4	C1 C2 C3 C4
Zone 2	2	Softball 200'	A1 A2 B1 B2	C5 C6 C7 C8
Zone 3	3	Basketball/Parkour	B3 B4	C9 C10

POLE FOUNDATION SCHEDULE

POLE DESIGNATION	FORCES (1.)			FOOTING			PIER		
	MOMENT (M) FT-LBS	SHEAR (V) LBS	VERTICAL (P) LBS	SIZE	THICKNESS	REINFORCEMENT TOP & BOTTOM (TOTAL) QUANTITY - SIZE	DIAMETER INCHES	CORE DIA. INCHES (2.)	VERTICAL REINFORCING
A1, A2	46,571	1,286	1,318	9'-6" x 9'-6"	2'-0"	(48) 12 - #6's EACH WAY	36	29	12 - #6
B1, B2	85,713	1,988	2,128	11'-0" x 11'-0"	2'-0"	(56) 14 - #6's EACH WAY	36	29	12 - #6
B3, B4	19,507	737	525	7'-0" x 7'-0"	2'-0"	(40) 10 - #6's EACH WAY	36	29	12 - #6
S1, S2	53,689	1,387	1,402	9'-6" x 9'-6"	2'-0"	(48) 12 - #6's EACH WAY	36	29	12 - #6
S3, S4	52,474	1,367	1,402	9'-6" x 9'-6"	2'-0"	(48) 12 - #6's EACH WAY	36	29	12 - #6

1. ASD LOAD COMBINATION D+W.
   VERTICAL FORCE IS WEIGHT OF DRESSED POLE (DOES NOT INCLUDE PRECAST BASE WEIGHT).
2. CORE DIAMETER EQUAL TO INSIDE DIAMETER OF TIES.

POLE IDENTIFICATION

POLE DESIGNATION	POLE TYPE	PRECAST BASE TYPE	FIXTURE CONFIGURATION (FIX. PER XARM)	FIXTURE AND ACCESSORIES EPA (FT^2)
A1, A2	LSS60B	3B	5 (4)	10.1
B1, B2	LSS70C	4B	9 (4+3)	17.1
B3, B4	LSS40A	1B	3 (3)	5.0
S1, S2	LSS60B	3B	6 (4+2)	11.9
S3, S4	LSS60B	3B	6 (4+2)	11.3

- POLES A1 & A2 HAVE ONE MUSCO LED FIXTURE AT 25'-0" AGL, INCLUDED ABOVE.
- POLES B1 & B2 HAVE TWO MUSCO LED FIXTURES AT 25'-0" AGL, INCLUDED ABOVE.

CONCRETE/REINFORCEMENT NOTES

CONCRETE SHALL COMPLY WITH THE FOLLOWING ASTM STANDARDS: MIXTURE WITH ASTM C-94, PORTLAND CEMENT WITH ASTM C-150 TYPE 1-A, AGGREGATES WITH ASTM C-33 AND BE IN CONFORMANCE WITH ACI 318.

CONCRETE SHALL BE AIR-ENTRAINED (COMPLY WITH ASTM C-260), HAVE A MAXIMUM WATER-CEMENT RATIO, w/cm = 0.43 AND HAVE A MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS OF 4,000 PSI.

DESIGN SLUMP LIMITS ARE 4" MINIMUM AND 6" MAXIMUM. THE JOB SITE SLUMP MAY BE INCREASED BY THE USE OF A WATER REDUCING AGENT MEETING ASTM C494-92.

CONCRETE REINFORCEMENT SHALL COMPLY WITH ASTM A615 GRADE 60, EXCEPT TIES CAN BE OF GRADE 40 AND BE IN CONFORMANCE WITH ACI 315 & 318.

CONCRETE MUST ATTAIN 3,000 PSI STRENGTH PRIOR TO POLE INSTALLATION AND FIXTURE MOUNTING.

DESIGN NOTES

DESIGN PARAMETERS:
WIND: 105 MPH (EXP. C, I = 1.0) PER IBC CODE, 2009 EDITION (ASCE 7-05).
DESIGN WIND PARAMETERS ARE NOTED. ACTUAL WIND SPEED AND EXPOSURE MUST BE VERIFIED FOR THE SITE BY THE PROPER GOVERNING OFFICIAL.

GEOTECHNICAL PARAMETERS:
ALLOWABLE END BEARING SOIL PRESSURE: 1,000 PSF
IN ACCORDANCE WITH THE 2009 EDITION OF THE INTERNATIONAL BUILDING CODE, CHAPTER 18.

OVER EXCAVATE 4'-0" BELOW THE BOTTOM OF THE SPREAD FOOTING TO A DEPTH OF -8'-0" BELOW GRADE. REPLACE THE OVER EXCAVATED AREA WITH COMPACTED STRUCTURAL FILL. THE STRUCTURAL FILL SHOULD BE IBC, TABLE 1806.2, CLASS 3 OR BETTER AND BE COMPACTED TO 98% OF STANDARD PROCTOR (ASTM D698). ANY ORGANIC SOIL ENCOUNTERED MUST BE REMOVED AND REPLACED.

DESIGN SOIL PARAMETERS ARE AS NOTED. ACTUAL ALLOWABLE SOIL PARAMETERS MUST BE VERIFIED ON SITE. REFERENCE SOILS AND FOUNDATION REPORT, NO. S2042, PREPARED BY THE GEOTECHNICAL GROUP, INC; NEEDHAM, MA.

A GEOTECHNICAL ENGINEER OR REPRESENTATIVE OF IS RECOMMENDED (NOT REQUIRED) TO BE AVAILABLE AT THE TIME OF THE FOUNDATION INSTALLATION TO VERIFY THE SOIL DESIGN PARAMETERS AND TO PROVIDE ASSISTANCE IF ANY PROBLEMS ARISE IN FOUNDATION INSTALLATION.

ENCOUNTERING SOIL FORMATIONS THAT WILL REQUIRE SPECIAL DESIGN CONSIDERATIONS OR EXCAVATION PROCEDURES MAY OCCUR. POLE FOUNDATIONS WILL NEED TO BE ANALYZED ACCORDING TO THE SOIL CONDITIONS THAT EXIST. IF ANY DISCREPANCIES OR INCONSISTENCIES ARISE, NOTIFY THE ENGINEER OF SUCH DISCREPANCIES. FOUNDATIONS WILL THEN BE REVISED ACCORDINGLY. REVISIONS WILL BE ANALYZED PER RECOMMENDATIONS DIRECTED BY A REGISTERED ENGINEER.

ALL EXCAVATIONS MUST BE FREE OF LOOSE SOIL AND DEBRIS PRIOR TO FOUNDATION INSTALLATION AND CONCRETE BACKFILL PLACEMENT.

CONTRACTOR MUST BE FAMILIAR WITH THE COMPLETE SOIL INVESTIGATION REPORT AND BORINGS, AND CONTACT THE GEOTECHNICAL FIRM (IF NECESSARY) TO UNDERSTAND THE SOIL CONDITIONS AND THE POSSIBILITY OF GROUND WATER PUMPING AND EXCAVATION STABILIZATION OR BRACING DURING PRECAST BASE INSTALLATION AND PLACEMENT OF CONCRETE BACKFILL.

GENERAL NOTES:
FIXTURES MUST BE LOCATED TO MAINTAIN 10'-0" MINIMUM HORIZONTAL CLEARANCE FROM ANY OBSTRUCTION. ENGINEER MUST BE NOTIFIED IF FOUNDATIONS ARE NEAR ANY RETAINING WALLS OR WITHIN / NEAR ANY SLOPES STEEPER THAN 3H : 1V. POLES, FIXTURES, PRECAST BASES, ELECTRICAL ITEMS AND INSTALLATION PER MUSCO LIGHTING.

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FOR BID
PURPOSES ONLY

LINCOLN PARK
FIELD LIGHTING
SOMERVILLE, MA

musco Lighting
CORPORATE: 100 1st AVE WEST
OSKALOOSA, IA 52577
(800) 825-6020

STRUCTURAL ENGINEERS, P.C.
114 NICHOLAS DRIVE
MARSHALLTOWN, IOWA 50158
PHONE NUMBER: 641-752-6334
EMAIL: MSL.INFO@SEPC.BIZ

DRAWING TITLE: POLE AND FOUNDATION
SCALE: SEE PLAN
NOTES: SCAN #159842JBR2

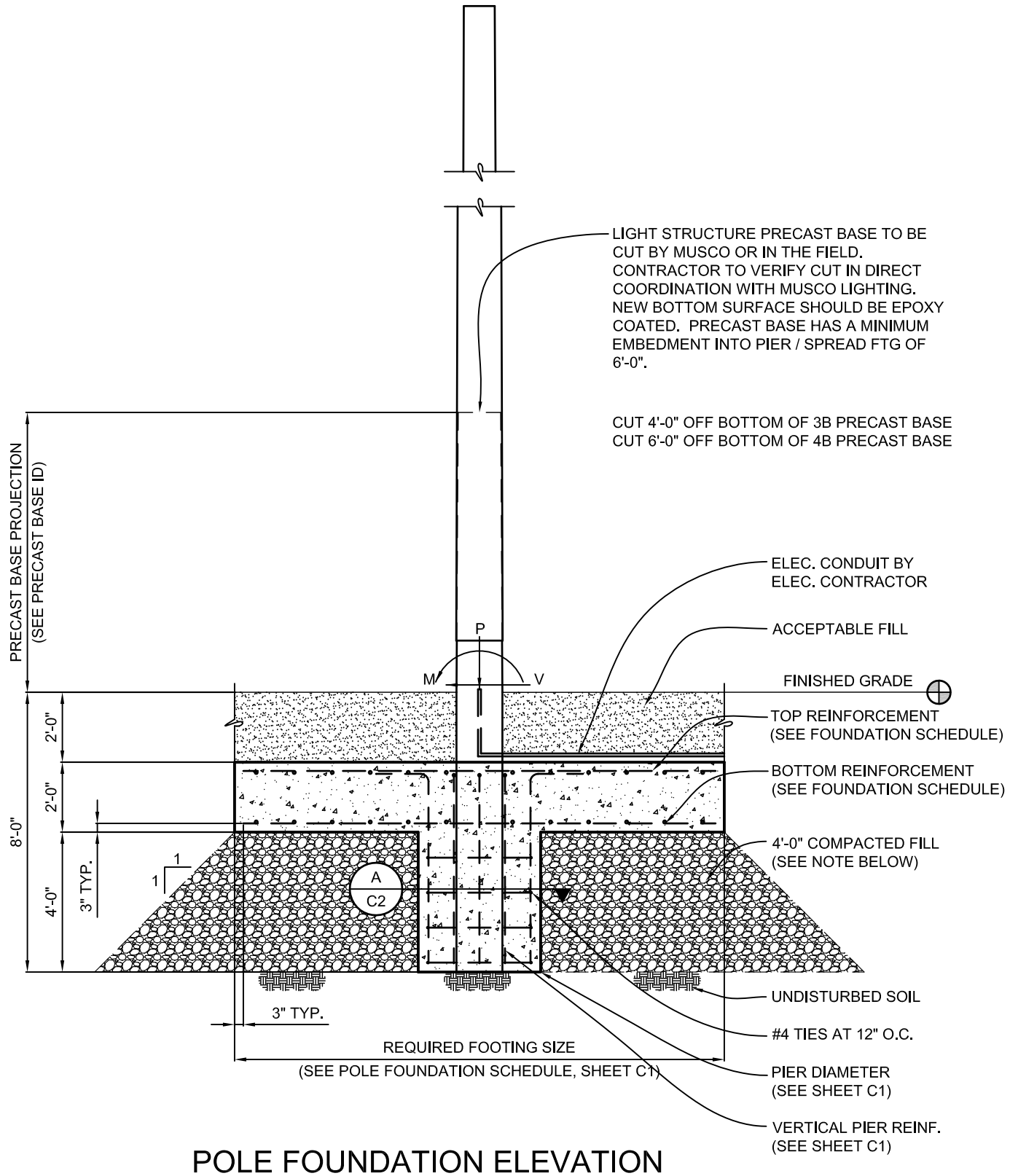
PROJECT NUMBER
159842

DATE
12 FEBRUARY 2016

DRAWING NUMBER
C1
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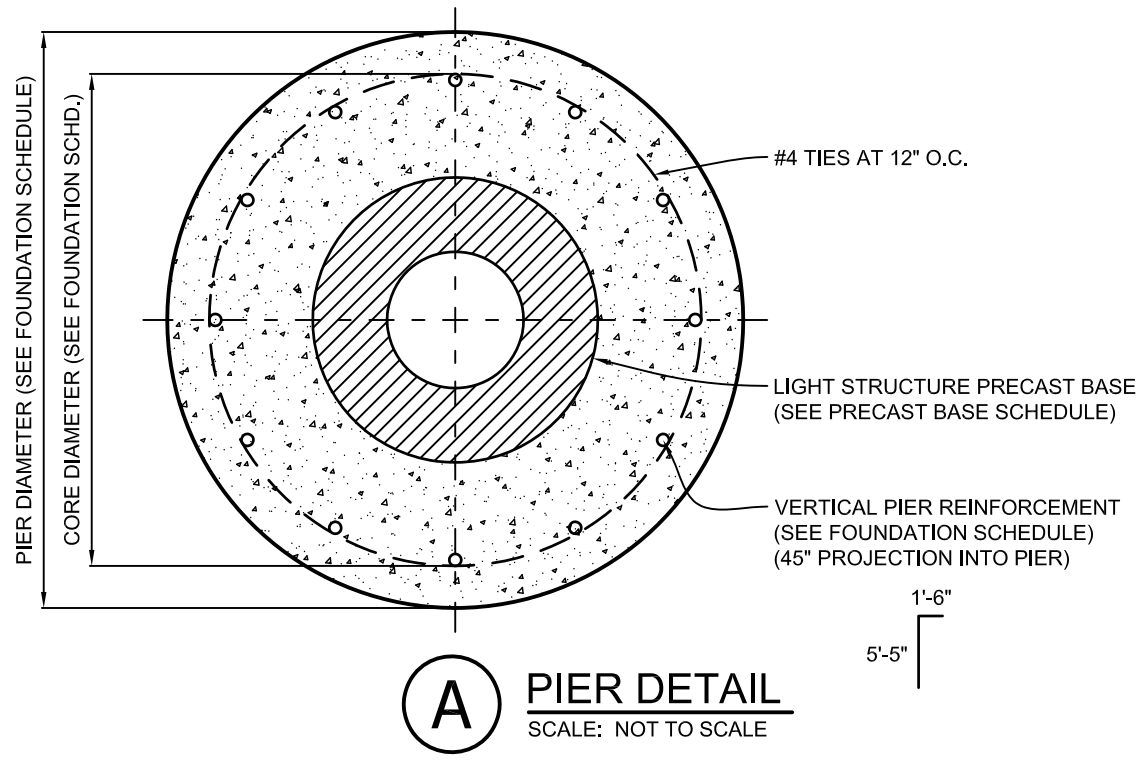
PRECAST BASE IDENTIFICATION					
PRECAST BASE TYPE	PRECAST BASE WEIGHT	PRECAST BASE LENGTH	PROJECTION ABOVE GRADE	STANDARD EMBEDMENT	OUTSIDE DIAMETER
1B	920 LBS	15'-2"	7'-2"	8'-0"	9.56"
3B	2,470 LBS	20'-0"	8'-0"	12'-0"	13.38"
4B	3,490 LBS	22'-0"	8'-0"	14'-0"	15.75"
PRECAST BASE WEIGHT, LENGTH AND STANDARD EMBEDMENT ARE PRECUT PROPERTIES REFERENCE POLE ID TABLE ON SHEET C1 FOR POLE TO PRECAST BASE TYPES					



POLE FOUNDATION ELEVATION

SCALE: NOT TO SCALE

NOTE:
OVER EXCAVATE 4'-0" BELOW THE BOTTOM OF THE SPREAD FOOTING TO A DEPTH OF -8'-0" BELOW GRADE. REPLACE THE OVER EXCAVATED AREA WITH COMPACTED STRUCTURAL FILL. THE STRUCTURAL FILL SHOULD BE IBC, TABLE 1806.2, CLASS 3 OR BETTER AND BE COMPACTED TO 98% OF STANDARD PROCTOR (ASTM D698). ANY ORGANIC SOIL ENCOUNTERED MUST BE REMOVED AND REPLACED.



A PIER DETAIL

SCALE: NOT TO SCALE

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FIELD LIGHTING
SOMERVILLE, MA

musco Lighting
CORPORATE: 100 1st AVE WEST
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Lincoln Park

Somerville,MA

Lighting System

Pole / Fixture Summary

Pole ID	Pole Height	Mtg Height	Fixture Qty	Luminaire Type	Load	Group
A1	60'	60'	4	216 LED	2.39 kW	B
		25'	1	96 LED	0.39 kW	B
A2	60'	60'	4	216 LED	2.39 kW	B
		25'	1	96 LED	0.39 kW	B
B1	70'	70'	7	216 LED	4.18 kW	B
		25'	2	96 LED	0.79 kW	B
B2	70'	70'	7	216 LED	4.18 kW	B
		25'	2	96 LED	0.79 kW	B
B3	40'	40'	3	96 LED	1.18 kW	C
B4	40'	40'	3	96 LED	1.18 kW	C
S1	60'	60'	6	216 LED	3.58 kW	A
S2	60'	60'	6	216 LED	3.58 kW	A
S3	60'	60'	6	216 LED	3.58 kW	A
S4	60'	60'	6	216 LED	3.58 kW	A
10			***58***		***32.19 kW***	

Group Summary

Group	Description	Load	Fixture Qty
A	Soccer	14.33 kW	24
B	Softball	15.5 kW	28
C		2.36 kW	6

Fixture Type Summary

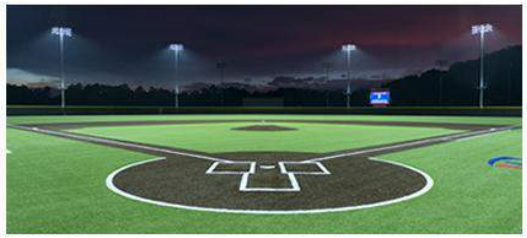
Type	Source	Wattage	Lumens	L90	L80	L70	Quantity
216 LED	LED 5700K - 65 CRI	597W	65,400	33,000	>42,000	>42,000	46
96 LED	LED 5700K - 65 CRI	394W	38,600	61,000	>72,000	>72,000	12

Light Level Summary

Calculation Grid Summary

Grid Name	Calculation Metric	Illumination				Groups	Fixture Qty
		Ave	Min	Max	Max/Min		
Basketball Area	Horizontal Illuminance	20.8	0	39	175322.70	C	6
Basketball	Horizontal Illuminance	31.8	24	39	1.61	C	6
Grid	Horizontal	0.14	0	34	0.00	A,B	52
Soccer	Horizontal Illuminance	30.2	26	36	1.42	A	24
Softball 200' (Infield)	Horizontal Illuminance	33.6	23	41	1.76	B	28
Softball 200' (Outfield)	Horizontal Illuminance	22.2	13	31	2.31	B	28

From Hometown to Professional









We Make It Happen.

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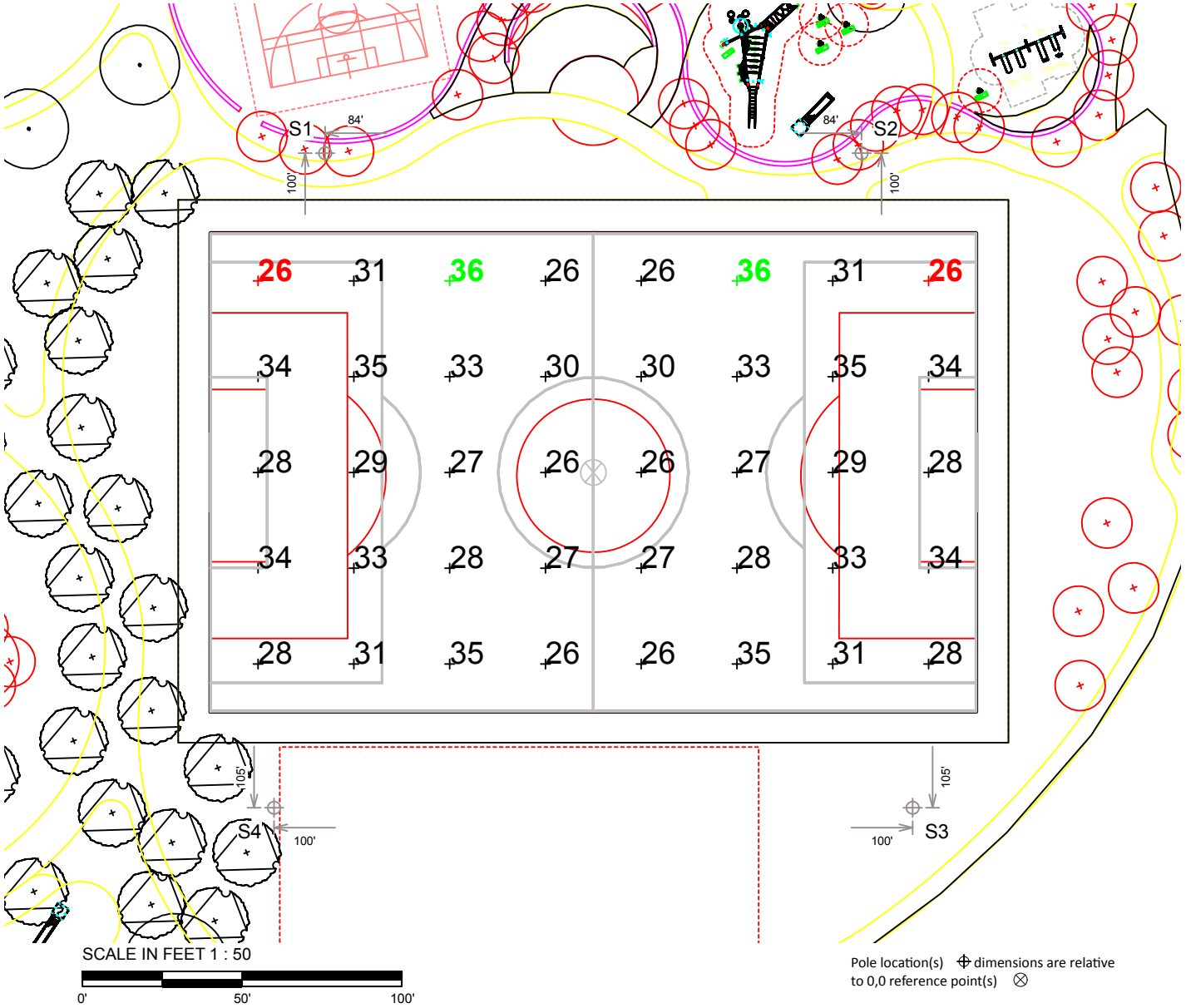
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Lincoln Park

Somerville,MA

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
4	S1-S4	60'	-	60'	216 LED	6	6	0
4	TOTALS					24	24	0



Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

GRID SUMMARY

Name:	**Soccer**
Size:	240' x 150'
Spacing:	30.0' x 30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

HORIZONTAL FOOTCANDLES

	Entire Grid
Guaranteed Average:	**30**
Scan Average:	30.17
Maximum:	36
Minimum:	26
Avg / Min:	1.18
Guaranteed Max / Min:	**2**
Max / Min:	1.42
UG (adjacent pts):	1.41
CU:	0.69
No. of Points:	40

LUMINAIRE INFORMATION

Color / CRI:	5700K - 65 CRI
Luminaire Output:	65,400 / 38,600 lumens
No. of Luminaires:	**24**
Total Load:	14.33 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
216 LED	33,000	>42,000	>42,000
96 LED	61,000	>72,000	>72,000

Reported per TM-21-11. See cutsheets for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA LM-5-04.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume +/- 5% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

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EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
2	A1-A2	60'	-	25'	96 LED	1	1	0
				60'	216 LED	4	4	0
2	B1-B2	70'	-	25'	96 LED	2	2	0
				70'	216 LED	7	7	0
4	TOTALS					28	28	0

Lincoln Park

Somerville,MA

GRID SUMMARY

Name:	**Softball 200'**
Size:	220.0' x 220.0'
Spacing:	20.0' x 20.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

HORIZONTAL FOOTCANDLES

	Infield	Outfield
Guaranteed Average:	**30**	**20**
Scan Average:	33.55	22.20
Maximum:	41	31
Minimum:	23	13
Avg / Min:	1.45	1.68
Guaranteed Max / Min:	**2**	**2.5**
Max / Min:	1.76	2.31
UG (adjacent pts):	1.38	1.72
No. of Points:	25	73

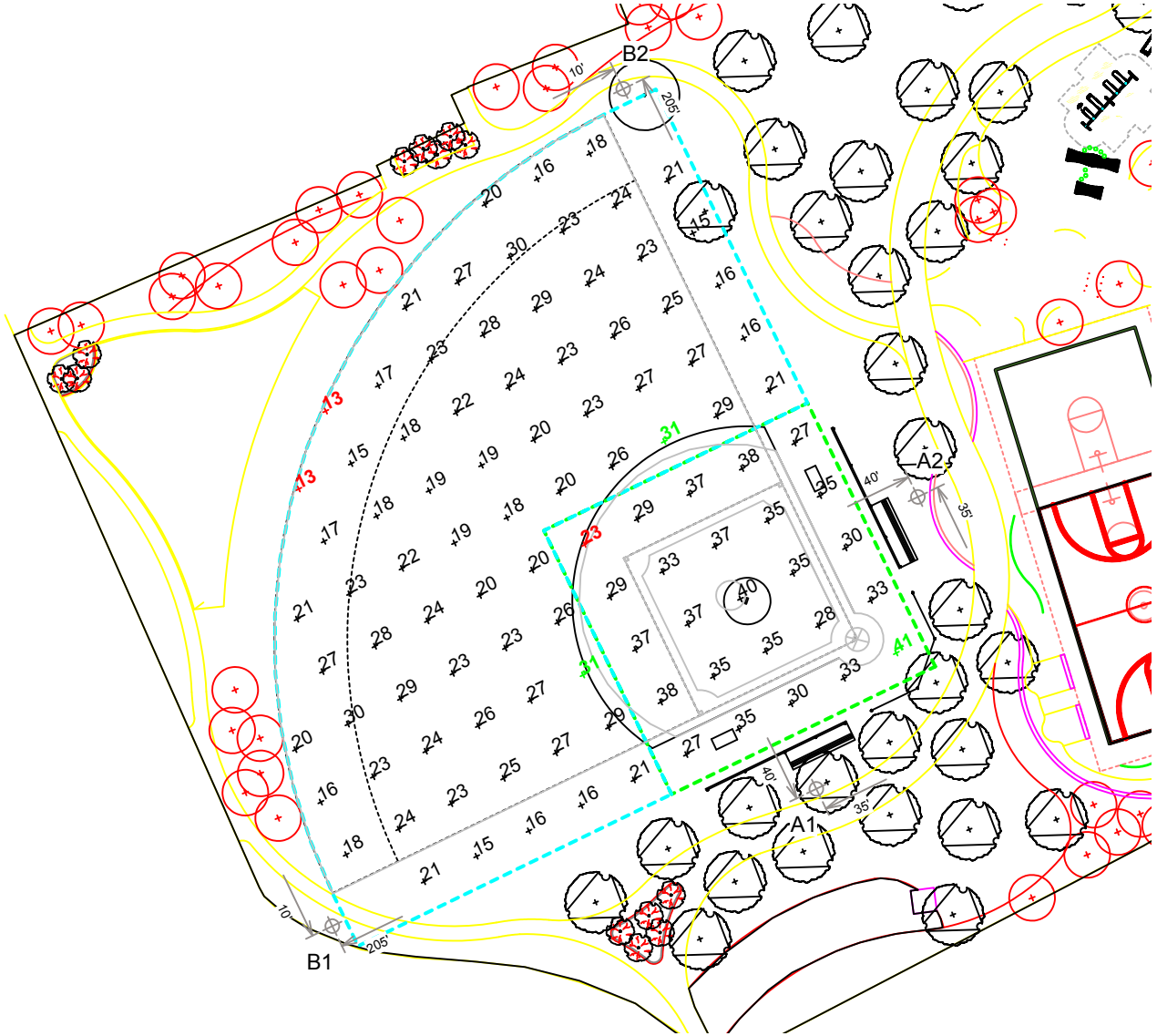
LUMINAIRE INFORMATION

Color / CRI:	5700K - 65 CRI
Luminaire Output:	65,400 / 38,600 lumens
No. of Luminaires:	**28**
Total Load:	15.5 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
216 LED	33,000	>42,000	>42,000
96 LED	61,000	>72,000	>72,000

Reported per TM-21-11. See cutsheets for details.



SCALE IN FEET 1 : 60

0' 60' 120'

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA LM-5-04.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume +/- 5% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

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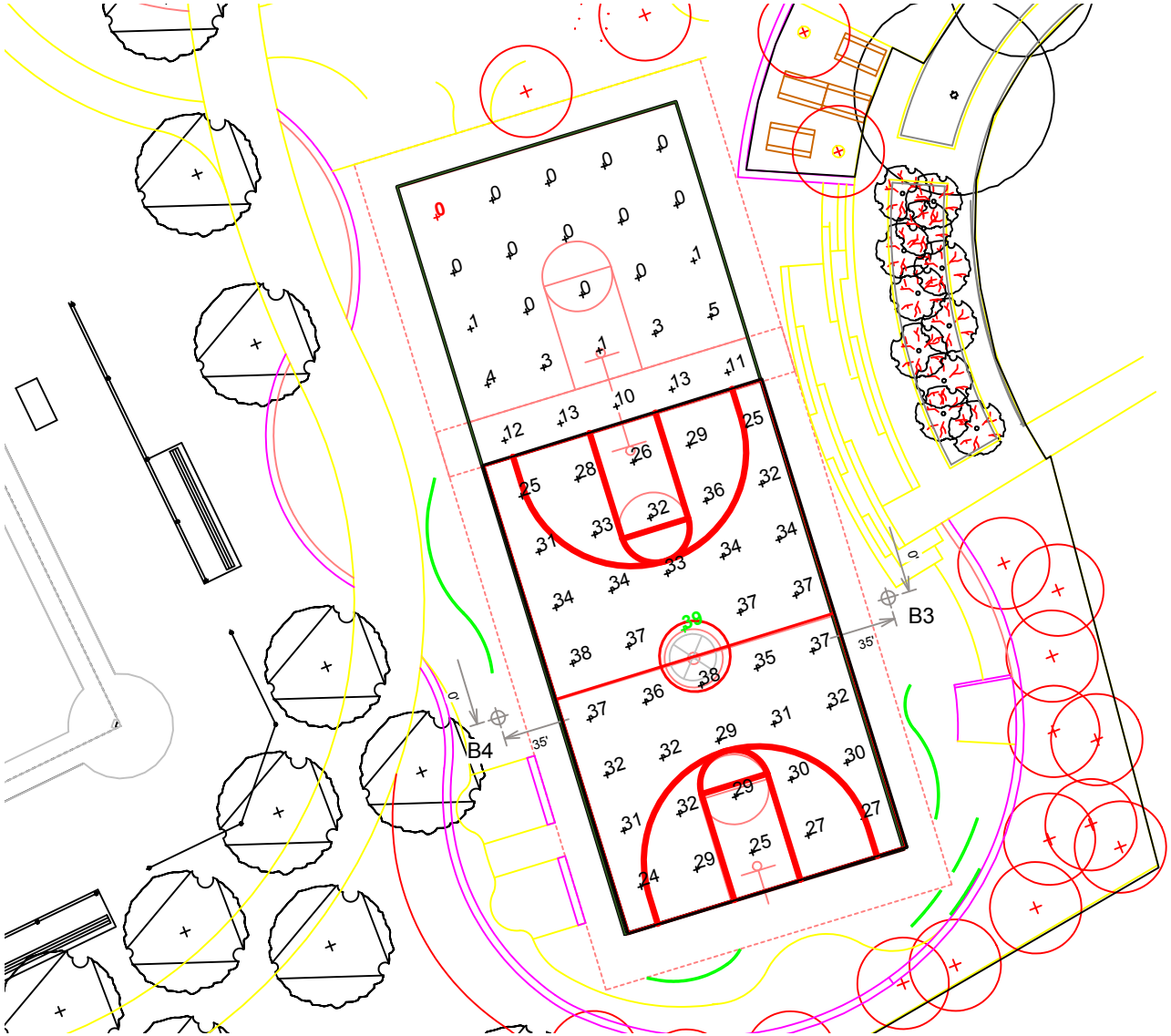
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Lincoln Park

Somerville,MA

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
2	B3-B4	40'	-	40'	96 LED	3	3	0
2	TOTALS					6	6	0



Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

GRID SUMMARY

Name:	**Basketball Area**
Size:	50' x 134'
Spacing:	10.0' x 10.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**20.79**
Maximum:	39
Minimum:	0
Avg / Min:	93709.17
Max / Min:	**175322.70**
UG (adjacent pts):	76.09
CU:	0.66
No. of Points:	65

LUMINAIRE INFORMATION

Color / CRI:	5700K - 65 CRI
Luminaire Output:	38,600 lumens
No. of Luminaires:	**6**
Total Load:	2.36 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
96 LED	61,000	>72,000	>72,000

Reported per TM-21-11. See cutsheets for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA LM-5-04.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

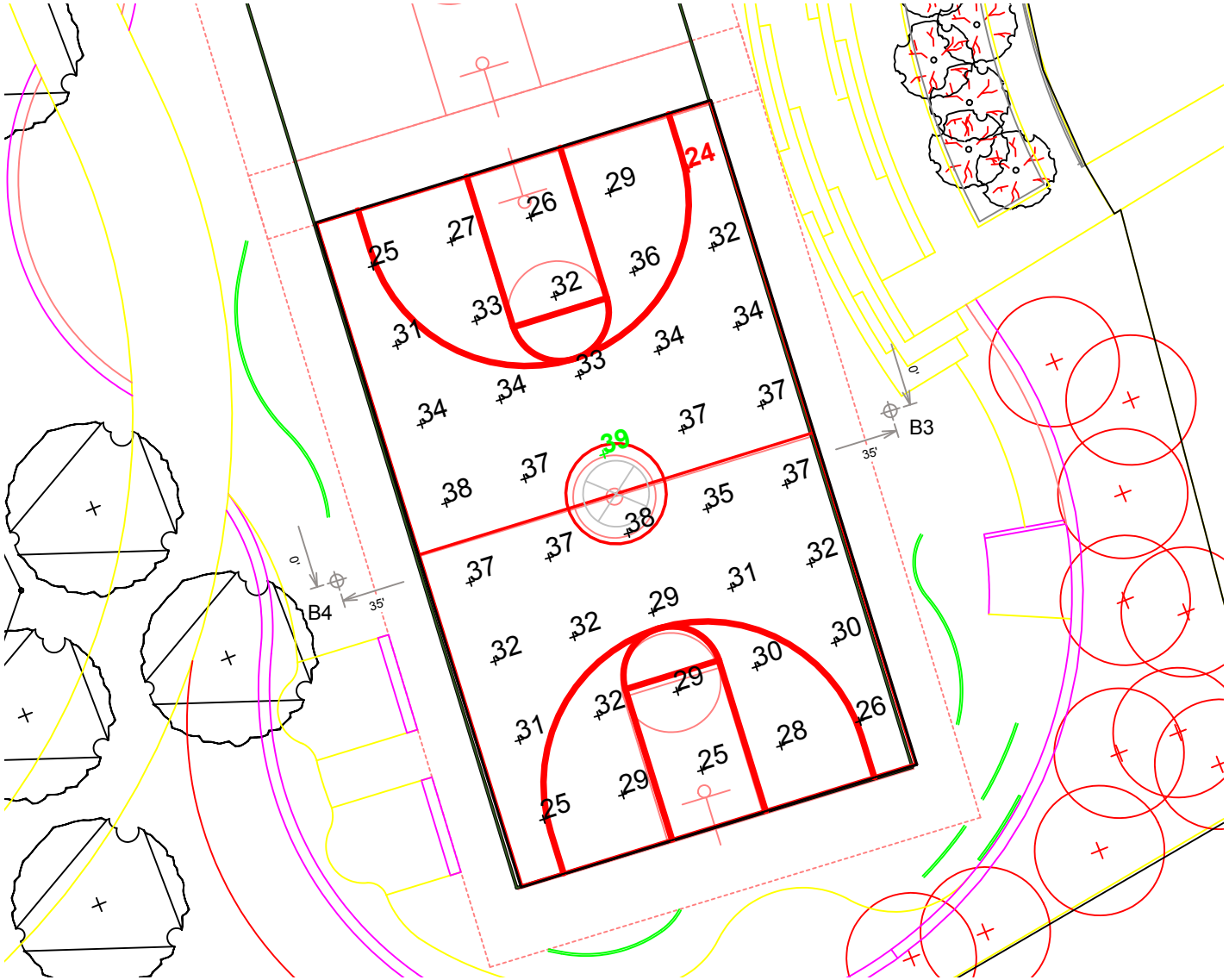
Installation Requirements: Results assume +/- 5% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

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EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
2	B3-B4	40'	-	40'	96 LED	3	3	0
2	TOTALS					6	6	0



SCALE IN FEET 1 : 20

0' 20' 40'

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

ENGINEERED DESIGN By: Jared Brown • File #159842JBR1 • 08-Dec-15

Lincoln Park

Somerville,MA

GRID SUMMARY

Name:	**Basketball**
Size:	84' x 50'
Spacing:	10.0' x 10.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

HORIZONTAL FOOTCANDLES

	Entire Grid
Guaranteed Average:	**30**
Scan Average:	31.84
Maximum:	39
Minimum:	24
Avg / Min:	1.32
Guaranteed Max / Min:	**2**
Max / Min:	1.61
UG (adjacent pts):	1.32
CU:	0.62
No. of Points:	40

LUMINAIRE INFORMATION

Color / CRI:	5700K - 65 CRI
Luminaire Output:	38,600 lumens
No. of Luminaires:	**6**
Total Load:	2.36 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
96 LED	61,000	>72,000	>72,000

Reported per TM-21-11. See cutsheets for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA LM-5-04.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume +/- 5% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

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Lincoln Park

Somerville,MA

EQUIPMENT LAYOUT

INCLUDES:

· Basketball
· Basketball Area
· Soccer
· Softball 200'

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

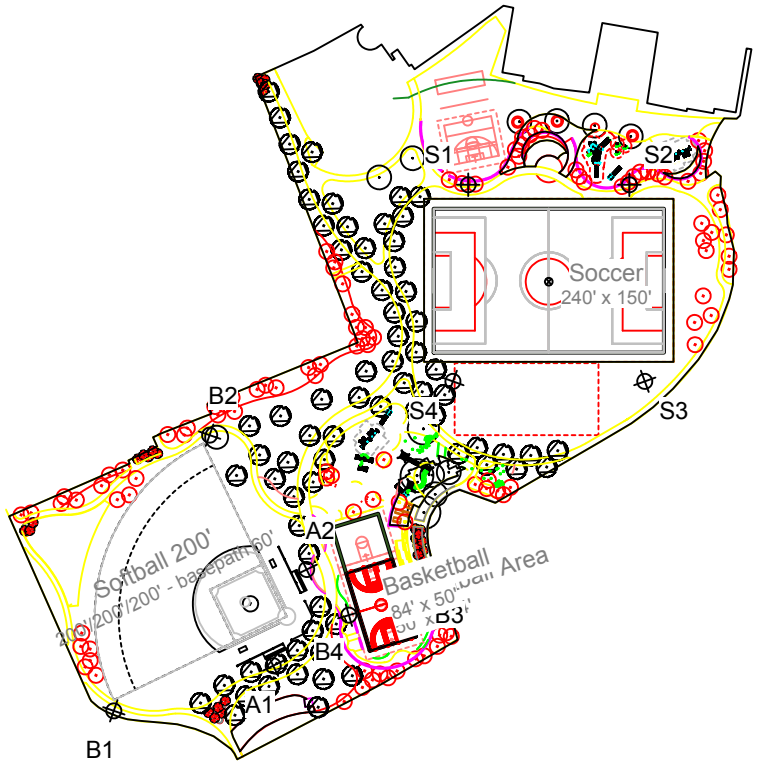
Installation Requirements: Results assume +/- 5% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires		
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE
2	A1-A2	60'	-	25' 60'	96 LED 216 LED	1 4
2	B1-B2	70'	-	25' 70'	96 LED 216 LED	2 7
2	B3-B4	40'	-	40'	96 LED	3
4	S1-S4	60'	-	60'	216 LED	6
10	TOTALS					58

SINGLE LUMINAIRE AMPERAGE DRAW CHART

Ballast Specifications (.90 min power factor)	Line Amperage Per Luminaire (max draw)						
Single Phase Voltage	208 (60)	220 (60)	240 (60)	277 (60)	347 (60)	380 (60)	480 (60)
216 LED	3.8	3.6	3.3	2.8	2.3	-	1.6
96 LED	2.5	2.3	2.1	1.9	1.5	-	1.1



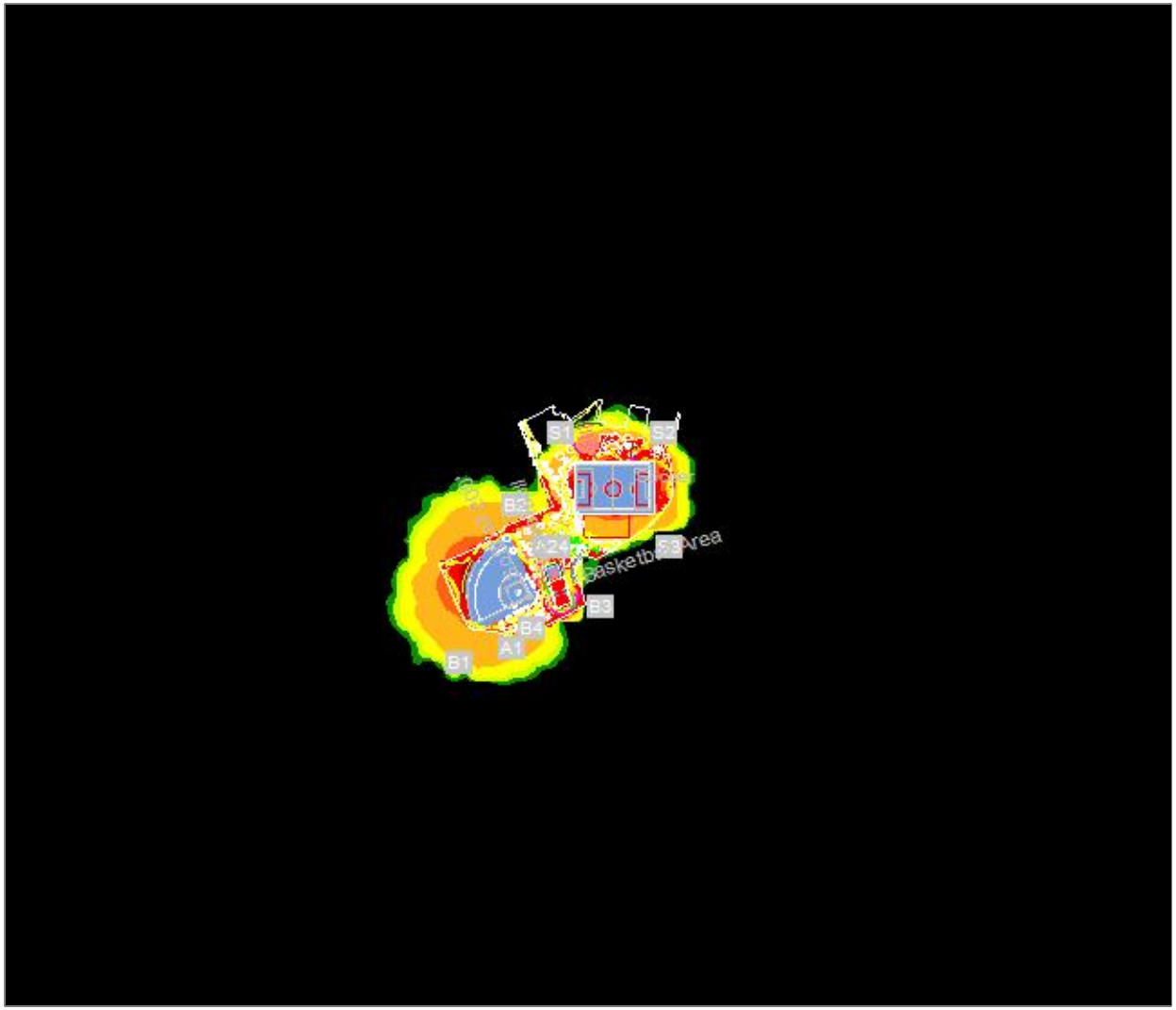
SCALE IN FEET 1 : 200

0' 200' 400'

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

ENGINEERED DESIGN By: Jared Brown • File #159842JBR1 • 08-Dec-15

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Lincoln Park

Somerville,MA

GLARE IMPACT

Summary

The Maximum Candela map indicates the maximum candela achieved at a point (ground level) from any source. This can be used to approximate the amount of glare an observer would be subjected to when viewing the lit environment. It assumes that the observer would face the brightest light source in any direction.

While very high candela values are reported on or very near the application area, the goal of the lighting system is to control the light such that the impact off-site is minimal.

Values at or below 500 candelas will result in no discomfort glare.

Candelas:

\+ 150,000 100,000 50,000 5,000 1,000 500 250

High Glare
Should only occur on or very near the lit area where light source is in direct view. Care must be taken to minimize high glare zones.

Significant Glare
Equivalent to high beam headlights of a car. (25,000 to 75,000 candelas)

Minimal to No Glare
Equivalent to 100W incandescent light bulb.

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Q-Tran, Inc.
155 Hill Street
Milford, CT 06460

P: (203) 367-8777
F: (203) 367-8771
www.q-tran.com

Q-SET-ELED

The electronic LED driver provides a constant voltage output for operating LED systems requiring a normal 12VDC or 24VDC voltage.

Model Numbers:

Without Dimming Module
Q-SET-ELED- 60 -UNV/12
Q-SET-ELED-120-UNV/12
Q-SET-ELED-100-UNV/24
Q-SET-ELED-200-UNV/24

With Dimming Module
Q-SET-ELED- 60 -UNV/12+DIM (DIM is a 0-10V control)
Q-SET-ELED-120-UNV/12+DIM
Q-SET-ELED-100-UNV/24+DIM
Q-SET-ELED-200-UNV/24+DIM

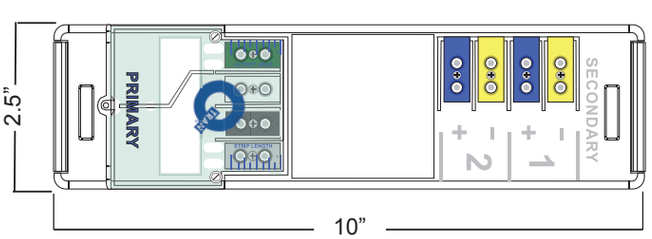
Each 12V QSET-1 ELED unit has one/ two 60W (120W) Drivers per QSET. Each Q-VAULT-5 can hold a total of 240W.

Each 24V QSET-1 ELED unit has one/ two 100W (200W) Drivers per QSET. Each Q-VAULT-5 can hold a total of 400W.

Optional: Dimmer Controllers - Does not include 0-10V dimmer.



- MUST BE USED WITH Q-VAULT-5
- SUITABLE FOR OUTDOOR USE
- SUITABLE FOR GROUND INSTALLATION
- SUITABLE FOR SUBMERSIBLE LUMINARIES
- UL CLASS 2



(Must be purchased with Q-VAULT-5)



LANDSCAPE LANDSCAPE C US

Q-SET-ELED Ordering &Specification Guide

1 **Model** **Primary V.** **Secondary V.**
1 - **2** / **3**

12V
QSET-ELED- 60 -UNV/12
QSET-ELED-120-UNV/12
QSET-ELED- 60 -UNV/12+DIM
QSET-ELED-120-UNV/12+DIM

24V
QSET-ELED-100-UNV/24
QSET-ELED-200-UNV/24
QSET-ELED-100-UNV/24+DIM
QSET-ELED-200-UNV/24+DIM

2. Primary Voltage - UNIVERSAL

3. Secondary Voltage -
12VDC or 24VDC

Ordering Example:
QSET-ELED-100 - UNV/12

Q-Tran, Inc.
155 Hill Street
Milford, CT 06460

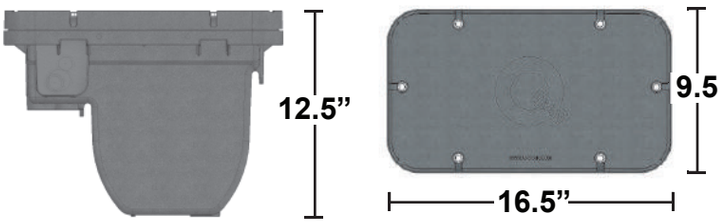
P: (203) 367-8777
F: (203) 367-8771
www.q-tran.com

Q-VAULT-5

Accessories

Q-VAULT-5 Gasket





Stabilizing Bars



Perforated Drain Pipe



IP68 LISTED



(Q-VAULT-5 must be purchased with Q-SET power supply)

Q-VAULT-5 Installation Kit







Q-SET sold separately

Q-VAULT-5 Accessories

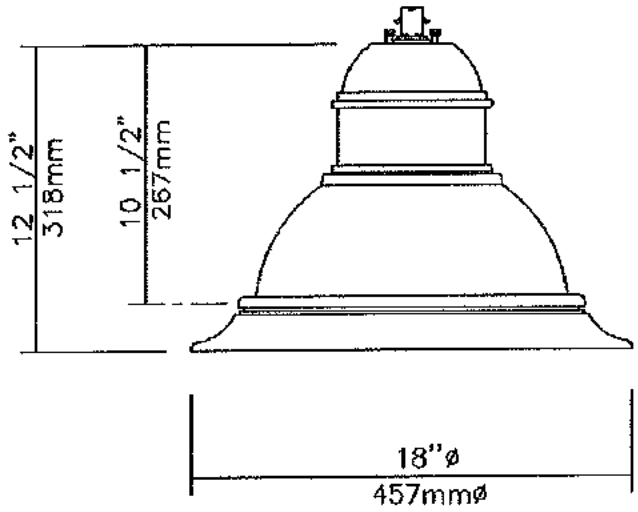
Standard Unit is equipped with:

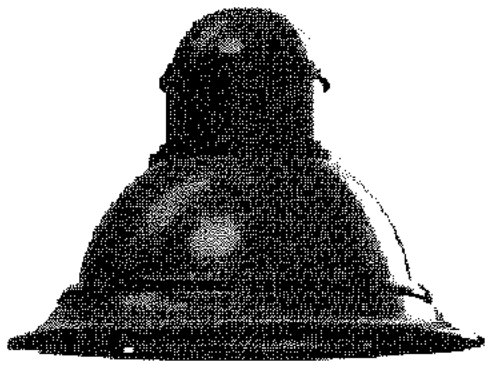
1 Housing & Door
1 Housing Gasket
2 Stabilizing Bars
1 Installation Kit
Slotted Hex Stainless Steel 1/4-20 Removable Brass Nuts
Perforated Pipe

Installation Kit includes:

1	Epoxy Pack
1	Epoxy Application Syringe
1	Wad of Watertight Putty
1	Desiccant Pouch
1	Silver Marker
1	Installation Instructions
1	Drilling Guide Label
1	Hex Tool
4	Wire Ties

Somerville Bike Path (72349)





EPA: .84 sq ft / weight: 35 lb (15.9 kg)
Note: 3D image may not represent color or option selected.
Logos above include link, click to access.

Qty 1 Luminaire **DOS-40W30LED4K-ES-LE2F-277-BKTX**

Description of Components:

Housing: In a round shape, this housing is made of die cast A380 aluminum, c/w a watertight grommet, mechanically assembled to the bracket with four bolts 5/16-18 UNC. This suspension system permits for a full rotation of the luminaire in 90 degree increments.

Access-Mechanism: A die cast A360 aluminum technical ring with latch, hinge and a cast-in decorative skirt. The mechanism shall offer tool-free access to the inside of the luminaire. An embedded memory-retentive gasket shall ensure weatherproofing.

Light Engine: LifeLED™ composed of 4 main components: **LED lamp / Optical System / Heat Sink / Driver**
Electrical components are RoHS compliant.

Lens: Made of soda-lime tempered glass lens, mechanically assembled and sealed onto the lower part of the heat sink.

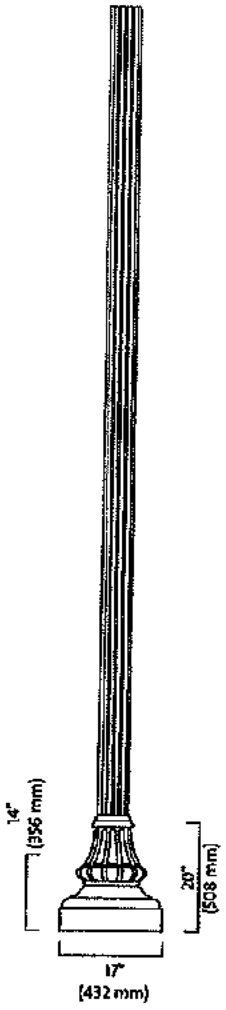
Lamp: LED Module (Included), LED type Philips Lumileds Rebel ES. Composed of 30 high-performance white LEDs, 40w lamp wattage. Color temperature of 4000 Kelvin nominal, 70 CRI. Operating lifespan after which the system emits 70% of its original lumen output, all of those parameters are tested for 100% of light engines. Use of a metal core board insures greater heat transfer and longer lifespan of the light engine.

Optical System: (LE2F), IES type II (asymmetrical). Composed of high-performance acrylic collimators, optimized with varying beam angles to achieve desired distribution. System is rated IP66. Performance shall be tested per LM-63 and LM-79 (IESNA) certifying its photometric performance. Street-side indicated.

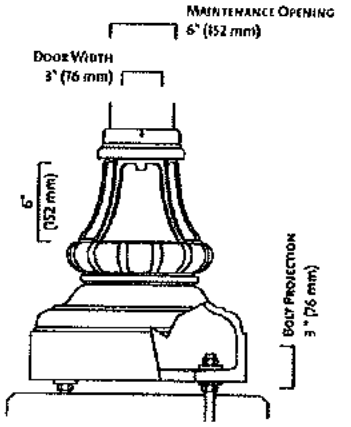
Heat Sink: Made of cast aluminum optimising the LEDs efficiency and life. Product does not use any cooling device with

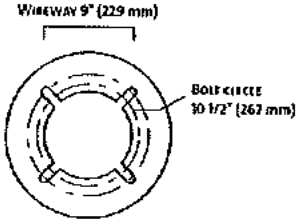
PHILIPS
LUMEC

RA40 > TRADITIONAL ALUMINUM POLE



Base details





Comes with 4 anchor bolts,
8 nuts and 8 washers.
B.C. from: 10 3/2" to 12 1/2" (267 to 318 mm)

Specifications:

Pole: made from a one-piece, seamless, 12 flute 5" round (127 mm) tube of extruded aluminum welded to a decorative cast-aluminum base incorporating an anchor plate.
A maintenance opening is complete with decorative cast-aluminum cover in the same style as the pole and copper ground lug.
Joint cover: a one-piece cast-aluminum decorative joint cover is mechanically fastened to the shaft and base junction with stainless steel hardware.
Finish: See page 142 for finish details.
Options:

LS:	Provision for loudspeaker outlet (see page 132)
PH7:	Button-type photoelectric cell (specify operating voltage)
PH8:	Quarter-turn type photoelectric cell (specify operating voltage)
DR:	Duplex receptacle (120V line voltage, only)
GFI:	DR with common ground fault interrupter (120V line voltage only)
BA:	Banner arm (see page 136)
PS:	Plant support (see page 137)
MPL:	Mid-pole luminaire

Note: The recommended method for calculating EPA (Effective Projected Area) is in accordance with AASHTO 2001 standards: for three seconds, the pole is tested in wind gusts equivalent to the strongest winds on record over the past 50 years, and with a 50 pound load (22.7 kg) placed at 1 foot (305 mm) above its center.
Important: Do not obstruct space between anchor plate and concrete base.

CATALOG NUMBER	NOMINAL HEIGHT		TENON SECTION		WALL THICKNESS		WEIGHT		EPA RATING 90 MPH	110 MPH	120 MPH	150 MPH	ANCHOR BOLTS	
	ft	m	in	mm	in	mm	lbs	kg	sq.ft	sq.ft	sq.ft	sq.ft	in	mm
RA40-8	8	2.44	5	127	0.208	5.2	78	35	30	22.78	19.15	12.11	3/4-20	19-508
RA40-10	10	3.05	5	127	0.208	5.2	86	39	26.1	17.39	14.52	9.01	3/4-20	19-508
RA40-12	12	3.66	5	127	0.208	5.2	93	42	20.73	13.6	11.27	6.84	3/4-20	19-508
RA40-14	14	4.27	5	127	0.208	5.2	101	46	16.77	10.79	8.85	5.16	3/4-20	19-508
RA40-16	16	4.88	5	127	0.208	5.2	109	49	13.75	8.62	6.96	3.85	3/4-20	19-508
RA40-18	18	5.49	5	127	0.208	5.2	116	53	11	6.64	5.26	2.65	3/4-27	19-686
RA40-20	20	6.10	5	127	0.208	5.2	123	56	8.75	5.02	3.85	1.65	3/4-27	19-686

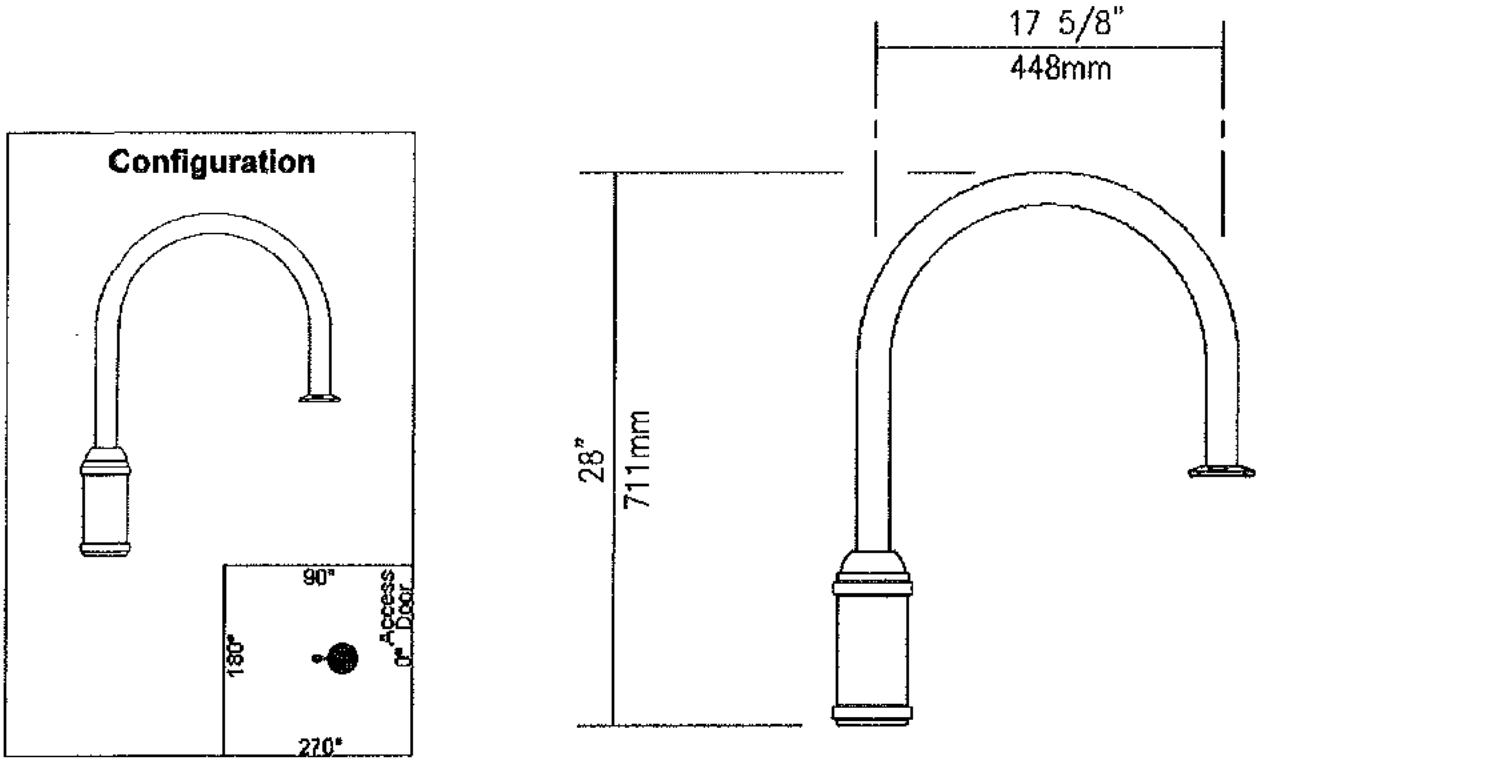
Note: Philips Lumec reserves the right to modify the above details to reflect changes in the cost of materials and/or production and/or design without prior notice.

moving parts (only passive cooling device)

Driver: High power factor of 90%. Electronic driver, operating range 50/60 Hz. **Auto-adjusting to a voltage between 120 and 277 volt AC rated for both application line to line or line to neutral, Class II,** THD of 20% max. Maximum ambient operating temperature from -40F(-40C) to 130F(55C) degrees. Certified in compliance to cULus requirement. Dry and damp location. Assembled on a unitized removable tray with Tyco quick disconnect plug resisting to 221F(105C) degrees.

The current supplying the LEDs will be reduced by the driver if the internal driver temperature exceeds 185F(85C), as a protection to the LEDs and the electrical components. Output is protected from short circuits, voltage overload and current overload. Automatic recovery after correction.

Surge Protector: Surge protector tested in accordance with ANSI/IEEE C62.45 per ANSI/IEEE C62.41.2 Scenario I Category C High Exposure 10kV/10kA waveforms for Line-Ground, Line-Neutral and Neutral-Ground, and in accordance with U.S. DOE (Department of Energy) MSSLC (Municipal Solid-State Street Lighting Consortium) model specification for LED roadway luminaires electrical immunity requirements for High Test Level 10kV / 10kA.



Qty	1	Bracket	DBA-1A-BKTX

Description of Componente:

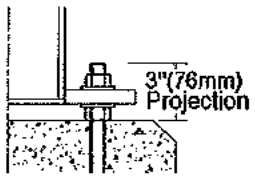
Arm: Shall be made from bent aluminum tubing 6061-T6, 1 5/8" (41mm) outside diameter, welded.

Adaptor: Made of cast 356 aluminum. Slip-fits on a 3" (76mm) outside diameter x 6" (152mm) long tenon. Mechanically assembled.

Bracket Weight: 3 lbs (1.4 kg)

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LUMEC

Base & Bolts Information



Comes with 4 steel anchor bolts, 3/4" X 17" + 3", 8 nuts and 8 washers. Important: Do not obstruct space between anchor plate and concrete base.

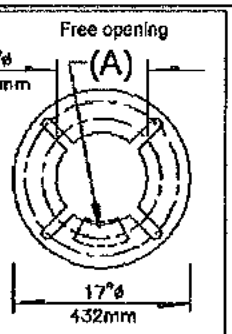
Anchor Plate

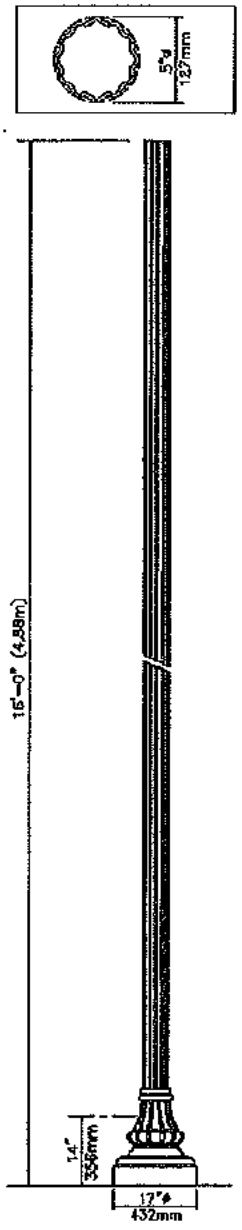
-Bolt Circle:
10 1/2" (267mm)

- Material:
Cast Aluminum

- (A)= Access door

- NOTE:
Bolt Circle Allowed:
10 1/2" to 12 1/2"
267mm to 318mm





Qty 1 Pole **RA40-16-T3D6L-BKTX**

Description of Components:

Pole Shaft: Shall be made from a 5" (127mm) 12 fluted round extruded 6061-T6 aluminum tubing, having a 0.208" (5.3mm) wall thickness, welded to the pole base.

Joint Cover: One-piece round joint cover made from cast 356 aluminum, mechanically fastened with stainless steel screws.

Pole Base: Shall be made from a round fluted cast 356-T6 aluminum base having a 0.375" (9.5mm) wall thickness, complete with a cast-in anchor plate.

Maintenance Opening: The pole shall have a 2 7/8" to 6" wide x 5 1/2" long (73mm x 152mm x 140mm) maintenance opening centered 14" (356mm) from the bottom of the anchor plate, complete with a weatherproof cast 356 aluminum cover and a copper ground lug.

Pole Options: (T3D6L) Pole Tenon having 3" (76mm) O.D. by 6" (152mm) Long.

Note: A tenon will be provided when the luminaire or bracket does not fit directly on pole shaft. Tenon not shown on the drawing.

IMPORTANT: Philips Lumec strongly recommends the installation of the complete lighting assembly with all of its accessories upon the anchoring of the pole. This will ensure that the structural integrity of the product is maintained throughout its lifetime.

Pole Weight: 74 lbs (33.6 kg)

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Miscellaneous

Description of Components:

Wiring: Gauge (#14) TEW/AWM 1015 or 1230 wires, 6" (152mm) minimum exceeding the bracket.

Hardware: All exposed screws shall be stainless steel with Ceramic primer-seal basecoat to reduce seizing of the parts. All seals and sealing devices are made and/or lined with EPDM and/or silicone.

Finish: Color to be **black textured RAL9005TX (BKTX)** and in accordance with the AAMA 2603 standard. Application of polyester powder coat paint (4 mils/100 microns) with ± 1 mils/24 microns of tolerance. The Thermosetting resins provides a discoloration resistant finish in accordance with the ASTM D2244 standard, as well as luster retention in keeping with the ASTM D523 standard and humidity proof in accordance with the ASTM D2247 standard.

The surface treatment achieves a minimum of 2000 hours for salt spray resistant finish in accordance with testing performed and per ASTM B117 standard.

LED products manufacturing standard: The electronic components sensitive to electrostatic discharge (ESD) such as light emitting diodes (LEDs) are assembled in compliance with IEC61340-5-1 and ANSI/ESD S20.20 standards so as to eliminate ESD events that could decrease the useful life of the product.

Quality Control: The manufacturer must provide a written confirmation of its ISO 9001-2008 and ISO 14001-2004 International Quality Standards Certification.

Certification: The manufacturer will have to supply a copy of approval products certificate, CSA or UL.

Mechanical resistance: In order to ensure the mechanical resistance of the poles, the reflected area should be calculated according to AASHTO standards and resists to a wind of 140 km/hr.

Web site information details: Click on any specific information details you need:

Paint finish / Warranties / Installation pictures / Driver Specification / ISO 9001-2008 Certification / ISO 14001-2004 Certification / cULus Certification / CSA Pole Certification

PHILIPS
LUMEC

Lamp technical information for DOS

LED = Philips Lumileds Rebel ES, CRI = 70, CCT = 4000K (+/- 350K)

LED rated life = 100,000 hrs [1] - Driver rated life = 50,000 hrs

Lamp	Typical delivered lumens [2]	Typical lamp wattage (W)	Typical system wattage [3] (W)	Typical current @ 120 V (A)	Typical current @ 240 V (A)	Typical current @ 277 V (A)	LED current (mA)	HPS equivalent [4]	Luminaire Efficacy Rating (lm/W)
40W30LED4K-ES	2965	40	45	0.38	0.19	0.16	400	70 W	66
60W30LED4K-ES	3940	60	68	0.57	0.28	0.25	600	100 W	58

[1] L70 = 100,000 hrs (at ambient temperature= 25°C and forward current = 700 mA)

[2] May vary depending on the optical distribution used

[3] System wattage includes the lamp and the LED driver

[4] Compared to Domus Small (equivalence should always be confirmed by a photometric layout)

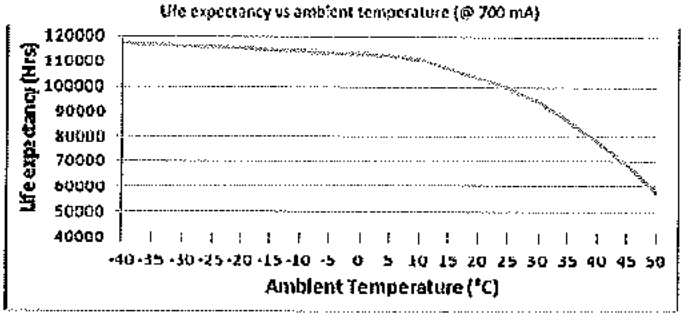
Photometric tests are done at 25°C ambient (as requested by LM-79). If our product is used at a different ambient temperature (nightime average), you can multiply the lumens by the percentage below.

Ambient (°C)	0	5	10	15	20	25	30	35	40
% Flux	105.6	105.1	104.2	103.8	102.8	101.9	101	100	98

As 4000K is our standard , photometric tests are only done with this CCT. If you want to use another CCT (6000K or 3000K) you can multiply the lumens by the percentage below

CCT (K)	6000K	4000K	3000K
% Flux	100	100	99.28

Life expectancy vs ambient temperature (@ 700 mA)



Note : Due to rapid and continuous advances in LED technology, LED luminaire data is subject to change without notice and at the discretion of

PHILIPS LUMEC