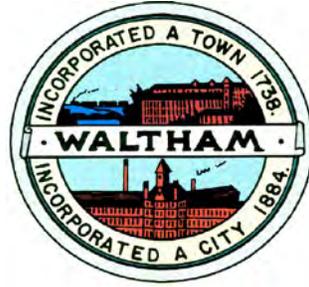


The City of Waltham



**Invites
Interested Parties
To propose the best offer and or bid
For the service or product herewith described:**

PROSPECT HILL PARK RENOVATION

A VIRTUAL bid opening will be held: 11:00 AM Wednesday September 30, 2020

A pre-bid conference: 2:00 PM Thursday September 17, 2020

(Meet on site at 314 Totten Pond Road, Waltham, MA 02451)

Last day for written questions: 12 Noon September 18, 2020.

(Via email ONLY to jpedulla@city.waltham.ma.us)

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**SECTION 00 02 00
CITY OF WALTHAM
MASSACHUSETTS**

NOTICE TO BIDDERS

Prospect Hill Park

WALTHAM, MASSACHUSETTS

The City of Waltham, Massachusetts invites sealed bids from Contractors for **Prospect Hill Park Renovations Waltham**, Massachusetts. The work includes, but is not limited to, excavation, electrical work, installation of athletic equipment , general earthwork and grading operations, storm drainage, erosion control, site clearing, Lawns establishment, planting and much more.

PLANS, SPECIFICATIONS and other Contract Documents may be obtained by visiting the City's Web Site at www.city.waltham.ma.us/bids

Copies of Addenda will be e- mailed to the registered Bidders without charge. Addenda will also be posted on the web site above

Sealed **GENERAL BIDS** for this project will be accepted from eligible bidders at the Purchasing Department, Waltham City Hall, 610 Main Street, Waltham, MA 02452 until **11:00 AM on September 30, 2020**, at which place and time they shall be publicly opened Via Zoom, read aloud and recorded for presentation to the Awarding Authority.

A **PRE-BID CONFERENCE** will be held for all interested parties at **2:00 PM on September 17, 2020**. Meet Prospect Hill Park 314 Totten Pond Rd, Waltham, MA 02451. Attendance at this pre-bid conference is strongly recommended but not mandatory for parties submitting a bid. However, it will be the only opportunity to visit the site prior to the bid opening.

LAST DAY FOR WRITTEN QUESTIONS is at 12 noon September 18, 2020. Questions are to be sent via e-mail only to Jpedulla@city.waltham.ma.us

PROJECT STARTING DATE: Not earlier than January 6, 2021. The Final Project completion is 180 Days from the Date of the Notice-to-Proceed.

Each general bid shall be accompanied by a bid deposit in the form of a bid bond, certified check, or a treasurer's or cashier's check issued by a responsible bank or trust company, payable to the City of Waltham in the amount of five percent (5%) of the value of the bid

Bids shall be made on the basis of the Minimum Wage Rates as determined by the Commissioner of Labor and Industries, Pursuant to the Provisions of Chapter 149, Sections 26 to 27D inclusive of Massachusetts General Laws, a copy of which is found in the City's Web site at www.city.waltham.ma.us/bids .

Bidders' selection procedures and contract award shall be in conformity with the rules of Commonwealth of Massachusetts statute Chapter 30, §39M.

Performance and Labor and Materials payment bonds in the full amount of the contract price will be required from the successful bidder.

The Awarding Authority reserves the right to reject any or all general bids, if it be in the public interest to do so, and to reject any sub-bid on any sub-trade if it determines that such sub-bid does not represent the sub-bid of a person competent to perform the work as specified or that less than three such sub-bids were received and that the prices are not reasonable for acceptance without further competition.

The successful bidder will be required to furnish a Certificate of Insurance, naming the City of Waltham as an Additional Named Insured with a waiver of subrogation, for General Liability and Vehicle Liability in the amount of \$1,000,000 per occurrence and \$1,000,000 in the aggregate and Worker's Compensation Insurance as prescribed by law.

In accordance with the laws of the Commonwealth of Massachusetts the undersigned certifies that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by OSHA that is at least 10 hours in duration at the time the employee begins work and shall furnish documentation of successful completion of said course with the first certified payroll report for each employee.

CITY ORDINANCE. APPROVAL OF CONTRACTS BY MAYOR, SEC. 3-12 OF THE CITY ORDINANCES.

All contract made by any department, board or commission where the amount involved is two thousand dollars (\$2,000) or more shall be in writing, and no such contract shall be deemed to have been made or executed until the approval of the Mayor is affixed thereto. Any construction contract shall, and all other contracts may, where the contract exceed five thousand dollars (\$5,000) be required to be accompanied by a bond with sureties satisfactory to the Mayor.

CITY OF WALTHAM

Joseph Pedulla, CPO
Purchasing Department
City Hall, 610 Main Street
Waltham, MA 02452

SECTION 00 10 00 - INSTRUCTION TO BIDDERS

PART 1 - GENERAL

1.01 SCHEDULE OF DATES

- A. Advertisement appears in Central Register, Plans and Specifications ready for Bidders at the Offices of the Waltham Purchasing Agent after 8:30 P.M. on November 7, 2020.
- B. **Pre-bid briefing : September 17, 2020, at 2:00 PM.** Meet on site at 314 Totten Pond Road, Waltham, MA 02451.
- C. **Questions** and requests for interpretations may be submitted in writing via e-mail ONLY to Jpedulla@city.waltham.ma.us up to **12:00 noon September 18, 2020.**
- D. Addenda will be issued with interpretations as determined by the Purchasing Department only via e-mail and posting on the web site.
- E. **General Bids Deadline: 11:00 A.M. on September 30 2020,** in the Purchasing Department, City Hall, 610 Main Street, Waltham, MA 02452, Attn: J. Pedulla, CPO, where the bids will be publicly open and read.
- F. **Project Starting Date: Not earlier than January 1, 2021.** The **Final Project completion is 180 days from the Notice-to-Proceed (NTP)**
- G.

1.02 BIDDING PROCEDURE

- A. Bids for the work are subject to the provisions of General Laws, Chapter 30, § 39M, as amended. Regulations governing the bidding procedures as set forth in the above mentioned amended General Laws must be followed.
- B. In the event of any inconsistencies between any of the provisions of these Contract Documents and of the cited statute, anything herein to the contrary notwithstanding, the provisions of the said statute shall control.
- C. No General Bid received by the Awarding Authority after the time respectively established herein for the opening of General Bids will be considered, regardless of the cause for the delay in the receipt of any such bid.

1.03 WITHDRAWAL OF BIDS

- A. Bids may be withdrawn prior to the time respectively established for the opening of General Bids only on written request to the Awarding Authority.

1.04 INTERPRETATION OF CONTRACT DOCUMENTS

- A. No oral interpretation will be made to any bidder. All questions or requests for interpretations must be made in writing to the Architect.
- B. Every interpretation made to a bidder will be in the form of an Addendum to the drawings and/or specifications, which will be made available to all persons to whom Contract Documents have been issued.
- C. Failure of the Awarding Authority to send, or of any bidder to receive any such Addendum shall not relieve any bidder from obligation under his bid as submitted.
- D. All such Addenda shall become a part of the Contract Documents.

1.05 EXAMINATION OF SITE AND CONTRACT DOCUMENTS

- A. Each bidder may visit the site of the proposed work and fully acquaint himself with conditions as they exist, and may also thoroughly examine the Contract Documents. Failure of any bidder to visit the site and acquaint himself with the Contract Documents shall not relieve any bidder from any obligation with respect to his bid.
- B. By submitting a bid, the bidder agrees that the Contract Documents are adequate and that the required result for a full and complete installation can be produced. The successful bidder shall furnish any and all labor, materials, insurance, permits and all other items needed to produce the required result to the satisfaction of the Awarding Authority.

1.06 BID SECURITY

- A. The General Contractor's bid must be accompanied by bid security in the amount of five percent (5%) of the bid.
- B. At the option of the bidder, the security may be bid bond, certified, treasurer's or cashier's check issued by a responsible bank or trust company. No other type of bid security is acceptable.

Bid Bonds shall be issued by a Surety Company qualified to do business under the laws of the Commonwealth of Massachusetts.
- C. Certified, Treasurer's or Cashier's check shall be made payable to the City of Waltham, Massachusetts.
- D. The bid security shall secure the execution of the Contract and the furnishing of a Performance and Payment Bond by the successful General Bidder for 100% of the contract value.

- E. Should any General Bidder to whom an award is made fail to enter into a contract therefore within five (5) days, Saturdays, Sundays and Legal Holidays, excluded, after notice of award has been mailed to him or fail within such time to furnish a Performance Bond and also a Labor and Materials or Payment Bond as required, the amount so received from such General Bidder through his Bid Bond, Certified, Treasurer's or Cashier's check as bid deposit shall become the property of the City of Waltham, Massachusetts as liquidated damages; provided that the amount of the bid deposit, which becomes the property of the City of Waltham, Massachusetts, shall not in any event exceed the difference between his bid price and the bid price of the next lowest responsible and eligible bidder; and provided further that, in case of death, disability, bona fide clerical error or mechanical error of a substantial nature, or other unforeseen circumstances affecting the General Bidder, his deposit shall be returned to him.

1.07 BID FORM

- A. General Bids shall be submitted on the "FORM FOR GENERAL BID", found elsewhere in this document. Erasures or other changes must be explained or noted over the signature of the bidder.
- B. Bid forms must be completely filled in. Bids which are incomplete, conditional, or obscure, or which contain additions not called for will be rejected.
- C. General Bidders shall submit one set of executed bid forms to the Awarding Authority.

1.08 SUBMISSION OF BIDS AND BID SECURITIES

- A. Each bid submitted by a General Contractor shall be enclosed in a sealed envelope that shall be placed with the bid security in an outer envelope. The outer envelope shall be sealed and clearly marked as follows:

(Firm Name): _____
General Bid and Bid Security for:
Prospect Hill Park Renovations

1.09 AWARD OF CONTRACT

- A. The Contract shall be awarded to the lowest responsible and eligible General Bidder on the basis of competitive bids in accordance with the procedure set forth in the provision of Chapter 30, §39M of the General Laws of the Commonwealth of Massachusetts.
- B. If the bidder selected as the General Contractor fails to perform his agreement to execute a contract in accordance with the terms of his General Bid, and furnish a Performance Bond and also a Labor and Materials or Payment Bond, as stated in his General Bid an award shall be made to the next lowest responsible and eligible bidder.

- C. The words “lowest responsible and eligible bidder” shall be the bidder whose name is the lowest of those bidders possessing the skill, ability and integrity necessary for the faithful performance of the work and who shall certify that he is able to furnish labor that can work in harmony with all other elements of labor employed, or to be employed, on the work. Essential information in regard to such qualifications shall be submitted in such form as the Awarding Authority may require.
- D. Action on the award will be taken within sixty (60) days, Saturdays, Sundays and Legal Holidays excluded after the opening of the bids.

1.10 SECURITY FOR FAITHFUL PERFORMANCE

- A. The successful bidder must deliver to the Awarding Authority simultaneously with his delivery of the executed contract, an executed Performance Bond, and also a Labor and materials or Payment Bond, each issued by a surety company qualified to do business under the laws of the Commonwealth and satisfactory to the Awarding Authority and each in the sum of One Hundred Percent (100%) of the Contract Price, as surety for the faithful performance of his contract, and for the payment of all persons performing labor or furnishing materials in connection therewith. Said bonds shall provide that, if the General Contractor fails or refuses to complete the Contract, the Surety Company will be obligated to do so.
- B. Premiums are to be paid by the General Contractor, and are to be included in the Contract Price.

1.11 EQUAL OPPORTUNITY

- A. The City of Waltham is an Equal Opportunity employer and will require compliance with the minority business enterprise plan (MBE) on file in the Purchasing Department

1.12 PRE-BID WALK-THRU

- A. A Pre-Bid Briefing will be held at the site on **September 17, 2020, at 2.00 PM.** Interested parties are encouraged to attend given that this will be the only time the site is available prior to the submission of bids. Further, prior to the bid opening, potential bidders may not go onto the site any time other than the aforementioned date and time.

1.13 SITE VISITS

- A. Prospective bidders are prohibited from going onto the site prior to the Bid Opening or any time other than the pre-bid walk-thru, as set forth in Section 1.12 above, unless authorized by the Architect in an Addendum to the bid documents.

1.14 CONTRACT DOCUMENTS

- A. The Awarding Authority shall make available the bid documents and addenda in the City Web site at www.city.waltham.ma.us/bids. No plans will be mailed.

1.15 EQUALITY

- A. Except where otherwise specifically provided to the contrary, the words “or approved equal” are hereby inserted immediately following the name or description of each article, assembly, system, or any component part thereof in the Contract Documents. It is the Contractor’s responsibility to provide all the research and documentation that would prove a product or assembly is “equal”. Failure to provide research or documentation does not alleviate the Contractor’s responsibility to meet the schedule.

1.16 TAX FREE NUMBER

- A. The City of Waltham has a tax-free number.

1.17 SCHEDULE

- A. The work of the Contract shall be **Completed 180 days from the NTP date.**

1.18 INTENTIONALLY LEFT BLANK

1.19 WEEKLY JOB MEETINGS

- A. There will be a weekly job meeting at the site on the same agreed-upon day and time. Time will be provided to discuss and view the progress of the work and to answer questions. The Contractor’s job Superintendent and Project Manager shall attend each meeting. The City reserves the right to have job meetings conducted in the location of its choosing.

1.20 PROJECT SUPERINTENDENT

- A. The Contractor shall provide the same person as Superintendent for the entire duration of the project. Failure to maintain the same person in this position shall result in a One Thousand Dollar (\$1,000.00) penalty per incident which shall cover the Architect’s time to re-orient new personnel.

1.21 AWARD

- A. The Awarding Authority reserves the right to reject any or all bids if it be in the public interest to do so, and to act upon the bids and make its award in any lawful manner.

1.22 PREVAILING WAGE SCHEDULE

- A. Bids shall be made on the basis of the Prevailing Wage Schedule, as determined by the Commissioner of Labor and Industries, pursuant to the provision of the Massachusetts General Laws. The Prevailing wage Schedule for this project can be found in the City's web Site at www.city.waltham.ma.us/bids

1.23 CONFLICT OF INTEREST

- A. A bidder filing a proposal thereby certifies that the proposal is made in good faith, without fraud, collusion, or connection of any kind with any other bidder for the same work, and that the bidder is competing solely on its own behalf without connection with, or obligation to, any undisclosed person or firm.

1.24 PROCEED ORDERS

- A. No bidder is to proceed without a proceed order as set out in the contract.

1.25 INTENTIONALLY LEFT BLANK

1.26 COMPLIANCE WITH MASSACHUSETTS GENERAL LAWS

- A. Pursuant to Massachusetts General Laws, Chapter 62C, Section 49A, I certify under the penalty of perjury that I, to the best of my knowledge and belief have filed all state tax returns and paid all the state taxes required under law.

1.27 CONSTRUCTION BARRICADES

- A. The General Contractor shall provide all barricades to enclose the work area to prevent unauthorized access to the site.
 - 1. The barricades shall provide enough room for all construction activities to be performed while separated from pedestrians, students, and staff on site.
 - 2. Safety is the sole responsibility of the Contractor and any barricades necessary to protect the work and the public shall be provided.
 - 3. Provide entrance protection.

1.28 INSURANCE

- A. The contractor shall purchase and maintain, at his expense all insurance required by the Contract. Documents and all insurance required by the applicable laws of Massachusetts, including but not limited to, General Laws, Chapter 146, in connection with all hoisting equipment.

B. The Contractor shall purchase and maintain such insurance as will protect him from claims under workmen's compensation acts and from claims for damages because of bodily injury, including death and all property damage including, without limitation, damage to buildings and adjoining the site of construction which might arise from and during operations under this contract, whether such operations be by himself or by any subcontractor or anyone directly or indirectly employed by either of them including:

1. Statutory Worker's Compensation and Employer's Liability

The contractor shall provide insurance for the payment of compensation and the furnishing of other benefits under Chapter 152 of the General Laws (so-called Worker's Compensation Act) to all persons to be employed under this contract and shall continue in force such insurance as aforesaid shall be deemed a material breach of this Contract and shall operate as an immediate termination thereof. The contractor shall, without limiting the generality of the foregoing, conform to the provisions of Section 34A of Chapter 149 of the General Laws, which Section is incorporated herein by reference and made a part of hereof.

2. Comprehensive General Liability Insurance

Minimum bodily injury limits of \$ 1,000,000 per person and \$ 1,000,000 per accident, and property damage limits of \$ 500,000 per accident and \$ 1,000,000 aggregate during any 12-month period, shall include the following:

- a. Public liability (bodily injury and property damage)
- b. X.C.U. (explosion, collapse, and underground utilities)
- c. Independent contractor's protective liability.
- d. Products and completed operations.
- e. Save harmless agreement for Owner and Architects set forth in ARTICLE 10.11 of the GENERAL CONDITIONS.

3. Comprehensive All Risk Motor Vehicle Liability Insurance

Minimum bodily injury limits of \$ 500,000 per person, \$ 1,000,000 per accident, and property damage limit of \$ 1,000,000 per accident.

4. All Risk Insurance

Covering all Contractors' equipment with a provision for Waiver of Subrogation against the Owner.

5. Excess Liability Insurance in Umbrella Form with combined Bodily Injury and Property Damage Limit of \$ 1,000,000.

6. **City of Waltham shall be a Named Additional Insured with a Waiver of Subrogation on the insurance policy for this project.**

1.29 SITE ACCESS

- A. The General Contractor shall gain access to the site via routes approved by the Owner.
 - 1. The General Contractor as part of the bid price will restore all roads, curbs, driveways, walks and grassed or landscaped areas damaged during construction.

1.30 CONSTRUCTION TRAILER

- A. The General Contractor shall locate the construction trailer at locations approved by the Owner.
- B. The General Contractor shall locate all on site stored or staged materials within the enclosed area designated by the Owner.

1.31 INTENTIONALLY LEFT BLANK

1.32 COMPLETE BID FORMS

- A. Please Note: Each bidder must fill in all the blanks on all the bid forms, even if the information is “zero dollars” or “not applicable”. Also, please acknowledge all Addenda issued by the Awarding Authority

2.00 FUNDS APPROPRIATION and LOAN AUTHORIZATION.

- A. THE CONTRACT OBLIGATION ON BEHALF OF THE CITY IS SUBJECT TO PRIOR APPROPRIATION OF MONIES FROM THE GOVERNMENTAL BODY AND AUTHORIZATION BY THE MAYOR.

3.0 CITY ORDINANCE. APPROVAL OF CONTRACTS BY MAYOR, SEC. 3-12 OF THE CITY ORDINANCES.

- A. All contract made by any department, board or commission where the amount involved is two thousand dollars (\$2,000) or more shall be in writing, and no such contract shall be deemed to have been made or executed until the approval of the Mayor is affixed thereto. Any construction contract shall, and all other contracts may, where the contract exceed five thousand dollars (\$5,000) be required to be accompanied by a bond with sureties satisfactory to the Mayor

Signature of Individual or Corporate Name

By:

(Signature of Corporate Officer if applicable)

Title: _____

Social Security Number or Federal Identification Number: _____

END OF SECTION

Prospect Hill Park Renovations

General Bid Opening Date: 11:00 am, September 30, 2020

Joseph Pedulla, CPO
City of Waltham
610 Main Street
Waltham, MA 02452

A. Basic Price

The undersigned:

(Please type or print the business name of the bidding firm)

having visited the site of the above project and having familiarized myself with the local conditions affecting the cost of the work and with the contract documents, including Amendments and Addenda No's. ____, ____, ____, ____, ____ hereby proposes to furnish all labor (including Sub Bids), materials, tools, equipment, insurance, permits and taxes, and to do and lawfully perform all things as provided in the specifications, all in accordance with the contract documents, for the sum of:

a. TOTAL BASE Bid

I. (in words) _____ Dollars, \$ _____

b. ENVIRONMENTAL/UTILITIES ALLOWANCE

(If Needed and with Prior City approval)

I. (in words) *Fifty Thousand* Dollars, \$ 50,000

c. GRAND TOTAL (a+b)

I. (in words) _____ Dollars, \$ _____

B. Left Blank Intentionally

C. The undersigned agrees that, if s/he is selected as General Contractor, s/he will within five 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 and furnish a performance bond and also a labor and materials or payment bond, each issued by a surety company qualified to do business under the laws of the Commonwealth 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.

- D. The undersigned certifies that s/he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the work and that s/he will comply fully with all laws and regulations applicable to awards made subject to section forty-four A.
- E. The undersigned as Bidder certifies that if this proposal is accepted, s/he will furnish to the City of Waltham with the invoice for the material or equipment supplied two copies of any and all Material Safety Data Sheets applicable to such material or equipment, as required by M.G.L. Chapter 111F, so called "Right to Know Law".
- F. The undersigned certifies under penalties of perjury that this bid is in all respects bona fide, fair and made without collusion or fraud with any other person. The word "person" shall mean any natural person, joint venture, partnership, corporation, or other business or legal entity.
- G. Substantial Completion
 - 1. The work of the Contract shall **be Completed 180 days from the NTP date**
- H. In accordance with M.G.L., the undersigned certifies that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by OSHA that is at least 10 hours in duration at the time the employee begins work and shall furnish documentation of successful completion of said course with the first certified payroll report for each employee.

Sincerely,

(Bidder)

(Address of Bidder)

By: _____
(Title - Owner*, Partner*)

(Seal, if Corporation)

By: _____
(If Corporation - Name and Office)

* If the business owned by the individual or partnership is conducted under a trade or assumed name, a certified copy of doing business under an assumed name should be annexed.

SECTION 00 33 1 0

PREVAILING WAGE SCHEDULE

Please visit the City Web Site at www.city.waltham.ma.us/bids for a copy of the schedules

SECTION 00 50 00

AGREEMENT

CITY OF WALTHAM

ARTICLE 1. This agreement, made this _____ day of _____, 2020 by and between the CITY OF WALTHAM, party of the first part, hereinafter called the CITY, by its MAYOR, and

_____ hereinafter called the CONTRACTOR.

ARTICLE 2. Witnesseth, that the parties to this agreement, each in consideration of the agreement on the part of the others herein contained, do hereby agree, the CITY OF WALTHAM for itself, and said contractor for his heirs, executors, administrators and assigns as follows:

To furnish all equipment, machinery, tools and labor, to furnish and deliver all materials required to be furnished (except as otherwise specified) and deliver in and about the project and to do and perform all work in strict conformity with the provisions of this Contract and of the Notice to Bidders, bid, Project Manual, and Drawings hereto annexed. The said Notice to Bidders, bid, Project Manual, and Drawings are hereby made a part of this contract as fully and to the same effect as if the same had been set forth at length and incorporated in the contracts.

ARTICLE 3. In consideration of the foregoing premises the CITY agrees to pay and the CONTRACTOR agrees to receive as full compensation for everything furnished and done by the CONTRACTOR under this contract, including all work approved by not included in the items herein mentioned.

This Agreement entered into as of the day and year first written above.

CITY OF WALTHAM, MASSACHUSETTS

FOR THE CITY

Jeannette A. McCarthy, MAYOR,
City of Waltham
Date: _____

Luke Stanton, Asst. City Solicitor
Date: _____
APPROVED AS TO FORM ONLY

Nick Abruzzi, Recreation Director
Date: _____

Joseph Pedulla, Purchasing Agent
Date: _____

Paul Centofanti, Auditor
Date: _____

I CERTIFY THAT SUFFICIENT FUNDS
ARE AVAILABLE FOR THIS CONTRACT

FOR THE COMPANY

CONTRACTOR (Signature),
Date: _____

Company

Address

SECTION 00501

PERFORMANCE BOND

CITY OF WALTHAM

KNOW ALL MEN BY THESE PRESENT THAT,

_____ as

principal and _____ as surety, are held and firmly bound unto the CITY OF WALTHAM and to such persons, firms, and corporations, who may furnish materials for or perform labor on the work, construction or improvements contemplated in the Contract hereinafter mentioned, or who may have any suits or claims for injury or damage to persons or property resulting from or arising out of the work done under this Contract, in the

SUM OF _____ DOLLARS (\$ _____)

(lawful money of the United States of America) for the payment whereof the Contractor and the Surety of Sureties bind themselves and their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, THAT for the above burden (the Contractor) its

_____ heirs, executors, administrators and assigns, shall faithfully perform the Contract, on his part and during the life of any guaranty or warranty, for defective materials and workmanship required under this Contract, and satisfy all claims and demands incurred for the same; and shall fully indemnify and save harmless the City from all cost and damage which it may suffer by reason of failure so to do, and shall fully reimburse and repay the City all outlay and expense which the City may incur in making good any such default, and shall promptly make payment to all persons supplying labor or materials for use in the prosecution of the work provided for in said Contract; and shall indemnify and save harmless the said City, its officers and agents from any and all suits or claims for injury or damage to persons or property resulting from or arising out of the work done under this Contract, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

PROVIDED, HOWEVER, that (except as to the City) no suit, action or proceeding by reason of any default whatever shall be brought on this Bond after two years from the day on which the final payment under the Contract falls due.

AND PROVIDED, that any alterations which may be made in the terms of the Contract or in the work to be done under it, or any assignment, transfer or subletting of any part of the work, or the giving by the City of any extension of time for the performance of the Contract, or any other forbearance on the part of either the City or the Contractor to the other, shall not in any way release the Contractor and the Surety of Sureties, or either or any of them, their heirs, executors, administrators, successors or assigns from their liability hereunder, notice to the Surety or Sureties of any such alterations, assignment, transfer, subletting extension or forbearance being hereby waived.

This Bond is made for the use and benefit of all persons, firms, and corporations who may furnish materials, or perform any labor for or on account of said work, construction or improvements, or who may have any suits or claims for injury or damage to persons or property resulting from or arising out of the work done under this Contract, and they and each of them are hereby made obligees hereunder the same as if their own proper names were written herein as such, and they and each of them may sue hereon in their own names for their own use and benefit.

And the Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed hereunder, or the Specifications accompanying the same, shall in any way affect its obligations on this Bond, and it does hereby waive notice of any such changes, extension of time, alteration or addition to the terms of the Contract or to the work, or to the Specifications.

IN WITNESS WHEREOF, said Contractor and Surety have hereunto set their respective names this _____ day of _____, 20____.

WITNESSES:

(CONTRACTOR)

(SEAL)

NAME _____ BY _____
(SIGNATURE AND TITLE)

ADDRESS _____
(SURETY) (SEAL)

NAME _____ BY _____
(SIGNATURE AND TITLE)

ADDRESS _____ BY _____
(ATTORNEY-IN-FACT)

POWER OF ATTORNEY

Attorneys-in-fact who sign bonds must file with each bond a certified copy of their power of attorney to sign said bonds.

SECTION 00502

PAYMENT BOND

CITY OF WALTHAM

KNOW ALL MEN BY THESE PRESENT THAT,

_____ as

principal and _____ as surety, are held and firmly bound unto the CITY OF WALTHAM and to such persons, firms, and corporations, who may furnish materials for or perform labor on the work, construction or improvements contemplated in the Contract hereinafter mentioned, or who may have any suits or claims for injury or damage to persons or property resulting from or arising out of the work done under this Contract, in the

SUM OF _____ DOLLARS (\$ _____) (lawful money of the United States of America) for the payment whereof the Contractor and the Surety of Sureties bind themselves and their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, THAT for the above burden (the Contractor) its

_____ heirs, executors, administrators and assigns, shall faithfully perform the Contract, on his part and during the life of any guaranty or warranty, for defective materials and workmanship required under this Contract, and satisfy all claims and demands incurred for the same; and shall fully indemnify and save harmless the City from all cost and damage which it may suffer by reason of failure so to do, and shall fully reimburse and repay the City all outlay and expense which the City may incur in making good any such default, and shall promptly make payment to all persons supplying labor or materials for use in the prosecution of the work provided for in said Contract; and shall indemnify and save harmless the said City, its officers and agents from any and all suits or claims for injury or damage to persons or property resulting from or arising out of the work done under this Contract, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

PROVIDED, HOWEVER, that (except as to the City) no suit, action or proceeding by reason of any default whatever shall be brought on this Bond after two years from the day on which the final payment under the Contract falls due.

AND PROVIDED, that any alterations which may be made in the terms of the Contract or in the work to be done under it, or any assignment, transfer or subletting of any part of the work, or the giving by the City of any extension of time for the payment of the Contract, or any other forbearance on the part of either the City or the Contractor to the other, shall not in any way release the Contractor and the Surety of Sureties, or either or any of them, their heirs, executors, administrators, successors or assigns from their liability hereunder, notice to the Surety or Sureties of any such alterations, assignment, transfer, subletting extension or forbearance being hereby waived.

This Bond is made for the use and benefit of all persons, firms, and corporations who may furnish materials, or perform any labor for or on account of said work, construction or improvements, or who may have any suits or claims for injury or damage to persons or property resulting from or arising out of the work done under this Contract, and they and each of them are hereby made obligees hereunder the same as if their own proper names were written herein as such, and they and each of them may sue hereon in their own names for their own use and benefit.

And the Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed hereunder, or the Specifications accompanying the same, shall in any way affect its obligations on this Bond, and it does hereby waive notice of any such changes, extension of time, alteration or addition to the terms of the Contract or to the work, or to the Specifications.

IN WITNESS WHEREOF, said Contractor and Surety have hereunto set their respective names this _____ day of _____, 20____.

WITNESSES:

(CONTRACTOR)

(SEAL)

NAME _____ BY _____
(SIGNATURE AND TITLE)

ADDRESS _____
(SURETY) (SEAL)

NAME _____ BY _____
(SIGNATURE AND TITLE)

ADDRESS _____ BY _____
(ATTORNEY-IN-FACT)

POWER OF ATTORNEY

Attorneys-in-fact who sign bonds must file with each bond a certified copy of their power of attorney to sign said bonds.

SECTION 00 50 30

GENERAL CONDITIONS

1. INFORMATION

All information shall come from the Office of the City Purchasing Agent. The Contractor shall inquire at this office for any information needed. Wherever the words “or equal as approved” are used, it is to be understood that the opinion of the City Purchasing Agent shall govern.

2. SUITS

The Contractor shall assume defense of and shall indemnify and hold the City and its agents harmless from all suits and claims against the City and its sub-contractors arising from the use of any invention, patent right labor or employment, or from any act of omission or neglect of the City, its agents, employees or any subcontractor in performing the work, under this contract.

3. LAWS AND REGULATIONS

The Contractor shall conform to all the applicable rules, regulations, laws and ordinances of the City of Waltham, the Commonwealth of Massachusetts, the United States of America and all agencies having jurisdiction over this contract.

4. PROTECTION OF PROPERTY

The Contractor shall take all proper precautions to protect the City’s property from damage and unnecessary inconvenience. Any City property damaged by the Contractor in carrying out the provisions of this contract shall be restored to its original condition, by and at the expense of the Contractor.

5. PROTECTION OF PERSONS

The Contractor shall take all proper precautions to protect persons from injury, unnecessary inconvenience, and shall be responsible for his failure to do so. The Contractor agrees to hold the City harmless from any and all liabilities of every nature and description, which may be suffered through bodily injury, including death, to any person, by reason of negligence of the Contractor, his agents or employees, or any subcontractor.

6. INSURANCE

A. **WORKMAN’S COMPENSATION:** The Contractor shall provide by insurance for the payment of compensation and furnishing of other benefits under Chapter 152 of the General Laws of the Commonwealth of Massachusetts to all persons to be employed under this contract, the premiums for which shall be paid by the Contractor.

B. **COMPREHENSIVE GENERAL LIABILITY**

Bodily Injury:	\$1,000,000 Each Occurrence
	\$2,000,000 Aggregate
Property Damage:	\$1,000,000 Each Occurrence
	\$2,000,000 Aggregate

C. **AUTOMOBILE (VEHICLE) LIABILITY**

Bodily Injury	\$2,000,000 Each Occurrence
Property Damage	\$1,000,000 Aggregate

D. **UMBRELLA POLICY**

General liability	\$2,000,000
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Your bid response must include a Certificate of Insurance with the above limits as a minimum. In addition, the Certificate of Insurance must have the following text contained in the bottom left box of the Certificate: [“The City of Waltham is a Named Additional Insured for all Insurance”](#). The Certificate of Insurance must be mailed directly to:

Office of the Purchasing Agent
Purchasing Department
City of Waltham
610 Main Street
Waltham, MA 02452

7. LABOR AND MATERIALS BOND

The Contractor agrees to execute and deliver to the City, a Performance Bond and a Labor and Materials Bond equal to 50% of the contract value. This contract shall not be in force until said bond has been delivered and accepted by the City. Bond to be issued by a company licensed by the Commonwealth of Massachusetts.

8. PERSONNEL:

The Contractor shall employ a competent supervisor and all properly licensed personnel necessary to perform the services required in this contract. The City Purchasing Agent shall have the right to require the Contractor to remove and/or replace any of the personnel for nonperformance or for unprofessional behavior. The City Purchasing Agent may require the Contractor to submit a weekly performance record of the areas and of the work performed, on forms approved by the City Purchasing Agent. The Contractor or his supervisor shall be available to inspect such work as required by the City Purchasing Agent.

9. PREVAILING WAGES

The Contractor is required to pay the prevailing wages as determined by the Federal Government and by Chapter 149, Sections 26 and 27D of the Massachusetts General Laws, including the submission of weekly payrolls to the awarding authority. Copies of the Prevailing Wage Schedule is found on line at www.city.waltham.ma.us/bids

10. MATERIALS

The City or its Agent reserves the right to approve or reject any supplies, material or equipment used by the Contractor. The Contractor agrees to replace any supplies, material or equipment used by the Contractor. The Contractor agrees to replace any rejected supplies, materials or equipment, to the satisfaction of the City or its Agents.

11. TERMINATION OF CONTRACT

This contract may be terminated by the City upon deliverance to the Contractor of a five-day written notice of said termination.

12. CONTRACT OBLIGATIONS

Contract obligations on behalf of the City are subject to an annual appropriation to cover the contract obligation and shall be in force until the date of Final acceptance excluding any guarantee period.

13. BIDDER EXPERIENCE EVALUATION

Each bidder shall submit with his bid, all the information relative to their experience and qualifications in performing the work required under this contract and shall have been in business for a minimum of five (5) years, in order for their bid to be considered.

14. NOT-TO-EXCEED AMOUNT

The bid amount proposed in your company's response is a "not-to- Exceed" amount unless the City makes changes, in writing, to the scope of work to be performed. The Change Order must be signed and approved by the City's Purchasing Agent, City Auditor, Law Department and the Mayor prior to the commencement of the change order work. No work is to begin until the proper approvals have been obtained. A change order will be priced at the unit price. Failure to comply with this procedure will result in the cancellation of the contract and the non-payment of services provided.

16. FINANCIAL STATEMENTS.

The City may require, within five (5) days after the bid opening, a complete and detailed Financial Statement prepared by a Certified Public Account, to determine a bidder's financial stability.

17. BREACH OF CONTRACT/ NON PERFORMANCE

If the Contractor shall provide services in a manner, which is not to the satisfaction of the City, the City may request that the Contractor refurnish services at no additional cost to the City until approved by the City. If the Contractor shall fail to provide services, which are satisfactory to the City, the City in the alternative may make any reasonable purchase or Contract to purchase services in substitution for those due from the Contractor. The City may deduct the cost of any substitute Contract for nonperformance of services together with incidental and consequential damages from the Contract price and shall withhold such damages from sums due or to become due to the Contractor. If the damages sustained by the City exceed sums due or to become due, the Contractor shall pay the difference to the City upon demand. The Contractor shall not be liable for any damages sustained by the City due to the Contractor's failure to furnish services under the terms of this Contract if such failure is in fact caused by the occurrence of a contingency the nonoccurrence of which was a basic assumption under which this Contract was made, including a state of war, embargoes, expropriation of labor strike or any unanticipated federal, state or municipal governmental regulation of order, provided that the Contractor has notified the City in writing of such cause within seven (7) days after its occurrence.

18. RIGHT TO AUDIT

The City of Waltham has the right to review and audit documents related to this contract. This right extends to any subcontractor, supplier or other entity used by the prime contractor to fulfill the obligations under this contract.

19. CITY ORDINANCE. APPROVAL OF CONTRACTS BY MAYOR, SEC. 3-12 OF THE CITY ORDINANCES.

All contract made by any department, board or commission where the amount involved is two thousand dollars (\$2,000) or more shall be in writing, and no such contract shall be deemed to have been made or executed until the approval of the Mayor is affixed thereto. Any construction contract shall, and all other contracts may, where the contract exceed five thousand dollars (\$5,000) be required to be accompanied by a bond with sureties satisfactory to the Mayor.

20. BID OPENING INCLEMENT WEATHER

If, at the time of the originally scheduled bid opening, City Hall is closed to inclement weather or another unforeseeable event, the bid opening will be extended until 2:00 PM on the next normal business day. Bids will be accepted until that date and time.

21. FUNDS APPROPRIATION.

THE CONTRACT OBLIGATION ON BEHALF OF THE CITY IS SUBJECT TO PRIOR APPROPRIATION OF MONIES FROM THE GOVERNMENTAL BODY AND AUTHORIZATION BY THE MAYOR.

22. THE AWARDING AUTHORITY RESERVES THE RIGHT TO REJECT ANY OR ALL BIDS, OR ANY PART OF ANY BID, WHICH IN THE OPINION OF THE AWARDING AUTHORITY, IS IN THE BEST INTERESTS OF THE CITY OF WALTHAM.

**General Conditions
End of Section 00 50 30**

Section 00 54 00

Compliance

These documents must be signed and returned with your bid

Compliance

The compliance documents in this section must be completed, signed and returned with your bid package.

Purchasing Department

City of Waltham
610 Main Street
Waltham, MA 02452

Failure to submit the completed documents will cause the disqualification of the proposal.

Section Index

Check when Complete

- Non-collusion form and Tax Compliance form..... _____
- Corporation Identification Form..... _____
- Certificate of Vote Authorization..... _____
- Certificate of Insurance (showing all limits of WC &GL)..... _____
- Three (3) References..... _____
- 5% Bid Bond or Certified Check>..... _____
- Debarment Certificate _____
- Prevailing Wage Certificate..... _____
- Right-to-know Law..... _____
- OSHA 10 Certificate for all Assigned Employees (MGL ch30, §39M and Ch 149) _____

Before the commencement of the Job, the contractor must provide to the above office:

- Performance and Payment Bonds each for 100% of the contract value and naming the City of Waltham

Your Company's Name: _____

Service or Product Bid _____

NOTE: Failure to submit any of the required documents, in this or in other sections, with your bid response package may cause the disqualification of your proposal.

CERTIFICATE OF VOTE OF AUTHORIZATION

Date:

I _____, Clerk of _____ hereby certify that at a meeting of the Board of Directors of said Corporation duly held on the _____ day of _____ at which time a quorum was present and voting throughout, the following vote was duly passed and is now in full force and effect:

VOTED: That _____ (*name*) is hereby authorized, directed and empowered for the name and on behalf of this Corporation to sign, seal with the corporate seal, execute, acknowledge and deliver all contracts and other obligations of this Corporation; the execution of any such contract to be valid and binding upon this Corporation for all purposes, and that this vote shall remain in full force and effect unless and until the same has been altered, amended or revoked by a subsequent vote of such directors and a certificate of such later vote attested by the Clerk of this Corporation.

I further certify that _____ is duly elected/appointed _____ of said corporation

SIGNED:

(Corporate Seal)

Clerk of the Corporation:

Print Name: _____

COMMONWEALTH OF MASSACHUSETTS

County of _____

Date:

Then personally appeared the above named and acknowledged the foregoing instrument to be their free act and deed before me, _____

Notary Public;

My Commission expires: _____

CORPORATION IDENTIFICATION

The bidder for the information of the Awarding Authority furnishes the following information.

If a Corporation:

Incorporated in what state _____
President _____
Treasurer _____
Secretary _____
Federal ID Number _____

If a foreign (out of State) Corporation – Are you registered to do business in Massachusetts?

Yes _____, No _____

If you are selected for this work you are required under M.G.L.ch. 30S, 39L to obtain from the Secretary of State, Foreign Corp. Section, State House, Boston, a certificate stating that you Corporation is registered, and furnish said certificate to the Awarding Authority prior to the award.

If a Partnership: (Name all partners)

Name of partner _____
Residence _____
Name of partner _____
Residence _____

If an Individual:

Name _____
Residence _____

If an Individual doing business under a firm's name:

Name of Firm _____
Name of Individual _____
Business Address _____
Residence _____
Date _____

Name of Bidder _____

By _____
Signature

Title

Business Address _____ (POST OFFICE BOX NUMBER NOT ACCEPTABLE)

State Telephone Number _____ Today's Date _____

PROVIDE THREE (3) SERVICE APPROPRIATE REFERENCES

1. Company Name:

Address:

Contact Name:

Phone #

Type of service/product provided to this Company:

Dollar value of service provided to this Company:

2. Company Name:

Address:

Contact Name:

Phone #

Type of service/product provided to this Company:

Dollar value of service provided to this Company:

3. Company Name:

Address:

Contact Name:

Phone #

Type of service/product provided to this Company:

Dollar value of service provided to this Company:

NOTE

Failure to submit any of the required documents, in this or in other sections, with your bid response package will be cause for the disqualification of your company.

**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, on a weekly basis, a copy of his or her 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 reports 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

_____, 200_____

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

I 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 _____

Print _____

RIGHT TO KNOW LAW

Any vendor who receives an order or orders resulting from this invitation agrees to submit a Material Safety Data Sheet (MSDS) for each toxic or hazardous substance or mixture containing such substance, pursuant to M.G.L. c. 111F, §§8,9 and 10 and the regulations contained in 441 CMR 21.06 when deliveries are made. The vendor agrees to deliver all containers properly labeled pursuant to M.G.L. c. 111F §7 and regulations contained in 441 CMR 21.05. Failure to furnish MSDS and/or labels on each container may result in civil or criminal penalties, including bid debarment and action to prevent the vendor from selling said substances, or mixtures containing said substances within the Commonwealth. All vendors furnishing substances or mixtures subject to Chapter 111F or M.G.L. are cautioned to obtain and read the laws, rules and regulations referenced above. Copies may be obtained from the State House Bookstore, Secretary of State, State House, Room 117, Boston, MA (617) 727-2834.

Authorized Signature Indicating Compliance with the Right-to-know laws:

Signature Date

Print Name

NOTE

Failure to submit any of the required documents, in this or in other sections, with your bid response package may cause the disqualification of your proposal.

DEBARMENT CERTIFICATION

In connection with this bid and all procurement transactions, by signature thereon, the respondent certifies that neither the company nor its principals are suspended, debarred, proposed for debarment, declared ineligible, or voluntarily excluded from the award of contracts, procurement or non procurement programs from the Commonwealth of Massachusetts, the US Federal Government and /or the City of Waltham. "Principals" means officers, directors, owners, partners and persons having primary interest, management or supervisory responsibilities with the business entity. Vendors shall provide immediate written notification to the Purchasing Agent of the City of Waltham at any time during the period of the contract of prior to the contract award if the vendor learns of any changed condition with regards to the debarment of the company or its officers. This certification is a material representation of fact upon which reliance will be placed when making the business award. If at any time it is determined that the vendor knowingly misrepresented this certification, in addition to other legal remedies available to the city of Waltham, the contract will be cancelled and the award revoked.

Company Name _____

Address _____

City _____, State _____, Zip Code _____

Phone Number (____) _____

E-Mail Address _____

Signed by Authorized Company Representative:

Print name _____,

Date _____

10 HOURS OSHA TRAINING CONFIRMATION

Chapter 306 of the Acts of 2004

CONSTRUCTION PROJECTS

AN ACT RELATIVE TO THE HEALTH AND SAFETY ON PUBLIC

The undersigned hereby certifies that all employees to be employed at a worksite for construction, reconstruction, alteration, remodeling, repair, installation, demolition, maintenance or repair of any public work or any public building estimated to cost more than \$10,000.00 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 payroll report for each employee and will comply with all laws and regulations applicable to awards of subcontracts subject to section 44F.

Company Name: _____

Address: _____

Signature: _____

Title: _____

Print Name _____

Date _____

See Chapter 306 of the Acts of 2004

NOTE

Failure to submit any of the required documents, in this or in other sections, with your bid response package will be cause for the disqualification of your company.

SECTION 00 82 10PERMITSPART 1 GENERAL

1.01 CONTRACT DOCUMENTS

- A. The general provisions of the Contract, including General and Supplemental Conditions and General Requirements, apply to the work specified in this section.

1.02 PERMITS

- A. The Contractor shall be responsible for obtaining and complying with all permits required of his equipment, work force, or particular operations (such as blasting and fuel storage permits, etc.) in the performance of the Contract. All costs associated with obtaining permits will be included in the price of the work.
- B. If included as part of this project, The Contractor shall be responsible for complying with requirements of the Local Conservation Commission and the Cambridge Watershed Protection District. All costs associated with complying with the conditions will be included in the price of the work.
- C. The Contractor shall be responsible for obtaining and complying with the requirements of the Street Opening and Trench Permits required by the City Department of Public Works in the performance of the Contract. All costs associated with complying with the conditions of the permits will be included in the price of the work. All costs associated with obtaining permits will be waived by the City.

END OF SECTION

Section 00 83 00

VIRTUAL/ZOOM BID OPENINGS

Although the city no longer holds live bid openings due to the current public health crisis, bid openings will be conducted virtually. You may wish to follow the bid openings by connecting to zoom- www.zoom.us/join . Zoom Link information will be found in the bid document. Click on the bid name to join.

Bid results will be emailed to all vendors of record soon after the bid closes. A copy will be posted in the City web site, under the title of the bid of your interest.

If you wish to inspect any portion of your competitors' responses please email jpedulla@city.waltham.ma.us. The bid document section you requested will be scanned over to your email address.

END OF SECTION

DIVISION 01

SECTION 01 01 00
SUMMARY OF WORK

PART 1- GENERAL:

1.01 PROJECT DESCRIPTION

The project is for the Prospect Hill Park Renovations as described in the Contract Documents.

1.02 CONTRACT TIME

- A. The work of this contract shall be completed By 180 Days from the date of the Notice-to-Proceed (NTP)
- B. The project shall start no sooner than January 1, 2021
- C. The Contractor shall submit shop drawings, data and samples or place his/her order sufficiently early to permit consideration and approval by the Landscape Architect before materials are necessary for incorporation into the Work. Any delay resulting from the Contractor's failure to do so shall not be used as a basis of a claim against the Owner.

1.03 CONTRACT DOCUMENTS

The Contract Documents are enumerated in the Agreement, and include these Specifications and the Drawings, as prepared for City of Waltham, by Hedlund Design Group Inc

1.04 INSPECTION OF THE SITE

Although it is not required of interested parties to visit the sites, the City encourages becoming familiar with the sites. It is the Contractor responsibility to obtain all information pertaining this project prior to bidding. By submitting a bid, the company confirms that it is thoroughly familiar with the site and all existing conditions which impact and affect the work. Requests for extra compensation will not be considered for any work which could have been foreseen by a visual inspection of the site.

1.05 CONTRACTOR'S USE OF THE SITE

- A. The contractor will have full access to the site shown within the Contract Limit of Work Line.
 - 1. The Contractor, his/her Subcontractors, and their employees may park on the site inside the Contract Limit of Work Line, given that no such on-site parking interferes with the site work.
 - 2. The Contractor shall furnish his/her own toilet facilities on-site.
- B. The Contractor shall take all precautions necessary to protect all abutting properties during construction. Any and all damage caused by construction operations shall be repaired.
 - 1. The project site shall be kept clean and free from accumulation of waste material and debris.

2. The Contractor, his/her Subcontractors, and their employees shall be respectful and courteous of the neighborhood while working on site.

1.06 ENCLOSURES

Provide at the earliest practical time temporary enclosure of materials, work in progress and completed portions of the work to provide protection to the work and the employees.

1.07 SAFETY AND SECURITY

- A. The Contractor shall be responsible for the safety and security of the site within the Contract Limit of Work Line and for the safety of all persons who enter within the Contract Limit of Work Line.
- B. The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions & programs in connection with the work. He/she shall promulgate safety regulations and shall notify the Owner of particular hazards.
- C. The Contractor shall erect and maintain, as required by existing conditions and progress of work, all reasonable safeguards for safety and security. This includes the construction of barriers and the posting of danger signs and other warnings against hazards. By these and other necessary methods the Contractor shall stop unauthorized entry within the Contract Limit of Work Line.
- D. The Contractor shall cooperate with and maintain a close liaison with the Police Department and Fire Department, and he/she shall abide by safety or security related requests from any of these authorities.

1.08 WORK TO BE DONE

The work of this Contract includes construction of Park Improvements as indicated on the construction plans located within the confines of the Prospect Hill Park.

--- END OF SECTION ---

SECTION 01 02 50

MEASUREMENT AND PAYMENT

PART 1 - GENERAL:

1.01 BASE BID

A. Measurement

1. Measurement for payment of Prospect Hill Park Renovations, shall be on a lump-sum basis.

B. Payment

1. Payment of the lump-sum price under the Base Bid of the Proposal shall fully compensate the Contractor for furnishing all labor, materials, equipment and incidentals required for work described in SECTION 01 01 00, SUMMARY OF WORK of these Specifications.
2. Contractor shall submit substantiated estimates for payment in an approved form at monthly intervals or when mutually agreed by Contractor and Hedlund Design Group .

1.02 ADDITIONAL WORK

- A. Increases or decreases in the quantities of certain classes of work, when ordered or approved in writing by the Landscape Architect.

- B. Additional Work, if any shall be performed at a mutually satisfactory price agreed upon between the Landscape Architect/Engineer and Contractor.

- - - END OF SECTION - - -

SECTION 01 02 08

CHANGE ORDER PROCEDURE

PART 1 - GENERAL:

1.01 GENERAL PROVISIONS

Attention is directed to the General Conditions of the Contract, all Divisions of the specifications, and the Contract Drawings, all of which apply to work of this section.

1.02 SCOPE OF WORK

Work included: Make such changes in the Work, in the Contract Sum, in the Contract Time of Completion, or any combination thereof, as are described in written Change Orders signed by the Owner and issued after execution of the Contract, in accordance with the provisions of this Section.

1.03 QUALITY ASSURANCE

Include within the Contractor's quality assurance program such measures as are needed to assure familiarity of the Contractor's staff and employees with these procedures for processing Change Order data.

1.04 SUBMITTALS

- A. Make submittals directly to the Landscape Architect at the address shown on the Project Manual.
- B. Submit the number of copies of required items requested stated in SECTION 01300, SUBMITTALS.

1.05 PRODUCT HANDLING

- A. Maintain a "Register of Bulletins and Change Orders" at the job Site, accurately reflecting current status of all pertinent data.
- B. Make the Register available to the Landscape Architect/Engineer for review at his/her request.

1.06 PROCESSING CHANGES INITIATED BY THE OWNER

- A. Should the City contemplate making a change in the Work or a change in the Contract Time of Completion, the Landscape Architect will issue a "Bulletin" to the Contractor.
 - 1. Bulletins will be dated and will be numbered in sequence.
 - 2. The Bulletin will describe the contemplated change, and will carry one of the following instructions to the Contractor:

- a. Make the described change in the Work at no change in the Contract Sum and no change in the Contract Time of Completion.
 - b. Make the described change in the Work, credit or cost for which will be determined in accordance with pertinent paragraphs of the General Conditions.
 - c. Promptly advise the Landscape Architect as to credit or cost proposed for the described change. This is not an authorization to proceed with the change.
- B. If the Contractor has been directed by the Landscape Architect to make the described change in the Work at no change in the Contract Sum and no change in the Contract Time of Completion, but the Contractor wishes to make a claim for one or both of such changes, the Contractor shall proceed with the change and shall notify the Landscape Architect.
- C. If the Contractor has been directed by the Landscape Architect to make the described change subject to later determination of cost or credit, the Contractor shall:
 - 1. Take such measures as needed to make the change.
 - 2. Consult with the Landscape Architect and reach agreement on the most appropriate method for determining credit or cost for the change.
- D. If the Contractor has been directed by the Landscape Architect to promptly advise him as to credit or cost proposed for the described change, the Contractor shall:
 - 1. Analyze the described change and its impact on costs and time.
 - 2. Secure the required information and forward it to the Landscape Architect for review.
 - 3. Meet with the Landscape Architect as required to explain costs and, when appropriate, determine other acceptable ways to achieve the desired objective.
 - 4. Alert pertinent personnel and subcontractors as to the impending change and, to the maximum extent possible, avoid such work as would increase the Owner's cost for making the change, advising the Landscape Architect in writing when such avoidance no longer is practicable.

1.07 PROCESSING CHANGES INITIATED BY THE CONTRACTOR

- A. Should the Contractor discover a discrepancy among the Contract Documents, a concealed condition, or other cause for suggesting a change in the Work, a change in the Contract Sum, or a change in the Contract Time of Completion, he shall notify the Landscape Architect.

- B. Upon agreement by the Landscape Architect that there is reasonable cause to consider the Contractor's proposed change, the Landscape Architect will issue a Bulletin in accordance with the provisions described in Article 1.05 above.

1.08 PROCESSING BULLETINS

- A. Contractor shall make written reply to the Landscape Architect in response to each Bulletin.
 - 1. State proposed change in the Contract Sum, if any.
 - 2. State proposed change in the Contract Time of Completion, if any.
 - 3. Clearly describe other changes in the Work required by the proposed change, or desirable therewith, if any.
 - 4. Include full backup data such as subcontractor's letter of bid or similar information.
 - 5. Submit this response in single copy.
- B. When cost or credit for the change has been agreed upon by the Owner and the Contractor, or the Owner and Landscape Architect have directed that cost or credit be determined in accordance with the Contract, the Landscape Architect will issue a "Change Order" to the Contractor.

1.09 PROCESSING CHANGE ORDERS

- A. Change Orders will be dated and will be numbered in sequence.
- B. The Change Order will describe the change or changes, will refer to the Bulletin or Bulletins involved, and will be signed by the Owner and the Landscape Architect.
- C. The Landscape Architect will issue four copies of each Change Order to the Contractor.
 - 1. The Contractor promptly shall sign all four copies and return three copies to the Landscape Architect.
- D. Should the Contractor disagree with the stipulated change in Contract Sum or change in Contract Time of Completion, or both:
 - 1. The Contractor promptly shall return three copies of the Change Order, unsigned by him, to the Landscape Architect with a letter signed by the Contractor and stating the reason or reasons for the Contractor's disagreement.
 - 2. The Contractor's disagreement with the Change Order shall not in any way relieve the Contractor of his/her responsibility to proceed with the change as

ordered and to seek settlement of the dispute under pertinent provisions of the Contract Documents.

1.10 CITY ORDINANCE. APPROVAL OF CONTRACTS BY MAYOR, SEC. 3-12 OF THE CITY ORDINANCES.

All contract made by any department, board or commission where the amount involved is two thousand dollars (\$2,000) or more shall be in writing, and no such contract shall be deemed to have been made or executed until the approval of the Mayor is affixed thereto. Any construction contract shall, and all other contracts may, where the contract exceed five thousand dollars (\$5,000) be required to be accompanied by a bond with sureties satisfactory to the Mayor.

1.11 BID OPENING INCLEMENT WEATHER

If, at the time of the originally scheduled bid opening, City Hall is closed to inclement weather or another unforeseeable event, the bid opening will be extended until 2:00 PM on the next normal business day. Bids will be accepted until that date and time.

1.12 VIRTUAL/ZOOM BID OPENINGS

Although the city no longer holds live bid openings due to the current public health crisis, bid openings will be conducted virtually. You may wish to follow the bid openings by connecting to zoom- www.zoom.us/join . Zoom Link information will be found in the bid document. Click on the bid name to join.

Bid results will be emailed to all vendors of record soon after the bid closes. A copy will be posted in the City web site, under the title of the bid of your interest.

If you wish to inspect any portion of your competitors' responses please email jpedulla@city.waltham.ma.us. The bid document section you requested will be scanned over to your email address.

- - - END OF SECTION - - -

SECTION 01 04 00

CONTROL OF WORK

PART 1 - GENERAL:

1.01 GENERAL PROVISIONS

Attention is directed to the General Conditions of the Contract, all Divisions of the Specifications and the Contract Drawings, all of which apply to this section.

1.02 PLANT

The Contractor shall furnish plant and equipment which will be efficient, appropriate, and of sufficient quantity to secure a satisfactory quality of work and a rate of progress which will ensure the completion of the Work within the time stipulated in the Contract Documents. If at any time such plant appears to the Owner to be inefficient, inappropriate or insufficient for securing the quality of work required or for producing the rate of progress aforesaid, he may order the Contractor to increase the efficiency, change the character, or increase the plant and equipment, and the Contractor shall conform to such order. Failure of the Owner to give such order shall in no way relieve the Contractor of his obligations to secure the quality of work and rate of progress required. In addition, the Contractor shall maintain his equipment, including mufflers, oil seals or gaskets, and air pollution control devices, in proper working order.

1.03 PROJECT MANAGEMENT

- A. The Work must be completed in a continuous uninterrupted operation. The Contractor must use sufficient labor and equipment to complete all the necessary work requirements within a minimum period of time and as stated in the Contract Documents.
- B. Prior to the start of any work, the Contractor shall submit a Progress Schedule in a bar chart form at the preconstruction meeting to the Landscape Architect for completing the Work. See SECTION 01300, SUBMITTALS of these Specifications.
- C. The Contractor is fully responsible for the security and safety of partially completed work until the Project is finally accepted by the Owner and the Landscape Architect/Engineer.
- D. Hours of work for construction activities are limited to 7:00 AM to 4:00 PM Monday through Friday. Any changes to the work schedule shall be authorized by the Landscape Architect/Engineer.
- E. All work areas shall be secured, and materials and equipment shall be removed at the end of each work day.

- F. The Contractor shall retain on the Project during its progress, a competent full-time representative. This representative shall not be changed except with the consent of the Owner and Landscape Architect/Engineer. The representative shall be in full charge of the Work and all instructions given to him shall be binding.

1.04 SITE INVESTIGATION OF EXISTING CONDITIONS

- A. The Contractor acknowledges that he/she has satisfied him/herself as to the conditions existing at the Site of the Work, the type of equipment required to perform the Work, the quality and the quantity of the materials to be furnished insofar as this information is reasonably ascertainable from an inspection of the Site, as well as from information presented by the Specifications made a part of the Contract. Any failure of the Contractor to acquaint himself/herself with available information will not relieve him from the responsibility for estimating properly the difficulty or cost of successfully performing the Work.
- B. No claim for extra compensation or extension of time will be allowed due to the Contractor's failure to estimate properly the quantities, locations and measurements of all items required to complete the Work.
- C. Report any discrepancies to the Landscape Architect/Engineer and request her/his interpretation.

1.05 OWNER'S COOPERATION

The Owner will furnish the Contractor, without charge, three (3) copies of the Specifications. Additional copies requested by the Contractor will be furnished at cost.

1.06 PROTECTION OF WORK AREA

- A. The Contractor shall secure all work areas by 4:00 PM each work day.
- B. All of the Contractor's equipment, supplies, etc. left on-site, shall be secured daily, in no case shall the Owner assume responsibility for damage or loss of materials and equipment left on site.
- C. The Contractor shall take precautions to prevent injury to the public due to open excavations or excavated materials. All trenches, excavated materials, equipment, or other obstacles which could be dangerous to the public shall be secured in an agreed upon staging area.

1.07 LAWS AND REGULATIONS

- A. The Contractor shall keep himself fully informed of all State and Federal laws and Municipal ordinances and regulations in any manner affecting those engaged or employed in the Work, or the materials used in the Work, or in any way affecting the conduct of the Work, and of all such orders and decrees of bodies or tribunals having any jurisdiction or authority over the same.

- B. If any discrepancy or inconsistency is discovered in the Plans, Specifications, or Contract for the Work in relation to any such laws, ordinances, regulations, orders or decrees, the Contractor shall forthwith report the same to the Landscape Architect/Engineer in writing. He/she shall at all times himself/herself observe and comply with, and shall cause all his/her agents and employees to observe and comply with all such laws, ordinances, regulations, orders, and decrees, and shall protect and indemnify the Owner and its officers, agents and servants against any claim or liability arising from or based on the violation of any such laws, ordinances, regulations, and orders or decrees, whether by himself/herself or his/her employees or subcontractors.

1.08 PROTECTION OF TREES AND SHRUBS (if applicable)

- A. The Contractor shall take particular care to avoid damage to trees in, along and adjacent to the Work area. Trees shall be protected from injury according to the specifications and the Contract Drawings. No trees or shrubs shall be removed or pruned without the approval of the Owner and the Landscape Architect. The Contractor shall be liable for all damage and/or disturbance to existing trees. Actual penalties for damage to plants shall be in accordance with the schedules defined herein, with assessed damages to be deducted from sums payable under the Construction Contract.
- B. Any measure required for the protection of trees and shrubs shall be considered to be part of the Work to be done under the various divisions of the Work in the Contract, and no separate payment will be made for this Work.

1.09 PERMITS AND CODES

- A. Under this Contract, all work shall be as shown in the Contract Drawings and Specifications and shall comply with applicable codes and regulations at the local, county, state, and federal levels. All labor, materials, equipment and services necessary to make the Work comply with such requirements shall be provided without additional cost to the Owner.
- B. Do not close any street, sidewalk, alley, or passageway as to interfere as little as possible with the use ordinarily made of roads, driveways, alleys, sidewalks, or other facilities near enough to the Work to be affected thereby.
- C. Where code references are given, the latest issue of that Code in effect at the time of bidding shall be used. Code references are given to indicate the minimum quality and performance acceptable. Where Specifications and/or Contract Drawings indicate more stringent requirements, the Specifications or Contract Drawings shall govern.
- D. The Contractor, under this Contract shall be responsible for providing and filing all Plans, Specifications and other documents, pay all requisite fees and secure all permits, inspections and approvals necessary for legal installation and operation of the systems and or equipment furnished under this Contract.
- E. Comply also with applicable provisions of American National Standard Code for Building Construction ANSI A10.6.

1.10 INSPECTION AND TESTS

- A. Under this Contract the Contractor shall conduct and pay for all testing required by the Specifications.
- B. All material and workmanship shall be subject to inspection, examination, by the Landscape Architect/Engineer at any and all times during construction.
- C. All work that is unsatisfactory, or fails to comply with the Specifications in the opinion of the Landscape Architect/Engineer, shall be corrected by the Contractor at his own expense to the satisfaction of the Landscape Architect/Engineer.

1.11 SANITARY REGULATIONS

- A. The Contractor shall provide adequate sanitary facilities for the use of those employed on the Work. Such facilities shall be made available when the first employees arrive on the Site of the Work, shall be properly secluded from public observation, and shall be constructed and maintained during the progress of the Work.
- B. The Contractor shall maintain the sanitary facilities in a satisfactory and sanitary condition at all times and shall enforce their use. He/she shall vigorously prohibit the committing of nuisance on the Site of the Work, on lands of the Owner, or an adjacent property.

1.12 COORDINATION WITH UTILITIES (if Applicable)

- A. The Contractor shall coordinate his/her Work with the utility companies to prevent damages or disruption to existing equipment and to coordinate new utility installations. The Contractor shall contact the utility companies owning underground equipment in the area of his work to prior to commencing excavation. Contact with the utility companies shall be make sufficiently in advance so they can properly locate their equipment.
- B. The Contractor shall contact Dig-Safe (1-888-344-7233) prior to the start of any prior to the start of construction, and obtain a Certificate verifying that the location work has been completed. Contact the City of Waltham Engineer to verify the location of additional on-site utilities.
- C. The contractor shall be responsible for locating all site items such as utilities that could be affected by this Contract prior to the start of construction.
- C. Site information: No representations are made indicating subsurface conditions. It is expressly understood that the Owner/Landscape Architect/Engineer will not be responsible for interpretations or conclusions drawn therefrom by the Contractor.

1.13 CONSTRUCTION FENCE

- A. The Contractor shall maintain a construction fence installed to secure the Site at all times. Existing fencing may be maintained in place or reused to the extent feasible to satisfy this requirement.
- B. Maintain construction fencing in place throughout length of construction period or as directed by the Landscape Architect/Engineer. After completion of construction, take down construction fencing and remove from the Site. Repair any damage caused by the fence removal, if any.

1.14 FIRE PROTECTION

Gasoline and other flammable liquids shall be stored in and dispensed from UL listed safety containers in conformance with the National Board of Fire Underwriters recommendations. Do not store flammables near buildings. No flammable shall be stored between 4 p.m. and 7 a.m. on workdays; nor anytime on non-workdays.

1.15 CLEAN UP

During the course of the Work, the Contractor shall keep the Site in as clean and neat a condition as possible. He/she shall dispose of all residue resulting from the work. At the conclusion of the day's work, the Contractor shall leave the entire Site of the Work in a neat and orderly condition.

--- END OF SECTION ---

SECTION 01 20 00

PROJECT MEETINGS

PART 1 - GENERAL:

1.01 GENERAL PROVISIONS

Attention is directed to the General Conditions of the Contract, all Divisions of the specifications, and the Contract Drawings, all of which apply to work of this section.

1.02 SCOPE OF WORK

Work included: To enable orderly review during progress of the Work, and to provide for systematic discussion of problems, as long as deemed necessary by the Landscape Architect/Engineer and Owner throughout the construction period.

Related work: The Contractor's relations with his subcontractors and materials suppliers, and discussions relative thereto, are the Contractor's responsibility and normally are not part of Project Meetings content.

1.03 QUALITY ASSURANCE

For those persons designated by the Contractor to attend and participate in Project Meetings, provide required authority to commit the Contractor to solutions agreed upon in the Project Meetings.

1.04 MEETING NOTES

The Landscape Architect will compile minutes of each Project Meeting and will furnish copies to all the attendees, Contractor, and the Owner before next scheduled meeting.

PART 2 - EXECUTION:

2.01 MEETING SCHEDULE

A. Except as noted below for Preconstruction Meeting, frequency of Project Meetings will be weekly, or as determined by the Owner, depending on work progress.

B. Coordinate as necessary, to establish mutually acceptable schedule for meetings.

2.02 MEETING LOCATIONS

Project Meetings will be held at the job sites.

2.03 PRE-CONSTRUCTION MEETING

A. The contractor shall arrange for a Preconstruction Meeting within 5 days after the award of contract. The limitations on the use of the premises, as outlined in SECTION 01010, SUMMARY OF WORK, will be discussed, and the Owner will describe the parking

assignment, delivery procedures, toilet facilities, and other provisions he/she may wish to establish.

- B. Contractor is to coordinate attendance by authorized representatives of the Owner, the Contractor, site work subcontractors, and the Landscape Architect/Engineer.
- C. Minimum agenda: Data will be distributed and discussed on at least the following items:
 - 1. Organizational arrangement of Contractor's forces and personnel, and those of subcontractors, materials suppliers, and Owner.
 - 2. Channels and procedures for communication.
 - 3. Construction schedule, including sequence of critical work.
 - 4. Contract Documents and revisions.
 - 5. Processing of Shop Drawings and other data submitted to the Owner for review.
 - 6. Processing of Bulletins, field decisions, and Change Orders.
 - 7. Procedures for safety, first aid, security, quality control, housekeeping, and related matters.
 - 8. Submittal of Construction Fence layout.
 - 9. Submittal of Progress Schedule, Tabulation of Submittals and
 - 10. Schedule of Values.

2.04 PROJECT MEETINGS

- A. Frequency: Project Meetings shall, in general, be held once a week. Meetings shall be chaired by the Landscape Architect/Engineer, who will also prepare the meeting agenda issued prior to the meeting.
- B. Attendance:
 - 1. To the maximum extent practicable, assign the same person or persons to represent the Contractor at Project Meetings throughout progress of the Work.
 - 2. Site work subcontractors, material suppliers, and others may be required to attend those Project Meetings in which their aspect of the Work is involved.
- C. Minimum agenda:
 - 1. Review progress of the Work since last meeting, including status of submittals for approval.

2. Identify problems which impede planned progress.
3. Develop corrective measures and procedures to regain planned schedule.
4. Complete other current business.

D. Revisions to Minutes:

1. Unless published minutes are challenged in writing prior to the next regularly scheduled Project Meeting, they will be accepted as properly stating the activities and decisions of the meeting.
2. Persons challenging published minutes shall reproduce and distribute copies of the challenge to all indicated recipients of the particular set of minutes.
3. Challenge to minutes shall be settled at start of the next regularly scheduled meeting.

--- END OF SECTION ---

SECTION 01 40 00

QUALITY CONTROL

PART 1 - GENERAL:

1.01 GENERAL PROVISIONS

Attention is directed to the General Conditions of the Contract, all Divisions of the Specifications and the Drawings, all of which apply to this section.

1.02. SCOPE OF WORK

- A. The scope of the work under this Specification section, without limiting the generality thereof, includes the furnishing of all labor, materials, equipment, services, and incidentals necessary to complete all of the work in accordance with the Contract Documents, which are intended to describe and provide for a finished piece of work.

1.03. TESTING LABORATORY (if applicable)

- A. The Owner will select, engage, and pay for the services of an independent testing laboratory to perform structural tests on concrete and such other materials as the Landscape Architect/Engineer may deem appropriate.
- B. Retesting of materials which fail the original test shall be paid for by the Contractor.

--- END OF SECTION ---

SECTION 01 50 00

TEMPORARY FACILITIES

PART 1 - GENERAL:

1.01 GENERAL PROVISIONS

Attention is directed to the General Conditions of the Contract, all Divisions of the Specifications and the Contract Drawings, all of which apply to this section.

1.02 SCOPE OF WORK

- A. The scope of the work under this Specification section, without limiting the generality thereof, includes the furnishing of all labor, materials, equipment, services, and incidentals necessary to complete all of the work in accordance with the Contract Documents, which are intended to describe and provide for a finished piece of work.
- B. The work includes the following, without limiting the generality thereof;
 - 1. Temporary utilities.
 - 2. Field office (not required).
 - 3. Barriers and enclosures.
 - 4. Safety and security.

1.03 TEMPORARY UTILITIES

- A. The Contractor is responsible for all temporary electrical distribution, lighting, and water distribution from existing sources.
- B. The Contractor shall provide and pay for his own temporary telephone service within the Contract Limit Line.
- C. The provision for temporary toilets is included under SECTION 01010 - SUMMARY OF WORK.

1.04 FIELD OFFICE

- A. The contractor is responsible for his/her own office space, if deemed necessary.
- B. The Contractor shall provide appropriate survey equipment on site for use by the Engineer, field checking layouts and installations.

1.05 BARRIERS AND ENCLOSURES

- A. The Contractor shall maintain the construction fence and furnish warning signs around the work area to limit unauthorized entry within the Contract Limit Line.

- B. At the earliest practical time provide temporary enclosure of materials, equipment, work in progress and completed portions of the work to provide protection to the work and employees.

1.06 SAFETY AND SECURITY

- A. The Contractor shall be responsible for the safety and security of the building and the site within the Contract Limit Line, and for the safety of all persons who enter within the Contract Limit Line.
- B. The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the work.
- C. The Contractor shall erect and maintain, as required by existing conditions and progress of the work, all reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations, and notifying the Owner of particular hazards.
- D. The Contractor shall cooperate with and maintain a close liaison with the Police Department and Fire Department, and he shall abide by safety-related requests from any of these agencies.

--- END OF SECTION ---

SECTION 01 60 00

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. 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 upon request.
- C. The individual retained to perform the work of this Section shall be as approved by the City Representative.

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 Project Representative at no extra cost to the Owner.
- B. Upon request by the Project Representative, 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 Project Representative.
- B. The Surveyor shall lay out the essential or necessary grades and locations of all proposed site 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 Project Representative.
- C. The Contractor shall inform the Project Representative when the general layout is completed and shall not begin excavation until the Project Representative approves the various alignments. Any discrepancies encountered in field conditions shall be reported to the Project Representative 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 Project Representative's approval of basic layout and stakeout.

--- END OF SECTION ---

SECTION 01 70 00

PROJECT CLOSE-OUT

PART 1 - GENERAL:

1.01 GENERAL PROVISIONS

Attention is directed to the General Conditions of the Contract, all Divisions of the Specifications and the Drawings, all of which apply to this section.

1.02. SCOPE OF WORK

- A. The scope of work under this specification section, without limiting the generality thereof, includes the furnishing of all labor, materials, equipment, services, incidentals necessary to complete all of the work in accordance with the Contract Documents, which are intended to describe and provide for a finished piece of work.
- B. The type of work includes the following, without limiting the generality thereof:
 - 1. Substantial completion
 - 2. Final cleaning.
 - 3. Record drawings.
 - 4. Operating and maintenance data.
 - 5. Warranties.
 - 6. Maintenance materials.
 - 7. Final completion.

1.03 SUBSTANTIAL COMPLETION

- A. Prior to requesting Substantial Completion as provided in the General Conditions the Contractor shall make a thorough inspection of the Work. During this inspection the Contractor shall prepare a comprehensive list of all items remaining to be completed or corrected. This list shall include all remaining Contractor and Subcontractor items to be provided under the Contract Documents.
- B. Upon completion of the list, the Contractor shall notify, the Landscape Architect in writing, that the Work is Substantially Complete. The Landscape Architect shall then conduct a thorough inspection. If the Landscape Architect agrees that the Work is Substantially Complete, the Landscape Architect will promptly make a prepare a monetized punch list, setting forth in accurate detail any items on the Contractor's list and additional items that are not acceptable or incomplete. The Contractor shall coordinate all Subcontractors to achieve prompt completion of the punch list.
- C. The Contractor shall not be relieved of the responsibility to provide Contract items left off of the Landscape Architect's punch list.
- D. If the Landscape Architect determines that the Work is not Substantially Complete, the Landscape Architect shall inform the Contractor of those items that must be completed

before the Landscape Architect will prepare a monetized punch list. Upon completion of those items, the Contractor shall again request the Landscape Architect to prepare a punch list.

- E. When the punch list has been prepared, the Landscape Architect will arrange a meeting with the Contractor and Subcontractors to identify and explain all punch list items and answer questions on work which must be done before final acceptance.
- F. The Landscape Architect may revise the punch list, from time to time, to ensure that all items of Work are properly completed.

1.04 FINAL CLEANING

- A. Immediately prior to Substantial Completion of the work, the Contractor shall perform all cleanup work as follows:
 - 1. Remove all waste materials and rubbish from the site and legally dispose of it.
 - 2. Remove all tools, equipment, machinery, surplus material, temporary enclosures, and any other material belonging to the Contractor or his Subcontractors.
 - 3. Clean all surfaces, fixtures, and equipment within the work areas, and any surfaces outside the work area which have been made dirty by the work of the contract. Leave the entire site clean and ready for use.

1.05 RECORD DRAWINGS/AS-BUILT DRAWINGS

- A. During the course of the work the Contractor shall maintain, at the site, a clean set of black line prints of the contract drawings. This set of prints will be marked "Record Drawings" and shall be kept in a clean condition and separate from the drawings in general reference use. On these record drawings, the Contractor shall record all deviations from the work as described in the contract drawings, especially those deviations in utilities work.
- B. At the completion of the work, neat, clean and complete record drawings shall be prepared and submitted to the Owner as a condition precedent to final payment. At his own expense the Contractor shall obtain reproducible of working drawing sheets from the Owner.

1.06 OPERATING AND MAINTENANCE DATA

At substantial completion of the project, the Contractor shall deliver to the Owner two sets of all operating and maintenance instructions for the various pieces of equipment or paints included in the project. This information shall be neatly bound in loose leaf notebooks for the Owner's permanent record.

1.07 WARRANTIES

At substantial completion of the project, the Contractor shall deliver to the Landscape Architect copies of all warranties for the various materials and pieces of equipment included in the project. These warranties shall be submitted in duplicate and shall be bound together with the operating and maintenance data called for above.

1.08 FINAL COMPLETION

- A. Related Requirements: The Contractor's attention is directed to the General Conditions of the Contract.
- B. Final Completion:
 - 1. Within 10 days after Substantial Completion, if any of the items on the Landscape Architect's punch list are not complete or if the Contractor has not provided the appropriate Record Drawings, Operating Manuals, Warranties, Guarantees, or Spare Parts, the Landscape Architect shall assign a monetary value for each incomplete item as well as any other items as provided by M.G.L. c.30 sec.39K.
 - 2. The Contractor shall provide the Landscape Architect with a Notarized Contractor's Certificate and Release and an appropriate Application for Payment. This Application shall be for an amount equal to the remaining balance of the Contract less the amount of the Landscape Architect's monetized punch list and any other items as provided under M.G.L. c.30 sec.39K.
 - 3. The Contractor shall complete all remaining Work in accordance with the provisions of the General Conditions.
 - 4. Upon completion of all remaining items, and after receipt of all appropriate Record Drawings, Operating Manuals, Warranties, Guarantees and Spare Parts required by the Contract Documents, The Contractor shall provide a notarized Contractor's Certificate and Release and a final Application for Payment to complement this close-out process.
 - 5. The Contractor shall provide copies of Lien Waivers for all subcontractors and suppliers to obtain final payment. No final payment or release of retainage shall be made without notarized copies of all Lien Waivers for the completed project.

--- END OF SECTION ---

DIVISION 02

SECTION 02 57 16

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

DIVISION 03
TECHNICAL SPECIFICATIONS

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SECTION 02 01 00 EXISTING TREES TO REMAIN

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

- A. All of the Contract Documents, including the Contract Form, General Provisions, General Conditions, Supplemental Conditions, and all Attachments to the General Provisions, and Division 1 - General Requirements, apply to the work of this Section.

- B. This Section specifies requirements for maintaining existing trees, before, during and after construction.
 - 1. The Contractor’s attention is directed to the protection of all existing trees within the project area.

 - 2. No construction activity shall occur on-site before tree protective fencing has been installed.

 - 3. No pruning or removal of tree limbs shall be allowed to provide clearance for construction work unless approved by the City of Waltham Tree Warden.

1.02 REFERENCE STANDARDS

- A. National Arborist Association Pruning Standards for Shades Trees (1988 Revision)

1.03 QUALITY ASSURANCE

- A. Work under this Section is subject to inspection by the City of Waltham Tree Warden and shall be done to his satisfaction.

- B. Pruning and aeration of trees shall be done by or under the direct supervision of a Massachusetts Registered Arborist.

- C. Notify the Landscape Architect at least one week before trees are scheduled for pruning.

PART 2 – PRODUCTS

2.01 TREE PROTECTION FENCE

- A. Trees indicated on the Drawings shall be protected by temporary moveable 6' height chain link fence, dimensioned as shown on the Drawings, or equal method acceptable to the Landscape Architect.
- B. Cover area within tree enclosure with 3" depth of mulch.
- C. Tree protection fence is minimal area required to protect trunk and branches and does not define the full extent of tree canopy. No materials shall be stockpiled or vehicles parked or driven within the tree canopy, unless it is necessary to install site improvements in that area. This area is delineated on the Drawings.

2.02 ACTIVITIES WHICH ARE PROHIBITED WITHIN THE TREE CANOPY (DRIP-LINE)

- A. Parking or driving of equipment, machinery, and stockpiling of materials.
- B. Dumping of any liquid waste such as paint thinner from cleaning brushes, wash-out materials from cleaning equipment, or debris of any kind.

PART 3 – EXECUTION

3.01 GRADING OPERATIONS AT EXISTING TREES TO REMAIN

- A. Where grading work is required within the drip-line or canopy of existing trees to remain:
 - 1. Notify the Landscape Architect prior to excavating in these areas.
 - 2. Deep water tree to a depth of 12" one week prior to grading operations, and immediately after grading operations are complete.
- B. When excavating or trenching with the drip-line, hand dig in a manner which will cause minimum damage to roots systems.
- C. Cut roots cleanly and to a depth 3" below finished grade. Do not cut tree roots over 2 inches in diameter unless approved by the Landscape Architect or Tree Warden.
- D. Prune injured roots clean and backfill as soon as possible.

3.02 WATERING OF EXISTING TREES TO REMAIN DISTURBED BY CONSTRUCTION

- A. All existing trees whose canopy has been disturbed by construction, by grading and/or installation of paving or walls, shall be watered throughout the construction period.

1. The Contractor shall maintain at the site at all times a watering truck or permitted connection to a fire hydrant for the purpose of tree watering through the months of June through September and additional periods as determined by the Landscape Architect.
2. Watering of trees disturbed by construction shall consist of deep watering (12"24" depth) monthly, and additionally as directed by the Landscape Architect or Tree Warden.

3.03 PRUNING EXISTING TREES TO REMAIN

- A. Crown Raising: Remove limbs of any tree within 5' of sidewalks or walks to a height of 80" above finished grade.

END OF SECTION

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SECTION 02 10 50 RODENT CONTROL

PART 1 - GENERAL

1.01 SUMMARY

- A. This section specifies rodent control and general pest control requirements within project areas, and bordering areas as designated by the Landscape Architect. This work is to be performed prior to demolition, excavation, and site preparation and throughout the Contract, so that rodents (rats, and mice) and other pests do not disperse from or infest the project area.

- B. The Contractor shall develop and implement an Integrated Pest Management (IPM) approach. As part of that approach, the Contractor shall maintain a cooperative dialogue with appropriate agencies and management/representatives of neighboring properties.

- C. The Contractor shall perform the rodent control tasks described in this Scope of Work and also respond to other pest control needs when directed by the Owner.

1.02 SUBMITTALS

- A. Submit to the Owner copies of pesticide applicator certifications and licenses within ten (10) days of their issuance or renewal for the duration of this Contract.

- B. After performing the survey described in 3.2 and before initiating baiting, submit to the Landscape Architect a written description of proposed pest control procedures, indicating materials, quantities, methods, and time schedule. For all pesticides to be used, submit a copy of the pesticide manufacturer's EPA-approved pesticide label with application directions.

- C. Submit to the Owner documentation of pest control activities and results and follows:
 - 1. Weekly - Submit data sheets with locations of sites treated, amounts and types of pesticide used, number and types of traps set, survey and inspection results, sanitation conditions, complaint calls investigated, and any problem that occurred.

 - 2. Monthly - Submit a written summary that includes determinable results of the IPM program and recommendations.

 - 3. Quarterly - Submit a map that shows bait stations where rodent baits are being maintained.

1.03 QUALIFICATIONS

- A. The Contractor shall perform this work at all times in accordance with the following minimum standards and as acceptable to the Owner.
 - 1. The Contractor and key personnel shall have experience with commercial and residential accounts and construction projects; have experience and technical training in vertebrate pest management and integrated pest management; have experience with various rodent control techniques, equipment, and strategies; have training and experience with insect control; and have knowledge of and experience with techniques to reduce non-target hazards.
 - 2. The supervisor shall be licensed and certified by the Massachusetts Pesticide Bureau and certified in General Pest Control (category 41) and Vertebrate Pest Control (category 44). The supervisor shall have specific training and experience in vertebrate pest management, commercial rodent control, general pest control, and integrated pest management.
 - 3. Applicators shall be licensed by the Massachusetts Pesticide Bureau and certified in General Pest Control (category 41). Applicators shall have specific training and experience in commercial rodent control and integrated pest management.

1.04 COORDINATION

- A. Perform this Work in cooperation with the other Work performed under the Contract.
- B. Initiate the work on or before field mobilization begins for the Contract and with adequate timing to achieve control before environmental disruptions. Provide a maintenance program until Contract is completed and all equipment and materials are removed.
- C. Perform this work in such a manner that toxicant or other control tools do not pose a hazard to persons, domestic animals, or non-target wildlife.

1.05 PERMITS

- A. Obtain and maintain in coordination with the Contractor appropriate permit(s) from city or state agencies for pest control activities associated with this Work.
- B. Obtain and maintain in coordination with the Contractor all right of entry permits required for the performance of this Work. This includes all utilities and private properties to which entrance is required.

PART 2 - PRODUCTS

2.01 PRODUCTS

- A. Furnish and use only pesticide formulations registered by the U.S. Environmental Protection Agency (EPA) and the Massachusetts Department of Food and Agriculture, where appropriate according to label directions and as acceptable to the Landscape Architect.
- B. Furnish and use devices and supplies (e.g., traps and bait stations) to facilitate the management and effectiveness of the pest control program, where appropriate and as acceptable to the Landscape Architect.

PART 3 - EXECUTION

3.01 MEETINGS

- A. Not used.

3.02 SURVEY

- A. Prior to baiting, survey the proposed construction area and accessible or observable bordering areas designated on the plans and record signs of rodent activity and sanitation conditions. Closely inspect all embankments, edge areas, and properties within and abutting the construction area. Maintain survey records in the manner described in 3.7.
- B. Thoroughly inspect the construction area and accessible or observable bordering areas and any nearby areas for rodent activity and sanitation deficiencies weekly throughout the duration of this Contract and in accordance with the work schedule. Maintain inspection records in the manner described in 3.7.
- C. Plan the control program and allocate resources based on survey and inspection data and as acceptable to the Owner. Pest control areas designated on the Plans are approximate and the Contractor shall extend services beyond those areas as required based on survey and inspection data.

3.03 APPLICATION FOR RODENT CONTROL

- A. Apply rodenticide in strict accordance with EPA-approved label directions and the Rules and Regulations of the Massachusetts Department of Food and Agriculture. Maintain records of all bait placements in the manner described in 3.7.
- B. Where appropriate, especially for surface placements of rodent baits, use properly secured and tamper-resistant bait stations consistent with EPA regulation. Individually number and properly identify all bait station.

3.04 SURFACE APPLICATIONS

- A. Initial Surface Baiting

1. Rid the construction area of all detectable rodents before construction begins, or as acceptable to the Owner. Bait all observable rodent burrows. Install and secure bait stations at regular and appropriate intervals and locations, and document rodent activity (burrows, droppings, bait consumed, dead rodents). Replenish bait and shift bait stations as necessary to ensure complete control of rodent populations. Bait edge and accessible bordering areas designated on the Plans as necessary to ensure that rodents will not be dispersed by construction activities and that rodents will not infest work areas.

3.05 MAINTENANCE SURFACE BAITING

- A. Establish a maintenance baiting program prior to mobilization by the Contractor, including construction areas and accessible bordering areas designated on the plans, as acceptable to the Owner. Check bait placements weekly. Use survey and baiting data to determine the most effective distribution of baiting locations and bait quantities. Shift and distribute bait and bait stations as appropriate to ensure continued control.

3.06 CLEAN-UP

- A. Remove visible rodent carcasses and dispose of them daily consistent with the pesticide label directions and applicable codes, laws, and regulations.
- B. Upon completion of any pest control operations at the site, remove remaining bait and dispose of it according to the pesticide label and applicable codes, laws, and regulations. Also remove all wires used for subsurface baiting and any bait stations or traps.

3.07 SANITATION

- A. Prior to construction and throughout the duration of this Contract, identify and document harborage and food sources available to rodents on the construction site and in observable bordering areas designated on the Plans. This includes any littering or improper or insufficient use of trash receptacles in construction areas. It also includes any bordering areas with sanitation conditions or structural deficiencies that violate City or State sanitation codes.
 1. Maintain records of sanitation conditions in the manner described in 3.7.

3.08 COMPLAINT CALLS

- A. During construction, respond to pest-related complaints from the "adjacent" neighborhood i.e. within 200 feet of the project limits, within 12 hours when directed by the Owner. Inspect the particular premises and adjacent areas for sanitation and structural deficiencies and also signs of historic and recent pest activity. Discuss providing sanitation and structural maintenance information to the adjacent property with the Owner prior to placing bait and traps. Use pesticides or traps as necessary

and appropriate to resolve the complaint when there is a relationship between the pest infestation and construction activities, or when directed by the Landscape Architect and/or Owner.

- B. Maintain records of all complaints investigated, including location, contact person, inspection results, and actions taken. Document the relatedness of the pest infestation to construction activities.

3.09 GENERAL PEST CONTROL

- A. When directed by the Landscape Architect, the Contractor shall determine appropriate methods for any pest control task not specifically identified above and shall submit them in writing to the Landscape Architect for approval in advance. Such pest control tasks would relate to unanticipated pest control needs within construction areas or adjacent areas. This could include control of insects or vertebrates other than rats and mice.
- B. Maintain records of general pest control activities and results in the manner described in 3.7.

3.10 RECORD KEEPING

- A. Use standardized data sheets acceptable to the Owner to maintain accurate records of date, placement, type, and amount of pesticides or other control tools (e.g., traps) applied. Similarly, maintain records of surveys, inspections, changes in pest activity, sanitation conditions, and complaint calls. Submit data in a format acceptable to the Landscape Architect and as required.

END OF SECTION

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02 41 00 SITE PREPARATION AND DEMOLITION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. The conditions and general requirements of the Contract, Division 0, and applicable parts of Division 1 apply to the Work under this Section.
- B. The Contractor shall, prior to any removal of rubbish or debris from the site, furnish written evidence satisfactory to the Owner's Representative that he has an approved dumping location for debris and/or spoil from his removals and excavation activities.
- C. On-site cleaning of materials for the purpose of salvage on the site shall not be permitted.
- D. The Contractor shall secure all necessary permits from the City of Waltham before starting this project.
- E. The City of Waltham shall have the right of first refusal on all removed materials, at the direction of the City's Project Manager. All materials refused by the City shall become the property of the Contractor.
- F. For all earthwork, excavation, and removals within the driplines of protected trees (not limited to areas within designated tree protection fencing), the Landscape Architect must be present on the site or have specifically waived that obligation in writing to the Contractor to ensure tree protection measures are being observed. Provide 48 hours' notice prior to commencement of all such work.

1.2 WORK INCLUDES, BUT IS NOT LIMITED TO THE FOLLOWING

- A. Provide all labor, equipment, implements and materials required to furnish, install, construct and perform all Site Preparation work complete, as shown on the Drawings and as specified herein.
- B. Work includes, but is not limited to the following:
 - 1. Temporarily shut off any utilities to the affected areas of the project site.
 - 2. Removal of existing benches, tables, edging, mulch, sports structures, safety surfacing and any and all associated footings, etc., as designated on Drawings;
 - 3. Removal and stockpile of subgrade material and all topsoil as required by the Construction Documents;
 - 4. Removal of shrub(s), stump(s), lawn, other vegetation, and topsoil where indicated on the Drawings. Remove root structures over 1/4-inch diameter within 5-feet of the stump;
 - 5. Sawcutting (where required) and removal of indicated sections of existing bituminous concrete pavement, and concrete pad / paving, as indicated on the Drawings;
 - 6. Removal and disposal of indicated play equipment, swings, and all footings;

7. Removal and disposal of wood fiber safety surfaces, sand safety surface, and associated subbases where subbase removal is required for grade or existing subbase does not meet specifications for new subbase;
8. Materials not indicated to be reused or protected, and not desired by the City of Waltham maintenance department, shall be removed legally off-site. Provide for proper disposal of all removals off-site, including documentation of approved dumping location as described in 1.01.B;
9. Protect existing trees, walls, curbing, concrete edges, catch basins, paving, utility poles, fences, railings, utilities, and buildings not indicated to be removed on the Drawings;
10. Protect the existing sidewalk within the public right-of-way;
11. Protect the public right-of-way from the entry of erosion and construction debris;
12. Any other necessary preparations for installation of improvements.

1.3 REFERENCES

- A. Examine all other Sections of the Specifications and all Drawings for the relationship of the work under this Section and the work of the other trades. Cooperate with all trades and all departments of City of Waltham and coordinate all work under this Section.
- B. The following related items are included under the Sections listed below:
 1. Section 31 20 00 - Earth Moving

1.4 LAWS, ORDINANCES, PERMITS AND FEES

The Contractor shall:

- A. Give necessary notices, obtain all permits and pay all governmental fees and other costs in connection with this work, file all necessary plans, prepare documents and obtain all necessary approvals.
- B. Obtain all required certificates of inspection for this work and deliver it to the Landscape Architect before request for acceptance and final payment for the work.
- C. Include in the work, without extra cost to the Owner, any labor, materials, services, apparatus, drawings (in addition to contract drawings and documents) in order to comply with all applicable laws, ordinances, rules and regulations, whether or not shown on the drawing and/or specified. The disturbed areas shall be secured with chain link construction fence and fence shall be maintained at all times while site is under construction.
- D. Provide all safety controls during construction including temporary walkways, fencing, barricades, etc. at no additional cost to the Owner.
- E. Completely remove from the project area all demolished materials, except as designated for stockpiling for re-use, and dispose of all materials off the site.

- F. Disposal of the materials shall be done in such a manner that there shall be no accumulation of any demolished material which may, in the opinion of the Owner's Representative, the Fire Department or any other public agency having jurisdiction, constitute a hazard.
- G. Comply with all Federal, State, and Local Codes for all utility work.

1.5 DEFINITIONS

The following related items are included herein and shall mean:

- A. S.S.H.B. - Standard Specifications for Highways and Bridges, the Commonwealth of Massachusetts, Department of Public Works, latest edition.
- B. A.S.T.M. - American Society for Testing and Materials.
- C. A.A.S.H.T.O. - American Association of State Highway and Transportation Officials.

1.6 SITE CONDITIONS

- A. The Contractor shall visit and accept the site as he finds it and shall inform himself of the character and the type of structures to be removed. The Owner assumes no responsibility for the condition of the site. Damage to the site (whether by reason of fire, theft, or other happenings) shall be at the risk of the Contractor from and after the date of Contract execution and no such damage or loss shall relieve the Contractor from any obligation under the Contract.
- B. Environmental Requirements: Contractor shall not work on or with soils when they are overly dry, wet, or frozen. Field Test: Form soil in palm of hand; if soil retains shape and crumbles upon touching, then it may be worked (if it will not retain its shape, it is too dry; if it does not crumble, it is too wet). Landscape Architect shall be final authority on condition of soil.

1.7 PROTECTION

- A. NO ACCESS to the Job Site shall be allowed on or through abutting private properties. Access shall be along the public right-of-ways.
- B. All rules and regulations governing the respective utilities shall be observed in executing all work under this Section. All work shall be executed in such a manner as to prevent any damage to existing streets, curbs, paving, service utility lines and structures, drainage lines and structures, and adjoining property. Monuments and benchmarks shall be carefully maintained and, if disturbed or destroyed, replaced as directed.
- C. The Contractor shall assume full responsibility for damages caused by his Subcontractor's equipment and personnel to the existing grounds as well as adjoining private property. The Contractor shall obtain approval for subsurface construction from DIGSAFE (1-888-344-7233 / 1-888-DIG-SAFE) and all necessary parties and the City of Waltham before proceeding within the Contract limits.

- D. The work of this Section shall be performed in such a manner as to cause no interference with access by the Subcontractors or other Contractors to all portions of the site as is necessary for the normal conduct of their work.
- E. The Contractor shall take adequate precautions to protect all walks, roads, streets, curbs, pavements, trees and planting, on or off the premises, and shall repair and replace or otherwise make good, as directed by the Owner's Representative, any damage so caused.
- F. Trees that are damaged during construction shall be removed by the Contractor at their expense if instructed to do so by the Landscape Architect, and the Contractor shall pay the City of Waltham for each damaged and removed tree based on the following schedule:
 1. \$1,500. per tree for 2" through 6" caliper
 2. \$3,000. per tree for over 6", through 12" caliper
 3. \$6,000. per tree for over 12", through 18" caliper
 4. \$12,000. per tree for over 18" caliper.

1.8 SPECIAL PROTECTION FOR MAINTAINING STREETS AND PUBLIC WAYS

- A. Do not close or obstruct streets, or sidewalks within the public right-of-way, without a permit. Do not place or store material in streets, alleyways or sidewalks.
- B. Conduct operations with minimum interference to street.
- C. Furnish, erect and maintain fences, planking, bracing, shoring, sheathing, lights, barricades, warning signs, and guards as necessary for the protection of streets, sidewalks, and adjoining property.
- D. Completely remove all protection when the work is completed or when ordered in writing to do so by the Owner.

1.9 UTILITIES

- A. All work shall be performed in accordance with Federal, State and Local Codes.
- B. Discontinuance or Interruption
 1. Before starting demolition, the Contractor shall be solely responsible for making all necessary arrangements and for performing any necessary work involved in connection with the discontinuance or interruption of all public and private utilities or services under the jurisdiction of the utility companies or corporations, and the Owner. These include gas, electricity, steam, refrigeration, low tension system, telephone, internet access, television, police signal, fire alarm, water, sanitary sewer, storm drainage, and without limiting the generality of the foregoing, including any system or systems which will be affected by the

work to be performed under this Contract.

C. Protection

1. Preserve in operating condition all active utilities including overhead any wires, traversing the project site, which are to remain. Should any damage occur to a utility which is to remain as a result, in the judgment of the Owner's Representative, of this operation, the Contractor shall at his own expense, repair all damage to any such utility to the satisfaction of the affected utility operator and the Owner.

D. Cleaning of Catch Basins and Storm Water Lines

1. Contractor shall clean all existing catch basins and their storm water lines on site, removing accumulated silt in the basin and clearing all pipes connecting to the street or to other drainage structures in order to provide sufficiently positive and continuous drainage to existing system.

PART 2 – NOT USED

PART 3 - EXECUTION

3.1. REMOVALS

- A. All holes and trenches resulting from removals shall be backfilled as appropriate with gravel borrow and compacted as specified in Section 31 20 00 - Earth Moving.
- B. Tree, stump, and shrub removal: In areas where the finish condition shall be lawn or planting bed, the existing stump shall be ground and roots over 1/4 inch in diameter within 5 feet of the stump shall be removed, all to a minimum of 24 inches below new finish grade. In areas where the finish condition shall be pavement, the stump and roots shall be completely removed.
- C. Tree Protection: All removals and earthwork within ten feet of tree trunks shall be handwork only.

3.2. DUST CONTROL

- A. Wet down thoroughly all work during excavation to prevent spread of dust. Make all arrangements and pay for all water and necessary connections therefore.

3.3. CLEAN-UP

- A. Remove from the project site all materials and debris resulting from the work of excavation. Storage of such materials on the project site will not be permitted. The project site shall be safe, clean and holes filled and compacted with clean fill upon completion of the excavation and site clearance work.

END OF SECTION

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03 30 00 CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. The conditions of the Contract apply to the work under this Section.
- B. The Contractor shall prior to any removal of surplus fill, excavated material, or debris from the site, furnish written evidence satisfactory to the Owner or Owner's representative that he has an approved dumping location for debris and/or spoil from his/her excavation activities.

1.2 WORK INCLUDED.

- A. Provide all labor, equipment, implements and materials required to furnish, install, construct and perform cast-in-place concrete as shown on the Drawings and as specified herein.
- B. To be included:
 - 1. Concrete for concrete pads, flush concrete curbs, and for all footings for picnic tables, benches, play equipment, bicycle rack and basketball hoop.
- C. Examine all other Sections of the Specifications and all Drawings for the relationship of the work under this Section and the work of other trades. Cooperate with all trades and all departments of the City of Waltham and coordinate all work under this Section therewith.
- D. The following related items are included under the Sections listed below.
 - 1. Section 02 41 00 - Site Preparation and Demolition
 - 2. Section 11 68 00 - Play Equipment and Structures
 - 3. Section 12 93 00 - Site Furnishings
 - 4. Section 31 20 00 – Earth Moving

1.3 SUBMITTALS

- A. All manufacturers' product literature.
- B. Test reports for concrete. Compression tests at 7 days and one at 28 days and slump test. One test is to be done for every 10 cubic yards of concrete.

1.4 LAWS, ORDINANCES, PERMITS AND FEES

The Contractor shall:

- A. Give necessary notices, obtain all permits and pay all governmental taxes, fees and other costs in connection with this work, file all necessary plans, prepare documents and obtain all necessary approvals.
- B. Obtain all required certificates of inspection for this work and deliver same to the Landscape Architect before request for acceptance and final payment for the work.
- C. Include in the work, without extra cost to the Owner, any labor, materials, services, apparatus, drawings (in addition to contract drawings and documents) in order to comply with all applicable laws, ordinances, rules and regulations of the City of Waltham and the Commonwealth of Massachusetts, whether or not shown on the Drawings and/or specified.

1.5 DEFINITIONS

- A. The following related items are included herein and shall mean:
 - 1. S.S.H.B. - Standard Specifications for Highways and Bridges, the Commonwealth of Massachusetts, Department of Public Works, latest edition
 - 2. A.S.T.M. - American Society for Testing and Materials
 - 3. A.A.S.H.T.O. - American Association of State Highway and Transportation Officials

1.6 SUBSURFACE INFORMATION

- A. The Owner and Landscape Architect assume no responsibility for the Contractor's failure to make his own site investigation and makes no representation regarding the character of the soil or subsurface conditions which may be encountered during the performance of the work.

1.7 FINISHED GRADES

- A. The words "finished grades" as used herein mean the required final grade elevations indicated on the Drawings. Where not otherwise indicated, site areas shall be given uniform slopes between points, for which finished grades are shown, or between such points and existing grade except that vertical curves or roundings shall be provided at abrupt changes in slope.

1.8 GRADES AND ELEVATIONS

- A. The Drawings indicate, in general, the alignment and finished grade elevations. The Landscape Architect, however, may make such adjustments in grades and alignment as are found necessary in order to avoid interference and to adapt the grading to other special conditions encountered.

1.9 WORK IN THE PUBLIC WAYS

- A. Notify the appropriate municipal officials at least seven calendar days in advance of commencing any work in the public ways to obtain all required permission to perform this work. Perform all work in the public ways in a manner required by the municipal authorities. Should there be any conflict between requirements specified in the Contract Documents and those of the City of Waltham, the municipal requirements shall govern.
- B. Do not close or obstruct any streets or sidewalks unless and until they have been discontinued by the appropriate municipal authority or unless and until he shall have first secured all necessary and required permits. No materials whatsoever shall be placed or stored in the streets. Conduct all operations to interfere as little as possible with the use ordinarily made of roads, driveways, sidewalks, or other facilities near enough to the work to be affected thereby.

PART 2 - PRODUCTS

2.1 General

- A. Cast-in-place concrete shall be Class D, air-entrained concrete conforming to the requirements and applicable provisions of Section 701 of the S.S.H.B. Minimum 28- day compressive strength shall be 4,000 psi. Concrete shall be air-entrained 5% minimum with a two (2") to four (4") inch maximum slump.

2.2 Form Materials

- A. Forms of Exposed Finished Concrete: Unless otherwise indicated, construct form work for exposed concrete surfaces with plywood, metal, metal-framed plywood faced or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practical sizes to minimize number of joints and to conform to the joint system shown on Drawings. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without bow or deflection.
- B. Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood," Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.
- C. Form for Unexposed Finish Concrete: Form concrete surfaces which will be unexposed in finish structure with plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.
- D. Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain or adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.

2.3 Reinforcing Materials

- A. Reinforcing Bars: ASTM A615, Grade 60.
- B. Welded Wire Fabric (WWF): ASTM A185, welded steel wire fabric.

- C. Supports for Reinforcement: Provide supports for reinforcement including bolsters, spacers and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with CRSI recommendations, unless otherwise acceptable.

2.4 Cement

- A. Cement shall be Portland Cement Type 1, free from water-soluble salts or alkalis which will cause efflorescence on exposed surfaces. Portland Cement shall comply with Standard Specifications of the ASTM-C150 Type I or II.
- B. Cement shall be stored in a weather-tight structure and in such a manner as to prevent deterioration or intrusion of foreign matter. It shall be easily accessible for proper inspection and identification of each shipment. Cement that has hardened or partially set shall not be used.

2.5 Aggregate

- A. Fine aggregate for all concrete shall consist of washed inert natural sand conforming to ASTM-C330.

2.6 Water

- A. Water for concrete shall be clean, potable, and free from deleterious substances.
- B. When subjected to the mortar strength test described in ASTM-C87 the strength at 28 days of mortar specimens made with the water under examination and normal Portland Cement shall be at least 100% of the strength of similar specimens made with distilled water.

2.7 Related Materials

- A. Grout: Non-shrink, non-metallic grout. Provide one of the following (or approved equal):
 - 1. Five Star Grout": U.S. Grout Company.
 - 2. "Masterflow 713": Master Builders.
- B. Chemical Hardener (chHD-Fn): Colorless aqueous solution containing a blend of magnesium fluosilicate and zinc fluosilicate combined with a wetting agent, containing not less than 2 lbs. of fluosilicates per gal.
- C. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.
- D. Moisture-Retaining Cover: One of the following, complying with ASTM C171.
- E. Waterproof paper.
- F. Polyethylene film.

- G. Polyethylene-coated burlap.
- H. Filler strips for expansion joints where used with caulking or sealants shall be cork type, non-extruding, self-expanding filler strips, AASHO M-153-111, ASTM D1752, III, as manufactured by Celotex Corporation, W.R. Meadows, Inc., W.R. Grace and Company, or equal. Where no sealant is required strips may be non-extruding bituminous type in accordance with ASTM D1751.
- I. Admixtures
 - 1. Admixtures causing accelerated setting of the cement in concrete shall not be used.
 - 2. In general, all concrete shall not contain additives, but an admixture may be employed therein (to improve workability, durability, etc.) subject to prior test and/or approved by the Landscape Architect in writing.
 - 3. Water-reducing and air-entraining agents shall be used in concrete in strict accordance with the manufacturer's printed instructions. Agents shall be stored safe from adverse temperature in accordance with manufacturer's printed instructions. Total air entrained in freshly mixed concrete shall be 5.0% plus or minus 1.0% of volume of concrete with required strengths maintained.
 - 4. Water-reducing agent: "Sonotard WR" by Sonneborn Building Products, "WRDA" by W.H. Grace Company, "Pozzolith 100" by Master Builders Company, or equal. Water reducing agent must be by same manufacturer as air-entraining agent.
 - 5. Air-entraining Agent: "Darex" by W.R. Grace Company, "Aerolith" by Sonneborn Building Products, "MB-VR" by Master Builders Company, "Sealtight Air Entraining Agent" by W.R. Meadows, or equal.
 - 6. No other admixtures may be used without Landscape Architect's approval.

2.8 Slump Limits:

Proportion and design mixes to result in concrete slump at point of placement as follows:

- A. Ramps and sloping surfaces: Not more than 3".
- B. Reinforcing wall systems: Not less than 1" and not more than 3".
- C. Other concrete: Not less than 1" and not more than 4".

2.9 Curing Compounds

- A. All curing compounds shall conform to requirements of ASTM Designation C-309, Type I, clear and C-156, No materials containing wax or saponifiable materials will be permitted.
- B. Curing compound in areas that will be exposed to view in the finished work, or to receive a painted finish, and areas to receive a concrete topping or ceramic tile mortar beds, seamless composition flooring, synthetic athletic surfacing, or other similar finishes, shall contain a fugitive dye, and shall be of a type that will become brittle and easily removable after about 3 weeks to allow dust-proofing treatment specified here in after.
- C. Curing compound shall be Master Builders "Master Seal", Symons "Cure and Seal",

Sonneborn "Kure-N-Seal", "CS-309" by W.R. Meadows or equal, conforming to ASTM 309, Type 1 and 2.

2.10 Proportioning and Design of Mixes

- A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. If trial batch method used, use an independent testing facility acceptable to Landscape Architect for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing unless otherwise acceptable to Landscape Architect.
- B. Submit written reports to Landscape Architect of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed by the Landscape Architect.
- C. Adjustments to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to Owner and as accepted by Landscape Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Landscape Architect before using in work.

2.11 Concrete Mix

- A. Job-Site Mixing: Mix materials for concrete in appropriate drum type batch machine mixer. For mixers of one cu. yd., or smaller capacity, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released. For mixers of capacity larger than one cu. yd., increase minimum 1-1/2 minutes of mixing time by 15 seconds for each additional cu. yd. or fraction thereof.
- B. Provide batch ticket for each batch discharged and use in work indicating project identification name and number, date, mix type, mix time, quantity, and amount of water introduced.
- C. Ready-Mix Concrete: Comply with requirements of ASTM C94, and as herein specified.
- D. Addition of water to the batch will not be permitted.
- E. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 may be required.
- F. When air temperature is between 85 Deg. F (30 deg. C) and 90 Deg. F (32 deg. C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 Deg. F. (32 deg. C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1. Formwork

- A. Forms shall conform to the lines, dimensions and shapes of concrete shown providing for openings, recesses, keys, slots, beam pockets and projections as required.

- B. Make forms clean and free of foreign material before placing concrete.
- C. Do not use earth cuts as forms for vertical surfaces, unless approved by the Landscape Architect.
- D. Design of Formwork
 - 1. Comply with ACI 301, Chapter 4, Paragraph 4.2. Formwork drawings shall bear the seal of licensed professional engineer.
 - 2. Form rods and tie wires of exterior surfaces shall slope down from the inside to outside of forms.
 - 3. Provide forms so that no discernible imperfection is in evidence in finished concrete surfaces due to deformation, bulging, jointing, or leakage of forms.

3.2. Mixing Concrete

A. Ready Mix Concrete

- 1. Comply with ASTM C94.
- 2. Add mixing water only at the site.
- 3. Discharge the concrete completely at the site within 1-1/2 hours after the introduction of the cement to the aggregates. In hot weather reduce this time limit so that no stiffening of the concrete shall occur until after it has been placed.
- 4. Begin the mixing operation within thirty minutes after the cement has been intermingled with the aggregates.

B. Batch Mixing at Site

- 1. Comply with ACI 301, Chapter 7, Paragraph 7.2.
- 2. Excessive mixing requiring the addition of water to preserve the required consistency will not be permitted. Mix concrete to a consistency which can be readily placed without segregation.
- 3. Where admixtures are specified, equip mixers with a device for measuring and dispensing the admixture.

- C. Hand-Mixed Concrete: When hand-mixed concrete is allowed and approved for certain parts of the work, mix on watertight platforms. Proportion cement, sand and aggregate loose by volume, carefully measured. Thoroughly mix sand and cement together dry until the mixture is a uniform color. Add the aggregate and turn the mass over until the mixture is uniform and homogeneous. Add water by sprinkling and turn the mass over until it is uniformly mixed and of the required consistency.

3.3. Placing Concrete

- A. Preparation Before Placing: Conform to ACI 310, Chapter 8, Paragraph 8.1.
- B. Conveying
 - 1. Comply with ACI 301, Chapter 8, Paragraph 8.2.
 - 2. Provide a spout or downpipe and elephant trunk or other appropriate method to prevent concrete from falling freely through a height greater than 3 feet.
- C. Depositing: Comply with ACI 301, Chapter 8, Paragraph 8.3.

3.4. Curing

- A. Comply with ACI 301, Chapter 12. Moist cure (continuous free water and cover with burlap) for first five (5) days after casting. Protect against temperatures under 40 deg. F. in first five days.

3.5 Form Removal

- A. Do not remove forms until the concrete has thoroughly hardened and has attained sufficient strength to support its own weight and construction live loads to be placed thereon, without damage to the structure. In general, do not disturb forms for framing until the concrete has attained at least 40% of design strength for side forms and 80% of design strength for bottom forms. Remove no forms for 24 hours after placing concrete. Protect concrete walks from pedestrian traffic for a period of 3 days after placing. Damp cure as per standards above. Be responsible for proper form removal and replace any work damage due to inadequate maintenance or improper or premature form removal.
- B. Where use of metal form ties extending to within less than 1-1/2 in. of the face of permanently exposed concrete has been unavoidable, cut off such ties at least 1-1/2 in. deep in the concrete but not less than 72 hours after concrete has been cast. Remove forms by methods which will not spall the concrete or cause any injury whatsoever. Hammering or prying against concrete will not be permitted.

3.6 Finishing

- A. General Requirements for Flatwork:
 - 1. Strike off top surfaces of finished fill and monolithic slabs true and level within a tolerance of 1/8 in. in 10 ft. and measured with a 10 ft. straightedge placed in any direction at any location.
 - 2. Set edge forms and intermediate screed strips accurately and sufficiently rigid to support screeds and so that proper surface elevations and concrete thickness are achieved allowing for dead load deflection and camber of formwork. Take measurements and control tolerances by the use of transit instrument.
 - 3. Upon completion of leveling, remove screed and fill spaces with concrete.

4. Concrete shall have a medium broom finish of parallel marks. Brooming shall be at right angles to the axis of walk or as shown on the Drawings.
 5. Joints and edges shall be tooled or otherwise finished as shown on the Drawings.
- B. Field Quality Control
1. Sampling and testing for quality control during placement of concrete may include the following, as directed by the Landscape Architect.
- C. Sampling Fresh Concrete: ASTM C172, except modified for slump to comply with ASTM C94.
- D. Slump: ASTM C143, one test for each concrete load at point of discharge; and one test for each set of compressive strength test specimens.
- E. Air Content: ASTM C173, volumetric method for lightweight or normal weight concrete; one for each set of compressive strength test specimens.
- F. Concrete Temperature: Test hourly when air temperature is 40 deg. F (4 deg. C) and below, and when 80 deg. F (27 deg. C) and above; and each time a set of compression test specimens made.
- G. Compression Test Specimen: ASTM C31; one set of 6 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.
- H. Compressive Strength Tests: ASTM C39; one set for each 100 cu. yds. or fraction thereof, of each concrete class placed in any one day or for each 5,000 sq. ft. of surface area placed; 1 specimen tested at 7 days, 2 specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
- I. When total quantity of a given class of concrete is less than 50 cu. yds., strength test may be waived by Landscape Architect if, in his/her judgment, adequate evidence of satisfactory strength is provided.
- J. When strength of field-cured cylinders is less than 85% of companion laboratory- cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
- K. Strength level of concrete will be considered satisfactory if average of sets of three consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive by more than 500 psi.
- L. Test results will be reported in writing to Landscape Architect and Contractor on same day that tests are made. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials; compressive breaking strength and type of break for both 7-day tests and 28-day test.
- M. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in

the structure, as directed by Landscape Architect. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42, or by other methods as directed. Contractor shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable concrete is verified.

3.7 Protection of Concrete

- A. Under no circumstances shall the Contractor pour and leave the fresh concrete open to vandalism, while it is setting up. Damaged concrete shall be subject to rejection by the Owner or Landscape Architect.

END OF SECTION

SECTION 05 52 00 METAL RAILINGS

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

- A. Attention is directed to the General Conditions of the Contract, all Divisions of the Specifications and the Contract Drawings, all of which apply to this Section.

1.02 DESCRIPTION OF WORK

- A. This section specifies furnishing, fabrication, and installation of:
 - 1. Ramp Railings

1.03 RELATED WORK

- A. Section 03 30 00 - Cast-In-Place Concrete

1.04 INSTALLER/FABRICATOR QUALIFICATIONS

- A. Installer Qualifications: An experienced installer and fabricator who has completed metal work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

1.05 QUALITY ASSURANCE

- A. Provide shop-drawings stamped by a registered Engineer verifying that rails comply with all statutory load requirements.
- B. Handrail fabrication and installation shall comply with ADA Accessibility Guidelines (ADAAG) and Massachusetts Architectural Access Board Regulations (MAAB).

1.06 SUBMITTALS

- A. Shop Drawings: Submit shop drawings of work showing size and thickness of each member, type of material, method of connection and assembly. Show dimensions, clearances, anchorages, relationships to surrounding work, coatings, and other pertinent details of fabrication and installation.
 - 1. Show profiles, reinforcing, fasteners, and any accessories.

2. Indicate welded connections using standard AWS welding symbols. Indicate net weld lengths.
 3. Where feasible, take field measurements prior to preparation of shop drawings and fabrication. Do not delay job progress; allow for trimming and fitting where field measurements before fabrication will delay work.
- B. For railings provide shop drawings stamped by a registered Engineer in the State of Massachusetts and structural calculations demonstrating compliance with loading requirements of all applicable codes.
- C. Product Data: Provide manufacturer's product data, installation instructions, use limitations, and recommendations for each material used. Provide certifications that materials comply with requirements.
1. Provide manufacturer's standard color choices.
- D. Welder's Certification: Provide certification, signed by Contractor, certifying that welders employed at project comply with requirements specified under AWS D1.1 and AWS D1.2.

1.07 QUALITY ASSURANCE

- A. Engineering: Provide services of a professional engineer, registered in the Commonwealth of Massachusetts to design and certify that the work of this Section meets or exceeds performance requirements specified.
- B. Shop fabricate work to greatest extent possible. Label each piece in shop to facilitate field assembly.
- C. Welding: Perform welding in conformance with AWS D1.1 and D1.3 as applicable.

1.08 PROJECT DELIVERY, STORAGE, AND HANDLING

- A. Store work off ground and under cover. Protect from damage. Repair and clean work before erection.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General: Provide products and materials of new stock, free from defects, and of best commercial quality for each intended purpose.
- B. Steel Plates, Shapes, and Bars: ASTM A 36.

- C. Steel Pipe: ASTM A 53, Schedule 40, Type S (seamless), galvanized steel, Grade A for cold-bending.
- D. Welding Rods: Conform to AWS Standards and recommendations of welding rod manufacturer.
- E. Grout for Exterior applications: Provide factory packaged, non-shrink, latex-modified, non-staining, hydraulic controlled expansion cement formulation for mixing with water at project site. Provide formulation that is resistant to erosion from water exposure without need for protection by a sealer or waterproof coating.

2.02 FABRICATION - GENERAL

- A. Fabricate work of this Section to be straight, plumb, level and square, and to sizes, shapes and profiles indicated on approved shop drawings. Ease exposed edges. Cut, reinforce, drill and tap metal work as required for proper assembly.
 - 1. Fabricate miscellaneous supports, brackets, braces and the like required to fully complete the work.
 - 2. Obtain loading requirements from suppliers of work to be supported. Design and support systems with a safety factor of at least 6 unless otherwise indicated.
 - 3. Allow for thermal movement resulting from 100 degree F change in ambient temperature.
 - 4. Shear and punch metals accurately. Remove burrs.
 - 5. Ease exposed edges to a radius of approximately 1/32 inch unless indicated otherwise. Form bent corners to smallest radius possible without causing grain separation or impairing work.
 - 6. Remove sharp or rough areas on exposed traffic surfaces.
 - 7. Weld seams continuously. Spot welding is permitted for temporary welding only.
- B. Work Exposed to View: For work exposed to view, select materials with special care. Provide materials which are smooth and free of blemishes such as pits, roller marks, trade names, scale and roughness. Fabricate work with uniform hairline joints. Form welded joints and seams continuously. Grind welds flush and smooth. For exposed fasteners, use hex head bolts or Phillips head machine screws.

- C. Ramp rails: Conform to ASTM E 985 for design and engineering for structural performance based on testing performed in accordance with ASTM E 894 and ASTM E 935, using load and deflection values specified below.
- (1) 50 pounds per lineal foot applied in any direction at the top and to transfer this load through the supports to the structure,
 - (2) 200 lb concentrated load applied in any direction at any point along the top and to transfer this load through the supports to the structure,
 - (3) Intermediate rails and components to withstand a 50 lbs/square foot horizontal load.
- E. Provide members of type, size, style and profile indicated, unless otherwise required to support loads.
- F. Provide fully welded construction, using internal slip connectors. Grind joints smooth and flush.
- G. Provide coped joints at member intersections, fully welded all around. Provide mitered connections at square turns unless radius turns are indicated.

2.03 FINISH

- A. Railings shall be shop primed and painted with a polyurethane coating as specified below.
1. Touch-up all breaks on hot-dip surfaces caused by cutting, welding, drilling or undue abrasion with liquid zinc coating.
 2. One Coat Primer (dry film thickness 3.0 to 4.0 mils) of Tnemec No. 66 Hi-Build Epoxoline" Epoxy; Porter No. 4361 MCR-43 High Build Epoxy, Dupont "Corlar epoxy primer, or equal.
 3. Apply one finish coat (dry film thickness 1.5 to 2.0 mils per coat) as follows: Tnemec No. 74 Endura-Shield IV Acrylic Polyurethane, Porter No. 8731 Hythane Ultra Acrylic Polyurethane, DuPont Imron Polyurethane, or equal.
 4. Field touch up damaged or abraded galvanized surfaces with ZRC Cold Galvanizing Compound, PPG Speedhide Galvanized Steel Paint, or Tnemec 90-93 Zinc rich primer or approved equal, and touch up with above finish paint.
- B. Color of finish paint shall be chosen by the Owner from the manufacturer's standard color choices.

Part 3 - EXECUTION

3.01 PREPARATION

- A. Coordinate and furnish anchorage devices, setting drawings, diagrams, templates, instructions, and directions for installation of concrete inserts, sleeves, anchors, bolts and miscellaneous items to be embedded or attached to concrete work, masonry work, or structural steel work.

3.02 INSTALLATION- GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners necessary for securing work of this Section to in-place construction.
- B. Cutting, Fitting and Placement: Perform cutting, drilling, and fitting required for installation work of this Section.
- C. Erect work square, plumb and true, accurately fitted, and with tight joints and intersections. Avoid field cutting and drilling to the greatest extent possible.
- D. Fit exposed connections accurately together to form hairline joints. Shop weld connections, except when work cannot be shop welded due to shipping size or galvanizing limitations.
- E. Field Welding: Comply with AWS D1.1 and D1.2 for procedures of manual metal-arc welding, appearance and quality of welds, and correction methods for defective welds.
- F. Where posts are fastened into concrete, set such members in proprietary type expanding grout manufactured specifically for such purpose. Use grouts strictly in accordance with manufacturer's directions.
- G. Install handrails as indicated on approved shop drawings. Adjust handrails prior to final anchoring and grouting. Plumb posts in all directions.

END OF SECTION

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SECTION 11 66 00 ATHLETIC EQUIPMENT

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

- A. Attention is directed to the General Conditions of the Contract, all Divisions of the Specifications and the Contract Drawings, all of which apply to this section.

1.02 SCOPE OF WORK

- A. Furnish and install one 20' wide 30" high gaga pit with rubber surfacing and ADA door
- B. Furnish and install one basketball hoop with backboard

1.03 RELATED WORK

- A. Section 03 30 00 - Cast-in-Place Concrete
- B. Section 32 12 16 – Asphalt Paving

1.04 SUBMITTALS

- A. Submit manufacturer's literature demonstrating compliance with the specifications.
- B. Submit manufacturer's recommended installation details and instructions.
- C. Where applicable, submit standard color choices.

1.05 DELIVERY STORAGE AND HANDLING

- A. All materials shall be protected from weather and other damage prior to installation.

PART 2 - MATERIALS

2.01 20' wide and 30" high Octagon Gaga Pit with ADA Door and rubber mats

- A. Gaga Pit shall be a 20' octagon gaga ball pit system from Coach Cliff's Gaga Ball Pits, LLC, 95 Noll Street, Waukegan, IL or or approved equal.
 - 1. Structure shall be the Octagon 30H – with Hunter Green Gaga Ball Pit bracket system – #00830-GRN.
 - 2. Sign shall be Metal Game Rules sign – 11" x 17" - #03070
 - 3. ADA door shall be - 30H ADA Doorway Kit - #02040-SCL
 - 4. ADA door lumber shall be - 2 – 5/4X6X8 Tier 3 (Weathered Wood color) structural composite boards.

5. Structure lumber shall be 2x10x8 Tier 3 (Weathered Wood color) structural composite boards with one ADA gate and one Cut-Out opening.
6. Flooring material shall be rubber mats with holes intended for use inside of the octagon.
7. Manufacturer shall provide a 50-year warranty on the structural composite lumber against rotting, splitting, fading, etc.

2.02 BASKETBALL HOOP AND BACKBOARD

- A. Basketball standard shall be a 6 (six) foot offset PA 666 manufactured by True Bounce (True Bounce, 56 Conduit St., New Bedford, MA 02745 or equal).
 1. Post shall be powder-coated, 6" x 6" square designed as shown on the Drawings.
- B. Basketball backboards shall be a sound deadening backboard, True Bounce XL7042 or equal with protective padding.
 1. Backboard shall be 42" x 72" constructed of 1/2" thick resistant polycarbonate. Backboard shall have 1/2" hole pattern to allow for sound reduction.
 2. The basketball court shall be striped as per plans. Coordinate striping colors and hoop installation with Landscape Architect.
 3. Board shall have a heavy duty "E" channeled aluminum with stainless steel fasteners.
 4. Padding shall be "Pro-Mold Low Profile Backboard Padding" as manufactured by True Bounce or equal.
- C. Basketball goals shall have regulation size (18" diameter) 5/8" diameter single rim of high tensile steel powder coated orange official size goal, with nylon net, and all required attaching hardware. Rim shall have 7/16" round steel braces, and 12 net-tie net holders.
 1. Hardware shall be zinc-galvanized or stainless steel.

PART 3 - INSTALLATION

3.01 General

- A. Install according to manufacturer's directions.
- B. Install level and plumb.

END OF SECTION

11 68 00 PLAY EQUIPMENT AND STRUCTURES

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. The conditions of the Contract and Division 1 General Requirements apply to the Work under this Section.
- B. All references to products by manufacturer, trade name or performance Specifications bearing the connotation "or Approved Equal" shall be as determined by the Landscape Architect and the City of Waltham, per MGL c. 30 s. 39M, part B, criteria 1.

1.2 WORK INCLUDED

- A. Provide all labor, equipment, implements and materials required to furnish, install, construct and perform all site improvements complete as shown on the Drawings and specified herein.
- B. To be included, but not limited to the following:
 - 1. See 2.1 Play Equipment.

1.3 REFERENCES

- A. Examine all other Sections of the Specifications and all Drawings for the relationship of the work under this Section and the work of other trades. Cooperate with all trades and all departments of the City of Waltham and coordinate all Work under this Section therewith.
- B. The following related items are included under the Sections listed below:
 - 1. Section 02 41 00 - Site Preparation and Demolition
 - 2. Section 03 30 00 - Cast In Place Concrete
 - 3. Section 31 20 00 - Earth Moving
 - 4. Section 32 18 40 – Playground Safety Surfacing

1.4 SUBMITTALS

- A. Shop Drawings and Samples
 - 1. Provide complete Shop Drawings and/or samples and catalog cuts for all items called for on the Drawings and as specified and in accordance with applicable requirements under Division 01.
 - 2. After installation, provide a copy of the inspection certificate from a Certified Playground Safety Inspector confirming that the play equipment is in compliance

with the latest editions of ASTM F-1487 and the CPSC Public Playground Safety Handbook, and all other applicable standards and regulations.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's original unopened and undamaged packages with labels legible and intact.
- B. Store materials in unopened packages in a manner to prevent damage from the environment and construction operations.
- C. Handle in accordance with manufacturer's instructions.

PART 2 - PRODUCT

2.1 PLAY EQUIPMENT

- A. The play equipment for this park is as follows. All playground equipment is manufactured by Landscape Structures and will be purchased by the City of Waltham and installed by Contractor.
 - 1. 194663 - Zip Krooz 34'
 - 2. 169320 - Log Stepper w/ Handloop
 - 3. 219509 - Geoplex Climber
 - 4. 120618- Playstructure Seat
 - 5. 152911 – Left Transfer Module
 - 6. 169319 – Recycled Wood-Grain Lumber Panel
 - 7. 116247 – Deck Diff. Perm. Ladder
 - 8. 202594 – Portal Climber
 - 9. 222706 Whoosh Winder
 - 10. 207581 – The Ascent Rock
 - 11. 169318 Wood Plank Wiggle Ladder
 - 12. 12902 Handhold – Left Leg
 - 13. 115228 – Driver Panel
 - 14. 200509 – Traveler Climber

15. 152911 – Right Transfer Module
16. 172666 Corkscrew w/ Recycled Wood-Grain Handholds
17. 152907 – Deck Link w/ Barriers & Steel End Panels – Two Steps
18. 202625 – Crest Climber w/ Permalene Handholds
19. 124863 – Slidewinder 2
20. 154884 – Cool Topper Single Post / Pyramid Roof
21. 182503 – Welcome Sign

2.2 CAST IN PLACE CONCRETE

- A. Concrete for the footings will be cast in place concrete as specified in Section 03 30 00 of the Specifications. Top of concrete footing shall be twelve (12) inches minimum below finished grade and shall be deeper as required by the manufacturer's installation instructions. See Appendix A for specific footing and installation details.

2.3 MAINTENANCE KIT

- A. The Contractor shall provide the City of Waltham with the standard maintenance kit for each play equipment including extra hardware and one (1) gallon of graffiti removal / cleaning solutions as recommended by the manufacturer, as well as manuals that include all installation and maintenance instruction provided by the manufacturer.

PART 3 - EXECUTION

- 3.1. 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.
- 3.2. 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 according to site gradients; no sloping platforms, tracks, or members intended to be horizontal shall be accepted.
- 3.3. The excavation for the footings shall be done as specified in Section 31 00 00 of these Specifications and according to the manufacturer's instructions found in Appendix A of these Specifications.
- 3.4. 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.

- 3.5. The concrete shall be poured around the supporting pieces of the equipment to the grades shown. The concrete shall be poured and cured according to Section 03 30 00 of these Specifications. Slope tops of footings to drain.
- 3.6. After the specified cure period of the concrete has passed the bracing may be removed.
- 3.7. The fills and surfaces shall then be placed and brought to the grades shown in the Contract Drawings and in accordance with Section 31 00 00 of these Specifications.
- 3.8. The Contractor shall refer to Appendix A of these Specifications for additional information on the play equipment.

PART 4 – GUARANTEE

- 4.1 All operating parts and structural elements of the play equipment shall be guaranteed against failure or defect during normal use and operation for the entire warranty period as established by the manufacturer.
- 4.2 Any defective elements shall be replaced in part or whole by the Contractor at no cost to the Owner.
- 4.3 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.
- 4.4 The Contractor is responsible for securing a Certified Playground Safety Inspector to ensure compliance with the latest editions of ASTM F-1487 and the CPSC Public Playground Safety Handbook, and all other applicable standards and regulations. A certificate of compliance shall be issued to the Owner prior to final inspection.

END OF SECTION

SECTION 12 93 00 – SITE FURNISHINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. See Appendix for specific manufacturer instructions and details. This section includes:
 - 1. Recycled Plastic Wood Bench
 - 2. Recycled Plastic Wood Backless Bench
 - 3. Standard Fixed Picnic Table
 - 4. ADA Fixed Picnic Table
 - 5. Moveable Picnic Table at Pavilion
 - 6. Bicycle Rack
 - 7. Litter Receptacle
 - 8. Recycling Receptacle
 - 9. Flagpole
 - 10. Double Grill

- B. Related Requirements:
 - 1. 03 30 00 Cast-In-Place-Concrete
 - 2. 32 14 13 Concrete Unit Paver
 - 3. Appendix

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Submit color and finish sample for bike racks and litter receptacles.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain site furnishings from specified sources. Submit manufacturer's product literature to Landscape Architect for approval.
- B. Installer qualifications:
 - 1. Site furniture to be installed by manufacturer's Certified Installer whose work has resulted in construction of at least five similar installations, with a record of successful in-service performance for at least three years.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Protect all site furniture during storage and construction against rain, snow or ground water, and against soilage or contamination from earth and other materials.

PART 2 - PRODUCTS

2.1 RECYLCED PLASTIC WOOD BENCH

- A. Products: Subject to compliance with requirements, provide the following:

1. Bench to be by DuMor, model number 88 or approved equal.
2. Length to be 6'
3. Color of metal to be BLACK
4. Color of plastic timber to be REDWOOD.
5. Material: metal frame and plastic timber slats.
6. Table to be embedded per manufacturer's instructions onto concrete base.

2.2 RECYCLED PLASTIC WOOD BACKLESS BENCH

- A. Products: Subject to compliance with requirements, provide the following:
1. Bench to be by DuMor, model number 163 or approved equal.
 2. Length to be 6'
 3. Color of metal to be BLACK
 4. Color of plastic timber to be REDWOOD.
 5. Material: metal frame and plastic timber slats.
 6. Table to be embedded per manufacturer's instructions onto concrete base.

2.3 STANDARD FIXED PICNIC TABLE

- A. Products: Subject to compliance with requirements, provide the following:
1. Table to be by DuMor, model number 100 Series PL or approved equal.
 2. Length to be 6'
 3. Color of metal to be BLACK.
 4. Color of plastic timber to be REDWOOD.
 5. Material: metal frame and plastic timber slats.
 6. Table to be embedded per manufacturer's instructions onto concrete base.

2.4 ADA FIXED Picnic Table

- A. Products: Subject to compliance with requirements, provide the following:
1. Table to be by DuMor, model number 100-68-1 PL or approved equal.
 2. Length to be 8'
 3. Color of metal to be BLACK.
 4. Color of plastic timber to be REDWOOD.
 5. Material: metal frame and plastic timber slats.
 6. Table to be embedded per manufacturer's instructions onto concrete base.

2.5 MOVEABLE PICNIC TABLE AT PAVILION

- A. Products: Subject to compliance with requirements, provide the following:
1. Table to be by DuMor, model number 71-60 PL or approved equal.
 2. Length to be 6'
 3. Finish to be powder coated BLACK.
 4. Color of plastic timber to be REDWOOD.
 5. Material: metal frame and plastic timber slats.
 6. Table to be moveable.

2.6 BICYCLE RACK

- A. Products: Subject to compliance with requirements, provide the following:
 - 1. Bicycle rack to be by DuMor, 83 series or approved equal.
 - 2. Finish to be powder coated BLACK.
 - 3. S-1 Embedment.

2.7 LITTER RECEPTACLE

- A. Products: Subject to compliance with requirements, provide the following:
 - 1. Trash receptacle to be by DuMor, model number 287 or approved equal.
 - 2. Metal to be powder coated. Color to be ARGENTO.
 - 3. Hole Shape - SO
 - 4. All hardware to be supplied by manufacturer and shall be tamper resistant and stainless steel.

2.8 RECYCLING RECEPTACLE

- A. Products: Subject to compliance with requirements, provide the following:
 - 1. Trash receptacle to be by DuMor, model number 287 or approved equal.
 - 2. Metal to be powder coated. Color to be ARGENTO.
 - 3. Hole Shape - SO
 - 4. All hardware to be supplied by manufacturer and shall be tamper resistant and stainless steel.

2.9 FLAGPOLE

- A. Products: Subject to compliance with requirements, provide the following:
 - 1. Flagpole to be Zeuss Flagpole, Aeolus Series – Model #301 or approved equal.
 - 2. Material to be fiberglass reinforced composite and ground set.
 - 3. Flagpole to have mounting height of 30' w/ 3' below grade for overall height of 33'.
 - 4. The flagpole shall be manufactured of fiberglass woven roving and polyester resin with 75% of the reinforcing fibers oriented in the axial plane for maximum stiffness and 25% in the radial plane for required hoop strength. Load calculations shall be based on AASHTO and NAAMM standards with the pole designed with a two to one (2:1) safety factor for 125 mph winds, unflagged, with a 1.3 gust factor.
 - 5. Flagpole to be sanded smooth and coated with a high gloss Aliphatic Polyurea coating system which provides extended UV protection and weatherability.
 - 6. Internal pole is equipped with a cam cleat, door and security screw, tab and lock nut at time of internalizing, prior to shipment.

2.10 DOUBLE GRILL

- A. Products: Subject to compliance with requirements, provide the following:
 - 1. Grill to be by DuMor, double grill 24-00 or approved equal.
 - 2. Grill finished with heat resistance black enamel.
 - 3. Grill embedded in concrete footing per manufacturer's instructions.

PART 3 - EXECUTION

3.1. EXAMINATION

- A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.

3.2. INSTALLATION, GENERAL

- A. Install site furnishings as per manufacturer's recommendations and details shown in these documents. Complete field assembly of site furnishings where required.
- B. Do not install any materials with chips, cracks, discolorations and other defects that would cause visible discoloration on the finished work.
- C. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.
- D. Stake out all locations of site furniture for approval by Landscape Architect prior to installation and anchoring.
- E. Install site furnishings level, plumb, true, and securely anchored or positioned at locations indicated on Drawings.

END OF SECTION

SECTION 13 11 23 Water Spray Play Equipment

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

- A. All of the Contract Documents, including the Contract Forms, General Provisions, General Conditions, and all Attachments to the General Provisions, and Division 1 General Requirements, apply to the work of this Section.
- B. Examine and coordinate all Drawings and other section of the specifications for requirements which affect work of this section whether or not such work is specifically mentioned in this Section. Coordinate work with other trades to assure the steady progress of all work under the Contract.

1.02 DESCRIPTION OF WORK

- A. The Owner will furnish the water play features, above ground equipment cabinet and controls, and rainwater diverter for installation by the Contractor. Contractor is responsible for checking, receiving, storing and coordinating with the manufacturer to receive a complete and satisfactory order.
- B. The Contractor shall be responsible for furnishing and installing footings for play features, water piping and wiring, electrical supply equipment including all grounding, and electrical connection between activators and controller.
- C. For those items to be supplied by the Owner, the Contractor shall provide any incidental hardware and all footings and other materials not supplied by the manufacturer, but required for installation of these items.
- D. All work shall be performed as indicated on the Contract Drawings and Specifications and shall include every aspect of work as obvious or implied and necessary to make the work complete and fully operational.
- E. Related Work:
 - 1. Section 03 30 00 - Cast-in-Place Concrete
 - 2. Section 26 00 00 - Electrical Service Improvements
 - 3. Section 33 14 17 – Site Water Service Utility Laterals
 - 4. Section 33 31 00 – Sanitary Sewerage Piping
 - 5. Section 33 41 13 – Storm Drainage Piping

1.03 QUALIFICATIONS

- A. The Contractor performing all of the plumbing related work of this Section shall be a Massachusetts Licensed Master Plumber.
- B. The Contractor performing all of the electrical related work of this Section shall be a Massachusetts Licensed Electrician.

1.04 SUBMITTALS

- A. Submit the following:
 - 1. Provide manufacturer's information and catalog cuts for the following: Water Play Features, Water regulators, Valves, Valve boxes and Controllers including wiring diagrams.
 - 2. Shop Drawings: Show water play equipment including plan layout and locations, types, sizes, capacities, and flow characteristics of water play piping components. Include connections to water meters, backflow preventers, valves, piping, accessories, controls, and wiring. Show areas of sprinkler spray and overspray.
 - 3. Coordination Drawings: Indicate interface and spatial relationship between water play elements, water supply, drainage, and electrical connections.
 - 4. Maintenance Data: Include complete maintenance instructions for system.

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.
- B. Comply with ASTM F 645, "Guide for Selection, Design, and Installation of Thermoplastic Water Pressure Piping Systems."
- C. Comply with NFPA 70, "National Electrical Code," for electrical connections between wiring and electrically operated devices.

PART 2 - MATERIALS

2.01 SPRAY FEATURES AND ACTIVATION BOLLARDS

- A. All products, including cited products, proposed for use, shall be subject to all the requirements specified herein, including manufacturer's warranties. Citing a manufacturer as equal does not exempt manufacturer from providing spray elements which provide equivalent play value and design intent.

- B. The above water play features shall conform to the following general requirements:
1. All structural elements, unless otherwise specifically indicated, shall be made of Type 304/304L stainless steel structural tubing of the diameter and thickness specified for each element.
 2. Nozzles, water opening and sprayers shall be made of bronze with vandal resistant fittings. Ground nozzles shall be provided with winter caps.
 3. The attachment of the above water spray features shall be designed to allow easy removal of the features for winter storage. In-ground jets shall be provided with a winterizing plate.
 4. Finishes: Painted Finish for stainless steel elements shall be a polyester smooth glossy heat-cured powder coat that is UV and chemical resistant.
 5. All equipment shall have grounding studs.
- C. The basis of design for the following Water Play Components are elements manufactured by Vortex International (Local Representative M.E. O'Brien & Sons, 1-800835-0056). The listing of specific Vortex model numbers is intended to serve as a description of the water elements and is not intended to limit equal manufacturer's models which satisfy the same design intent in terms of theme, water spray form and dimension, and material quality.
1. The Bollard Activator VOR-611.2008 shall be constructed of 304/304L stainless steel structural tubing with an outside diameter of 4½" (11.4cm) and a wall thickness of 0.120" (3mm). The upper part of the feature is constructed with a 45° elbow. The activator shall have no moving parts and run on a low voltage electrical supply. A capacitive sensor switch to be used as an 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 316 Stainless steel and powder coated, the s Steel Button integrated and shall be secured in place using tamper-resistant fasteners. The SAFESWAP™ anchoring and leveling system shall be used.
 - a. Overall play product dimensions: The Bollard Activator shall have an overall height of 39" (99cm) above the final grade.
 - b. 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 button on the

Bollard Activator is touched by the user. The Bollard Activator has a led light activation signal.

2. Play Product Structure: The Geysler 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 geysler body using a tamper-resistant tool. Tamper resistant brass winter cap shall be included. The anchoring system shall have an integrated levelling system facilitating installation and a plumb finished to the activity deck surface.
 - a. Overall play product dimensions: The overall height of the Play Product shall be 0" (0 cm) above ground.
 - b. Play Product Interactivity: Users can touch the soft frothy water falling down in contrast to the more powerful streams spraying up from the centre.
 - c. 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 geysler effect.
 - d. 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.

3. Play Product Structure: The Sparkle N°1, VOR-0324, shall be constructed of 304/304L stainless steel structural tubing with an outside diameter of 4½" (11.4cm). The spray head housing shall be fitted with a spray cap assembly consisting of a lead-free brass locking ring and an adjustable lead-free brass spray cap with two (2) angled holes. The nozzle system shall be free of finger entrapment hazards. It shall be fastened to the body using tamper-resistant fasteners. A Tamper resistant brass winter cap shall be included. The embedded anchoring and leveling system shall be used. Ground sprays are compatible with many nozzles each producing different water effects. The spray zone of each chosen nozzle varies according to its respective water effect. When many ground sprays are connected to the same water line, they must have the same hydraulic requirements.
 - a. Overall play product dimensions: The overall height of the Play Product shall be 0" (0cm).

- b. Play Product Interactivity: Users can play with the cloud of droplets or create a water stream by blocking one of the holes.
 - c. Hydraulic Activity/Components: The spray cap shall have two (2) holes at a 25° angle from vertical. The collision of the two water jets creates the sparkle water effect, consisting of a cloud of droplets.
 - d. Hydraulic Requirements: The hydraulic requirements shall be 4-6 gpm (15-23 lpm) @ 3-5 psi (0.2-0.3 bar). Low consumption nozzle that minimizes water usage while maximizing spray effects is also available.
4. Play Product Structure: The Aqualien Rainforest No.7 VOR-7000.0000 shall include three seeshells (small, medium, large). Each seeshell shall consist of one (1) seeshell post and one (1) Water Dome. Each post shall be constructed of 304/304L stainless steel structural tubing with an outside diameter of 2 $\frac{3}{8}$ " (6cm) and a wall thickness of .109" (3mm). Each Water Dome shall have a diameter of 20" (51cm) and shall be constructed of translucent SEEFLOW™ polymer with an UltraHigh Molecular Weight Polyethylene center spray cap. The Small seeshell shall be 38"(97cm) height, the medium shall be 41"(104cm) and the large shall be 44"(112cm). The SAFESWAP™ anchoring and leveling system shall be used.
- a. Overall play product dimensions: The overall height of the structure shall be no less than 44" (112cm) with a head clearance of no less than 29" (75cm).
 - b. Play Product Interactivity: Creates visual interest as water sprays from the top of each seeshell and streams down over the translucent Water Domes.
 - c. Hydraulic Activity/Components: Each seeshell shall have four (4) gentle water streams emitted from the spray cap that shall flow down the Water Domes.
 - d. Hydraulic Requirements: The hydraulic requirements shall be 3-12 gpm (11-45 lpm) @ 3-4 psi (0.2-0.3 bar).
5. Play Product Structure: The Bloom No1 VOR-7486.2008 shall be constructed from a curved base support post, it shall be constructed of stainless steel structural tubing with an outside diameter of 3.50" (8.9cm) and a wall thickness

of 0.30" (7.6mm). The structure shall have a top post assembled to the base post with two (2) sealed stainless steel bearings named TWIRLTEC™. The top post shall be constructed of stainless steel structural tubing with an outside diameter of 3.50" (8.9cm) and a wall thickness of 0.12" (3.0mm). The TWIRLTEC™ shall consist of one (1) soft-touch rotating sphere and fastened at the joint of the posts with tamper resistant hardware. The top structure shall also consist of three (3) SEEFLOW™ leaves and three (3) SEEFLOW™ petals on the top. At the base of the leaves there shall be three (3) nozzle. The SEEFLOW™ leaves and petals shall be constructed of translucent SEEFLOW™ polymer and have metal attachment. On the top of the structure, there shall be a UHMWPE sprinkler. The SAFESWAP™ anchoring and leveling system shall be used.

- a. Overall play product dimensions: The overall height of the Bloom No1 shall be no less than 120" (305cm).
 - b. Play Product Interactivity: Two (2) upward streams from top of the sprinkler apply a spiraling water effect. Users can also spin the TWIRLTEC™ soft-touch rotating sphere, creating a long lasting spiraling impressive water effect coming from the nozzles.
 - c. Hydraulic Activity/Components: Three (3) gentle water streams emitted from the top post. Two (2) upward streams spray from the sprinkler shall create a spiraling water effect. As a user spins the TWIRLTEC™ soft-touch rotating sphere, the water pouring out of the top post and creating a spiraling water effect.
 - d. Hydraulic Requirements: The combined hydraulic requirements shall be 7-10 gpm (26.5-37.8 lpm) @ 6-9 psi (0.4-0.6 bar).
6. Play Product Structure: The Split Stream VOR-7516.0000 shall be constructed of 304/304L stainless steel structural tubing with an outside diameter of 4½" (11.4cm) and a wall thickness of 0.120" (3mm). The interchangeable brass spray cap shall be fastened to the body using tamper-resistant fasteners. Tamper resistant brass winter cap shall be included. The spray cap shall have two (2) nozzle orifices angled to provide a V-shaped spray effect. The nozzle system shall be free of finger entrapment hazards. The Embedded anchoring and leveling system shall be used.
- a. Overall play product dimensions: The overall height of the Play Product shall be 0" (0 cm) above ground.
 - b. Play Product Interactivity: Users can enjoy the two water arcs created by the Split Stream.

- c. Hydraulic Activity/Components: The Split Stream produce two (2) soft stream from its two (2) holes.
 - d. Hydraulic Requirements: The hydraulic requirements shall be 5-10 gpm (19 - 38 lpm) @ 5-10 psi (0.3 – 0.7 bar).
7. Play Product Structure: The Spidey Spray N°2 VOR-7674.0000 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 brass winter cap shall be included. The interchangeable spray cap shall have eight (8) spray orifices, four (4) per side. The nozzle system shall be free of finger entrapment hazards. The Embedded anchoring and leveling system shall be used.
- a. Overall play product dimensions: The above ground height of the Play Product shall be 0" (0 cm) above ground.
 - b. Play Product Interactivity: Users can enjoy the eight water arcs of the Spidey Spray N°2 creating the shape of the spider leg.
 - c. Hydraulic Activity/Components: A lead-free brass spray head nozzle shall be mounted flush with the surface of the Spidey Spray cap and shall produce eight (8) soft stream spray effects.
 - d. Hydraulic Requirements: The hydraulic requirements shall be 7 - 10 gpm (26 -38 lpm) @ 2-5 psi (0.1 - 0.3 bar).
8. Play Product Structure: The Garden Bug VOR-7785.2008 is made of structural stainless steel 304/304L pipe with a 3.5" (8.9 cm) out diameter with a .120" (3mm) wall thickness. The curved body is made with no joints and has 6 simulated legs that use a dumping seeflow made of UV resistant polymer. The dumping effect is based on the orientation of the vessel combined with its counterweight system. The head is made of (2) stainless steel 304/304L domes welded together. The antennae are made from stainless steel 304/304L pipe with a 1.315" (3.3cm) outer diameter with a wall thickness of .109" (2.8mm).The feature is anchored using the safeswap system.
- a. Overall play product dimensions: The overall height of the Play Product shall be 143" (363 cm) above ground.
 - b. Play Product Interactivity: The Garden Bug shall create visual interest and build anticipation as the six (6) bucket fills and then dumps water in the immediate area

- c. Hydraulic Activity/Components: The Garden Bug shall contain six (6) dumping buckets.
 - d. Hydraulic Requirements: The combined hydraulic requirements shall be 6-12 gpm (22-45 lpm) @ 6-8 psi (0.4 – 0.5 bar).

- 9. Play Product Structure: The Snail N^o4 VOR-7217.2008 shall be constructed of stainless steel structural tubing with an outside diameter of 4.50" (11.4cm) and a wall thickness of 0.237" (6mm). The structure shall be bent with no ripples or joints. The body of the Snail N^o4 shall consist of two welded stainless steel domes with an outside diameter of 20" (51cm) and a wall thickness of 0.120" (3mm). The snail antennae shall consist of two (2) 5" (12.7cm) spheres with a wall thickness of 0.120" (3mm). Each side of the vertical dome shall include one (1) hydraulically connected Podspray™. TURNTEC™ allows the upper section to rotate 360°. The rotational joint shall be free of pinch points and contain no flexible hoses. The SAFESWAP™ anchoring and leveling system shall be used.
 - a. Overall play product dimensions: The overall height of the Snail N^o4 shall be no less than 31" (79cm).
 - b. Play Product Interactivity: Users can grab the shell to rotate the Snail N^o4 and spray water in different directions. Users can press the Podspray™, and amplifying the laminated water effect on the mouth.
 - c. Hydraulic Activity/Components: The Snail N^o4 shall have one (1) slot in between the two antennas, resulting in a laminar water effect. Two (2) hydraulically connected Podspray™ when pressed, shall amplifying the laminated water effect.
 - d. Hydraulic Requirements: The combined hydraulic requirements (for the regular product only) shall be 10-13 gpm (38-49 lpm) @ 5-10 psi (0.3-0.7 bar).

- 10. Play Product Structure: The Playsafe Drain No1, VOR-1001.4000 consists of a frame and a removable cover. The frame shall be constructed of a stainless steel 1/8" thickness X 2" width X 30" outside diameter bent flat bar and a stainless steel 29 3/4" outside diameter bent square tube. The deckgrating cover shall be stainless steel and constructed with 29 1/2" diameter and 1/4" thickness. The open area of the playsafe drain is 134.5 sq.in. (867.7 sq. cm) and the gap of the openings is 1/4 in (0.6 cm). This removable cover has an antiskid surface. The Playsafe Drain No1 has also an optional strainer basket. A form with the playsafe drain which has the capabilities to be leveled shall be inserted in the hole to create concrete drain box pit. Once the drain box pit is created, the form shall be removed. The Playsafe Drain No1 allows for multi drain access points. Each water line outlet connected to the drain box shall be a maximum of 8" in

diameter at a minimum slope of 1% . The maximum GPM will be 629 at a maximum of 1.5 ft/sec through the grating.

- a. Overall play product dimensions: The overall height of the Play Product shall be 0" (0 cm) above ground. The diameter of this feature shall be no less than 30" (76.2cm).

11. Play Product Structure: The Manhole with Rain Diverter Valve, VOR-5324.0000 shall consist of one (1) access door, one (1) vault and one (1) rain diverter valve. The access door shall be constructed of Aluminium. The door shall include a lockable access hatch. The exterior dimensions of the door are 42" X 42". The Vault shall be constructed of High Density Polyethylene and shall be 30" (76cm) inside diameter and an overall height of 46" (116.8cm) and suitable for public spaces. The rain diverter is grade sensitive due to gravity drainage 1 % grade minimum. The rain diverter port shall be used to drain rain and the system purge water. The maximum flow rate is 450 gallon per minute. The Stainless Steel anchoring system shall have an integrated levelling system facilitating installation and a flush finished to the concrete slab surface without any protruding bolts or hardware. The water treatment product shall be fastened directly to the Anchoring system.

- a Overall play product dimensions: The overall height of the structure shall be no less than 49" (124.5 cm).

2.02 CONTROLLER

A. MAESTROPRO CONTROLLER MAIN – 33907.12B2:

1. The MaestroPRO control panel is TYPE 1, housed in a fiberglass corrosion resistant NEMA 4X Enclosure.
2. The MaestroPRO control panel shall be supplied with a 10" touch screen user interface with controls for each output, activation device(s), and operation hours. These selector settings allow the user to select the operational mode of the components (i.e. Manual, Off and Automatic).
3. The MaestroPRO control panel shall be supplied by power through a MaestroPRO power box: providing power through two 100VA transformers 120 VAC primary / 24 VAC secondary OR 240 VAC primary / 24 VAC secondary, depending on MaestroPRO power box associated, with built- in electrostatic shield protection, and by a power supply 120/240 VAC primary to 24 VDC secondary and 100 VA.
4. The MaestroPRO control panel shall integrate 24 digital outputs with 24 VAC (per output: max 1.6 Amp inrush, max 0.3 Amp nominal) and 12 digital inputs with selectable 5 or 24 VDC (1A max over all inputs).
5. The MaestroPRO control panel shall surge at any time a maximum of 4 Amp over each of its two "12 digital outputs" sets.

6. The MaestroPRO control panel shall have the capacity to receive digital signals from activation devices or sensors, operating on 5 or 24VDC.
7. The MaestroPRO control panel 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. All outputs are electrically protected against over consumption with resettable fuses.
8. The MaestroPRO control panel shall have the capacity to operate a Rain Diverter Valve with a 24V AC max 1.6 Amp signal to prevent rain water to go into the sewer network when the Splashpad is not in function. That requires 2 outputs from MaestroPRO control panel.
9. The MaestroPRO main control panel shall have the ability to control fast acting valves supplied by 24 VAC max 1.6 Amp inrush each.
10. MaestroPRO control panel shall have the capacity to receive pulse signal from items compatible with 24 VDC (for instance for paddle wheel water meter, anemometer).
11. The MaestroPRO control panel shall have capability to be interconnected with any MaestroPRO Expansion (33907.22B2) using a dedicated RJ45 connector (located on I/O board).
12. The MaestroPRO control panel shall have capability to be interconnected with max 1 Ethernet based item like the Maestro light controller (33908.0xxx) by using an Ethernet RJ45 Cat5 cable. If more than 1 Ethernet based items need to be connected, an Ethernet switch junction box (44900.0011) must be used.
13. MaestroPRO control panel shall have removable terminal blocks for easy wiring.
14. The MaestroPRO firmware shall be factory programmed with spray and light sequences designed according to the requirements of the project. Users shall have the flexibility to modify sequence duration specifically to each operation schedule directly through the interface. New sequences (created by Vortex) shall be added into the program using either a transportable USB Key or with an internet connection. A 24hr/7day user programmable Agenda, which shall allow the user to set the operational hours of the facility. Sequence quantity is not limited. For any further details about user interface, please refer to the User Guide Manual provided by Vortex.
15. Operation schedule shall be set by week day or by specific date (month and day number). For both cases, schedule is set by hours in the day (start/end time). Operation schedule quantity is not limited, and all different schedules will be displayed in a paginated style.
16. The MaestroPRO firmware operates in English, French and Spanish.
17. The MaestroPRO firmware shall have the ability to soft start ramp up the Splashpad to minimize potential water hammer.
18. The MaestroPRO firmware 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).
19. The MaestroPRO firmware in the interface lets the user modify easily the water consumption while keeping the sequence capability.
20. The MaestroPRO firmware shall have the ability to handle automatic Backwash process once connected to a multi positions valves.

B. MAESTROPRO CONTROLLER EXPANSION – 33907.22B2:

1. The MaestroPRO control panel is TYPE 1, housed in a fiberglass corrosion resistant NEMA 4X Enclosure.
2. The MaestroPRO Expansion control panel shall be physically connected to the MaestroPRO main (33907.12B2) or to another MaestroPRO Expansion (33907.22B2). All MaestroPRO control panels are connected together following a daisy-chain pattern. Cat 5 Ethernet cable with RJ-45 connector must be used.
3. The MaestroPRO Expansion control panel shall be supplied by two 100VA transformers 120V AC primary / 24 VAC secondary or 240 VAC primary / 24 VAC secondary, depending on MaestroPRO power box associated, with built- in electrostatic shield protection, and by a power supply 120/240 VAC primary to 24 VDC secondary and 100 VA.
4. The MaestroPRO Expansion control panel shall integrate 24 digital outputs with 24VAC (per output: max 1.6A inrush, max 0.3A nominal) and 12 digital inputs with selectable 5 or 24 VDC (1A max over all inputs).
5. The MaestroPRO Expansion control panel shall have the capacity to receive digital signals from activation devices or sensors, operating on 5 or 24 VDC.
6. The MaestroPRO Expansion control panel 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. All outputs are electrically protected against over consumption with resettable fuses.
7. The MaestroPRO Expansion control panel shall have the ability to control fast acting valves supplied by 24V AC max 1.6Amp (inrush) each.
8. The MaestroPRO Expansion control panel shall have removable terminal blocks for easy wiring.
9. In case of emergency, pushing the Red Emergency Button will power down the entire controller.

C. MAESTROPRO POWER BOX – 33907.13Bx:

1. The MaestroPRO Power Box shall be housed in a fiberglass corrosion resistant NEMA 4X rated enclosure.
2. Power consumption: Maximum power fully loaded forced manually is 200W. Power while in standard sequence in operation hours shall be approx. 100W, Power while in idle mode shall be approx. 10W – i.e. out of operation hours or without sequence running.
3. MaestroPRO control panel shall be protected by fuses sized according to voltage and transformer size.
4. In case of emergency, pushing the red emergency button will power down the associated controller.
5. The MaestroPRO Power Box shall be powered using whether a 120VAC 60Hz or 240VAC 50Hz power input with a maximum of 5Amps.

D. REMOTE CONNECTION: if remote connection ability is required, the operating system shall be connected to internet.

1. A hard connection to an existing network can be set. MaestroPRO control panel integrates a LAN port set by default as DHCP client with RJ45 physical connector.
2. MaestroPRO control panel shall include a built-in LTE/4G cellular module. In order to connect to internet, a NANO-SIM card previously activated by carrier must be inserted into the control panel on the Main board.

E. VOR-33923.XXXX SAFEGUARD MODULE (applicable if WR or WQMS):

1. The contractor shall provide and install the following Water Quality Management System Module as manufactured by VORTEX, 7800 Trans-Canada Hwy, PointeClaire, Quebec H9R 1C6, (514) 694-3868.
2. The Water Quality Management System Module shall be factory assembled and water pressure tested before delivery.
3. The Water Quality Management System Module shall be fully serviceable and accessible for ease of maintenance and use.
4. All electrical equipment, including flow switches, shall be tested before delivery.
5. All equipment shall be mounted directly onto a galvanized steel base using galvanized steel hardware prior to delivery.
6. Controller shall control electrical solenoid valves for play features and bypass with a 24V AC max 1.6Amp signal with a total of 10Amp over all 24 outputs with the included 200VA transformer.
7. The chemical controller shall have an alarm system that shall close all valves to the aquatic play features in case of a loss of proper water chemistry. The 120V AC from the chemical controller will switch a relay connected to the controller.
8. The chemical controller shall be wired to the Safeguard Module on site.
9. Controller shall control UV system (part of the UV module) with a 24V AC max 250mA signal and will be wired on site.
10. A flow switch shall be present on the feature pump to monitor flow and shut down the feature system in the event of no flow. It shall be wired to the Safeguard Module on site.
11. A flow switch shall be present on the flow cell located on the filter loop module to monitor flow and shut down the filter pump in the event of no flow. All valves to the aquatic play features will be closed until the filter no flow event is cleared.
12. Note: Modular WQMS has to be installed inside a closed room protected from the elements.

F. INSTALLATION CHARACTERISTICS:

1. Electrical Connections: All main power electrical connections to the Splashpad Controller are to be performed per local codes.
2. Drawings and Instructions: Product drawings and installation manuals shall be supplied by the manufacturer for ease of installation.
3. As per Electrical Construction and Safety Codes: Controller and/or LED power panels and/or any other electrical equipment must be hard-wired to a ground fault circuit interrupter (GFCI) from the input power source. All electrical work should be performed by a licence electrician in accordance to local electrical construction and safety codes.

2.03 MANIFOLDS AND VALVES

- A. Manifolds shall be of stainless steel structural tubing, type 304/304L, structurally strong, durable, and resistant to corrosive environments. Rigid centricast fiber reinforced (FRP) and/or molded fiberglass, PVC, filament wound tubing, Galvanized Steel, or Aluminum shall **not** be utilized for any distribution systems manifolds.
- B. Bronze: All Backflow devices and Pressure Regulators shall be manufactured from bronze. Plastics such as PVC, and Nylon shall not be utilized.
- C. Bronze: All Backflow devices and Pressure Regulators shall be manufactured from bronze. Plastics such as PVC, and Nylon shall not be utilized.
 - 1. Painted Finish: Shall be a polyester smooth glossy heat-cured powder coat that is UV and chemical resistant.
- D. 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.
- E. 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.
- F. Equipment Cabinet: This above grade equipment cabinet with up to ten (10) valves shall be a pre-fabricated water distribution system containing piping, valves and electrical wiring. They shall be factory assembled, water pressure tested and 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 preventer 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 when required. Should the controller be located remotely, the installer shall supply the electrical equipment required from the power switch with branch circuit protection.
- G. Above Ground Command Centers: Shall consist of a reinforced frame and access hatch suitable for use in public spaces. The side walls shall be paneled with PVC sheets predrilled for all applicable water line inlets and outlets. The access hatch shall be constructed of 1/8" thick, reinforced; powder coat painted checker plate, and shall be lockable using a standard padlock. For equipment servicing, an integrated corrosion resistant step down pedestal/seat shall be included. All hardware shall be stainless steel.

1. Provide padlock for access hatch lock. Padlock shall be a hardened steel solid body padlock, with hardened steel or boron alloy shackle. Shackle shall be sized to fit hatch lock, supplied with two keys, Master Lock padlock or equal manufacturer.
- H. The Controller shall be remote mounted in the electrical control cabinet.
- I. Water Distribution Manifolds: Shall be constructed of 3 2@ outside diameter 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.
- J. Solenoid Valves: There shall be one (1) solenoid valve installed on each of the water distribution ports for the play elements. 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.
- K. Piping and Fittings: All piping and fittings shall be schedule 80 PVC. All factory assembled components, fittings and connections shall be water pressure tested prior to delivery.
- L. 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.

2.04 PIPING MATERIALS

- A. CPVC Pipe: Pipe shall be Schedule 80, solvent weld, ASTM No. D-1784 sized as shown on the Drawings and Details as manufactured by Crestline or approved equal.
- B. Fittings: Fittings for all CPVC piping shall be Schedule 80, solvent weld CPVC as manufactured by Dura, Lasco, or approved equal.
- C. Solvent: CPVC solvent shall conform to ASTM and be NSF approved. Solvent shall be appropriate for gluing of pipes and fittings up to 6 inches in size. Solvent shall be as manufactured by IPS, Rectorseal, UniWeld, or approved equal and shall be used in conjunction with an appropriate primer.

2.05 CONCRETE

- A. Cast-in-place concrete for use in water spray feature foundations and footings shall conform to the requirement of Section 03 30 00 Cast-In-Place Concrete.

2.06 SAND

- A. Sand borrow for pipe bedding shall conform to the requirements of Section MI.04.1 of MHD Standard Specifications.

2.07 THRUST BLOCKS

- A. Concrete thrust blocks shall be installed in locations as indicated on the Drawings. 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 detailed on the plans and/or directed by the Project Engineer.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install manufactured items in strict conformance with the requirements of the manufacturer, the Drawings, and as directed by the Project Engineer. Where the Drawings and the manufacturer's details differ, the Drawings shall be followed.
- B. Accurately layout play elements horizontally and vertically such that required finish grades of surrounding paving can be achieved.
- C. Each play element shall be separately grounded with a UL listed compression cooper grounding lug. Attach to each spray feature in a continuous loop and back to grounding bus.
- D. The installation and backfilling of pipe, fittings and other related items shall be installed and tested in conformance with the requirements set forth in Sections 31 00 00 – Earthwork.
- E. The installation of the electrical service to the equipment vault shall be performed in conformance with Section 26 00 00 - Electrical Service Improvements.
- F. Pour concrete foundations and footings to the dimensions indicated on the Drawings. Footing and foundation sizes shown on the Drawings shall take precedence over those shown on manufacturer's detail.

3.02 FLUSHING PVC SUPPLY LINES

- A. **Prior to start up and testing of water spray elements**, remove all spray nozzles from play elements and flush PVC supply lines to remove sand, PVC pipe shavings and other debris. Flush until water runs completely clear to prevent nozzles from being plugged with grit.

3.03 TRAINING

- A. At Substantial Completion, provide complete operations and maintenance manuals for all water spray components to the Owner.

3.04 WARRANTY & MAINTENANCE

A. Manufacturer's Warranty:

1. There shall be a 25-year warranty on stainless steel structures and stainless steel anchoring systems.
2. There shall be a 5 year warranty on spray nozzles, spray caps and spray heads, brass components and HDPE components, vault, drain boxes, strainers, and electrical enclosures.
3. There shall be a 2 year warranty on powder coated or painted finishes, stainless steel hardware, and moving parts, fiberglass products, toe guards, valves, controller, and all other parts not specified above.

B. In addition to the Manufacturer's Warranty previously described in this Section, the Contractor shall provide the following Warranty:

1. The working of the water play system shall be fully warranted by the Contractor against plumbing, mechanical, and electrical defects for a period of one year after the date of Substantial Completion of the project, a period which will include one full season of use. The water play system is defined as water play features, water piping and wiring from the features to the below ground equipment vault, and equipment within the vault. The Warranty shall provide for the cost of labor and materials to repair the system in good working condition. Where defects are covered by the Manufacturer's warranty, the Contractor shall be responsible for obtaining replacements from the manufacturer, as well as providing labor or other costs not reimbursed by the manufacturer necessary to restore the system to good working condition.

C. Contractor's Maintenance Period:

1. The Contractor shall be responsible for two system start-ups and two system close-downs, over the period of two years.
 - a. For start-ups and shut-downs, the Contractor shall be solely responsible for performing all required procedures including draining, yearly maintenance recommended by the manufacturer, and any other tasks normally associated with start-up and shut-down.
 - b. At the Contractor's last shut-down in the second season of operation, the Contractor shall schedule the shut-down to include Owners

Representatives to whom he will teach shutdown and start-up procedures.

END OF SECTION

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SECTION 13 34 23 SHADE SHELTER

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

- A. All of the Contract Documents, including the Contract Forms, General Provisions, General Conditions, and all Attachments to the General Provisions, and Division 1 - General Requirements, apply to the work of this Section.

- B. Examine and coordinate all Contract Drawings and other section of the specifications for requirements which affect work of this section whether or not such work is specifically mentioned in this section. Coordinate work with other trades to assure the steady progress of all work under the Contract. The Contractor shall refer to the Contract Documents for all new work and coordinate how it relates to this Section.

1.02 SCOPE OF WORK

- A. The work shall include, but is not limited to, the following:
 - 1. Furnishing and installing the shade shelter as per the drawings at the splashpad in the locations shown on the drawings, in accordance with manufacturer's recommendations, and as specified herein.

1.03 RELATED WORK

- A. Section 03 30 00 - Cast-in-Place Concrete

- B. Section 31 20 00 – Earth Moving

1.04 SUBMITTALS

- A. Submit the following:
 - 1. Manufacturer's complete shop drawings indicating type, size & gauge of materials, connection details, and layout plan for footings and posts, demonstrating compliance with the Specifications.

 - 2. The metal shade structure manufacturer shall submit structural calculations for the shade structure footings, sealed by a registered engineer in the state of Massachusetts.

 - 3. Shop drawings for steel reinforcement of shade structure footings.

4. Manufacturer's installation instructions.
5. Manufacturer's standard color chart and samples. Manufacturer's drawings indicating type, size & gauge of materials, connection details, and layout plan for footings and posts, demonstrating compliance with the Specifications.
6. Shop drawings for steel reinforcement of shade shelter footings.
7. Manufacturer's installation instructions.
8. Manufacturer's standard color chart and samples.

1.05 QUALITY CONTROL

- A. Manufacturer qualifications: Manufacturer shall have a minimum of 5 years experience in the fabrication of tubular steel shade shelters. Manufacturer shall have fabricated similar shelters to that which is specified.
- B. Members shall be designed according to the American Institute of Steel Construction (AISC) specifications and the American Iron and Steel Institute (AISA) specifications for cold-formed members.
- C. Fabrication welds shall be in strict accordance with the structural welding code of the American Welding Society (AWS) specifications. All structural welds shall be in compliance with the requirements of "Pre-qualified" welded joints. All welding shall conform to ASTM A-233 series E-70XX electrodes - low hydrogen. Field welding is not allowed.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, and handle metal fabrication items to prevent damage and deterioration.
- B. Store assembled items off the ground.

1.07 REFERENCE STANDARDS

- A. Materials and methods of construction shall comply with the following standards:
 1. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel; 2003a.
 2. ASTM A 325 - Standard Specification for Structural Steel Bolts, Heat Treated, 120,000 PSI Minimum Tensile Strength; 2004.
 3. ASTM A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength; 2003a.

4. ASTM A 563 - Standard Specification for Carbon and Alloy Steel Nuts; 2004.
5. ASTM A 500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2003a.
6. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process; 2003.
7. ASTM A 792/A 792M - Standard Specification for Steel Sheet, 55% Aluminum Zinc Alloy Coated by the Hot-Dip Process; 2003.
8. American Institute of Steel Construction (AISC).
9. American Iron and Steel Institute (AISI) Specifications for Cold Formed Members.
10. American Society of Testing Material (ASTM).
11. American Welding Society (AWS).
12. OSHA Steel Erection Standard 29 CFR 1926.750 Part R.
13. SSPC-SP 2 – Hand Tool Cleaning; Society for Protective Coatings; 2000.
14. SSPC-SP 10 - Near-White Blast Cleaning; Society for Protective Coatings; 2000.

1.08 WARRANTY

- A. Shade Shelter shall have manufacturer's limited 20 year warranty on upright posts and support structure frames against failure due to rust-through corrosion.

PART 2 - PRODUCTS

2.01 METAL SHADE STRUCTURE

- A. Shade Shelter shall be 30' x 25' single-cantilever shade system structure Model No. SC253010 with steel columns, stainless cabling, powder coat finishing, and fabric shade manufactured by Shade Systems or approved equal.
- B. Wind speed rated frame to 165 m.p.h. and frame w/ canopy to 90 m.p.h.

- C. All materials shall be structurally sound and appropriate for safe use. Product durability shall be ensured by corrosion-resistant metals such as stainless steel, and coatings such as zinc-plating, galvanizing, and power-coating on steel parts.
- D. All tubing used shall be cold-formed and milled per ASTM A-135 and ASTM A-500. Material testing is in accordance with ASTM E-8. Minimum yield is 40,000 psi with a minimum tensile strength of 45,000 psi on all posts. All tubing shall be pre-cut to appropriate lengths, and where applicable all outside surfaces shall be galvanized, with an interior corrosion-resistant zinc-rich coating. Where required, support pipes shall be schedule 40 hot-dip galvanized or powder-coated black steel. All fastening hardware shall be stainless steel.
- E. All powder-coated parts undergo a rigorous multi-step process to ensure colorfastness and durability per the specific sequential steps itemized below. All parts are completely sandblasted, pre-treated, and coated with coastal primer prior to powder coating. Powder-coating is then electrostatically applied and oven-cured at 375 to 425 degrees Fahrenheit. Powders shall meet or exceed ASTM standards for Adhesion, Hardness, Impact, Flexibility, Overbake Resistance, and Salt Spray Resistance. Colors shall be specified. Finish color shall be chosen from manufacturer's standard colors.
- F. Fabric to be knitted of monofilament and tape construction high density polyethylene with Ultra-Violet (U.V.) stabilizers and flame retardant. Coolnet™ offers the ultimate combination of maximum sun protection, strength and durability to ensure maintenance free long-life performance. UV- Block Factor varies by standard color offered from 90% to 97%.
- G. 20-year warranty on all posts, cables and tensioning plates. 10-year warranty on all shade fabric. 1-year warranty on all powder coating.

PART 3 - EXECUTION

3.01 Assembly

- A. Carefully lay out footings according to manufacturer's dimensions.
- B. Construct steel reinforced footings in accordance with Section 03 30 00 - Cast-in-Place Concrete. Footings shall be 4,000 PSI concrete.
- C. Shelter shall be erected in a workman-like manner with framing and roofing installed according to the manufacturer's installation instructions. Care shall be taken to avoid damaging shelter during installation. Touch-up any damage to finish with manufacturer supplied touch-up paint.

END OF SECTION

SECTION 26 00 00 ELECTRICAL SERVICE SYSTEMS

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Extent of electrical work under this Section shall include, but not be limited to:
 - 1. Provide power source for splashpad from Maintenance Building.
 - 2. Provide electrical connections to splashpad elements, activator and rain diverter as per drawings.
 - 3. Installation of new conduit and wire from utility pole south of the splashpad to new utility pole west of central access road, to connect to existing utility pole north of the splashpad to reroute existing overhead electric wire around splashpad.
 - 4. Provide power and grounding to Pavilion lights and outlets as per drawings.
 - 5. Preparation & submission of EVERSOURCE work order as needed.
- B. The Contractor shall provide any additional labor and materials required by the utility company to complete the work of this Section, at no additional cost to the Owner.
- C. All work performed under this Section shall be performed by a MA licensed Electrician.
- D. The Contractor is required to apply and obtain all permits required for this work. The City of Waltham will waive all fees associated with these applications.

1.02 ELECTRIC UTILITY

- A. The Electric Utility for this project is EVERSOURCE Electric. All coordination with the Electric Utility is the responsibility of the Contractor. All work and materials for the electric service shall be in accordance with the requirements of the Electric Utility, and are to be met under this Section and included in the bid price of the Contractor. Contractor shall adhere to EVERSOURCE's *"Information and Requirements for Electric Service."*
- B. The Contractor shall be responsible for preparation and submission of an EVERSOURCE work order for that work required to be done by the utility to complete the work of this Section which includes disconnecting existing service and connecting new service.

1.03 EXAMINATION OF SITE

- A. Before submitting a Bid, this Contractor must visit the job site to determine the conditions under which the work is to be done.

1.04 DRAWINGS AND SPECIFICATIONS

- A. Drawings and specifications are complementary to each other. Any labor and material which is called for by either, whether or not by both, or which is necessary for the successful operation of all systems, shall be furnished and installed. Discrepancies should be brought immediately to the attention of the Engineer.
- B. Plans and specifications for this project should be examined to determine the scope and character of the work.
- C. Coordination with the City of Waltham Inspector of Wires and other Trades is required before and during construction.
- D. This Contractor shall prepare an electrical set of coordination drawings. Prior to any installations, the Electrical Contractor must receive approval of drawings from the City of Waltham Inspector of Wires.

1.05 SUBMITTALS

- A. Product Data: For each type of product indicated include product data, storage and handling requirements and recommendations, construction details, material descriptions, dimensions of individual components and profiles, finishes, field-assembly requirements, and installation details.
- B. Shop Drawings:
 - 1. Stamped electrical plan per City of Waltham building code requirements including electrical improvements indicating the following:
 - a. Overall dimensions
 - b. Location, size and details for all conduit and electrical improvements
 - c. Site wiring requirements
- C. Submit samples of materials for use under this Section as directed by the City Inspector of Wires.
- D. The Engineer's review shall be only for conformance with the design concept of the project and compliance with the specifications and Drawings. The responsibility of, and the necessity of, furnishing materials and workmanship required by the specifications and Drawings which may not be indicated on the shop drawings is included under the work of this Section.

1.06 INSURANCE

- A. Insurance is to conform to the provisions and requirements as set forth in the Information for Bidders Section.

1.07 WORKMANSHIP

- A. Materials shall be new and shall conform to the standards of UL, Inc., in every case where such a standard has been established for the particular type of material in question. Work shall be executed in a workmanlike manner and a competent MA licensed Electrician shall be provided for the entire project.
- B. After wires are pulled in and fixtures and equipment are installed, this Contractor shall make tests for performance, grounds, etc., and shall immediately remedy any defects. This Contractor shall provide equipment to be used for tests.
- C. Work under this Contract must be so performed that the progress of the entire project, including work of all Trades, shall not cause delays or interference.
- D. It will be the responsibility of the Contractor to instruct the Owner in the function, operation and maintenance of electrical systems and equipment. This is to be done upon completion of the installation, before leaving the job site and to the satisfaction of the Owner and City Inspector of Wires.

1.08 GUARANTEE

- A. Materials and labor incorporated in the work are to be guaranteed against defects for a period of one (1) year from date of substantial completion. This Contractor shall correct such defects that occur within the guarantee period and to the satisfaction of the City Inspector of Wires without cost to the Owner, within a twenty-four (24) hour period.
- B. This Contractor shall not be responsible for failures through normal usage, nor for those caused by neglect or abuse on the part of the Owner or his employees.

1.09 INSPECTIONS AND PERMITS

- A. Obtain all necessary permits and licenses, and pay all fees for permits and inspections. Permit fees are the responsibility of the Contractor as part of his bid, as is all coordination with the local utility, EVERSOURCE.
- B. The Contractor shall contact the City of Waltham Inspector of Wires prior to work and to arrange for inspection.

PART 2 - PRODUCTS

2.01 CONDUITS, WIRES AND GROUNDING

- A. Conduits, wires and grounding to be approved by City of Waltham Inspector of Wires prior to installation.

PART 3 - EXECUTION

3.01 INSPECTION AND COORDINATION

- A. This Contractor shall inspect surfaces and areas that will receive his material and the job conditions as they exist, and report any conditions that may adversely affect his work. Notify City Inspector of Wires or Electrical Contractor of unsuitable conditions.
- B. Coordinate work with construction schedule and job progress.
- C. This Contractor shall confer with the Electrical Contractor and other Trades to coordinate his work and to properly locate systems to avoid conflict and interference.
- D. Any interference with the work of other Trades or with Engineering or structural details shall be brought to the attention of the Owner for decision before installation. Contractor's failure to so coordinate his work will not relieve him of the responsibility to correct work to suit building conditions.
- E. The Contractor shall contact the City Inspector of Wires to arrange for inspections prior to filling any electrical trenches.

END OF SECTION

SECTION 31 10 00 - SITE CLEARING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:

1. Removing surface debris.
2. Clearing and grubbing.
3. Removing designated trees, shrubs, and other plant life within the Limit of Work area, as indicated on Drawings.
4. Removing abandoned above and below grade utilities.
5. Excavating, stockpiling and testing topsoil.

B. Related Sections:

1. Section 02 41 00 - Site Preparation and Demolition
2. Section 31 22 13 - Rough Grading.
3. Section 31 23 18 - Rock Removal.
4. Section 31 13 00 - Tree pruning.
5. Section 31 25 00 - Erosion and Sediment Control

1.2 QUALITY ASSURANCE

A. Conform to applicable code for environmental requirements, disposal of debris, and use of herbicides.

B. Prior to the commencement of work, obtain the Engineer's approval of staked and/or flagged site clearing.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Stripped Topsoil

1. Soil Analysis:

- a. Reports indicating and interpreting test results for complete topsoil and soil components.
- b. All Tests performed by the University of Massachusetts Cooperative Extension Service or equivalent in accordance with current standards of Association of Official Agricultural Chemists or other testing laboratory as approved by the Landscape Architect. See Section 1.4 Quality Assurance for soil sampling procedures
- c. Testing reports to include the following for the stockpiled topsoil and finished planting soil that may or may not be amended in order to meet the specifications:
 - 1) Mechanical gradation (sieve analysis) and USDA soil classification
 - 2) Percent organic matter
 - 3) Chemical analysis for the following elements:

- a) Soluble salts.
 - b) Carbon: nitrogen ratio
 - c) Potassium
 - d) Phosphorus
 - e) Magnesium
 - f) Calcium
 - g) Acidity (pH)
 - h) Testing for the following heavy total metals as required by the USEPA
 - (1) Lead, Nickel, Cadmium, Zinc, Copper, arsenic and selenium.
2. Soil analysis to include amendment recommendations for the following:
 - a. Turf/Lawn
 - 1) Lawn-New Establishment
 - b. Home Grounds, Gardens, & Landscaping
 - 1) Deciduous Trees, Shrubs & Vines-New Establishment
 - 2) Needle Leaf Trees & Shrubs-New Establishment
 3. Submit reports at least one (1) month before placement.
 4. Submit topsoil soil analysis results to the following for confirmation of recommended soil amendments:
 - a. Landscape Architect
 - b. Owner
 - c. Landscape Contractor
 - d. Seed supplier

PART 2 PRODUCTS

2.1 MATERIALS

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing plant life designated to remain is tagged or identified.
- B. Identify waste area for placing removed materials.

3.2 PREPARATION

- A. Dig Safe at 1-888-DIG-SAFE (1-888-344-7233) not less than three working days before performing Work.
 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Prior to altering any utilities, obtain consent of utility service provider.
 1. Arrange with the utility service providers to shut off utilities to be disturbed as indicated on the Drawings and inform Owner and Engineer of anticipated interruption.

3.3 PROTECTION

- A. Locate, identify, and protect utilities indicated to remain, from damage.
- B. Protect trees, plant growth, and features designated to remain, as final landscaping as specified in the Drawings.
- C. Protect benchmarks, survey control points, and existing structures from damage or displacement.

3.4 CLEARING AND GRUBBING

- A. Remove trees and shrubs within the limit of work as indicated on Drawings. Remove stumps, main root ball, surface rock, and other obstructions.
 - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or be re-located.
 - 2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct new construction. Notify the Engineer prior to any root cutting.
 - 3. Grind stumps and remove roots, obstructions, and debris extending to a depth of 18 inches below grade.
 - 4. Mechanical grubbing is prohibited within the tree protection zones indicated on Drawings, and all grubbing is to be done by hand methods.
 - 5. Chip removed tree branches and dispose off-site, unless noted otherwise on the Drawings.
- B. Fill depressions created by clearing and grubbing operations in accordance with Section 31 20 00 unless further excavation or grading is indicated on the Drawings.
- C. Clear undergrowth and deadwood, without disturbing subsoil.

3.5 REMOVAL

- A. Remove and properly dispose of cleared material.
- B. Remove all surplus soil and unsuitable soil.
- C. Remove debris, rock, and extracted plant life from site.
- D. Remove paving, curbs, and structures as indicated on the Drawings.
- E. Neatly saw cut edges at right angle to surface.
- F. Remove abandoned utilities. Indicated removal termination point for underground utilities on Record Documents.
- G. Continuously clean-up and remove trash, construction debris and waste materials from site. Do not allow materials to accumulate on site.

H. Do not burn or bury materials on site. Leave site in clean condition.

3.6 TOPSOIL EXCAVATION

A. Remove sod/grass before excavation of topsoil.

B. Excavate topsoil from areas to be further excavated, relandscaped, or regraded, to the depths encountered without mixing with underlying soils and foreign materials for use in finish grading.

1. Remove trash, debris, weeds, roots and other waste materials from stockpiled topsoil.

C. Do not excavate wet topsoil.

D. Transport topsoil and place in small stockpiles in locations requiring placement of topsoil.

E. Stockpile in area designated on site to a height not exceeding 8 feet and protect from erosion.

1. Stockpile material on impervious material and cover over with same material, until disposal.

2. Do not stockpile within the tree protection zones indicated on Drawings.

3. Stockpile topsoil away from the edge of excavations, do not intermix with subsoil.

4. Grade and shape stockpiles to drain surface water.

5. Cover to prevent windblown dust contamination by air borne weed seed.

6. Install temporary erosion control devices for all stockpiled soil, as indicated on Drawings and/or as directed by the Engineer to protect adjacent properties and/or resource areas.

F. Submit topsoil for soil analysis. See Section 1.3.

G. Remove excess topsoil not intended for reuse on the Project site.

END OF SECTION

31 13 00 TREE PRUNING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. The conditions and general requirements of the Contract, Division 0 and applicable parts of Division 1, apply to the work under this Section.
- B. 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 time of this Contract and in accordance with the various Items specified herein.
- C. The work of this Section consists of all tree pruning and removal work and related Items as specified herein and includes, but is not limited to:
 - 1. Crown Cleaning;
 - 2. Crown Raising;
 - 3. Crown Reduction;
 - 4. Crown Thinning;
 - 5. Crown Training;
- D. All work in this section shall be performed by a Massachusetts Certified Arborist. (See 1.02, Qualification of Arborist, below.)
- E. All trees to be pruned or removed are located on the site. All trees indicated shall be inspected by the Arborist and Landscape Architect before work is to be done. In addition to trees indicated for removal on the Drawings, trees should be removed for the following reasons: dead trees, hazardous trees, or trees in serious decline, as determined by a certified Arborist. If the Arborist discovers tree(s) which have not been marked for removal and are intended for pruning, but whose condition is such that removal is warranted, whether due to death, disease, decay, damage, or structural weakness, such tree(s) shall not be pruned and the Arborist 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.
- F. The intent of this portion of the Contract is to identify trees that should be removed while pruning all remaining trees on the site to provide safety, protection of property, clearance of roadways, walks, buildings and luminaries, and to improve the overall structure of the trees. Pruning is also required for the entire edge of the project limit of work as directed by the Landscape Architect and owner.

- G. The Contractor is required to review and inspect the site regarding trees to be removed (as indicated on the Drawings) prior to bid proposal in order to form his/her own assumptions as to the ultimate cost of the work.

1.2 QUALIFICATION OF ARBORIST

- A. Work on this section of the Contract 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. Subcontractors must derive a majority of their income from arboricultural work. The Owner may require proof of these qualifications.
- B. Unless otherwise approved by the Owner, all work shall be conducted by qualified and trained personnel under the direct supervision of a Massachusetts Certified Arborist, in good standing. A Massachusetts Certified Arborist must be on site at all times during any pruning operations. The Contractor shall be required to provide proof of certification.
- C. Any subcontractor hired by the General Contractor to perform any portion of the work shall meet all qualifications herein and be acceptable to the Owner.

1.3 SPECIAL REQUIREMENTS

- A. Dutch elm disease wood (if any) shall be disposed of in accordance with provisions of General Laws, Chapter 87, Section 5, and Chapter 132, Section 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 is permitted on the project site.

1.4 STANDARDS AND DEFINITIONS

- A. Pruning and Removals shall conform to the following:
 - 1. American National Standards Institute (ANSI): Standard A300-2001 Standard Practices for Tree Care Operations – Tree, Shrub and Other Woody Plant Maintenance.
 - 2. American National Standards Institute (ANSI): Standard Z-133.1.-2001 Safety Requirements for Tree Care Operations – Pruning, Trimming, Repairing, Maintaining, and Removing Trees, and Cutting Brush.
 - 3. All other applicable Occupational Safety and Health Administration (OSHA) standards, and state and local regulations.
- B. American National Standards Institute- (ANSI) is the private, non-profit organization that administers the safety and maintenance regulations for the Tree Care Industry.
- C. Crown Cleaning- The removal of dead, diseased, obstructing, split, and/or broken

branches that are 2 inches in diameter or greater. Limbs that are susceptible to failure from dense or heavy foliar masses should be thinned.

- D. Crown Raising- The removal of lower tree branches to allow safe movement of vehicles and pedestrians under the canopy of the tree. Limbs above sidewalks shall be no lower than 10 feet from the ground. Limbs over the road shall be no lower than 16 feet from the ground.
- E. Crown Reduction- The technique used to reduce the overall mass of the tree by thinning out the top and sides or just removing individual limbs of the tree. Reduction pruning is commonly associated with pruning away from buildings, structures, signs, lights and other overhead obstructions.
- F. Crown Thinning- The selective removal of branches to increase light penetration and air movement. No more than 25% of the trees living branches shall be removed.
- G. Crown Training- A pruning process that utilizes all the major pruning types to promote a strong central leader and strong scaffold branches on recently planted trees.
- H. D.B.H.- Diameter at breast height. The location on a tree 4.5 feet above ground where the diameter of the tree is measured.
- I. Massachusetts Certified Arborist- (MCA) An individual who is listed by the Massachusetts Arborist Association as a MCA who has passed a comprehensive exam and maintained their certification through the accumulation of continuing education credits.
- J. Occupational Safety & Health Administration- (OSHA) is the Federal agency responsible for insuring worker safety.
- K. Owner- the individual or designated representative responsible insuring the requirements of this Contract are adhered to.
- L. Street tree- Any tree planted and maintained within the public right of way under the jurisdiction of the City of Waltham.

1.5 EXAMINATION OF SITE AND DOCUMENTS

- A. The Contractor shall be responsible for having a clear understanding of the existing conditions of the site before submitting a bid for this Contract and shall be responsible for fully carrying out the work of the Contract, regardless of actual site conditions encountered.

1.6 ORDER OF WORK

- A. Before any work is started, the Contractor shall attend a conference with the Owner and the Landscape Architect. The Contractor shall provide a list of trees that should be removed as per the Drawings or for the following reasons: dead trees, hazardous trees,

or trees in serious decline. All trees to remain shall be pruned to provide safety, protection of property, clearance of roadways, walk, buildings and luminaries, and to improve the overall structure of the tree. The type of pruning to be performed includes but is not limited to crown cleaning, crown raising, crown reduction, crown thinning, and crown training. At this conference the Owner will also establish the order of precedence for carrying out the work.

- B. Based on the conference, the Contractor shall submit a schedule of work for the Owner's review and approval prior to beginning work. Any changes to this schedule must be approved by the Owner. Unless otherwise authorized by the Owner, failure of the Contractor to comply with the approved pruning and removal schedule shall be sufficient cause to give notice that the Contractor is in default of the Contract and will result in its termination. Unless otherwise authorized by the Owner, the Contractor must complete ALL pruning work within 40 business days from the notice to proceed.

1.7 CHANGES IN THE WORK

- A. The Owner reserves the rights to change, add, or delete areas or quantities to be pruned or removed as deemed to be in the City's best interest.
- B. No claim for extra compensation or extension of time will be allowed on account of actual conditions inconsistent with those assumed.
- C. Any alterations or modifications of the work performed under this contract shall be made only by written agreement between the Contractor and the Owner. No claims for extra work or materials shall be allowed unless covered by written agreement.

1.8 PROTECTION OF VEGETATION TO BE PRESERVED

- A. The Contractor shall protect all existing trees, shrubs and lawns designated to remain for the length of the construction period. The placement of tree protection devices shall be as per the Drawings.
- B. Damage no plant to remain by burning, by pumping of water, by cutting of live roots or branches, or by any other means. No plants to be saved shall be used for crane stays, guys or their fastenings. Vehicles shall not be parked within the dripline of trees to remain, or wherever 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 tree, shrub or lawn to remain, and shall immediately report to the Owner for appraisal of any damage and for determination of corrective treatment of compensation to the Owner.
- D. The Contractor shall compensate the Owner for damages by installing replacement tree(s) of the size and species approved by the City of Waltham, and of sufficient quantity such as the sum of the DBH inches for replacement trees equals the total DBH inches of the damaged tree(s). Damaged shrubs shall be replaced with shrub(s) of the same size, species, and quantity, unless determined otherwise by the Owner.

- E. Damaged shrubs or lawns shall be restored or replaced to match existing to remain to the satisfaction of the Owner, at no cost to the Owner.

PART 2 - MATERIALS

2.1 EQUIPMENT AND MATERIALS

- 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 repair or condition or otherwise unsuitable.
- B. At the discretion of the Owner, if the equipment failures, breakdowns or other related problems occur that are jeopardizing the meeting of deadlines established in the written schedule provided by the Contractor, the Contract will be terminated.
- C. Vehicles shall display prominently the Contractor's name, address, and telephone number on both doors.
- D. Aerial lift equipment may be required for pruning and removal work unless otherwise approved by the Owner. Such equipment shall have a minimal working height of fifty-five (55) feet, and shall include an articulated upper boom, insulated lower boom, a ten to fifteen (10-15) cubic yard enclosed hydraulic dump body, pintlehook and attachments for a towed chipper, or approved equal.
- E. A chipper, meeting all OSHA requirements, shall be used which will process material up to twelve (12) inches in diameter.
- F. A crane or log loader shall be used on site to remove logs too large to be chipped.

2.2 PERSONNEL

- A. The Contractor shall submit each employee's name and title prior to the commencement of work. The Contractor shall provide a list of all Massachusetts Certified Arborists who will be working on this contract. This list shall include the names of those individuals and their certification number. The Contractor shall advise the Owner of any changes in the roster assigned to this contract.
- B. Each worker shall be experienced and highly qualified with necessary tree work skills to successfully complete this contract, including the ability and training to perform aerial rescue. Said skill shall also include worker safety and ability to be in compliance with current OSHA and ANSI Z-133.1 Standards.

PART 3 - EXECUTION

3.1. DESCRIPTION OF WORK

- A. Each tree to be pruned shall be serviced according to the following types of pruning, as needed: Crown Cleaning, Crown Raising, Crown Reduction, Crown Thinning and Crown Training.

- 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 Specifications 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 trees.
- D. If the Contractor discovers tree(s) which have 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 report these findings to the Owner, in writing, within 24 hours, and await the Owner's direction before proceeding with work on the particular tree(s) in question.
- E. Tree removal is generally described as the removal of individual trees that have been found to be dead, hazardous, and/ or otherwise marked for removal by the Owner.

3.2. 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 or otherwise cleaned of all material related to the work operation. Degree of clean up required will be described by the Owner at the Pre-construction Conference and will be based upon the character of the work area.
- C. All trimmings or any other form of debris shall be collected, chipped, hauled and disposed of properly in accordance with all applicable laws at the Contractor's expense.

3.3. PRUNING PROCEDURES AND QUALITY CONTROL

- A. All pruning shall be performed in manner which 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 a minimum of one third (1/3) the size of the branch being removed, unless otherwise instructed by the Owner.
- B. The use of climbing spurs or spiked shoes shall not be permitted for pruning trees and their use will result in immediate cancellation of the Contract. They are only permitted during tree removal operations and emergency aerial rescue operations.
- C. All cuts shall be made sufficiently close to the parent stem so that wound closure can be readily started under normal conditions. Cuts shall never be made through the branch collar. Slab cuts, rip cuts and all other cuts that do not meet the most current edition of the ANSI A300 pruning standard will result in cancellation of the Contract.
- D. Luminaries and proper elevation over street and sidewalk surfaces to at least the following

minimum specifications:

1. Sidewalk/Paths –All branches shall be pruned to allow a minimum ten (10) foot clearance over sidewalks and paths, including proposed new paths.
 2. Luminaries –Any and all branches extending directly below a street light, limiting the light reaching the street or path shall be removed and all branches shall be cut back to afford a minimum four (4) foot clearance.
 3. Street/Roads –All branches shall be pruned to allow a minimum sixteen (16) foot clearance over street surface.
- E. All limbs over two inches in diameter to be removed shall be precut to prevent splitting. Any branches that would injure the tree or other objects by falling shall be lowered to the ground by proper rigging and rope procedures.
- F. Remove one of two crossed or rubbing branches where practical so the removal will not leave large holes in the general outline of the tree.
- G. On trees known to be diseased, tools are to be disinfected with alcohol after each cut between trees and where there is known to be a danger of transmitting the disease on tools.
- H. Lateral branches as well as occasional water sprouts may be retained. Complete removal of secondary laterals and water sprouts resulting in the stripping of major limbs, will not be permitted.

3.4. SAFETY

- A. 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.
- B. 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 post all work areas. The Contractor must also provide police details if required and/ or erect and maintain protective devices acceptable to the City Arborist, including but not limited to barricades, lights and warning signs.
- C. Any practice employed by the Contractor that is obviously hazardous, as determined by the City Arborist, shall be immediately discontinued.

3.5. FINAL ACCEPTANCE

- A. Upon completion of the work the Contractor shall notify the Owner in writing and

request that a final inspection for acceptance be made.

END OF SECTION

SECTION 31 20 00 - EARTH MOVING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes: Provide labor, materials and equipment necessary to complete the work of this Section, including:

1. Removal of subsoil, excavating and trenching
2. Backfilling
3. Cutting, grading, filling, rough contouring, and compacting site for utility, road, parking, sidewalks, walkways and landscape installation.

B. Related Sections:

1. Section 03 30 00 - Cast-In-Place Concrete
2. Section 31 23 18 - Rock Removal.
3. Section 31 23 19 – Dewatering.
4. Section 31 25 00 – Erosion and Sedimentation Controls
5. Section 31 37 00 – Riprap and Rock Lining.
6. Section 32 11 23 – Aggregate Base Course
7. Section 32 12 16 – Asphalt Paving
8. Section 32 13 13 – Concrete Paving
9. Section 32 91 13 – Fertilizers and Amendments.
10. Section 32 92 00 - Lawns
11. Section 32 91 13 – Fertilizers and Amendments.
12. Section 32 93 00 – Plants and Plantings.
13. Section 33 14 17 - Site Water Service Utility Laterals
14. Section 33 31 00 - Sanitary Sewerage Piping
15. Section 33 41 13 – Storm Drainage Piping
16. Section 33 47 30 – Bioretention.
17. Section 33 47 40 – Sand Filter.
18. Section 34 47 13 – Timber Guardrail.

1.2 REFERENCES

A. Local utility standards when working within 24 inches of utility lines.

B. American Association of State Highway and Transportation Officials:

1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

C. ASTM International:

1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
2. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft³ (600 kN-m/m³)).
3. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.

4. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
5. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
6. ASTM D2419 - Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
7. ASTM D2434 - Standard Test Method for Permeability of Granular Soils (Constant Head).
8. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).
9. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
10. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.3 DEFINITIONS

- A. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions on Drawings or without approval by Landscape Architect/Engineer.
- B. Landscaped Areas: Areas not covered by structures, walks, roads, paving, or parking.
- C. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- D. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
- E. Utility: Any buried pipe, duct, conduit, or cable.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures {01330 - Submittal Procedures}: Requirements for submittals.
- B. Shop Drawings: Indicate soil densification grid for each size and configuration footing requiring soils densification.
- C. Product Data: For the following:
 1. Each type of plastic warning tape;
 2. Geotextile;
- D. Samples: Submit, in air-tight containers, 10 lb. sample of off site fill to testing laboratory.
- E. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
 1. Classification according to ASTM D 2487 of each on-site and borrow soil material proposed for fill and backfill.

2. Laboratory compaction curve according to ASTM D 1557 for each onsite and borrow soil material proposed for fill and backfill.

F. Materials Source: Submit name of imported materials source.

1.5 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

1.6 QUALITY ASSURANCE

- A. Furnish each subsoil and topsoil material from single source throughout the Work.
- B. Perform Work in accordance with ASTM C136, ASTM D2419, and ASTM D2434.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Cold Weather Requirements:

1. Excavation: When temperatures below 32 degrees F are anticipated, do not excavate to final required elevations for concrete work unless concrete can be placed immediately.
2. Backfilling: When backfilling below 32 degrees F, the following procedures must be followed:
 - a. Remove frozen ground in its entirety from beneath and five feet beyond the area of fill placement.
 - b. Fill material to consist of selected fill free of all frozen chunks that exceed four inches in size. Material transported to the project site must only consist of material excavated from below the frost depth.
 - c. End of the workday: Cover the area of fill placement with insulated blankets. Other means of protection (straw, wood chips, etc.) may also be used for protection provided it is approved by the Landscape Architect/Engineer.
 - d. Following workday: Remove the insulated blankets and/or strip the area of all frozen material as specified previously.
 - e. Upon establishing the subgrade elevations, protect the grades with insulated blankets or place additional material that will adequately insulate the ex-posed earth surface from frost. Strip additional or protective material just prior to pouring concrete.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

A. Satisfactory Soils for General Backfill (imported or excavated):

1. May include excavated and re-used material. Imported borrow. Select or local borrow. Structural.

2. Material, graded free of lumps larger than 6 inches, rocks larger than 3 inches, organic material, and debris.
3. ASTM D2487 Unified Soil Classification Groups GW, GP, GM, SW, SP, and SM or a combination of these groups.
4. Provide borrow from off-site borrow sources that have no known releases or disposal of oil and/or hazardous materials and invasive species.
5. Immediately notify the Landscape Architect/Engineer if satisfactory soils are not maintained within 2 percent of optimum moisture content at the time of compaction.

B. Unsatisfactory Soils for General Backfill (imported or excavated):

1. May include imported borrow or excavated and re-used material.
2. ASTM D2487 Unified Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.
3. Contains rock or gravel larger than 3 inches in any dimension, debris, oil and or/ hazardous waste, frozen materials, vegetation, invasive species and other deleterious matter.

C. Hazardous Materials or Soils

1. Soil sampling has not been conducted at this site and hazardous waste or contaminated soil is not anticipated to be encountered. If during the life of this contract hazardous material is suspected to be encountered the contractor shall immediately notify the owner and Landscape Architect/Engineer, cease all construction activities and take all necessary precautions in compliance with Massachusetts Department of Environmental Protection's (DEP) 310 CMR 40.0000, the Massachusetts contingency plan and 310 CMR 30 Hazardous Waste Regulations.

D. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

E. Berm/Embankment fill:

1. Free of roots, stumps, wood, rubbish, stones greater than 6 inches, frozen or other objectionable materials.
2. Conforming to ASTM D2487 Unified Soil Classification GC, SC, CH, or CL with at least 30 percent passing the No.200 sieve.

2.2 ACCESSORIES

A. Geotextile Fabric: Nonwoven drainage geotextile made from polyolefins, polyesters, or polyamides with the following minimum properties according to ASTM D 4659 and referenced standard test methods:

1. Grab Tensile Strength: 120 lbf (533 N); ASTM D 4632.
2. Tear Strength: 50 lbf (222 N); ASTM D 4533.
3. Puncture Resistance: 70 lbf (311 N); ASTM D 4833.
4. Water Flow Rate: 120 gpm per sq. ft. (4885 L/min per sq. m); ASTM D 4491.
5. Apparent Opening Size: No. 70 (0.212 mm); ASTM D 4751.

B. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities

1. A minimum of 6 inches wide and 4 mils thick
2. Continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection
3. Detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:
 - a. Red: Electric.
 - b. Yellow: Gas, oil, steam, and dangerous materials.
 - c. Orange: Telephone and other communications.
 - d. Blue: Water systems.

2.3 SOURCE QUALITY CONTROL

- A. Testing and Analysis of Subsoil Material: Perform in accordance with ASTM D698. ASTM D1557. AASHTO T180.
- B. When tests indicate materials do not meet specified requirements, change material and retest.
- C. Furnish materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.1 EXCAVATION EXAMINATION

- A. Verify site conditions.
- B. Verify survey benchmark and intended elevations for the Work as indicated on Drawings
- C. Notify Landscape Architect/Engineer of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.

3.2 EXCAVATION PREPARATION

- A. Call Dig Safe at 1-888-DIG-SAFE (1-888-344-7233) not less than three working days before performing Work.
 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Prior to altering any utilities, obtain consent of utility service provider.
 1. Notify utility company to remove and relocate utilities.
 2. Arrange with the utility service providers to shut off utilities to be disturbed as indicated on the Drawings and inform Owner and Landscape Architect/Engineer of anticipated interruption.
- C. Identify required lines, levels, contours, and datum.
- D. Establish temporary traffic control and detours when work is performed in public right-of-way. Relocate controls and reroute traffic as required during progress of Work.

3.3 PROTECTION

- A. Maintain and protect above and below grade utilities indicated to remain.
- B. Protect plant life, lawns, rock outcroppings and other features remaining as portion of final landscaping.
- C. Protect benchmarks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- D. Grade excavation top perimeter to prevent surface water run-off into excavation or to adjacent properties.
- E. Prevent displacement or loose soil from falling into excavation; maintain soil stability.
- F. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.
- G. Protect structures, utilities and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth operations.
- H. Protect newly graded areas from traffic, freezing, erosion and over compaction.

3.4 UNDERGROUND UTILITIES

- A. Do not interrupt existing utilities that are in service until temporary or new utilities are installed and operational.
- B. Abandoned utilities:
 - 1. Remove abandoned utilities beneath, and five feet laterally beyond, the structure's proposed footprint. Backfill and compact excavations required for their removal.
 - 2. Utilities extending outside the five feet limit specified above may be abandoned in place provided their ends are adequately plugged as described below.
 - 3. Permanently close open ends of abandoned underground utilities, exposed by excavations, which extend outside the limits of the area to be excavated.
 - 4. Close open ends of metallic conduit and pipe with threaded galvanized metal caps or plastic plugs or other approved method for the type of material and size of pipe. Do not use wood plugs.
 - 5. Close open ends of concrete and masonry utilities with concrete or flowable fill.

3.5 GENERAL EXCAVATION

- A. Excavate subsoil to accommodate utilities, roads, parking, sidewalks, walkways, landscape installation, and paving.
- B. Slope banks with machine to angle of repose or less until shored.
- C. Grade top perimeter of excavation to prevent surface water from draining into excavation.

- D. Trim excavation. Remove loose matter.
- E. Remove lumped subsoil, boulders, and rock up to 1 cu yd measured by volume.
 - 1. Remove rock to lines and grades required to permit installation of permanent construction as indicated on Drawings without exceeding the following dimensions:
 - a. 24 inches outside of concrete forms other than at footings;
 - b. 12 inches outside of concrete forms at footings;
 - c. 6 inches outside of minimum required dimensions of concrete cast against grade;
 - d. Outside dimensions of concrete walls indicated to be cast against rock with-out forms or exterior waterproofing treatments;
 - e. 6 inches beneath bottom of concrete slabs on grade;
 - f. 6 inches beneath pipe in trenches, and the greater of 24 inches wider than pipe or 42 inches wide;
 - g. As indicated on the Drawings.
- F. Notify Landscape Architect/Engineer of unexpected subsurface conditions.
- G. Correct areas over excavated with structural fill specified in this Section as directed by Landscape Architect/Engineer.
- H. Remove excess and unsuitable material from site.
- I. Stockpile excavated material in area designated on site in accordance with this Section.
- J. Repair or replace items indicated to remain damaged by excavation.

3.6 EXCAVATING WITHIN ROOT ZONES

- A. Mechanical excavation practices are prohibited within the tree root zones as indicated on Drawings. All excavating is to be done by hand methods with the use of an Air Spade or approved equivalent such that the existing tree roots are maintained to the maximum extent practicable.
- B. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct new construction. Notify the Engineer/Landscape Architect prior to any root cutting.
- C. Excavation of soil must occur within the same week as the proposed grading activity or surface material placement. At no time will the exposed roots of the existing trees be allowed to dry out. Tree roots will be hand watered during any period when they are exposed.

3.7 SUBSOIL EXCAVATING

- A. Excavate subsoil and topsoil from areas designated.

- B. Stockpile excavated material meeting requirements for subsoil materials and topsoil materials.
- C. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
- D. Remove excess excavated materials subsoil and topsoil not intended for reuse, from site.
- E. As necessary, remove groundwater by pumping to keep excavations dry in accordance with Section 31 23 19 .
- F. Excavate subsoil required for roadways, parking lots, drainage, building slabs, and culvert replacement.
- G. Excavate unsatisfactory subsoils for roadway construction.
- H. Proof roll bearing surfaces. Fill soft spots with acceptable fill and compact uniformly to 95 percent of maximum density.
- I. Correct unauthorized excavation at no cost to Owner.
- J. Backfill over-excavated areas under in accordance with specifications and as directed by the Landscape Architect/Engineer.
- K. Excavate subsoil from areas to be further excavated, relandscaped, or regraded.
- L. Do not excavate wet subsoil or excavate and process wet material to obtain optimum moisture content.
- M. When excavating through roots, perform Work by hand and cut roots with sharp axe.
- N. Benching Slopes: Horizontally bench existing slopes greater than 1: 4 to key placed fill material to slope to provide firm bearing.
- O. Stability: Replace damaged or displaced subsoil as specified for fill.

3.8 EXCAVATION FOR PRE-CAST STRUCTURES

- A. Excavate to indicated elevations and dimensions within accepted tolerance.
- B. Extend excavations a sufficient distance from structures for installing services and other construction, and for inspections.
 - 1. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures:
 - a. Do not disturb bottom of excavations intended as bearing surfaces.

3.9 TRENCHING

- A. Excavate for storm and sewer sanitary sewer lines, water, and electric piping.

- B. Excavate trenches to indicated gradients, lines, depths, and elevations. Cut trenches sufficiently wide to enable installation of utilities and allow inspection.
- C. Hand trim excavation and leave free of loose matter.
- D. Support pipe, joints and conduit, during placement and compaction of bedding fill.
- E. Remove projecting stones and sharp objects along trench subgrade.
- F. Coordinate backfilling with utilities testing.
- G. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.
- H. Backfill trenches to required contours and elevations.
- I. Place and compact fill materials as for Backfilling.

3.10 LINES AND GRADES

- A. Lay pipes to lines and grades indicated on Drawings.
 - 1. Landscape Architect/Engineer and Owner reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.
- B. Use laser-beam instrument with qualified operator to establish lines and grades.

3.11 UNAUTHORIZED EXCAVATION

- A. Immediately notify the Landscape Architect/Engineer prior to the commencement of any unauthorized excavation or backfilling work.
- B. Backfill unauthorized excavation under footings, foundation bases, roadways or retaining walls with compacted select granular material without altering the required footing elevation. Elsewhere, backfill and compact unauthorized excavation as specified for authorized excavation of the same classification.

3.12 BACKFILL EXAMINATION

- A. Verify unsatisfactory soils have been removed.

3.13 BACKFILL PREPARATION

- A. Compact subgrade to density requirements for subsequent backfill materials.
- B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with structural granular fill and compact to density equal to or greater than requirements for subsequent fill material.
- C. Scarify subgrade surface to depth of 6 inch.

- D. Proof roll to identify soft spots; fill and compact to density equal to or greater than requirements for subsequent fill material.
- E. Replace unsatisfactory soil with compacted backfill or fill material.
- F. Survey locations of underground utilities for As-built Drawings and Record Documents.
- G. Test and inspect underground utilities as specified.
- H. Remove trash and debris.
- I. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities without additional compensation.
- J. If unsatisfactory soil is encountered immediately notify Landscape Architect/Engineer before any work commences.

3.14 BACKFILLING

- A. Backfill systematically, as early as possible, to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.
- B. Place and compact backfill in excavations promptly.
- C. Place backfill and fill soil materials in layers to specified depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- D. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- E. Fill voids with approved backfill materials while shoring and bracing, and as sheeting is removed.
- F. Backfill areas to contours and elevations indicated on Drawings.
- G. Use unfrozen and unsaturated materials.
- H. Place geotextile fabric over unstable subsoil.
- I. Place geotextile fabric prior to placing subsequent fill materials.
- J. Place material in continuous layers as follows:
 1. Soil Materials: Maximum 8 inches compacted depth.
 2. Structural Fill Materials: Maximum 8 inches compacted depth.
 3. Granular Fill: Maximum 8 inches compacted depth.
- K. Employ placement method that does not disturb or damage other work.

- L. Employ placement method so not to disturb or damage existing foundations, foundation perimeter drainage, or utilities in trenches.
- M. Maintain optimum moisture content of backfill materials to attain required compaction density.
- N. Do not leave more than 50 feet of trench open at end of working day.
- O. Protect open trench to prevent danger to Owner and the public.
- P. Make gradual grade changes. Blend slope into level areas.
- Q. Remove surplus backfill materials from site.
- R. Leave fill material stockpile areas free of excess fill materials.

3.15 FILLING (GRADING)

- A. Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations as indicated on Drawings.
 - 1. Provide a smooth transition between adjacent existing grades and new grades.
 - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Fill areas to contours and elevations with unfrozen materials.
- C. Place fill material in continuous layers and compact.
- D. Maintain optimum moisture content of fill materials to attain required compaction density.
- E. Slope grade away from building minimum 2 percent slope for minimum distance of 10 ft, unless noted otherwise.
- F. Make grade changes gradual. Blend slope into level areas.
- G. Trim and rough grade area within the grading limits to a depth sufficient below the finish grades to accommodate topsoil, pavement, concrete and other finished surfaces.
- H. Repair or replace items indicated to remain damaged by excavation or filling.

3.16 EMBANKMENT/BERM FILL

- A. Fill materials for berms and key trenches:
 - 1. Furnish from approved designated borrow areas.
 - 2. Free from roots, stumps, wood, stones greater than 6", and frozen or other objectionable material.
- B. Remove all unsuitable soil and scarify subgrade prior to placement of fill.

- C. Provide a key trench beneath all the berm as indicated on Drawings. Extend the trench a minimum of 3 ft below existing grade.
 - 1. Key Trench Bottom Width: minimum of 3 ft.
 - 2. Key trench side slopes: minimum of 1:1 (h:v).
- D. Place the most permeable borrow material along the downstream portions of the embankment.
- E. Install principal spillway concurrently with fill placement. Do not excavate into the embankment.
- F. Place fill in 8 inch maximum layers continuous for the entire length of embankment.
- G. Compaction: As indicated on Drawings.
- H. Compact fill using a sheeps foot type compactor. To prevent damage to the drainage pipe(s), do not cross any pipe with compaction equipment until minimum cover is established along the pipe(s).
- I. Use topsoil on the outer shell of the berm. The topsoil must meet specification requirements and have the capability to support vegetation of the quality required to prevent erosion of the berm.

3.17 STOCKPILING

- A. Stockpile materials on site at locations indicated.
- B. Stockpile in sufficient quantities to meet Project schedule and requirements.
- C. Separate differing materials with dividers or stockpile apart to prevent mixing.
- D. Prevent intermixing of soil types or contamination.
- E. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.
- F. Cover to prevent windblown dust.
- G. Stockpile soil materials away from edge of excavations.
- H. Do not store within drip line of remaining trees.
- I. For soil stockpiles left overnight, provide silt sock, strawbales, silt fence, or a combination of silt fence with strawbales around the stockpile perimeter.
- J. Stockpile unsuitable materials on impervious material and cover to prevent erosion and leaching, until disposed of.

3.18 STOCKPILE CLEANUP

- A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.
- B. When borrow area is indicated, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

3.19 TOLERANCES

- A. Top Surface of Backfilling Within Building Areas: Plus or minus 1/2 inch from required elevations.
- B. Top Surface of Backfilling Under Paved Areas: Plus or minus 1 inch from required elevations.
- C. Top Surface of Backfilling Under Paved Areas or Lawn: Plus or minus 1
- D. Top Surface of Backfilling Paved Areas: Plus or minus 1/2 inch from required elevations.
- E. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.
- F. Top Surface of Exposed Subgrade: Plus or minus one inch.

3.20 FIELD QUALITY CONTROL

- A. Provide field quality control testing by a qualified independent geotechnical engineering testing agency. Testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthmoving only after test results for prior work comply with requirements.
- B. Repair and reestablish grades to specified tolerances where graded surfaces have been disturbed or altered due to construction activities, weather conditions or other means.
- C. Request inspection of excavation and controlled fill operations in accordance with Drawings and specifications.
- D. Request visual inspection of bearing surfaces by Landscape Architect/Engineer before installing subsequent work.
- E. Perform laboratory material tests in accordance with ASTM D1557. ASTM D698. AASHTO T180.
- F. Perform in place compaction tests in accordance with the following:
 - 1. Density Tests: ASTM D1556, ASTM D2167, or ASTM D2922.
 - 2. Moisture Tests: ASTM D3017.
- G. When tests indicate Work does not meet specified requirements, remove Work, replace, compact, and retest.
- H. Proof roll compacted fill surfaces under slabs-on-grade, pavers, and paving.

3.21 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
 - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
 - 2. Remove and replace or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.22 PROTECTION OF FINISHED WORK

- A. Reshape and re-compact fills subjected to vehicular traffic during construction.

END OF SECTION

SECTION 31 23 18 - ROCK REMOVAL

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Removing unidentified and discovered rock during excavation.
- B. Related Sections:
 - 1. Section 31 20 00 – Earthmoving.

1.2 DEFINITIONS

- A. Site Rock: Solid mineral material with volume in excess of 1 cu yd or solid material that cannot be removed with 3/4 cu yd capacity excavator.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Submit report and photos on size quantitie and locations of rock removal prior to removal of any rock.

PART 2 PRODUCTS

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify site conditions and note subsurface irregularities affecting Work of this section.

3.2 PREPARATION

- A. Identify required lines, levels, contours, and datum.

3.3 ROCK REMOVAL BY MECHANICAL METHOD

- A. Engineer review and approval required prior to any rock removal.
- B. Excavate and remove rock by mechanical method.
 - 1. Drill holes and use expansive tools wedges mechanical disintegration compound to fracture rock.
- C. Cut away rock at bottom of excavation to form level bearing.
- D. Remove shaled layers to provide sound and unshattered base for footings or foundations.

- E. In utility trenches, excavate to 6 inches below invert elevation of pipe and 24 inches wider than pipe diameter.
- F. Remove excavated materials from site. and reuse for site landscaping, as applicable.
- G. Correct unauthorized rock removal in accordance with backfilling and compacting requirements of Section 31 20 00.

3.4 FIELD QUALITY CONTROL

- A. Request visual inspection of load bearing surfaces by Landscape Architect/Engineer before installing subsequent work.

END OF SECTION

SECTION 31 23 19 - DEWATERING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Dewatering requirements to control groundwater and surface water runoff to prevent flooding of excavations, trenches and adjacent properties, and the loosening and saturation of soils.
 - 2. Surface water control system to remove sediment and control the rates and volumes of disposal of surface and subsurface waters removed from the work areas.
 - 3. The protection of adjacent and downgradient environmental resources and property.
- B. Related Sections:
 - 1. Section 31 10 00 – Site Clearing.
 - 2. Section 31 20 00 - Earthmoving.
 - 3. Section 31 25 00 - Erosion and Sedimentation Controls.

1.2 DEFINITIONS

- A. Dewatering includes the following:
 - 1. Lowering of ground water table and intercepting horizontal water seepage to prevent ground water from entering excavations and trenches.
 - 2. Disposing of removed water.
- B. Surface Water Control: Removal of surface water within open excavations.

1.3 QUALITY CONTROL

- A. Provide dewatering and surface water control systems to permit Work to be completed on dry and stable subgrade.
 - 1. Prevent damage to adjacent properties, buildings, structures, utilities and other facilities.
 - 2. Retain all sediments on-site within the work area.
 - 3. Prevent sediment discharge and degradation of the resource area(s).

1.4 PERFORMANCE REQUIREMENTS

- A. Dewatering system to:
 - 1. Lower water table within areas of excavation to elevation to permit Work to be completed on dry and stable subgrade.
 - 2. Prevent damage to adjacent properties, buildings, structures, utilities, and facilities from construction operations.
 - 3. Prevent loss of fines, quick condition, or softening of foundation subgrade.
 - 4. Maintain stability of sides and bottoms of excavations and trenches.
 - 5. Retain all sediment on-site within the limit of work.

6. Prevent sediment discharge and degradation of the resource area(s).

B. Design surface water control systems to:

1. Collect and remove surface water and seepage entering excavation.
2. Prevent damage to adjacent properties, buildings, structures, utilities, and facilities from construction operations.
3. Maintain stability of sides and bottoms of excavations and trenches.
4. Retain all sediment on-site within the limit of work.
5. Prevent sediment discharge and degradation of the resource area(s).

1.5 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Shop Drawings:

1. Indicate dewatering pump locations, pipe sizes and capacities, grades, surface water control devices, valves, and water disposal method and location.
2. Include a description of sediment removal and water disposal.

1.6 QUALITY ASSURANCE

A. Comply with SWPPP issues under Notice of Intent Permit under National Pollutant Discharge Elimination System (NPDES), for storm water discharge from construction sites.

B. Do not allow water to accumulate in excavations. Provide and maintain the dewatering system to remove promptly, and to dispose of properly, all water entering excavations to keep them dry until the proposed work is completed.

1.7 COORDINATION

A. Coordinate work to permit earthmoving operations to be completed on dry stable substrate.

PART 2 PRODUCTS

2.1 DEWATERING EQUIPMENT

A. Select dewatering equipment to meet specified performance requirements.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

3.2 PREPARATION

- A. Protect existing adjacent buildings, structures, and improvements from damage caused by dewatering operations.

3.3 DEWATERING SYSTEM

- A. Install dewatering system in accordance with Drawings.
- B. Locate system components to allow continuous dewatering operations without interfering with installation of permanent Work and existing public rights-of-way, sidewalks, and adjacent buildings, structures, and improvements.
- C. Excavate sumps in sizes and to depth indicated.
- D. Notify the Engineer of any changes required to accommodate field conditions and, on completion of the dewatering system installation, revise and resubmit the information required to show the installed system.
- E. Do not discharge water to protected environmental resources without treatment to remove suspended solids and sediments.

3.4 SURFACE WATER CONTROL SYSTEM

- A. Divert surface water and seepage water within excavation areas into sumps and pump water into drainage channels storm drains settling basins in accordance with requirements of agencies having jurisdiction.
- B. Control and remove unanticipated water seepage into excavation.

3.5 SYSTEM OPERATION AND MAINTENANCE

- A. Operate dewatering system, as necessary, until backfilling is complete.
- B. Modify dewatering and surface water control systems when operation causes or threatens to cause damage to new construction, existing site improvements, or adjacent property.

3.6 WATER DISPOSAL

- A. Discharge water into existing drainage channels and settling basins.

3.7 SYSTEM REMOVAL

- A. Remove dewatering and surface water control systems after dewatering operations are discontinued.
- B. Remove sumps, unless indicated otherwise by the Engineer.

- C. Repair damage caused by dewatering and surface water control systems or resulting from failure of systems to protect property.

3.8 FIELD QUALITY CONTROL

- A. After dewatering system is installed, perform pumping test to determine when selected pumping rate lowers water level below pump intake. Adjust pump speed, discharge volume, or both to ensure proper operation.

END OF SECTION

SECTION 31 25 00 - EROSION AND SEDIMENTATION CONTROLS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Labor, materials and equipment necessary to install proper control measures to prevent erosion, siltation and sedimentation of the Project site and adjacent and off-site areas.
- B. Related Sections:
 - 1. Section 31 10 00 - Site Clearing.
 - 2. Section 31 20 00 - Earthmoving.
 - 3. Section 32 92 00 - Lawns.

1.2 SUBMITTALS

- A. Product Data: Submit data on each type of proprietary erosion control devices, and geotextile.

1.3 QUALITY ASSURANCE

- A. Material and installation must be in accordance with the Order of Conditions issued by the Conservation Commission.

PART 2 PRODUCTS

2.1 MATERIAL

- A. Tubular Sediment Barrier: Tubular netting filled with water permeable compost material meeting the following requirements:
 - 1. Compost:
 - a. Derived from a well-decomposed source of organic matter.
 - b. Free of weeds, refuse, contaminants or other materials toxic to plant growth. Non-composted products will not be accepted.
 - 2. Tubular Netting:
 - a. One continuous barrier.
 - b. Diameter per Drawings.
 - c. Equal to the following:
 - 1) Silt Soxx by Filtrexx
 - 2) Silt Sock
 - 3) FilterMitt by Phase II Stormwater Products, Inc.
- B. Erosion Control Blanket: Short term (one year) 100% natural and biodegradable blanket and weave material. Manufacturers:
 - 1. American Excelsior Company Curlex NetFree

2. East Coast Erosion Control ECS-2B (Double net).
 3. ACF EarthShieldTMCM400 is a woven
 4. North American Green Bionet 125BN.
 5. Approved equal.
- C. Erosion Control Turf Reinforcement Matting (TRM): A permanent turf reinforcement mat consisting of a matrix of ultraviolet stabilized, 100% polypropylene fibers stitched between two ultraviolet-stabilized synthetic nets. Equal to:
1. American Excelsior - RECYCLEX®TRM – V
 2. North American Green EroNet™ P300®
 - a. 5.0 lb., UV-stable polypropylene top net, 100% polypropylene fiber matrix, 3.0 lb., UV-stable polypropylene bottom net
 - b. Section 713.18.
 3. ACF Environmental ECP-2 10 oz.™ Polypropylene Turf Reinforcement Mat
 - a. Uniformly distributed 100% polypropylene fiber and two medium weight polypropylene nets securely sewn together with UV stabilized thread.
 4. LANDLOK®435 turf reinforcement mat(TRM)
- D. Catchbasin Inserts: permeable geotextile fabric that mounts under the grate of catchbasins. Equal to:
1. ACF Environmental Silt Sack
 2. UltraTech International, Inc. Ultra-Drain Guard
 3. Enpac 1341 Catch Basin Insert
 4. Temporary vegetative cover for graded areas must be undamaged, air dry threshed straw free of undesirable weed seed.
 5. Spray-applied bonded fiber matrix.
- E. Seeding Materials
1. Seeding and Soil Supplements as specified in Section 32 92 19.
- F. Bonded Fiber Matrix: A hydraulically applied slurry consisting of long strand wood fibers, organic tackifiers and bonding agents, when dry forms a continuous erosion control blanket bonded to the soil surface. Equal to:
1. Geoperm Bonded Fiber Matrix
 2. Mat, Inc. Soil Guard
 3. Profile Products Flexterra

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify compacted subgrade, granular base, and/or stabilized soil is acceptable and ready to support devices and imposed loads.
- B. Verify gradients and elevations of base or foundation for other work are correct.

3.2 PREPARATION

- A. Install control measures prior to construction to prevent erosion, siltation and sedimentation of construction areas, adjacent areas and off-site areas in the following work areas:
 - 1. Soil stockpiles, storage and staging areas;
 - 2. Cut and fill slopes and other stripped and graded areas;
 - 3. Constructed and existing swales and ditches;
 - 4. Bioretention areas, detention ponds, infiltration basins and other stormwater controls.
 - 5. As indicated on Drawings
- B. Provide additional means of erosion and sediment control as required for continued or unforeseen erosion problems.

3.3 GENERAL

- A. Install and maintain site erosion and sediment controls as indicated on Drawings.
- B. Remove all temporary erosion controls at the end of construction.

3.4 TUBULAR SEDIMENT BARRIER

- A. See Drawings and manufacturer's recommendations for installation.
- B. Installed on the perimeter of the site and/or along resource areas as shown in the Drawings.

3.5 SITE STABILIZATION

- A. Incorporate erosion control devices indicated on Drawings into the Project at the earliest practicable time.
- B. Construct, stabilize and activate erosion controls before site disturbance within tributary areas of those controls.
- C. Do not exceed 35 feet height for stockpile(s) and waste pile(s). Slope stockpile(s) sides at 2:1 or flatter.
- D. Provide appropriate temporary stabilization of any disturbed area on which activity has ceased and which will remain exposed for more than 14 days.
 - 1. Provide temporary seed mix with application rates according to the State of Massachusetts DOT Standard Specifications.
 - a. Water the seeded areas as required until satisfactory establishment.
 - 2. During non-germinating periods, apply mulch at recommended rates.
- E. Provide permanent stabilization of disturbed areas which are either at finished grade or will not be disturbed within one year in accordance with permanent seeding specifications or as indicated on Drawings with one of the following:
 - 1. Application of Bonded Fiber Matrix hydroseed seed mix as specified.
 - 2. Placement of erosion control blanket as indicated on Drawings.

F. Stabilize diversion channels, sediment traps, and stockpiles immediately.

3.6 SLOPE STABILIZATION (SLOPES OF 4:1 OR GREATER)

A. Do not leave disturbed areas and slopes unattended or exposed for excessive periods of time such as the inactive winter season. Provide appropriate stabilization practices as indicated on Drawings on disturbed area as soon as possible, but not more than 14 days after the construction activity in that area has temporarily or permanently ceased.

B. Reinforce temporary areas having a slope greater than 4:1 with erosion control blankets, straw waddle or approved equivalent until the site can be properly stabilized.

C. Provide permanent slope stabilization immediately after the placement of topsoil. Provide permanent stabilization as indicated on Drawings with one of the following:

1. Apply of hydroseed seed mix as specified.
2. Application of Bonded Fiber Matrix hydroseed seed mix as specified.
3. Placement of erosion control blanket as indicated on Drawings.

D. Apply of hydroseed seed mix as specified.

3.7 EROSION CONTROL BLANKET

A. As indicated on Drawings and or manufacturer's recommendations for installation.

3.8 CATCHBASIN INSERTS

A. As indicated on Drawings and/or manufacturer's recommendations for installation.

3.9 FIELD QUALITY CONTROL AND CLEANING

A. Inspect erosion and sediment control devices and stabilized slopes on a weekly basis and after each rainfall event of .25 inch or greater. Make necessary repairs of identified problems within 24 hours to ensure erosion and sediment controls are in good working order. Reset or replace materials as required.

B. When field visits indicate Work does not meet specified requirements, repair and/or replace Work.

C. Any deviation from the requirements must be approved by the Engineer.

D. When sediment accumulation in sedimentation structures has reached a point one-third depth of sediment barrier or device, remove and dispose of sediment.

E. Do not damage structure or device during cleaning operations.

F. Do not permit sediment to erode into construction or site areas or natural waterways.

G. Clean channels when depth of sediment reaches approximately one half channel depth.

3.10 PROTECTION

- A. Do not permit construction traffic over stabilized areas.
- B. Protect Project site stabilization from elements, flowing water, or other disturbance until vegetation established.

END OF SECTION

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SECTION 31 37 00 – RIPRAP AND ROCK LINING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Rock or Riprap placed loose.
 - 2. Riprap placed in bags.
- B. Related Sections:
 - 1. Section 31 20 00 – Earthmoving.
 - 2. Section 32 11 23 - Aggregates Base Course.
 - 3. Section 33 41 13 – Storm Drainage Piping.

1.2 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data for riprap bags, binder and geotextile fabric.
- C. Samples: Submit sample of River rock, riprap aggregate.
- D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.3 QUALITY ASSURANCE

- A. Furnish each aggregate material from single source throughout the Work.

PART 2 PRODUCTS

2.1 MATERIALS

- A. River rock: Naturally rounded stone, inch minimum and maximum size, as indicated on the Drawings inch maximum size.
- B. Riprap: Native type; broken stone irregular shaped rock; solid and nonfriable; inch minimum and maximum size, as indicated on the Drawings inch maximum size.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions and slope before starting work.
- B. Do not place rock, riprap, or riprap bags over frozen or spongy subgrade surfaces.

3.2 PLACEMENT

- A. Place geotextile fabric over substrate, lap edges and ends.
- B. Place rock and riprap at culvert pipe ends, and spillways as indicated on Drawings.
- C. Installed Thickness: As indicated on Drawings.
- D. Place rock evenly and carefully over bagged riprap to minimize voids, do not tear bag fabric, place bags and rock in one consistent operation to preclude disturbance or displacement of substrate.
- E. After placement, spray with water to moisten bagged mix. Keep bagged mix moist for 24 hours.

3.3 SCHEDULES

- A. Culvert Pipe Ends: Bagged riprap, placed one layer thick, 6 inch average thickness, concealed with topsoil fill.
- B. Sloped Grade At Retaining Wall: Individual riprap units, 6 inch thickness; placed prior to finish topsoil.

END OF SECTION

SECTION 32 11 23 - AGGREGATE BASE COURSES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Aggregate subbase.
 - 2. Aggregate base course.

- B. Related Sections:
 - 1. Section 31 20 00 - Earthmoving
 - 2. Section 31 37 00 - Riprap and Rock Lining
 - 3. Section 32 12 16 - Asphalt Paving
 - 4. Section 03 30 00 - Cast in Place Concrete Paving
 - 5. Section 33 05 13 - Manholes and Structures
 - 6. Section 33 14 17 - Site Water Utility Laterals
 - 7. Section 33 31 00 - Sanitary Sewerage Piping.
 - 8. Section 33 41 13 - Storm Drainage Piping.

1.2 REFERENCES

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO M147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses.
 - 2. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
 - 3. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.

- B. ASTM International:
 - 1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - 2. ASTM D448 - Standard Classification for Sizes of Aggregate for Road and Bridge Construction
 - 3. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - 4. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
 - 5. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
 - 6. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
 - 7. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).
 - 8. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

9. ASTM D2940 - Standard Specification for Graded Aggregate Material for Bases or Subbases for Highways or Airports.
10. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
11. ASTM D4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data:
 1. Submit data for geotextile fabric and herbicide.
- C. Samples: Submit, in air-tight containers, 10 lb. sample of each type of aggregate fill to testing laboratory.
- D. Materials Source: Submit name of aggregate materials suppliers.
- E. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

- A. Furnish each aggregate material from single source throughout the Work.

PART 2 PRODUCTS

2.1 AGGREGATE MATERIALS

- A. Subbase Aggregate: ASTM D2940; graded type.

Sieve Size	Percent Passing
2 inches	100
No. 4	30 to 60
No. 200	0 to 12

- B. Base Aggregate: ASTM D2940; graded type.

Sieve Size	Percent Passing
2 inches	100
1-1/2 inches	95 to 100
3/4 inches	70 to 92
3/8 inches	50 to 70

No. 4	35 to 55
No. 30	12 to 25
No. 200	0 to 8

- C. Crushed Stone: durable crushed rock consisting of angular fragments, free from a detrimental quantity of thin, flat, elongated pieces or durable crushed gravel stone obtained by artificial crushing of boulders or fieldstone. The crushed stone must be free from clay, loam, or deleterious material.

Crushed Stone to conform to the following gradations:

Sieve Size	Percent Passing By Weight	
	1/2-Inch Stone	3/4-Inch Stone
1 inch	---	100
3/4 inch	---	90-100
5/8 inch	100	---
1/2 inch	85-100	10-50
3/8 inch	15-45	0-20
No. 4	---	0-5
No. 8	0-5	---
Sieve Size	Percent Passing By Weight	
	1-1/2-Inch Stone	2-Inch Stone
2 inch	100	90-100
1-1/2 inch	95-100	---
1-1/4 inch	---	25-50
1 inch	35-70	---
3/4 inch	0-25	0-15
1/2 inch	---	---

2.2 FINE AGGREGATE MATERIALS

- A. Fine Aggregate Type (Sand): Natural river or bank sand; washed; free of silt, clay, loam, friable or soluble materials, and organic matter; graded in accordance with ASTM C136; within the following limits:

Sieve Size	Percent Passing
No. 4	95-100
No. 16	50-85
No. 30	25-60
No. 50	10-30
No. 100	0-10
No. 200	0

2.3 SOURCE QUALITY CONTROL

- A. Coarse Aggregate Material - Testing and Analysis: Perform in accordance with ASTM D698. ASTM D1557. AASHTO T180. ASTM D4318. ASTM C136.
- B. Fine Aggregate Material - Testing and Analysis: Perform in accordance with ASTM D698. ASTM D1557. AASHTO T180. ASTM D4318. ASTM C136.
- C. When tests indicate materials do not meet specified requirements, change material and retest.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements {01300 - Administrative Requirements}: Verification of existing conditions before starting work.
- B. Verify compacted substrate is dry and ready to support paving and imposed loads.
 - 1. Proof roll substrate in minimum two perpendicular passes to identify soft spots.
 - 2. Remove soft substrate and replace with compacted fill as specified in Section 31 23 23.
- C. Verify substrate has been inspected, gradients and elevations are correct.

3.2 PREPARATION

- A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.
- B. If fill is required, compact subgrade soil in accordance with Section 31 20 00 .
- C. Excavate sandy loam and loamy sand topsoil from areas to be paved prior to subbase installation.
- D. Do not place fill on soft, muddy, or frozen surfaces.

3.3 AGGREGATE PLACEMENT

- A. Where required, install geotextile fabric over subgrade in accordance with manufacturer's instructions.
 - 1. Lap ends and edges minimum 6 inches.
 - 2. Anchor fabric to subgrade when required to prevent displacement until aggregate is installed.
- B. Spread aggregate over prepared substrate to total compacted thickness indicated on Drawings.
- C. Roller compact aggregate to 95 percent maximum density.

- D. Level and contour surfaces to elevations, profiles, and gradients indicated on Drawings.
- E. Roadway Shoulders: Place shoulders along edges of subbase and base course to prevent lateral movement. Construct shoulders, at least 12 inches wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to 95 percent of maximum density.
- F. Add small quantities of fine aggregate to coarse aggregate when required to assist compaction.
- G. Maintain optimum moisture content of fill materials to attain specified compaction density.
- H. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.4 TOLERANCES

- A. Maximum Variation From Flat Surface: 1/4 inch measured with 10 foot straight edge.
- B. Maximum Variation From Thickness: 1/4 inch.
- C. Maximum Variation From Elevation: 1/2 inch.

3.5 FIELD QUALITY CONTROL

- A. Perform compaction testing in accordance with ASTM D1556. AASHTO T180.
- B. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- C. Frequency of Tests: One test for every 1000 square yards of each layer compacted aggregate.

3.6 COMPACTION

- A. Compact materials to 98 percent of maximum density as determined from test strip, in accordance with ASTM D2940.

END OF SECTION

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SECTION 32 12 16 - ASPHALT PAVING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Asphalt materials.
 - 2. Aggregate materials.
 - 3. Asphalt paving base course, binder course, and wearing course.
 - 4. Asphalt paving overlay for existing paving.
 - 5. Surface slurry.
 - 6. Asphalt berm (Cape Cod berm).
 - 7. Extruded asphalt curb.

- B. Related Requirement:
 - 1. Section 31 20 00 - Earth Moving
 - 2. Section 32 17 23 - Pavement Markings
 - 3. Section 33 05 13 - Manholes and Structures

1.2 REFERENCE STANDARDS

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO M17 - Standard Specification for Mineral Filler for Bituminous Paving Mixtures.
 - 2. AASHTO M29 - Standard Specification for Fine Aggregate for Bituminous Paving Mixtures.
 - 3. AASHTO M140 - Standard Specification for Emulsified Asphalt.
 - 4. AASHTO M208 - Standard Specification for Cationic Emulsified Asphalt.
 - 5. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.
 - 6. AASHTO M320 - Standard Specification for Performance-Graded Asphalt Binder.
 - 7. AASHTO M324 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
 - 8. AASHTO MP1a - Standard Specification for Performance-Graded Asphalt Binder.

- B. Asphalt Institute:
 - 1. AI MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot- Mix Types.
 - 2. AI MS-2 – Asphalt Plant Manual
 - 3. AI MS-19 - Basic Asphalt Emulsion Manual.
 - 4. AI SP-2 - Superpave Mix Design.

- C. U.S. Army Corp OF Engineers
 - 1. UN-13 (CE MP-ET) – Hot Mix Asphalt Handbook

- D. ASTM International:
 - 1. ASTM C1371-2004a - Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers.

2. ASTM C1549-2004 - Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.
3. ASTM D242 - Standard Specification for Mineral Filler for Bituminous Paving Mixtures.
4. ASTM D692 - Standard Specification for Coarse Aggregate for Bituminous Paving Mixtures.
5. ASTM D946 - Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction.
6. ASTM D977 - Standard Specification for Emulsified Asphalt.
7. ASTM D1073 - Standard Specification for Fine Aggregate for Bituminous Paving Mixtures.
8. ASTM D1188 - Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples
9. ASTM D2027 - Standard Specification for Cutback Asphalt (Medium-Curing Type).
10. ASTM D2397 - Standard Specification for Cationic Emulsified Asphalt.
11. ASTM D2726 - Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures.
12. ASTM D2950 - Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods.
13. ASTM D3381 - Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction.
14. ASTM D3515 - Standard Specification for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
15. ASTM D3549 - Standard Test Method for Thickness or Height of Compacted Bituminous Paving Mixture Specimens.
16. ASTM D3910 - Standard Practices for Design, Testing, and Construction of Slurry Seal.
17. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
18. ASTM E408-1971(1996)e1 - Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques.
19. ASTM E903-1996 - Standard Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres.
20. ASTM E1918-1997 - Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field.
21. ASTM E1980-2001 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures
- B. Product Data:
 1. Submit product information for asphalt and aggregate materials.
 2. Submit mix design with laboratory test results supporting design.
 - a. Design mix submittal to follow the format indicated in the Asphalt Institute Manual MS-2, Marshall Stability Method; and include the following:
 - 1) Type/name of the mix.
 - 2) Gradation analysis.
 - 3) Grade of asphalt cement used

- 4) Marshall Stability (lbs.).
- 5) Flow and effective asphalt content (percent).

1.4 QUALITY ASSURANCE

- A. Mixing Plant: Conform to State of standard.
- B. Obtain materials from same source throughout.
- C. Perform work within public rights-of-way in accordance with the rules, regulations and requirements of the Public Agency having control and ownership of such rights-of-way.

1.5 QUALIFICATIONS

- A. Installer: Company specializing in performing work of this section.

1.6 AMBIENT CONDITIONS

- A. Do not place asphalt mixture between November 1 and March 1.
- B. Do not place asphalt mixture when ambient air or base surface temperature is less than 40 degrees F, or surface is wet or frozen.
- C. Apply tack coat only when the ambient temperature is above 40°F, and when the temperature has been above 35°F for 12 hours immediately prior to application. Do not apply when base is wet, contains excess moisture, or during rain.
- D. The required temperature of the bituminous pavement mixture, within a tolerance of plus or minus 15°F, when delivered at the site, will be governed by the temperature of the base upon which the mix is placed, as follows:

Base Temperature in Degrees F	Required Material Temperature in Degrees F For Course Thickness in Inches			
	1	1-1/2	2	3 and Greater
35-40	-	305	295	280
41-50	310	300	285	275
51-60	300	295	280	270
61-70	290	285	275	265
71-80	285	280	270	265
81-90	275	270	265	260
91 & over	270	265	260	255

- E. Place asphalt mixture when temperature is not more than 15 degrees F less than initial mixing temperature.

PART 2 PRODUCTS

2.1 ASPHALT PAVING

- A. Asphalt Cement: Comply with AASHTO M-226/ASTM D 3381; Table 2 for grades AC-10, AC-20, or AC-30, AR-8000, viscosity grade, depending on local mean annual air temperature, as follows:

Temperature Condition	Asphalt Grades
Cold, mean annual air temperature < 7 degrees C) 45 degrees F)	AC-10 85/100 pen.
Warm, mean annual air temperature Between 7 degrees C (45 degrees F) And degrees C (75 degrees F)	AC-20 60/70 pen.
Hot, mean annual air temperature > 24 degrees C (75 degrees F)	AC-30

1. Tack Coat: AASHTO M208 ASTM D2397; SS-1h, CSS-1, or CSS-1h; diluted emulsified asphalt, one part water to one part emulsified asphalt setting type.
2. Reclaimed Asphalt Pavement (RAP): Processed material obtained by milling or full depth removal of existing asphalt paving.

B. Aggregate Materials:

1. Fine Aggregate:
 - a. 100% Natural sand
 - b. 100% Stone sand
 - c. A blend of natural sand and stone sand
 - d. The fine aggregate, as delivered to the mixer, must meet the following gradation requirement:

<u>Sieve</u>	<u>Percent Passing</u>	<u>Minimum</u>	<u>Maximum</u>
3/8 inch	95		100
No. 8	70		95
No. 50	20		40
No. 200	2		16

- e. In the fine aggregate sieve analysis (passing No. 8), the amount between two successive sieves (No. 16, 30, 50, and 100) not to exceed 33 percent of the fine aggregate total.

C. Reclaimed Asphalt Pavement (RAP): Provide material obtained from the highways or streets by crushing, milling, or planing existing hot mix asphalt pavements.

1. Proportion of RAP to virgin aggregate for base course mixtures and intermediate course mixtures maximum amounts:
 - a. 40% for drum mix plants
 - b. 20% for modified batch plants.

- c. 10% for surface course mixtures.

2.2 MIXES

- A. Use dry material to avoid foaming. Mix uniformly.
- B. Asphalt-Aggregate Mixture: A minimum stability based on a 50-blow Marshall Method, complying with AASHTO T245 (ASTM D 1559), of 1200 lb. with a flow between 8 and 16. Provide the aggregate gradation and bitumen content, as follows:
 1. Air Voids: 3-5%.
 2. Allowable variance of percent bitumen by weight of total mix: +0.4 percent.
 3. The maximum allowable percentage of wear per Abrasion Test (AASHTO-T96): 35 percent.
 4. Sieve analysis of mix percent by weight passing as follows:

<u>Sieve</u>	<u>Standard Top Course</u>	<u>Dense Top Course</u>	<u>Modified Top Course</u>	<u>Binder Course</u>	<u>Base Course</u>	<u>Dense Mix</u>	<u>Sand Mix</u>
2 inch					100		
1 inch			100	100	55-80		
3/4 inch			95-100	80-100			
5/8 inch	100						
1/2 inch	95-100	100	75-90	65-80	40-65	100	
3/8 inch	80-90	90-100	60-75			80-100	100
No. 4	50-76	50-76	40-60	48-65	20-45	55-80	80-100
No. 8	37-54	37-54	32-44	37-51	15-33	48-63	64-85
No. 16	26-40	26-40	24-34			36-49	46-68
No. 30	17-29	17-29	16-26	17-30	8-17	24-38	26-50
No. 50	10-21	10-21	8-18	10-22	4-12	14-27	13-31
No. 100	5-16	5-16	4-13			6-18	7-17
No. 200	2-7	2-7	2-7	0-6	0-4	4-8	3-8
Bitumen	5.5-7.0	5.5-7.0	5.5-6.5	5-6	4-5	7-8	7-8

- C. Hot-Mix Asphalt: Dense, hot-laid, hot-mix asphalt plant mixes approved by MASSDOT Specifications and designed according to procedures in AI MS-2, "Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types".

2.3 SOURCE QUALITY CONTROL

- A. Submit proposed mix design mix for review prior to beginning of Work.

- B. Hot-Mix Asphalt: Dense, hot-laid, hot-mix asphalt plant mixes approved by MASSDOT Specifications and designed according to procedures in AI MS-2, "Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types".

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements {01700 - Execution Requirements}: Requirements for installation examination.
- B. Verify utilities indicated under paving are installed with excavations and trenches backfilled and compacted.
- C. Verify compacted subbase is dry and ready to support paving and imposed loads.
 - 1. Proof roll subbase with heavy pneumatic-tired equipment in minimum two perpendicular passes to identify soft spots.
 - 2. Remove soft subbase and replace with compacted fill as specified in Section 31 11 23.
- D. Verify gradients and elevations of base are correct.
- E. Verify manhole frames are installed in correct position and elevation.
- F. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- G. Proceed with paving only after the Engineer inspects and approves the finished subbase and base and unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Coordinate paving operations with all other work, especially underground utility construction, to prevent covering up unfinished or uninspected work and loss of time or labor by improper scheduling.
- B. Apply a uniform coating of an approved tack coat material on vertical surfaces of structures and existing pavement surfaces in contact with new bituminous pavement. Prevent splattering or staining of exposed surfaces above finished grade during the application. Clean, repair or replace exposed surfaces that are stained as a result of incorrect application.
- C. Thoroughly clean with a self-propelled sweeper all existing paved surfaces to be overlaid. Broom sweep until areas inaccessible by power sweeper.

3.3 DEMOLITION

- A. Saw cut and notch existing paving as indicted on Drawings.

- B. Clean existing paving to remove foreign material, excess joint sealant and crack filler from paving surface.
- C. Repair surface defects in existing paving to provide uniform surface to receive new paving.

3.4 COLD MILLING

- A. Clean existing pavement surface of loose and deleterious material immediately before cold milling.
- B. Remove existing asphalt pavement by cold milling to grades and cross sections as indicated on Drawings.
- C. Perform milling by machinery suitable for the type and size of project.

3.5 INSTALLATION

- A. Install pavements in the location and to the grades as indicated on Drawings.
- B. Install pavement courses at thickness as indicated on Drawings.
- C. Subbase:
 - 1. Aggregate Subbase: Install as specified in the Drawings.
- D. Primer:
 - 1. Apply primer in accordance with MassDOT standards.
- E. Tack Coat:
 - 1. Apply tack coat in accordance with MassDOT standards.
- F. Single Course Asphalt Paving:
 - 1. Install Work in accordance with MassDOT Standards.
 - 2. Place asphalt within 24 hours of applying primer or tack coat.
 - 3. Place asphalt wearing course to thickness indicated on Drawings.
 - 4. Compact paving by rolling to specified density. Do not displace or extrude paving from position. Hand compact in areas inaccessible to rolling equipment.
 - 5. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks.
- G. Double Course Asphalt Paving:
 - 1. Place asphalt binder course within 24 hours of applying primer or tack coat.
 - 2. Place binder course to thickness indicated on Drawings.
 - 3. Place wearing course within 24 hours of placing and compacting binder course. When binder course is placed more than 24 hours before placing wearing course, clean surface and apply tack coat before placing wearing course.
 - 4. Place wearing course to thickness indicated on Drawings.
 - 5. Compact each course by rolling to specified density. Do not displace or extrude paving from position. Hand compact in areas inaccessible to rolling equipment.

6. Perform rolling with consecutive passes to achieve even and smooth finish, without roller marks.

H. Meeting Existing Pavements

1. Sawcut the existing pavements to produce a uniform, smooth joint surface. Sawcut neat, straight, even lines with straight vertical edges free from irregularities. Do not damage the pavement to remain.
2. Full-Depth Pavement: Sawcut to the full depth of the pavement prior to placement of any new pavement. Apply tack coat to the sawcut surface immediately prior to the installation of the new abutting bituminous pavement material to provide a bond between the old and new pavement. The new compacted pavement surface must be finished flush with the abutting pavement.
3. Bituminous Pavement Overlays: Sawcut existing pavement to a minimum depth of one and one half inches. Prior to completing overlays, taper existing pavements by grinding one-half inches deep at the sawcut face and taper to zero inches deep at the following distances:
 - a. Six feet from the sawcut face in driveways and parking areas.
 - b. Twelve feet in roadways.

Clean and apply an asphalt emulsion tack coat immediately prior to placement of the overlay. The new compacted surface at the joint must be flush with the abutting existing pavement.

I. Surface Slurry

1. Install uniform thickness surface slurry over existing paving in accordance with ASTM D3910.
2. Allow slurry to cure.
3. Roll paving to achieve uniform surface.

J. Asphalt Berm

1. Clean surface of all loose and deleterious material.
2. Apply tack coat in accordance with the Drawings and MassDOT requirements.
3. Installed as indicated on Drawings.
4. Install asphalt berm with a self-propelled automatic berm machinery.
5. Do not place asphalt berm on wet surfaces, or when weather conditions otherwise prevent the proper handling or finishing of asphalt mixtures.
6. Backfill the back of the berm with topsoil within 24 hours after placement.

3.6 TOLERANCES

- A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.
- B. Scheduled Compacted Thickness: Within 1/4 inch.
- C. Variation from Indicated Elevation: Within 1/2 inch.

3.7 FIELD QUALITY CONTROL

- A. Asphalt Paving Mix Temperature: Measure temperature at time of placement.

- B. Owner to provide and Independent Testing Laboratory to perform testing of in-place bituminous pavement courses for compliance with requirements for thickness, density and surface smoothness. Top and base courses will be randomly tested with a calibrated nuclear gauge or Engineer approved equal. If density tests are found to be not in conformance with the specifications, additional core samples are to be provided at the same interval listed above for the paved surface for further testing. Pavement samples will be tested for conformance with the mix design. If additional core samples are found to be not in conformance with the specifications, remove and replace pavement at no expense to the Owner. Fill core samples with bituminous or cement concrete.
- C. Compaction: Perform the field density test for in-place materials by examination of field cores or nuclear gauge testing and provide a minimum compacted density of 95% of laboratory Marshall Density in accordance with one of the following standards:
 1. Bulk Specific Gravity and Density of Compacted Bituminous Mixture Using Paraffin-Coated Specimens: ASTM D-1188.
 2. Bulk Specific Gravity of Compacted Bituminous Mixtures Using Saturated Surface Dry Specimens: ASTM D-2726.
- D. Remove and replace areas of insufficient compaction in compliance with the specifications.

3.8 PROTECTION

- A. No vehicular traffic or loads permitted on the newly completed pavement until adequate stability has been attained, the material has cooled sufficiently to prevent distortion or loss of fines, and the pavement has achieved a maximum temperature of 140 degrees F.
- B. If the climatic or other conditions warrant it, the period of time before opening to traffic may be extended at the discretion of the Engineer.

3.9 FINAL CLEAN UP

- A. Clean all pavement surfaces with proper sweeping machinery.
- B. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an approved landfill.

3.10 ATTACHMENTS

- A. Paving at Truck Ramp and Garbage Area: Single course of 3-1/2 inch compacted thickness, with surface slurry.
- B. Paving at Parking Areas: Two courses; binder course of 2-1/2 inch compacted thickness and wearing course of 1 inch compacted thickness.
- C. Paving at Rear Bus Loading Area: Thickness and compaction of subbase to support vehicles up to 30,000 lb.
- D. Paving Front Sidewalks: Thickness and compaction of subbase to support moderate pedestrian traffic.

3.11 SCHEDULE – MIX USES

A. Mix Uses:

1. Top Course: Residential streets
2. Dense Top Course: Standard for non-residential commercial, steep grades, high traffic
3. Modified Top Course - Trucking terminals, Interstate Highways, 20,000 VPD
4. Binder Course: Standard for all pavements
5. Base Course: Used for heavy duty pavements when specified by ENGINEER
6. Dense Mix: Parking lots, sidewalks, bike paths, and driveways
7. Sand Mix: Playgrounds, tennis courts

END OF SECTION

SECTION 32 12 36 COLOR COATING

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

- A. Attention is directed to the General Conditions of the Contract, all Divisions of the Specifications and the Contract Drawings, all of which apply to this section.
- B. Examine and coordinate all Contract Drawings and other section of the specifications for requirements which affect work of this section whether or not such work is specifically mentioned in this section. Coordinate work with other trades to assure the steady progress of all work under the Contract. The Contractor shall refer to the Contract Documents for all new work and coordinate how it relates to this Section.

1.02 SCOPE OF WORK

- A. Work under this Section shall include all labor, materials, services, equipment, transportation and accessories and the performance of all operations necessary to complete the work of this Section, as indicated on the Contract Drawings and/or as specified herein.
- B. The work shall include, but is not limited to, the following:
 - 1. Color coating and line marking of basketball court, pickleball court, and splashpad.

1.03 RELATED SECTIONS

- A. Section 32 12 16: Asphalt Paving

1.04 SUBMITTALS

- A. Submit the following in accordance with the requirements of the General Conditions:
 - 1. Paint: Submit manufacturer's product data demonstrating specification compliance for line paint, and fortified and non-fortified paint for area painting.

Samples: Submit color samples of manufacturer's full range of standard colors for final selection by the Owner.
 - 2. Submit manufacturer's directions for application, including permissible temperature for application and storage, drying time, coating thickness and application rates, and period of curing time prior to application to new bituminous concrete.
 - 3. Submit installer name and evidence of qualifications.

1.05 REFERENCES

- A. Massachusetts Highway Department Standard Specifications for Highways and Bridges, 1988 edition.

1.06 QUALIFICATIONS

- A. Installer shall be from a company with at least 5 years experience in commercial painting.

1.07 REGULATORY REQUIREMENTS

- A. Materials and handling of paint shall conform to all environmental and OSHA regulations.

1.08 DELIVERY STORAGE AND HANDLING

- A. All packaged materials shall be delivered to the site in original unopened containers clearly indicating manufacturer name, brand name, and other identifying information. Paint shall be stored within the temperature ranges indicated by the manufacturer.

1.09 ENVIRONMENTAL REQUIREMENTS

- A. Paint shall be applied within the temperature ranges recommended by the paint manufacturer.

PART 2 - MATERIALS

2.01 PAINT

- A. Paint for marking lines and shall be factory-mixed non-bleeding paint specifically formulated for marking asphaltic concrete surfaces for line painting.
 - 1. Paint shall be 100 percent acrylic latex emulsion type, containing no alkyds, butadiene styrene, or vinyls and shall be thinned with water only. The paint shall be suitable for use over all types of bituminous surfaces, including weathered bituminous. When applied over bituminous concrete it shall not cause lifting, cracking, peeling, or other damage to the pavement. Thicknesses of coats shall be in accordance with manufacturer's recommendations. Acceptable manufacturers California Paints, Neyra Industries, The Glidden Co., or equal.
 - a) Colors shall be as noted on the Drawings.
 - 2. Paint for area color coating shall be a fortified 100% acrylic latex emulsion with silica additive. Acceptable manufacturers California Paints, Nova Sport, Dalton Enterprises, Inc., or equal. Paint shall contain no alkyds, butadiene styrene or vinyls and shall be thinned with water.

- a) Fortification shall be by addition of silica sand, pre-mixed at manufacturer's plant. No sand or silica shall be added to the emulsion in the field.
3. Finish coat shall be as described above except that it shall be a non-fortified acrylic latex emulsion.
4. Color: Pigment dispersions in the color coating are to be of the best quality chrome oxides so as to obtain a permanent true color. Colors for area color coating shall be:
5. Colors for court shall be as shown on the Drawings.

PART 3 - EXECUTION

3.01 APPLICATION - GENERAL

- A. Paint shall be applied according to manufacturer's instructions. Adhere to manufacturer's recommended curing period for new bituminous pavement prior to paint application which is generally a minimum of 28 days.
- B. Pavement surface should be dry and free of sand, grease, oil and other foreign substances prior to the application. The ambient air temperature is to be a minimum of 45 degrees Fahrenheit and rising at the start of paint application. Do not apply paint when rain is imminent.
- C. Thickness of each coat shall be as recommended by the manufacturer
- D. Paint shall be applied by brush, spray or roller, free of any fogging or overspray.

3.02 AREA PAINTING

- A. The entire Sport Court area is to be painted, as directed by the Landscape Architect and the Owner. Three (3) total colors may be used. Landscape Architect to supply final marking plan.
- B. The entire Splashpad areas is to be painted, as directed by the Landscape Architect and the Owner. Two (2) total colors may be used. Landscape Architect to supply final marking plan.
- C. Sweep and air clean area to be surfaced.
- D. Apply 4 (four) coats.
- E. Apply two coats of fortified surface paint at a rate of approximately .05 gallon per square yard per coat, minimum, with additional coats as necessary to cover previous design.

- F. Apply one coat of non-fortified finish paint at a rate of approximately .05 gallon per square yard.
- G. Apply final coat as per manufacturer's instructions.
- H. Apply line paint as described below.

3.03 LINE PAINTING

- A. Width of lines shall be 2".
- B. Lines shall be accurately located and marked by snapping a chalked line. All surfaces shall be thoroughly cleaned before the lines are painted thereon. The paint shall be applied accurately within the limits shown on the plans. All lines shall be clear and distinct with sharply defined edges. At least two (2) hours shall elapse between the painting of the first and second coats. Protect painted lines until cured.
- C. Edges of lines to be painted shall be masked prior to painting to insure sharp edges. Ragged lines will not be acceptable.
- D. Apply two coats of line paints in specified color.
- E. Remove masking tape and clean up work area.

3.04 GUARANTEE AND ACCEPTANCE

- A. Painted lines and surfaces shall be guaranteed for a period of one year from final acceptance against cracking, peeling, checking, or other defect. The Contractor will repair, re-coat or otherwise make satisfactory, any failed lines or areas, at no cost to the Owner.

END OF SECTION

SECTION 32 12 43 – PLANTABLE CONCRETE PAVEMENT

PART 1 GENERAL

1.1 SUMMARY

- A. Work shall consist of furnishing all material, labor, services and related items to complete the installation of Drivable Grass® a permeable, plantable and flexible concrete pavement system in accordance with these specifications.
- B. All notes on the plan that refer to “concrete paver system”, “paver swale”, or “drivable grass paver” will be built per Section 32 12 43 – Plantable Concrete Pavement.

1.2 RELATED SECTIONS

- A. Section 31 20 00 - Earth moving
- B. Section 32 92 00 – Lawns

1.3 REFERENCES AND STANDARDS

- A. ASTM D-422 - Particle Size Analysis
- B. ASTM D-698 - Laboratory Compaction Characteristics of Soil - Standard Proctor
- C. ASTM D-1557 - Laboratory Compaction Characteristics of Soil – Modified Proctor
- D. ASTM C-39/39M – Std. Test Method for Compressive Strength of Cylindrical Concrete Specimens
- E. ASTM C-33 Std. Spec. for Concrete Aggregates
- F. ASTM C31/ C31M Standard Practice for Making and Curing Concrete Test Specimens in the Field
- G. ASTM C 150 Std. Spec for Portland Cement
- H. ASTM C94 / C94M Std. Spec. for Ready – Mixed Concrete
- I. ASTM C 1157 Std. Performance Specification for Hydraulic Cement
- J. ASTM C595 Std. Spec. for Blended Hydraulic Cement
- K. ASTM C618 Std. Spec. for Coal Fly Ash and Raw or Calcined Natural Pozzolan for use in Concrete*
- L. ASTM C1611 / C1611M Std. Test Method for Slump Flow of Self-Consolidating Concrete
- M. ASTM C989 Std. Spec. for Ground Granulated Blast-Furnace Slag for use in Concrete and Mortars *
- N. ASTM C979 Std. Spec. for Pigment for Integrally Colored Concrete
- O. ACI 201 American Concrete Institute- Report on Durability
- P. ACI 211 American Concrete Institute- Std. Practice for Selecting Proportions for Normal, Heavy Weight, and Mass Concrete

* Denotes regional applicability

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures
- B. Product Data: Submit manufacturer’s product data, including installation instructions.
- C. Samples:
 - a. Submit sieve analysis for grading of bedding sand and base material

1.5 QUALITY ASSURANCE

- A. Prior to commencing the work of this section, verify the accuracy of layout and grading. Verify that all sub-grades, base course aggregate conditions, and subdrains are as specified. Notify the owner and / or engineer of any discrepancies and coordinate the correction of those discrepancies with other trades, as necessary.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site in manufacturer's original palletized configuration with labels clearly identifying product style number, color, name and manufacturer.
- B. Check all materials upon delivery to assure that the proper type, grade, color, and certification have been received.
- C. Store materials in clean, dry area in accordance with manufacturer's instructions.
- D. Protect all materials from damage due to jobsite conditions and in accordance with manufacturer's recommendations. Damaged materials shall not be incorporated into the work.

1.7 PROJECT CONDITIONS

- A. Review installation procedures and coordinate Drivable Grass® installation with other work around installation area.
- B. All adjacent hardscape and paving required by construction documents shall be completed prior to the installation of the Drivable Grass® paving mats.
- C. Gradients for Drivable Grass® paving mats can vary from flat to 12%. For steeper conditions, consult with manufacturer.
- D. Cold weather applications:
 - i. Coordinate maintenance contracts.
 - ii. Snowplow equipment operators should be educated about the underlying surface prior to beginning snow removal. Snowplow equipment should be fitted with teflon runners, which will help keep the snowplow blade from damaging the product.
 - iii. Do not use frozen materials or materials mixed or coated with ice or frost.
 - iv. Do not build in freezing conditions.
 - v. Ensure proper drainage to avoid standing freezing water in contact with paving mats.
 - vi. Do not use deicing agents that are known to damage concrete such as rock salt.
- E. Protect partially completed paving against damage from other construction traffic when work is in progress and until grass root system has had time to mature after 2 mowings. Projects using aggregate infill instead of planting are drivable upon completing infill.
- F. Areas adjacent to Drivable Grass® installation should be protected during construction.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Soil Retention Products, Inc., Corporate Office: 2501 State Street, Carlsbad, CA 92008. Phone: 760-966-6090 and 800-346-7995, fax: 760-966-6099, website: www.soilretention.com, e-mail: sales@soilretention.com.
- B. No substitutions permitted. For approved equal, equal field test data shall be submitted. Compressive strength results shall not be based on sand infilled lab tests.

2.2 PERMEABLE, FLEXIBLE, AND PLANTABLE PAVEMENT SYSTEM

- A. Permeable, Flexible, Plantable Pavement System: Drivable Grass®
 - a. Nominal Dimensions in inches (l x w x h) 24 x 24 x 1.5
 - b. Gross Area of Each Mat in square feet 4
 - c. Weight of Each Mat in pounds 45
 - d. Plantable Area in percent 60
 - e. Mats per pallet (each) 60
 - f. Area Covered per Pallet in square feet 240

- B. Color Buff/Tan
 - a. Flexibility (minimum radius of curvature in inches) 12
 - b. Concrete Compressive Strength @ 28 days in psi 5000
 - c. Propriety Grid Reinforcement Engineered Plastic

- C. Base Aggregate* –
 Double washed stone meeting gradation in Table 1 below.

Table 1
Gradation for Crushed Stone Base

Sieve Size	Percent Passing
2 in. (50 mm)	100
1 1/2 in. (37.5 mm)	95 to 100
1 in. (25.0 mm)	35 to 100
3/4 in. (19.0 mm)	0 to 25

- D. Bedding Course – Defined as the initial material directly beneath the Drivable Grass® mats. For non-planted applications, a 2” nominal sand shall be used. A uniform thickness of bedding between the base and the Drivable Grass® is required.
 - a. Sand shall be clean, non-plastic, and free from deleterious or foreign matter. The sand shall be sharp and manufactured from crushed rock. Do not use limestone screenings stone dust. The particles shall conform to the grading requirements shown below:

ASTM C33 CSA A23.1-M94

Sieve Size	Percent Passing
3/8 in. (9.5 mm)	100
No. 4 (4.75 mm)	95 to 100
No. 8 (2.36 mm)	85 to 100

No. 16 (1.18 mm)	50 to 85
No. 30 (0.600 mm)	25 to 60
No. 50 (0.300mm)	0 to 30
No. 100 (0.15mm)	2 to 10

E. Infill – Infill shall be the same as the bedding course (ASTM 33 sand).

2.3 GEOMEMBRANE LINER

- A. Black, PVC liner with a minimum thickness of 30 mils.
 - 1. The surface of the geomembrane must be free from pinholes or bubbles.
- B. The geomembrane raw materials must be manufactured of Ethylene and Propylene and be compounded and manufactured specifically for the intended purpose.
- C. The natural polyethylene resin without the carbon black must meet the requirements in Table 1. Carbon black should be added to the resin if the resin is not compounded for ultra-violet resistance.
- D. Supply the geomembrane in rolls with labels on each roll to identify the thickness of the material, the length and width of the roll, and name of manufacturer. The geomembrane liner roll quality control testing must meet the following requirements in Table 2.

Table 1. Resin Material Properties

Property	Test Method	HDPE Requirements
Density, g/ cc	ASTM D 4883, ASTM D 1505, or ASTM D 792	0.932 – 0.940
Melt Index, g/ 10 min.	ASTM D 1238 Condition E	<1.0

Table 2. Geomembrane Material Properties

Property	Test Method	Minimum Average Values	Testing Frequency (min.)
Thickness (mils) (smooth sheet) Minimum average Lowest individual of 10 readings	ASTM D 5199	20 +/- 1 mil	Per roll
Sheet Density, g/ cc	ASTM D 1505/D 792	1.2	200,000 lb.
Tensile Properties ¹	ASTM D 6693		20,000 lb.

1. Yield Strength, lb./in		58	
2. Break Strength, lb./in		73	
3. Yield Elongation, %		20%	
4. Break Elongation, %		20%	
2% Modulus (LLDPE only)	ASTM D 5323	N/A	Per each formulation
Tear Resistance, lb.	ASTM D 1004	8	45,000 lb.
Puncture Resistance, lb.	ASTM D 4833	45	45,000 lb.

1. Machine direction (MD) and cross machine direction (XMD) average values should be on the basis of 5 test specimens each direction. Yield elongation is calculated using a gauge length of 1.3 inches; Break elongation is calculated using a gauge length of 2.0 inches.
2. The yield stress used to calculate the applied load for the SP-NCTL test should be the mean value via MQC testing.
3. UV resistance is based on percent retained value regardless of the original HP-OIT value.

PART 3 EXECUTION

3.1 LINER INSTALLATION

- A. Embed liner to depth specified on the plans.
- B. Ensure surface is free of all protrusions or objects that may puncture the geomembrane.
- C. Key in liner 3" below finish grade before seeding.

3.2 SUBGRADE PREPARATION

- A. Vertical depth to accommodate structural section (if applicable) of base aggregate, bedding layer, and Drivable Grass[®] mat thickness.
- B. Excavate to the lines and grades shown on the construction drawings.
- C. Install any mow strips or curbs as specified.
- D. Proof roll foundation area as directed to determine if remedial work is required.
- E. Over-excavation and replacement of unsuitable subgrade soils with approved compacted fill shall be compensated as agreed upon with the Owner.
- F. Owner's representative shall inspect the subgrade and approve prior to placement of base material or fill soils.

3.3 INSTALLATION OF AGGREGATE BASE AND BEDDING LAYER

- A. Install and compact aggregate base as required by the contract drawings. The recommended base surface should be +/- 3/8" over a 10 ft. straight edge.
- B. Install, level to a uniform thickness, and compact bedding course upon which permeable, flexible and plantable pavement system will be placed.

3.4 INSTALL DRIVABLE GRASS[®] PAVEMENT SYSTEM

- A. Install permeable, flexible, and plantable pavement system in accordance with the manufacturer's guidelines.
- B. Install system to the line, grades and locations required by the contract documents.

- C. Install mats in one axial direction. Butt mats against each other leaving no significant gaps. Adjust mats as required to maintain good grid pattern alignment. For vehicular driving, a running bond pattern is recommended.
- D. Compact and seat the grids into the bedding course using a low-amplitude, 75-90 Hz plate compactor capable of at least 4,000 lbs. centrifugal compaction force. Use a fabric or pad between the compactor and concrete mats to prevent cracking or chipping.
- E.
- F. For crushed angular rock infills, ½" of sand should be used to fill the joints between the mats before the crushed angular rock is installed.

3.5 FILL SYSTEM WITH INFILL MATERIAL

- A. Infill for planted applications is to be comprised of the same material as the bedding course.
- B. Install system to the line, grades and locations required by the contract documents.
- C. Spread infill uniformly across the mats with a push broom. Leave the infill about ¼" below the concrete pad surface.

3.6 FIELD QUALITY CONTROL

- A. As a minimum, quality assurance should include observation of construction for general compliance with design drawings and specifications.
 - 1. Check final elevations for conformance to the drawings. Allow 1/8" to 1/4" above specified surface elevations to compensate for minor settlement.
 - 2. Lippage: No greater than 1/8 in. difference in height between concrete mats.

3.7 PROTECTION OF INSTALLED WORK

- A. The contractor shall be responsible for protecting work from damage due to subsequent construction activity on the site.

END OF SECTION

SECTION 32 14 13 CONCRETE UNIT PAVER

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes the following:
1. Concrete Pavers
 2. Joint Sand
 3. Setting Bed Sand
 4. Base Aggregate

1.02 REFERENCES

Note: Design street, industrial, port and airport pavement thicknesses in consultation with a qualified civil engineer, in accordance with established flexible pavement design procedures, LOCKPAVE[®] software, and in accordance with Interlocking Concrete Pavement Institute Technical Bulletins. Sample construction detail drawings are available from Unilock[®]. This specification may require modifications.

- A. ASTM International, latest edition:
1. C 33, Standard Specification for Concrete Aggregates.
 2. C 136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 3. C 140, Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
 4. C 144 Standard Specifications for Aggregate for Masonry Mortar.
 5. D 448, Standard Classification for Sizes of Aggregate for Road and Bridge Construction.
 6. C 936, Standard Specification for Solid Concrete Interlocking Paving Units.
 7. C 979, Standard Specification for Pigments for Integrally Colored Concrete.
 8. D 698 Test Methods for Moisture Density Relations of Soil and Soil Aggregate Mixtures Using a 5.5 lb (24.4 N) Rammer and 12 in. (305 mm) drop.
 9. D 1557 Test Methods for Moisture Density Relations of Soil and Soil Aggregate Mixtures Using a 10-lb (44.5 N) Rammer and 18 in. (457 mm) drop.
 10. C1645 Standard Test Method for Freeze-thaw and De-icing Salt Durability of Solid Concrete Interlocking Paving Units
 11. D 2940 Graded Aggregate Material for Bases or Subbases for Highways or Airports.
 12. D 4632, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
 13. D 4533, Standard Test Method for Index Trapezoidal Tearing Strength of Geotextiles
 14. D 4833, Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes and Related Products
 15. D 4491, Standard Test Method for Water Permeability of Geotextiles by Permittivity
 16. D 4751, Standard Test Method for Determining Apparent Opening Size of a Geotextile

1.03 SUBMITTALS

- A. Concrete Pavers:
 - 1. Samples for verification: Three representative full-size samples of each paver type, thickness, color and finish that indicate the range of color variation and texture expected upon project completion.
 - 2. Accepted samples become the standard of acceptance for the product produced.
 - 3. Test results from an independent testing laboratory for compliance of concrete pavers with ASTM C 936.
 - 4. Manufacturer's catalog product data, installation instructions, and material safety data sheets for the safe handling of the specified materials and products.

- B. Joint and Setting Bed Sand:
 - 1. Provide three representative one pound samples in containers of Joint Sand materials.
 - 2. Provide three representative one pound samples in containers of Setting Bed Sand materials.
 - 3. Test results from an independent testing laboratory for sieve analysis per ASTM C 136 conforming to the grading requirements of ASTM C 144.

- C. Polymeric Joint Sand:
 - 1. Test results from an independent testing laboratory for sieve analysis per ASTM C 136 conforming to the grading requirements of ASTM C 144.
 - 2. Samples for Initial Selection: Provide three representative samples in containers of Polymeric Joint Sand material, cured and dried, for color selection.
 - 3. Samples for Verification: Provide three one pound samples in containers of Polymeric Joint Sand.

- D. Base and Subbase Aggregate:
 - 1. Test results from an independent testing laboratory for sieve analysis per ASTM C 136.

- E. Paving Installation Contractor:
 - 1. Job references from a minimum of three projects similar in size and complexity. Provide Owner/Client/General Contractor names, postal address, phone, fax, and email address.

1.04 QUALITY ASSURANCE

- A. Utilize a Manufacturer having at least ten years of experience manufacturing concrete pavers on projects of similar nature or project size.

- B: Source Limitations:
 - 1. Obtain Concrete Pavers from one source location with the resources to provide products of consistent quality in appearance and physical properties.
 - 2. Obtain Joint and Setting Bed Sands from one source with the resources to provide materials and products of consistent quality in appearance and physical properties.

3. Obtain Polymeric Joint Sand from one source with the resources to provide materials and products of consistent quality in appearance and physical properties. C. Paving Contractor Qualifications:
 1. Utilize an installer having successfully completed concrete paver installation similar in design, material, and extent indicated on this project.
- C. Mockups:
 1. Install a 5 ft x 5 ft paver area per each paving pattern.
 2. Use this area to determine surcharge of the Setting Bed Sand layer, joint sizes, lines, laying pattern(s) and levelness. This area will serve as the standard by which the workmanship will be judged.
 3. Subject to acceptance by owner, mock-up may be retained as part of finished work.
 4. If mock-up is not retained, remove and dispose legally.

1.05 DELIVERY, STORAGE & HANDLING

- A. Deliver Concrete Pavers in manufacturer's original, unopened and undamaged container packaging with identification labels intact.
 1. Coordinate delivery and paving schedule to minimize interference with normal use of streets and sidewalks adjacent to paver installation.
 2. Deliver Concrete Pavers to the site in steel banded, plastic banded or plastic wrapped packaging capable of transfer by forklift or clamp lift.
 3. Unload Concrete Pavers at job site in such a manner that no damage occurs to the product or adjacent surfaces.
- B. Store and protect materials free from mud, dirt and other foreign materials.
- C. Prevent Joint and Setting Bed Sand from exposure to rainfall or removal by wind with secure, waterproof covering.
- D. Store Polymeric Joint Sand on elevated platforms, under a cover and/or in a dry location.

1.06 PROJECT/SITE CONDITIONS

- A. Environmental Requirements:
 1. Install Concrete Pavers only on unfrozen and dry Setting Bed Sand.
 2. Install Setting Bed Sand only on unfrozen and dry Base or Subbase Aggregate materials.
 3. Install Base or Subbase Aggregates only over unfrozen subgrade.
 4. Install Setting Bed Sand or Concrete Pavers when no heavy rain or snowfall are forecast within 24 hours.
- B. Weather Limitations for Polymeric Jointing Sand:
 1. Install Polymeric Joint Sand only when ambient temperature is above 40°F (5°C), under dry conditions with no rain forecast for 24 hours and when surface of pavement is completely dry.

1.07 CONCRETE PAVER OVERAGE AND ATTIC STOCK

- A. Provide a minimum of 5% additional material for overage to be used during construction.

- B. Contractor to provide 100 square feet of each product and size used to owner for maintenance and repair. Furnish Pavers from the same production run as installed materials.
- C. Manufacture to supply maintenance and reinstatement manuals for Concrete Paver units.

PART 2 PRODUCTS

2.01 CONCRETE PAVERS

- C. Basis-of-Design Product: The Concrete Paver shapes are based on the below or equal:
 - 1. Unilock, Umbriano 8"x16"x4" paver as manufactured by: Unilock, 35 Commerce Drive, Uxbridge, MA 01569
 - 2. Contact: Daniel Neviackas (508-341-4306)
 - 3. The specified products establish minimum requirements that substitutions must meet to be considered acceptable.
 - 4. To obtain acceptance of unspecified products, submit written requests at least 7 days before the Bid Date.
- D. Product requirements: Concrete Paver: Umbriano
 - 1. Finish: Umbriano
 - 2. Color: French Grey
 - 3. Edge: Micro Bevel
 - 4. Size: 8" x 16" x 4" (Note: Imperial dimensions are nominal equivalents to the metric dimensions.)
- C. Provide pavers meeting the minimum material and physical properties set forth in ASTM C 936, Standard Specification for Interlocking Concrete Paving Units. Efflorescence is not a cause for rejection.
 - 1. Average compressive strength 8000 psi (55MPa) with no individual unit under 7,200 psi (50 MPa).
 - 2. Average absorption of 5% with no unit greater than 7% when tested according to ASTM C 140.
 - 3. Conforming to ASTM C 1645 when tested for freeze-thaw requirements.
 - 4. Height tolerances +/- 3.2 mm (1/8 in).
- D. Accept only pigments in concrete pavers conforming to ASTM C 979.
Note: ACI Report No. 212.3R provides guidance on the use of pigments.
- E. Maximum allowable breakage of product is 5%.

2.02 JOINT SAND

- A. Provide natural Joint Sand as follows:
 - 1. Washed, clean, non-plastic, free from deleterious or foreign matter, symmetrically shaped, natural or manufactured from crushed rock.
 - 2. Do not use limestone screenings, stone dust, or sand for the Joint Sand material that does not conform to the grading requirements of ASTM C 33.
 - 4. Utilize sands that are as hard as practically available where concrete pavers are subject to vehicular traffic.

5. Gradation as shown in Table 1 below:

**TABLE 1 – JOINT SAND
GRADATION REQUIREMENTS FOR JOINT SAND**

ASTM C 144		
Sieve Size	Natural Sand Percent Passing	Manufactured Sand Percent Passing
No. 4 (4.75 mm)	100	100
No. 8 (2.36 mm)	95 to 100	95 to 100
No. 16 (1.18 mm)	70 to 100	70 to 100
No. 30 (0.600 mm)	40 to 75	40 to 75
No. 50 (0.300 mm)	10 to 30	20 to 40
No. 100 (0.150 mm)	2 to 15	10 to 25
No. 200 (0.075)	0 to 1	0 to 10

2.03 POLYMERIC JOINT SAND

- A. Provide Polymeric Joint Sand as manufactured by:
 - 1. Alliance Gator G2
 - a. Product Type: Dry mix, contains polymeric binding agent, activated with water.
 - b. Color: Grey
 - 2. Unicare HP Polymeric Max Sand
 - a. Product Type: Dry mix, contains polymeric binding agent, activated with water.
 - b. Color: Grey
- B. Provide Polymeric Joint Sand meeting the minimum material and physical properties as follows:
 - 1. Compression Strength: proven resistance to compression of 550 PSI after drying for 7 days under controlled conditions (73°F (23°C) at 50% humidity).
 - a. Test sand sample shape: cylinder (2" (5 cm) dia. X 4" (10 cm) high).
 - 2. Gradation as shown Table 1 above.

2.04 SETTING BED SAND

- A. Provide Setting Bed Sand as follows:
 - 1. Washed, clean, non-plastic, free from deleterious or foreign matter, symmetrically shaped, natural or manufactured from crushed rock.
 - 2. Do not use limestone screenings, stone dust, or sand material that does not conform to conform to the grading requirements of ASTM C 33.
 - 3. Do not use mason sand or sand conforming to ASTM C 144.
 - 4. Utilize sands that are as hard as practically available where concrete pavers are subject to vehicular traffic.
 - 5. Conform to the grading requirements of ASTM C 33 with modifications as shown in Table 2 below:

TABLE 2 – SETTING BED SAND

GRADATION REQUIREMENTS FOR SETTING BED SAND

ASTM C 33	
Sieve Size	Percent Passing
3/8 in (9.5 mm)	100
No. 4 (4.75 mm)	95 to 100
No. 8 (2.36 mm)	85 to 100
No. 16 (1.18 mm)	50 to 85
No. 30 (0.600 mm)	25 to 60
No. 50 (0.300 mm)	10 to 30
No. 100 (0.150 mm)	2 to 10
No. 200 (0.075)	0 to 1

Note: Coarser sand than that specified in Table 1 above may be used for joint sand including C 33 material as shown in Table 2. Use material where the largest sieve size easily enters the smallest joints. For example, if the smallest paver joints are 2 mm wide, use sand 2 mm and smaller in particle size. If C 33 sand is used for joint sand, extra effort may be required in sweeping material and compacting the pavers in order to completely fill the joints.

2.05 **BASE AGGREGATE**

- A. Provide Base Aggregate materials conforming to ASTM D 2940 and gradation requirements as presented in Table 3.

**TABLE 3
BASE AGGREGATE
GRADATION REQUIREMENTS**

ASTM D 2940	
Sieve Size	Percent Passing
2 in (50 mm)	100
1-1/2 in (37.5 mm)	95 to 100
3/4 in (19 mm)	70 to 92
3/8 in (9.5 mm)	50 to 70
No. 4 (4.75 mm)	35 to 55
No. 30 (600 μm)	12 to 25
No. 200 (75 μm)	0 to 8*

- * In order to prevent damage by frost heaving, it may be necessary to limit the percentages of material passing the No. 200 sieve to less than shown in the tables.

2.06 GEOTEXTILE

- A. Provide Geotextile DRIVE-GRID Tensar TriAx material conforming to the following performance characteristics, measured per the test methods referenced:
 - 1. 4 oz., nonwoven needle punched geotextile composed of 100% polypropylene staple fibers that are inert to biological degradation and resists naturally encountered chemicals, alkalis, and acids.
 - 2. Grab Tensile Strength: ASTM D 4632: 115 lbs.
 - 3. Grab Tensile Elongation: ASTM D 4632: 50%
 - 4. Trapezoidal Tear: ASTM D 4533: 50 lbs.
 - 5. Puncture: ASTM D 4833: 65 lbs.
 - 6. Apparent Opening Size: ASTM D 4751: 0.212 mm, 70 U.S. Sieve
 - 7. Permittivity: ASTM D 4491: 2.0 sec -1 8. Flow Rate: ASTM D 4491: 140 gal/min/s.f.
- B. As supplied by Unilock or other approved manufacturer

2.07 EDGE RESTRAINTS

- A. Flush granite curb as indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine areas indicated to receive paving for compliance with requirements for installation tolerances and other conditions affecting performance for the following items before placing the Concrete Pavers.
 - 1. Verify that subgrade preparation, compacted density and elevations conform to specified requirements.
 - 2. Verify that DRIVE-GRID Geotextiles have been placed according to drawings and specifications.
 - 3. Verify that the Base and Subbase Aggregate materials, thickness, compacted density, surface tolerances and elevations conform to specified requirements.
 - 4. Provide written density test results for soil subgrade, Base and Subbase Aggregate materials to the Owner, General Contractor and paver installation subcontractor.
 - 5. Verify location, type, and elevations of edge restraints, concrete curbing, concrete collars around utility structures, and drainage inlets.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 1. Beginning of Bedding Sand and Concrete Paver installation signifies acceptance of Base and edge restraints.

3.02 PREPARATION

- A. Verify that the subgrade soil is free from standing water.

- B. Stockpile Setting Bed Sand, Joint Sand, Base and Subbase Aggregate materials such that they are free from standing water, uniformly graded, free of any organic material or sediment, debris, and ready for placement.
- C. Remove any excess thickness of soil applied over the excavated soil subgrade to trap sediment from adjacent construction activities before placing the Geotextile and Subbase Aggregate materials.
- D. Keep area where pavement is to be constructed free from sediment during entire job. Remove and replace all Geotextile, Joint Sand, Setting Bed Sand, Base and Subbase Aggregate materials contaminated with sediment with clean materials.
- E. Complete all subdrainage of underground services within the pavement area in conjunction with subgrade preparation and before the commencement of Base or Subbase Aggregate construction.
- F. Prevent to damage underdrain pipes, overflow pipes, observation wells, or inlets and other drainage appurtenances during installation. Report all damage immediately.
- G. Compact soil subgrade uniformly to at least 95 percent of Standard Proctor Density per ASTM D 698 for pedestrian areas. Compact soil subgrade uniformly to at least 98 percent Modified Proctor per ASTM D 1557 for vehicular areas. Stabilization of the subgrade and/or base material may be necessary with weak or saturated subgrade soils.
- H. Backfill all service trenches within the pavement area to the sub-grade level with approved material placed in uniform lifts not exceeding 4 in. (100 mm) loose thickness. Compact each lift to at least 100 percent Standard Proctor Density as specified in ASTM D 698.
- I. Trim the subgrade to within 0 to ½ in. (0 to 13mm) of the specified grades. Do not deviate the surface of the prepared subgrade by more than 3/8 in. (10mm) from the bottom edge of a 39 in. (1m) straight edge laid in any direction.
- J. Proof-roll prepared subgrade according to requirements in Division 31 Section "Earth Moving" to identify soft pockets and areas of excess yielding. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting and replace with compacted backfill or fill as directed.
- K. Do not proceed with further pavement construction, under any circumstances, until the subgrade has been inspected by the Architect/Engineer.

Note: Base compaction of the subgrade soil on the recommendations of the Design Engineer. Request the Architect/Engineer to inspect subgrade preparations, elevations and conduct density tests for conformance to specifications.

3.03 INSTALLATION

A. EDGE RESTRAINTS

1. Provide concrete edge restraints as indicated.

- a. Install job-built concrete edge restraints to comply with requirements in Division 3 Section "Cast-in-Place Concrete."
- b. Provide concrete edge restraint along the perimeter of all paving as indicated. Install the face of the concrete edge restraint, where it abuts pavers vertical down to the subbase.
- c. Construct concrete edge restraint to dimensions and level specified and support on a compacted subbase not less than 6 in (150 mm) thick.

B. GEOTEXTILES

1. Provide separation geotextile on bottom and sides of prepared soil subgrade.
2. Secure in place to prevent wrinkling or folding from equipment tires and tracks.
3. Overlap ends and edges a minimum of 18 in. (450 mm) in the direction of drainage.

C. BASE AND SUBBASE AGGREGATE

1. Provide the Subbase Aggregate in uniform lifts not exceeding 6 in., (150 mm) loose thickness and compact to at least 100 percent Standard Proctor Density as per ASTM D 698.
2. Compact the Subbase Aggregate material with at least two passes in the vibratory mode then at least two in the static mode with a minimum 10 ton vibratory roller until there is no visible movement. Do not crush aggregate with the roller.
3. Tolerance: Do not exceed the specified surface grade of the compacted Subbase Aggregate material more than $\pm 3/4$ in. (20 mm) over a 10 ft. (3 m) long straightedge laid in any direction.
4. Provide the Base Aggregate material in uniform lifts not exceeding 6 in. (150 mm) over the compacted Subbase Aggregate (or Subgrade) material and compact to at least 100 percent Standard Proctor Density as per ASTM D 698.
5. Compact the Base Aggregate material with at least two passes in the vibratory mode then at least two in the static mode with a minimum 10 ton vibratory roller until there is no visible movement. Do not crush aggregate with the roller.
6. Tolerance: Do not exceed the specified surface grade of the compacted Base Aggregate material more than $\pm 3/8$ in. (10 mm) over a 10 ft. (3 m) long straightedge laid in any direction.
7. Compact and grade the upper surface of the base sufficiently to prevent infiltration of the bedding sand into the base both during construction and throughout its service life. Blend segregated areas of the granular base by the application of crushed fines that have been watered and compacted into the surface.

D. SETTING BED SAND

1. Provide, spread and screed Setting Bed Sand evenly over the compacted Base Aggregate course.
 - a. Protect screeded Setting Bed Sand from being disturbed by either pedestrian or vehicular traffic.
 - b. Screed only the area which can be covered by pavers in one day.
 - c. Do not use Setting Bed Sand material to fill depressions in the base surface.
2. Keep moisture content constant and density loose and constant until Concrete Pavers are set and compacted.

3. Screed Setting Bed Sand using either an approved mechanical spreader (e.g.: an asphalt paver) or by the use of screed rails and boards. Maintain in a loose condition slightly ahead of the paving units and fully protect against incidental compaction following screeding. Loosen compacted sand by rain or screeded sand left overnight before further paving units are placed.
4. Inspect the Setting Bed Sand course prior to commencing the placement of the Concrete Pavers. Acceptance of the Setting Bed Sand occurs with the initiation of Concrete Paver placement.

E. CONCRETE PAVERS

1. Replace Concrete Pavers with chips, cracks, voids, discolorations, and other defects that might be visible in finished work.
2. Mix Concrete Pavers from a minimum of three (3) bundles simultaneously drawing the paver vertically rather than horizontally, as they are placed, to produce uniform blend of colors and textures. (Color variation occurs with all concrete products. This phenomenon is influenced by a variety of factors, e.g. moisture content, curing conditions, different aggregates and, most commonly, from different production runs. By installing from a minimum of three (3) bundles simultaneously, variation in color is dispersed and blended throughout the project).
3. Exercise care in handling face mix concrete pavers to prevent surfaces from contacting backs or edges of other units.
4. Provide Concrete Pavers using laying pattern as indicated. Adjust laying pattern at pavement edges such that cutting of edge pavers is minimized. Cut all pavers exposed to vehicular tires no smaller than one-third of a whole paver.
5. Use string lines or chalk lines on Setting Bed Sand to hold all pattern lines true.
6. Set paver surface elevation a minimum of 3 mm (1/8 inch) to a maximum of 6 mm (1/4 inch) above adjacent drainage inlets, concrete collars or channels (provided the change in slope does not impede or alter the drainage or direction of flow).
7. Place units hand tight against spacer bars. Adjust horizontal placement of laid pavers to align straight.
 - a. When installation is performed with mechanical equipment, use only unit pavers with spacer bars on sides of each unit.
8. Provide space between paver units of 1/32 in. (1 mm) wide to achieve straight bond lines.
9. Prevent joint (bond) lines from shifting more than $\pm 1/2$ in. (± 13 mm) over 50 ft. (15 m) from string lines.
10. Fill gaps between units or at edges of the paved area that exceed 3/8 inch (10 mm) with pieces cut to fit from full-size unit pavers.
11. Cut Concrete Pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.
12. Prevent all traffic on installed Concrete Pavers until Joint Sand has been vibrated into joints. Keep skid steer and forklift equipment off newly laid Concrete Pavers that have not received initial compaction and Joint Sand material.
13. Vibrate Concrete Pavers into leveling course with a low-amplitude plate vibrator capable of a to 5000-lbf (22-kN) compaction force at 80 to 90 Hz. Perform at least three passes across paving with vibrator. Vibrate under the following conditions:

- a. After edge pavers are installed and there is a completed surface or before surface is exposed to rain.
- b. Compact installed Concrete Pavers to within 6 feet (2 meters) of the laying face before ending each day's work. Cover Concrete Pavers that have not been compacted and leveling course on which pavers have not been placed, with nonstaining plastic sheets to prevent Setting Bed Sand from becoming disturbed.

14. Protect face mix Concrete Paver surface from scuffing during compaction by utilizing a urethane pad.
15. Remove any cracked or structurally damaged Concrete Pavers and replace with new units prior to installing Joint Sand material.

F. JOINT SAND

1. Provide, spread and sweep dry Joint Sand into joints immediately after vibrating pavers into Setting Bed Sand course until full. Vibrate pavers and add Joint Sand material until joints are completely filled, then remove excess material. This will require at least 4 passes with a plate compactor.
2. Leave all work to within 3 ft. (1 m) of the laying face fully compacted with sand-filled joints at the completion of each day.
3. Remove excess Joint Sand broom clean from surface when installation is complete.
4. Polymeric Joint Sand
 - a. Install Polymeric Joint Sand per manufacturers recommended instructions.

3.04 FIELD QUALITY CONTROL

- A. Verify final elevations for conformance to the drawings after sweeping the surface clean.
 1. Prevent final Concrete Paver finished grade elevations from deviating more than $\pm 3/8$ in. (± 10 mm) under a 10 ft (3 m) straightedge or indicated slope, for finished surface of paving.
- B. Lippage: Paver-to-Paver Lippage:
 1. No greater than 3 mm (1/8 inch) difference in height between adjacent pavers.

3.05 REPAIRING, CLEANING AND SEALING

- A. Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.
- B. Cleaning: Remove excess dirt, debris, stains, grit, etc. from exposed paver surfaces; wash and scrub clean.
 1. Clean Concrete Pavers in accordance with the manufacturer's written recommendations.

3.06 PROTECTION

- A. Protect completed work from damage due to subsequent construction activity on the site.

END OF SECTION

SECTION 32 14 13.19 PERMEABLE CONCRETE PAVER MATERIALS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Permeable Concrete Pavers
 - 2. Permeable Joint Opening Aggregate
 - 3. Permeable Joint Aggregate Type 1
 - 4. Permeable Joint Aggregate Type 2
 - 5. Permeable Setting Bed Aggregate (Open-graded)
 - 6. Permeable Base Aggregate (Open-graded)
 - 7. Permeable Subbase Aggregate (Open-graded)

1.02 REFERENCES

- A. ASTM International, latest edition:
 - 1. C 29 Bulk Density and Voids in Aggregate Materials.
 - 2. C 33, Standard Specification for Concrete Aggregates.
 - 3. C 136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - 4. C 140, Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
 - 5. D 448, Standard Classification for Sizes of Aggregate for Road and Bridge Construction.
 - 6. C 936, Standard Specification for Solid Concrete Interlocking Paving Units.
 - 7. C 979, Standard Specification for Pigments for Integrally Colored Concrete.
 - 8. D 698 Test Methods for Moisture Density Relations of Soil and Soil Aggregate Mixtures Using a 5.5 lb (24.4 N) Rammer and 12 in. (305 mm) drop.
 - 9. D 1557 Test Methods for Moisture Density Relations of Soil and Soil Aggregate Mixtures Using a 10-lb (44.5 N) Rammer and 18 in. (457 mm) drop.
 - 10. C1645 Standard Test Method for Freeze-thaw and De-icing Salt Durability of Solid Concrete Interlocking Paving Units
 - 11. D 4254, Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
 - 12. D 4632, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
 - 13. D 4533, Standard Test Method for Index Trapezoidal Tearing Strength of Geotextiles
 - 14. D 4833, Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes and Related Products
 - 15. D 4491, Standard Test Method for Water Permeability of Geotextiles by Permittivity
 - 16. D 4751, Standard Test Method for Determining Apparent Opening Size of a Geotextile

Note: In order to determine the latest version of the listed specifications and standards, please consult the ASTM web page (www.astm.com)

1.03 SUBMITTALS

- A. Permeable Concrete Pavers:
 1. Samples for verification: Three representative full-size samples of each paver type, thickness, color and finish that indicate the range of color variation and texture expected upon project completion.
 2. Accepted samples become the standard of acceptance for the product produced.
 3. Test results from an independent testing laboratory for compliance of concrete pavers with ASTM C 936.
 4. Manufacturer's catalog product data, installation instructions, and material safety data sheets for the safe handling of the specified materials and products.
- B. Permeable Joint Opening Aggregate:
 1. Provide three representative one pound samples in containers of aggregate materials that indicate the range of color variation and texture expected upon project completion.
 2. Accepted samples become the standard of acceptance for the product produced.
 3. Test results from an independent testing laboratory for sieve analysis, including washed gradations per ASTM C 136.
 4. Test results for void space percentage per ASTM C 29.
- C. Permeable Setting Bed, Base and Subbase Aggregate:
 1. Test results from an independent testing laboratory for compliance with ASTM D 448 No. 8, No. 57 and No. 2.
 2. Test results from an independent testing laboratory for sieve analysis, including washed gradations per ASTM C 136.
 3. Test results for void space percentage per ASTM C 29.
- D. Paving Installation Contractor:
 1. Job references from a minimum of three projects similar in size and complexity. Provide Owner/Client/General Contractor names, postal address, phone, fax, and email address.

1.04 QUALITY ASSURANCE

- A. Utilize a Manufacturer having at least ten years of experience manufacturing interlocking concrete pavers on projects of similar nature or project size.
- B: Source Limitations:
 1. Obtain Permeable Concrete Pavers from one source location with the resources to provide products of consistent quality in appearance and physical properties.
 2. Obtain Permeable Joint Opening Aggregate from one source with the resources to provide materials and products of consistent quality in appearance and physical properties.
- C. Paving Contractor Qualifications:
 1. Utilize an installer having successfully completed concrete paver installation similar in design, material, and extent indicated on this project.
- D. Mockups:
 1. Install a 5 ft x 5 ft paver area.
 2. Use this area to determine joint sizes, lines, laying pattern(s) and levelness. This area will serve as the standard by which the workmanship will be judged.
 3. Subject to acceptance by owner, mock-up may be retained as part of finished work.
 4. If mock-up is not retained, haul offsite and dispose legally.

1.05 DELIVERY, STORAGE & HANDLING

- A. Deliver Permeable Concrete Pavers in manufacturer's original, unopened and undamaged container packaging with identification labels intact.
 - 1. Coordinate delivery and paving schedule to minimize interference with normal use of streets and sidewalks adjacent to paver installation.
 - 2. Deliver concrete pavers to the site in steel banded, plastic banded or plastic wrapped packaging capable of transfer by forklift or clamp lift.
 - 3. Unload pavers at job site in such a manner that no damage occurs to the product or adjacent surfaces.
 - B. Store and protect materials free from mud, dirt and other foreign materials.
- 1.06 PROJECT/SITE CONDITIONS
- A. Environmental Requirements:
 - 1. Install permeable pavers only on unfrozen permeable setting bed aggregate materials.
 - 2. Install permeable setting bed only on unfrozen permeable base and subbase aggregates.
 - 3. Install permeable base or subbase aggregates only over unfrozen subgrade.
- 1.07 PERMEABLE CONCRETE PAVER OVERAGE AND ATTIC STOCK
- A. Provide a minimum of 5% additional material for overage to be used during construction.
 - B. Furnish 50 square feet of each product and size used to owner for maintenance and repair. Furnish Permeable Concrete Pavers from the same production run as installed materials.
 - C. Manufacture to supply maintenance and reinstatement manuals for Permeable Concrete Paver units.

PART 2 PRODUCTS

- 2.01 PERMEABLE CONCRETE PAVERS
- A. Basis-of-Design Product: The permeable concrete paver shapes are based on the below or equal:
 - 1. Unilock Eco-Promenade 4"x4"x16" paver as manufactured by Unilock, 35 Commerce Drive, Uxbridge, MA 01569
 - B. Product requirements: Permeable Paver: Eco-Promenade
 - 1. Finish: Umbriano Finish
 - 2. Color: French Grey
 - 3. Edge: micro bevel
 - 4. Size: 4" x 4" x 16"
 - C. Provide pavers meeting the minimum material and physical properties set forth in ASTM C 936, Standard Specification for Interlocking Concrete Paving Units. Efflorescence is not a cause for rejection.
 - 1. Average compressive strength 8000 psi (55MPa) with no individual unit under 7,200 psi (50 MPa).
 - 2. Average absorption of 5% with no unit greater than 7% when tested according to ASTM C 140.
 - 3. Conforming to ASTM C 1645 when tested for freeze-thaw requirements.

- 4. Height tolerances +/- 3.2 mm (1/8 in).
- D. Accept only pigments in concrete pavers conforming to ASTM C 979.
- E. Note: ACI Report No. 212.3R provides guidance on the use of pigments.
- F. Maximum allowable breakage of product is 5%.

2.02 PERMEABLE JOINT OPENING AGGREGATE

- A. Provide Permeable Joint Opening Aggregate materials conforming to ASTM C 33 and gradation requirements of ASTM D 448 No. 8 as shown in Table 1.

**TABLE 1 - ECO-OPTILOC
PERMEABLE JOINT OPENING AGGREGATE
GRADATION REQUIREMENTS
(CRUSHED LIMESTONE)**

ASTM No. 8	
Sieve Size	Percent Passing
1/2 in (12.5 mm)	100
3/8 in (9.5 mm)	85 to 100
No. 4 (4.75 mm)	10 to 30
No. 8 (2.36 mm)	0 to 10
No. 16 (1.18 mm)	0 to 5

- B. Provide Permeable Joint Opening Aggregate materials conforming to ASTM C 33 and gradation requirements as presented in Table 2.
 - 1. Supplier:
 - a. Kafka Granite LLC, 101 S. Weber Ave, Stratford, WI 54484 – Toll Free: 800-852-7415
 - b. Alliance Aqua-Roc
 - c. SEK Perm Chip

**TABLE 2 - ECO-PRIORA & TOWN HALL
PERMEABLE JOINT OPENING AGGREGATE
GRADATION REQUIREMENTS (GRANITE CHIPS)**

1/8 to 3/16 inch granite chips	
Sieve Size	Percent Passing
1/4 in (6 mm)	97 to 100
No. 4 (4.75 mm)	70 to 83
No. 8 (2.36 mm)	37 to 50
No. 16 (1.18 mm)	0 to 12
pan	

2.03 PERMEABLE SETTING BED AGGREGATE

- A. Provide Permeable Setting Bed Aggregate materials conforming to ASTM C 33 and gradation requirements of ASTM D 448 No. 8 as presented in Table 3.

**TABLE 3
PERMEABLE SETTING BED AGGREGATE
GRADATION REQUIREMENTS**

ASTM No. 8	
Sieve Size	Percent Passing
½ in (12.5 mm)	100
3/8 in (9.5 mm)	85 to 100
No. 4 (4.75 mm)	10 to 30
No. 8 (2.36 mm)	0 to 10
No. 16 (1.18 mm)	0 to 5

2.04 PERMEABLE BASE AGGREGATE

- A. Provide Permeable Base Aggregate materials conforming to ASTM C 33 and gradation requirements of ASTM D 448 No. 57 as presented in Table 4.

**TABLE 4
PERMEABLE BASE AGGREGATE
GRADATION REQUIREMENTS**

ASTM No. 57	
Sieve Size	Percent Passing
1-1/2 in (37.5 mm)	100
1 in (25 mm)	95 to 100
1/2 in (12.5 mm)	25 to 60
No. 4 (4.75 mm)	0 to 10
No. 8 (2.36 mm)	0 to 5

2.05 PERMEABLE SUBBASE AGGREGATE

- A. Provide Permeable Subbase Aggregate materials conforming to ASTM C 33 and gradation requirements of ASTM D 448 No. 2 as presented in Table 5.

**TABLE 5
PERMEABLE SUBBASE AGGREGATE
GRADATION REQUIREMENTS**

ASTM No. 2	
Sieve Size	Percent Passing
3 in (75 mm)	100
2-1/2 in (63 mm)	90 to 100
2 in (50 mm)	35 to 70

1-1/2 in (37.5 mm)	0 to 15
3/4 (19 mm)	0 to 5

Note: For all aggregates, provide washed, clean, have zero plasticity, free from deleterious or foreign matter, crushed, angular rock and contain no No. 200 sieve size aggregate materials used in the construction of permeable pavement. Aggregate materials serve as the structural load bearing platform of the pavement as well as a temporary receptor for the infiltrated water that is collected through the openings in the pavement's surface.

2.06 GEOTEXTILE

- A. Provide Geotextile DRIVE-GRID Tensar TriAx material as indicated on the drawings conforming to the following performance characteristics, measured per the test methods referenced:
1. 4 oz., nonwoven needle punched geotextile composed of 100% polypropylene staple fibers that are inert to biological degradation and resists naturally encountered chemicals, alkalis, and acids.
 2. Grab Tensile Strength: ASTM D 4632: 115 lbs. 3.
Grab Tensile Elongation: ASTM D 4632: 50%
 4. Trapezoidal Tear: ASTM D 4533: 50 lbs.
 5. Puncture: ASTM D 4833: 65 lbs.
 6. Apparent Opening Size: ASTM D 4751: 0.212 mm, 70 U.S. Sieve
 7. Permittivity: ASTM D 4491: 2.0 sec⁻¹
 8. Flow Rate: ASTM D 4491: 140 gal/min/s.f.
- B. As supplied by Unilock or other approved manufacturer.

2.07 EDGE RESTRAINTS

- A. Flush granite curb edge restraint as indicated on plans on one side only.
- B. Plastic and Metal Edge Restraints:
1. Permaloc, www.permaloc.com
 - a. Material Type: Aluminum
 - b. Model No.: 3 inch GeoEdge capture plate and geogrid OR
 2. SEK Surebond
 - c. Model No.: 8 feet PermEdge with attached geogrid

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine areas indicated to receive paving for compliance with requirements for installation tolerances and other conditions affecting performance for the following items before placing the Permeable Concrete Pavers.
1. Verify that subgrade preparation, compacted density and elevations conform to specified requirements.
 2. Verify that Geotextiles, if applicable, have been placed according to drawings and specifications.

3. Verify that Permeable Base and Subbase Aggregate materials, thickness, compacted density, surface tolerances and elevations conform to specified requirements.
 4. Provide written density test results for soil subgrade, Permeable Base and Subbase Aggregate materials to the Owner, General Contractor and paver installation subcontractor.
 5. Verify location, type, and elevations of edge restraints, concrete collars around utility structures, and drainage inlets.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
1. Beginning of bedding sand and paver installation signifies acceptance of base and edge restraints.

3.02 PREPARATION

- A. Verify that the subgrade soil is free from standing water.
- B. Stockpile Permeable Setting Bed, Joint, Base and Subbase Aggregate materials such that they are free from standing water, uniformly graded, free of any organic material or sediment, debris, and ready for placement.
- C. Remove any excess thickness of soil applied over the excavated soil subgrade to trap sediment from adjacent construction activities before placing the Geotextile and Permeable Subbase Aggregate materials.
- D. Keep area where pavement is to be constructed free from sediment during entire job. Remove and replace all Geotextile, Permeable Joint, Setting Bed, Base and Subbase Aggregate materials contaminated with sediment with clean materials.
- E. Complete all subdrainage of underground services within the pavement area in conjunction with subgrade preparation and before the commencement of Permeable Subbase Aggregate construction.
- F. Prevent damage to underdrain pipes, overflow pipes, observation wells, or inlets and other drainage appurtenances during installation. Report all damage immediately.
- G. Compact soil subgrade uniformly to at least 90 percent of Standard Proctor Density per ASTM D 698 for pedestrian areas. Compact soil subgrade uniformly to at least 95 percent Modified Proctor per ASTM D 1557 for vehicular areas.
- H. Proof-roll prepared subgrade according to requirements in Division 31 Section "Earth Moving" to identify soft pockets and areas of excess yielding. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting and replace with compacted backfill or fill as directed.

Note: Base compaction and proof-rolling of the subgrade soil on the recommendations of the Design Engineer. Request the Architect/Engineer to inspect subgrade preparations, elevations and conduct density tests for conformance to specifications.

3.03 INSTALLATION

- A. EDGE RESTRAINTS
 1. Provide edge restraints as indicated.
 - a. Install job-built concrete edge restraints to comply with requirements in Division 3 Section "Cast-in-Place Concrete." Provide concrete edge restraint along the perimeter of all paving as specified. Install the face of the concrete edge restraint, where it abuts pavers vertical down to the subbase.

- b. Construct concrete edge restraint to dimensions and level specified and support on a compacted subbase not less than 6 in (150 mm) thick.
 - 2. Provide plastic or metal edge restraints as indicated.
 - c. Provide plastic or metal edge restraints along the perimeter of all paving as indicated and supported on a minimum of 6 inches (150 mm) of Base Aggregate.
 - d. Provide 10" spiral galvanized or stainless steel spike to fasten plastic edge restraint at 24 inches on center for straight sections and 12 inches on center for curved sections.
- B. GEOTEXTILES
 - 1. Provide separation geotextile on bottom and sides of prepared soil subgrade.
 - 2. Secure in place to prevent wrinkling or folding from equipment tires and tracks.
 - 3. Overlap ends and edges a minimum of 18 in. (450 mm) in the direction of drainage.
- C. PERMEABLE BASE AND SUBBASE AGGREGATE
 - 1. Provide the Permeable Subbase Aggregate in uniform lifts not exceeding 6 in., (150 mm) loose thickness and compact to at least 95 percent as per ASTM D 4254 to depths as indicated.
 - 2. Compact the Permeable Subbase Aggregate material with at least two passes in the vibratory mode then at least two in the static mode with a minimum 10 ton vibratory roller until there is no visible movement. Do not crush aggregate with the roller.
 - 3. Tolerance: Do not exceed the specified surface grade of the compacted Permeable Subbase Aggregate material more than $\pm 3/4$ in. (20 mm) over a 10 ft. (3 m) long straightedge laid in any direction.
 - 4. Provide the Permeable Base Aggregate material in uniform lifts not exceeding 6 in. (150 mm) over the compacted Permeable Subbase Aggregate material and compact to at least 95 percent as per ASTM D 4254 to depths as indicated.
 - 5. Compact the Permeable Base Aggregate material with at least two passes in the vibratory mode then at least two in the static mode with a minimum 10 ton vibratory roller until there is no visible movement. Do not crush aggregate with the compaction device.
 - 6. Tolerance: Do not exceed the specified surface grade of the compacted Permeable Base Aggregate material more than $\pm 1/2$ in. (13 mm) over a 10 ft. (3 m) long straightedge laid in any direction.
 - 7. Grade and compact the upper surface of the Permeable Base Aggregate material sufficiently to prevent infiltration of the Permeable Setting Bed Aggregate material both during construction and throughout its service life.
- D. PERMEABLE SETTING BED AGGREGATE
 - 1. Provide, spread and screed Permeable Setting Bed aggregate evenly over the Permeable Base Aggregate course.
 - a. Protect screeded Permeable Setting Bed Aggregate from being disturbed.
 - b. Screed only the area which can be covered by pavers in one day.
 - c. Do not use Permeable Setting Bed Aggregate material to fill depressions in the base surface.
 - 2. Keep moisture content constant and density loose and constant until Concrete Pavers are set and compacted.
 - 3. Inspect the Permeable Setting Bed Aggregate course prior to commencing the placement of the permeable concrete pavers.

4. Inspect the Setting Bed Aggregate course prior to commencing the placement of the Permeable Concrete Pavers. Acceptance of the Setting Bed Aggregate occurs with the initiation of Permeable Concrete Paver placement.
- E. PERMEABLE CONCRETE PAVERS
1. Replace unit pavers with chips, cracks, voids, discolorations, and other defects that might be visible in finished work.
 2. Mix Concrete Pavers from a minimum of three (3) bundles simultaneously drawing the paver vertically rather than horizontally, as they are placed, to produce uniform blend of colors and textures. (Color variation occurs with all concrete products. This phenomenon is influenced by a variety of factors, e.g. moisture content, curing conditions, different aggregates and, most commonly, from different production runs. By installing from a minimum of three (3) bundles simultaneously, variation in color is dispersed and blended throughout the project).
 3. Exercise care in handling face mix pavers to prevent surfaces from contacting backs or edges of other units.
 4. Provide Permeable Concrete Pavers using joint pattern as indicated. Adjust joint pattern at pavement edges such that cutting of edge pavers is minimized. Cut all pavers exposed to vehicular tires no smaller than one-third of a whole paver.
 5. Use string lines or chalk lines on Permeable Setting Bed aggregate to hold all pattern lines true.
 6. Set surface elevation of pavers 1/8 in. (3 mm) above adjacent drainage inlets, concrete collars or channels.
 7. Place units hand tight against spacer bars. Adjust horizontal placement of laid pavers to align straight.
 - a. When installation is performed with mechanical equipment, use only unit pavers with spacer bars on sides of each unit.
 8. Provide space between paver units of 1/32 in. (1 mm) wide to achieve straight bond lines.
 9. Prevent joint (bond) lines from shifting more than $\pm 1/2$ in. (± 15 mm) over 50 ft. (15 m) from string lines.
 10. Fill gaps between units or at edges of the paved area that exceed 3/8 inch (10 mm) with pieces cut to fit from full-size unit pavers.
 11. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.
 12. Prevent all traffic on installed pavers until Permeable Joint Aggregate has been vibrated into joints. Keep skid steer and forklift equipment off newly laid pavers that have not received initial compaction and Permeable Joint Aggregate material.
 13. Vibrate pavers into leveling course with a low-amplitude plate vibrator capable of a to 5000-lbf (22-kN) compaction force at 80 to 90 Hz. Perform at least three passes across paving with vibrator. Vibrate under the following conditions:
 - a. After edge pavers are installed and there is a completed surface.
 - b. Compact installed concrete pavers to within 6 feet (1,800 mm) of the laying face before ending each day's work. Cover pavers that have not been compacted and leveling course on which pavers have not been placed, with

nonstaining plastic sheets to prevent Permeable Setting Bed Aggregate from becoming disturbed.

14. Protect face mix Concrete Paver surface from scuffing during compaction by utilizing a urethane pad.
15. Remove any cracked or structurally damaged pavers and replace with new units prior to installing Permeable Joint Opening Aggregate material.
16. Provide, spread and sweep Permeable Joint Opening Aggregate into joints immediately after vibrating pavers into Permeable Setting Bed course until full. Vibrate pavers and add Permeable Joint Aggregate material until joints are completely filled, then remove excess material. This will require at least 4 passes with a plate compactor.
17. Remove excess Permeable Joint Aggregate broom clean from surface when installation is complete.

3.04 FIELD QUALITY CONTROL

- A. Verify final elevations for conformance to the drawings after sweeping the surface clean.
 1. Prevent final Concrete Paver finished grade elevations from deviating more than $\pm 3/8$ in. (± 10 mm) under a 10 ft (3 m) straightedge or indicated slope, for finished surface of paving.
- B. Lippage: Paver-to-Paver Lippage:
 1. No greater than 3 mm (1/8 inch) difference in height between adjacent pavers.

3.05 REPAIRING, CLEANING AND SEALING

- A. Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.
- B. Cleaning: Remove excess dirt, debris, stains, grit, etc. from exposed paver surfaces; wash and scrub clean.
 1. Clean Permeable Concrete Pavers in accordance with the manufacturer's written recommendations.

3.06 PROTECTION

- A. Protect completed work from damage due to subsequent construction activity on the site.

3.07 PERMEABLE JOINT AGGREGATE MATERIAL REFILLING

- A. Remove all debris from joint and provide additional Permeable Joint Aggregate material after 120 days and before 150 days after date of Substantial Completion/Provisional Acceptance.
 1. Fill Permeable Joint Aggregate material full to the lip of the paver.

END OF SECTION

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32 16 00 CAST IN PLACE CONCRETE CURB

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. The conditions of the Contract, including Division 00 and Division 01, apply to the work under this Section. All references to products by manufacturer, trade name or Performance Specifications bearing the connotation "or approved equal" shall be as determined by the Landscape Architect and the City of Waltham.

1.2 WORK INCLUDED

- A. Provide all labor, equipment, implements and materials required to furnish, install, construct and perform all site improvements complete as shown on the Drawings and specified herein. This includes, but is not limited to the following:

1. Cast in Place Flush Curb.

1.3 REFERENCES

- A. Examine all other Sections of the Specifications and all Drawings for the relationship of the work under this Section and the work of other trades. Cooperate with all trades and all departments of the City of Waltham and coordinate all work under this Section therewith.
- B. The following related items are included under the Sections listed below:
 1. Section 02 41 00 - Site Preparation and Demolition
 2. Section 32 13 13 - Cast in Place Portland Cement Concrete

1.4 SUBMITTALS

- A. Provide complete Shop Drawings, manufacturer's literature and/or samples for all items called for on the Drawings and as specified and in accordance with applicable requirements under Division 01.

1.5 DEFINITIONS

- A. The following items are included herein and shall mean:
 1. S.S.H.B. - Standard Specifications for Highway and Bridges, the Commonwealth of Massachusetts, Department of Public Works, latest edition.
 2. A.S.T.M. - American Society for Testing and Materials. The following standard specifications are applicable to the associated items as listed.
 3. AAB: Architectural Access Board.
 4. ADA: Americans with Disabilities Act and its current regulations.
 5. CPSC: Consumer Product Safety Council.

PART 2 - PRODUCT

2.1 CAST IN PLACE FLUSH CONCRETE EDGE

- A. See 03 30 00 C.I.P. Concrete.

PART 3 - EXECUTION

3.1. CAST IN PLACE FLUSH CONCRETE CURB

- A. See 03 30 00 C.I.P. Concrete.

END OF SECTION

SECTION 32 16 40 – GRANITE CURB

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Granite curbs.
- B. Related Requirements:
 - 1. Section 03 30 00 – Cast-In-Place Concrete
 - 2. Section 31 20 00 – Earth Moving.
 - 3. Section 32 12 16 - Asphalt Paving.

1.2 COORDINATION

- A. Coordinate the Work with pavement placement for road, parking areas and sidewalks.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit unit configuration, dimensions and installation instructions.
- C. Shop Drawings: Indicate layout of curbs, dimensions of paved areas, elevations, and affected adjacent construction.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver and protect in accordance with the manufacturer's recommendations.

PART 2 PRODUCTS

2.1 GRANITE CURB

- A. Curb to be either sloped granite or vertical granite in the locations shown in the Drawings
- B. Match existing curb as to color, appearance and dimensions.
- C. Furnish curbs with sawed top, split face and ends. Straight pieces to be a minimum of 3 feet long. Curb segments on curves with radius of 100 feet or less to be shaped to the required curvature, with the ends split on radial lines.
- D. Indicated dimensions for curb segments to not vary more than 2 inches for depth and 1 inch for width.

- E. Top and front surfaces to be true planes at right angles to each other, as seen with a straight edge. No projection greater than 3/4 inch or depression greater than 1/2 inch on the split surfaces will be acceptable. Top surface to not vary more than 1/8 inch.
- F. Drill holes will not be permitted in exposed curb surfaces.
- G. Provide transition curbs at all sidewalk ramps as indicated on Drawings.
- H. Curb Foundation and footing: As indicated on Drawings.

2.2 CONFIGURATION

- A. Nominal Size: As indicated on the Drawings.
- B. Profile: Manufacturer's standard. Rectangular cross section with sloped vertical faces, square ends.

2.3 CEMENTITIOUS MATERIALS

- A. Portland Cement: ASTM C150 Type I, grey color.
- B. Sand: ASTM C33.
- C. Standard Premixed Grout Mortar for curb joints.
- D. Water: Potable, not detrimental to mix.

2.4 MIXES

- A. Cementitious Bed: Portland cement mix conforming to the following:

Property	Value
Compressive Strength (28 day)	[5000] psi
Slump	[3 to 4] inches
Air Entrainment	[5 to 7] percent

- B. Joint Mortar: Portland cement mix conforming to the following:

Property	Value
Compressive Strength (28 day)	[3000] psi
Slump	[1 to 2] inches
Air Entrainment	[5 to 7] percent

- C. Add admixtures to cementitious mixes.
- D. Thoroughly mix ingredients in quantities needed for immediate use.
- E. Use cementitious mixes within two hours after mixing. Do not re-temper.

EXECUTION

2.5 PREPARATION

- A. Confirm subbase has been properly compacted to 95% compaction.

2.6 INSTALLATION

- A. Install in accordance with Section 501 of the Massachusetts Highway Department (MHD) Standard Specifications for Highways and Bridges and as indicated on Drawing.
- B. Set curb to line and grade on a foundation of one cubic foot dense grade gravel for each linear foot of curb installed or as shown in the Drawings. Ram all spaces under the curb so that it is completely supported throughout the entire length.
- C. Provide curb expansion joints at 5' O.C.
- D. Butt curb joint sections together to provide a tight joint. Carefully fill the joints between curbstones (both front and back) or edging with cement mortar and neatly point on the top, front and back. After pointing the curbstones or edging, clean all excess mortar forced out of the joints.
- E. Maximum joint width tolerance: 3/8 inches to 1/2 inches.
- F. Install concrete footing and subbase material as shown in the Drawings.
- G. Install joint sealer where curb abuts existing walls, posts, buildings, and fixed structures or appurtenance.
- H. All curbs to be installed at the reveal and slope as shown in the Drawings.
- I. Install transition curb at all walkway ramps and curb endings as indicated on Drawings.
- J. Curb Replacement: Sawcut edge a minimum of 12" from curb.
- K. Install units without damage to shape or finish. Replace or repair damaged units.

2.7 RESETTING EXISTING CURBS

- A. Remove mortar and concrete from existing curbs to be reused. Powerwash exposed exterior surface after placement to remove any remaining debris. Replace units damaged by the contractor's negligence.
- B. Reset existing curbs approved for reuse as shown in the Drawings or as directed by the Engineer.

END OF SECTION

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SECTION 32 17 23 - PAVEMENT MARKINGS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Traffic lines and markings.
- B. Related Requirements:
 - 1. Section 32 12 16 - Asphalt Paving.
 - 2. Section 03 30 00 - Concrete In-Place Concrete.

1.2 REFERENCE STANDARDS

- A. ASTM International:
 - 1. ASTM D34 - Standard Guide for Chemical Analysis of White Pigments.
 - 2. ASTM D126 - Standard Test Methods for Analysis of Yellow, Orange, and Green Pigments Containing Lead Chromate and Chromium Oxide Green.
 - 3. ASTM D562 - Standard Test Method for Consistency of Paints Measuring Krebs Unit (KU) Viscosity Using a Stormer-Type Viscometer.
 - 4. ASTM D711 - Standard Test Method for No-Pick-Up Time of Traffic Paint.
 - 5. ASTM D713 - Standard Practice for Conducting Road Service Tests on Fluid Traffic Marking Materials.
 - 6. ASTM D969 - Standard Test Method for Laboratory Determination of Degree of Bleeding of Traffic Paint.
 - 7. ASTM D1301 - Standard Test Methods for Chemical Analysis of White Lead Pigments.
 - 8. ASTM D1394 - Standard Test Methods for Chemical Analysis of White Titanium Pigments.
 - 9. ASTM D1475 - Standard test Method for Density of Liquid Coatings, Inks, and Related Products.
 - 10. ASTM D1640 - Standard Test Methods for Drying, Curing, or Film Formation of Organic Coatings at Room Temperature.
 - 11. ASTM D2202 - Standard Test Method for Slump of Sealants.
 - 12. ASTM D2371 - Standard Test Method for Pigment Content of Solvent-Reducible Paints.
 - 13. ASTM D2621 - Standard Test Method for Infrared Identification of Vehicle Solids From Solvent-Reducible Paints.
 - 14. ASTM D2743 - Standard Practices for Uniformity of Traffic Paint Vehicle Solids by Spectroscopy and Gas Chromatography.

1.3 SUBMITTALS

- A. Product Data: Submit paint formulation for each type of paint.
- B. Test and Evaluation Reports: Submit source and acceptance test results in accordance with AASHTO M247.

- C. Manufacturer's Instructions: Submit instructions for application temperatures, eradication requirements, application rate, line thickness, and any other data on proper installation.
- D. Proposed schedule of pavement marking with type of equipment to be used and description of colors to be installed at locations within project.

1.4 QUALIFICATIONS

- A. Applicator: Company specializing in performing work of this section.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Invert containers several days prior to use when paint has been stored more than 2 months. Minimize exposure to air when transferring paint. Seal drums and tanks when not in use.

1.6 AMBIENT CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside temperature ranges required by paint product manufacturer.
- B. Do not apply exterior coatings during rain or snow when relative humidity is outside humidity ranges, or moisture content of surfaces exceed those required by paint product manufacturer.
- C. Do not apply paint when temperatures are expected to fall below 50 degrees F for 24 hours after application.
- D. Volatile Organic Content (VOC). Do not exceed State or Environmental Protection Agency maximum VOC on traffic paint.

1.7 WARRANTY

- A. Furnish three year manufacturer's warranty for traffic paints.

PART 2 PRODUCTS

2.1 PAINTED PAVEMENT MARKINGS

- A. Manufacturers
 - 1. Conventional Dry Paint (Cold Applied):
 - a. Aexcel Corp., 12W-D221 White, 12Y-D233 Yellow;
 - b. Engineer approved equal.
 - 2. Rapid Dry Paint (Hot Applied):
 - a. Aexcel Corp., 12W-D273 White, 12Y-D287 Yellow;
 - b. Engineer approved equal.
- B. Performance / Design Criteria:
 - 1. Paint Adhesion: Adhere to road surface forming smooth continuous film one minute after application.

2. Paint Drying: Tack free by touch so as not to require coning or other traffic control devices to prevent transfer by vehicle tires within two minutes after application.
- C. Marking paint:
1. Roadway pavement: Thermoplastic type material as manufactured by an Engineer approved supplier.
 2. Parking Lots or Private Property: Waterbourne as manufactured by an Engineer approved supplier
 3. Pedestrian trails/paths: Waterbourne as manufactured by an Engineer approved supplier.
 4. Colors: White and/or yellow at the locations as indicated on Drawings.
 5. Do not use pavement marking paints containing more than 150 grams per liter of volatile organic compounds (VOC).

2.2 EQUIPMENT

- A. Continuous Longitudinal Line Application Machine: Use application equipment with following capabilities.
1. Dual nozzle paint gun to simultaneously apply parallel lines of indicated width in solid or broken patterns or various combinations of those patterns.
 2. Measuring device to automatically and continuously measure length of each line placed, to nearest foot.
 3. Device to heat paint to 110 degrees F for fast dry applications.
- B. Other Equipment:
1. For application of crosswalks, intersections, stop lines, legends and other miscellaneous items by walk behind stripers, hand spray or stencil trucks, apply with equipment meeting requirements of this section. Do not use hand brushes or rollers.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Prior to marking verify that new asphalt is complete, has been accepted by Owner or Engineer, and cured a minimum of fourteen (14) days.
- B. Inspect pavement surfaces for conditions and defects that will adversely affect quality of work. Do not place marking paint over unacceptable surfaces. If these conditions exist, immediately notify the Engineer.
- C. Commencement of installation constitutes acceptance of surface as suitable for installation.
- D. Do not apply paint to concrete surfaces until concrete has cured for 28 days.

3.2 PREPARATION

- A. Maintenance and Protection of Traffic:

1. Prevent interference with marking operations and to prevent traffic on newly applied markings before markings dry.
 2. Maintain travel lanes between 7: 00 AM to 9: 00 AM, and between 4: 00 PM and 6: 00 PM.
 3. Maintain access to existing businesses, and other properties requiring access.
- B. Surface Preparation.
1. Clean and dry paved surface prior to painting.
 2. Blow or sweep surface free of dirt, debris, oil, grease or gasoline.
- C. Provide qualified technician to supervise equipment and application of marking. Layout markings using guidelines, templates and forms. Use stencils and templates made to industry standards.
- D. "Free hand" painting of arrows, symbols, or wording is unacceptable.

3.3 DEMOLITION

- A. Remove existing markings in an acceptable manner.
- B. Do not remove existing pavement markings by painting over with blank paint.
- C. Remove marking paint removal by machine only and in a manner to reduce grooves in the pavement and abraded dust from the road surface to the maximum extent practicable. Remove by methods that will cause least damage to pavement structure or pavement surface. Satisfactorily repair any pavement or surface damage caused by removal methods.
- D. Clean and repair existing remaining or reinstalled lines and legends.

3.4 APPLICATION

- A. Agitate paint for 1-15 minutes prior to application to ensure even distribution of paint pigment.
- B. Apply marking paint at a rate of one (1) gallon per three to four hundred (300-400) lineal feet of four (4) inch wide stripes or to manufacturer's specification.
- C. Apply markings in locations and to indicated dimensions at indicated locations.
- D. Prevent splattering and over spray when applying markings. Protect adjacent curbs, walks, fences, and other items from receiving paint.
- E. Unless material is track free at end of paint application convoy, use traffic cones to protect markings from traffic until track free. When vehicle crosses a marking and tracks it or when splattering or over spray occurs, eradicate affected marking and resultant tracking and apply new markings.
- F. Collect and legally dispose of residues from painting operations.

3.5 TOLERANCES

- A. Maximum Variation from Wet Film Thickness: 1 mil.
- B. Maximum Variation from Wet Paint Line Width: Plus or minus 1/8 inch.
- C. Maximum Variation from Specified Application Temperature: Plus or minus 5 degrees F

3.6 FIELD QUALITY CONTROL

- A. Inspect for incorrect location, insufficient thickness, line width, coverage, retention, uncured or discolored material, and insufficient bonding.
- B. Repair lines and markings, which after application and curing do not meet following criteria:
 - 1. Incorrect Location: Remove and replace incorrectly placed patterns.
 - 2. Insufficient Thickness, Line Width, Paint Coverage or Coverage or Retention: Prepare defective material by acceptably grinding or blast cleaning to remove substantial amount of beads and to roughen marking surface. Remove loose particles and debris. Apply new markings on cleaned surface in accordance with this Section.
 - 3. Uncured or Discolored Material, Insufficient Bonding: Remove defective markings in accordance with this Section and clean pavement surface one foot beyond affected area. Apply new markings on cleaned surface in accordance with this Section.
- C. Replace defective pavement markings as specified throughout 3 year warranted period. Replace markings damaged by anti-skid materials, studded tires, tire chains, chemical deicers, snow plowing or other loss of marking material regardless of cause. When markings are damaged by pavement failure or by Owner's painting, crack sealing, or pavement repair operations, Contractor is released from warranty requirements for damaged work.
- D. A three member team will evaluate warranty provisions. Team will consist of one member from Owner, one member from Contractor, and third person who is mutually acceptable to Owner and Contractor. Any costs for third person will be equally shared between Owner and Contractor. At least once each year, beginning with year after acceptance, team shall:
 - 1. Observe Owner taking readings by retroreflectometer, or review Owner records of such evaluation. The number of readings will be as large as necessary to ensure that minimum criteria are satisfied. Readings will be during period from March 15 through October, when pavement is clean and dry.
 - 2. Determine color fade, discoloration or pigment loss based on visual color comparison between original sample plates and in-place pavement markings.
 - 3. Determine magnitude of material loss.
- E. Prepare list of defective areas and areas requiring additional inspection and evaluation to decide where material may need replaced. Provide traffic control as necessary if markings require more detailed evaluation.
- F. Replace failed or defective markings in entire section of defective markings within 30 days after notification when any of the following exists during warranty period:
 - 1. Average retroreflectivity within any 528 foot section is less than 1225 mcd/m²/1x for white pavement markings and 100 mcd/m²/1x for yellow pavement markings.

- 2. Marking is discolored or exhibits pigment loss, and is determined to be unacceptable by three member team based on visual comparison with beaded color plates.
 - 3. More than 15 percent of area of continuous line, or more than 15 percent of combined area of skip lines, within any 528 foot section of roadway is missing.
- G. Replace pavement marking material under warranty using original or better type material. Continue warranty to end of original 3 year period even when replacement materials have been installed as specified.
 - H. When eradication of existing paint lines is necessary, eradicate by shot blast or water blast method. Do not gouge or groove pavement more than 1/16 inch during removal. Limit area of removal to area of marking plus 1 inch on all sides. Prevent damage to transverse and longitudinal joint sealers, and repair any damage.
 - I. Maintain daily log showing work completed, results of above inspections or tests, pavement and air temperatures, relative humidity, presence of any moisture on pavement, and any material or equipment problems. Make legible entries in log in ink, sign and submit by end of each work day. Enter environmental data into log prior to starting work each day and at two additional times during day.

3.7 PROTECTION

- A. Protect painted pavement markings from vehicular and pedestrian traffic until paint is dry and track free. Follow manufacturer's recommendations or use minimum of 30 minutes. Consider barrier cones as satisfactory protection for materials requiring more than 2 minutes dry time.

3.8 MAINTENANCE

- A. Furnish service and maintenance of traffic paints for three years from Date of Substantial Completion.

3.9 ATTACHMENTS

- A. Pavement Markings:

Items	Location
4 inch White Conventional	Parking Space and Aisles
24 inch White Fast Dry	Stop Line

END OF SECTION

SECTION 32 18 40 PLAYGROUND SAFETY SURFACING

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Poured-in-Place Playground Surfacing System.

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 1. ASTM D412 Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension.
 2. ASTM D624 Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
 3. ASTM D2047 Standard Test Method for Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine.
 4. ASTM D2859 Standard Test Method for Flammability of Finished Textile Floor Covering Materials.
 5. ASTM E303 Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester.
 6. ASTM F1292 Standard Specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment.
 7. ASTM F1951 Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment.

1.03 SYSTEM DESCRIPTION

- A. Performance Requirements: Provide a 2-layer rubber-urethane playground surfacing system which has been designed, manufactured and installed to meet the following criteria:
 1. Shock Attenuation (ASTM F1292):
 - a. Gmax: Less than 200.
 - b. Head Injury Criteria: Less than 1000.
 2. Flammability (ASTM D2859): Pass.
 3. Tensile Strength (ASTM D412): 60 psi (413 kPa).
 4. Tear Resistance (ASTM D624): 140%.
 5. Water Permeability: 0.4 gal/yd²/second.
 6. Accessibility: Comply with requirements of ASTM F1951.

1.04 SUBMITTALS

- A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.
- B. Product Data: Submit manufacturer's product data and installation instructions.
- C. Product Test Reports: From IPEMA indicating that playground surface system complies with the requirements, based on comprehensive testing of the product as follows: ASTM F 1292 latest version, ASTM F 1951 latest version and CPS guidelines for impact attenuation for the fall height required by the equipment and the depth of safety surfacing. Product testing shall have been done within the last five (5) years.
- D. Verification Samples: Submit manufacturer's standard verification samples of 9" x 9" (229 x 229 mm) minimum.
- E. Quality Assurance/Control Submittals: Submit the following:
 - 1. Certificate of qualifications of the playground surfacing installer.
 - 2. Provide a list of five (5) installations of rubber safety surfacing completed by proposed installer in the last five years using the same system, including project name, phone number, address, and contact.
- F. Closeout Submittals: Submit the following:
 - 1. Warranty documents specified herein.
 - 2. Impact attenuation testing results as per 1.10.

1.05 QUALITY ASSURANCE

- A. Qualifications: Utilize an installer approved and trained by the manufacturer of the playground surfacing system, having experience with other projects of the scope and scale of the work described in this section.
- B. Certifications: Certification by manufacturer that installer is an approved applicator of the playground surfacing system.
- C. Surfacing manufacturer shall have marketed the surfacing system specified in the United States for at least five (5) years.
- D. International Play Equipment Manufacturers Association (IPEMA) certified.

1.06 REGULATORY REQUIREMENTS

- A. Installation of surfacing shall conform to applicable requirements of ADAAG - Americans with Disabilities Act Accessibility Guidelines, U.S. Architectural and Transportation Barriers Compliance Board, Washington, D.C. - latest edition, and regulations of the Commonwealth of Massachusetts Architectural Access Board (MAAB), 521 CMR.

1.07 DELIVERY, STORAGE & HANDLING

- A. General: Comply with Division 1 Product Requirement Section.
- B. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at a minimum temperature of 40 degrees F (4 degrees C) and a maximum temperature of 90 degrees F (32 degrees C).

1.08 PROJECT/SITE CONDITIONS

- A. Environmental Requirements: Install surfacing system when minimum ambient temperature is 40 degrees F (1 degree C) and maximum ambient temperature is 90 degrees F (32 degrees C). Do not install in steady or heavy rain.

1.09 WARRANTY

- A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.
- B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under contract documents.
- C. Proper drainage is critical to the longevity of the PlayBound Poured-in-Place surfacing system. Inadequate drainage will cause premature breakdown of the poured system in affected areas; and void the warranty.
- D. Warranty Period: Extreme-10: 10 years from date of completion of work.

1.10 POST INSTALLATION TESTING & INITIAL IMPACT ATTENUATION STANDARDS

- A. The Contractor shall engage a qualified testing agency to perform impact attenuation for G-max (Peak Deceleration) and Head Injury Criteria using the methods of ASTM F 1292, latest edition, to verify that installed surfacing meets the minimum standards of ASTM F1292.

1.11 CPSI AND MANUFACTURER'S REPRESENTATIVE

- A. The Contractor shall engage the services of a Certified Playground Safety Inspector (CPSI) to inspect proposed grades prior to pouring surfacing to ensure compliance with ASTM and Consumer Product Safety Guidelines in relation to height of transfer stations, access points, slide exits and other critical dimensions for existing play equipment.

PART 2 – PRODUCTS

2.01 POURED-IN-PLACE PLAYGROUND SURFACING SYSTEM

- A. Manufacturer: Surface America, Inc. EXTREME-10 type or approved equal.

1. Contact: PO Box 157, Williamsville, NY 14231; Telephone: (800) 999-0555, (716) 632-8413; Fax: (716) 632-8324; E-mail: info@surfaceamerica.com; website: <http://www.surfaceamerica.com>.
- B. Proprietary Products/Systems. Poured-in-place playground surfacing system, including the following:
1. PlayBound Poured-In-Place Primer:
 - a. Material: Urethane.
 2. PlayBound Poured-in-Place Basemat:
 - a. Material: Blend of 100% recycled SBR (styrene butadiene rubber) and urethane.
 - b. Meet ASTM F1292 requirements for critical fall height. Thickness: 4" (102 mm) for 10' critical fall height at playground.
 - c. Formulation Components: Blend of strand and granular material.
 3. PlayBound Poured-In-Place Top Surface:
 - a. Material: Blend of recycled EPDM (ethylene propylene diene monomer) rubber or TPV Granule and aromatic or aliphatic urethane binder.
 - b. Thickness: Nominal 1/2" (12.7 mm), minimum 3/8" (9.5 mm), maximum 5/8" (15.9 mm).
 - c. Color of particles shall be an integral dye. Pricing shall include the cost for the Owner to select any of the following colors: Terra Cotta Red, Primary Red, Gold, Beige, Yellow, Bright Green, Hunter Green, Teal, Sky Blue, Royal Blue, Purple, Pearl, Eggshell, Brown, Light Gray.
 - d. Dry Static Coefficient of Friction (ASTM D2047): 1.0.
 - e. Wet Static Coefficient of Friction (ASTM D2047): 0.9.
 - f. Dry Skid Resistance (ASTM E303): 89.
 - g. Wet Skid Resistance (ASTM E303): 57.

2.02 PRODUCT SUBSTITUTIONS

- A. Substitutions: No substitutions permitted.

2.03 MIXES

- A. Required mix proportions by weight:
1. Basemat: 16+% urethane (as ratio: 14% urethane divided by 86% rubber). 14% urethane, 86% rubber (based on entire rubber & urethane mix).
 2. Top Surface: 22% urethane (ratio: 18% urethane divided by 82% rubber). 18% urethane, 82% rubber (based on entire rubber & urethane mix).

2.04 BASE COURSE FOR Poured-IN-PLACE SURFACING

- A. Crushed stone for safety surface base shall be a homogenous 6" deep mixture of the following gradation, with exact gradation adjusted to the specific written requirements of the surfacing manufacturer. Bid shall include any additional costs necessary to adjust specified crushed stone base to the gradation and requirements of the specific manufacturer of the surfacing. Stone shall be uniformly mixed in a pug mill or mixing table or other mechanical means prior to placement and sieve analysis.

<u>Sieve Designation</u>	<u>Percent Passing</u>
1 inch	90-100
5/8 inch	50-80
1/4 inch	30-50
No. 4	15-35
No. 8	10-30
No. 30	3-5
No. 200	0-3

PART 3 – EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

- A. Comply with the instructions and recommendations of the playground surfacing manufacturer.

3.02 EXAMINATION

- A. Substrate preparation must be in accordance with surfacing manufacturer's specification. Concrete curbs must be fully cured – up to 7 days.
- B. Proper drainage is critical to the longevity of the PlayBound Poured-in-Place surfacing system. Inadequate drainage will cause premature breakdown of the poured system in affected areas; and void the warranty.

3.03 BASE PREPARATION

- A. The subgrade under the base course shall be compacted to 95%. Provide compaction testing as specified below.
- B. Crushed stone base course shall be installed and compacted in 2" lifts to 95% compaction. Provide compaction testing as specified below.

3.04 COMPACTION TESTING

- A. The Contractor shall pay for an independent laboratory, subject to the approval of the Engineer, to provide testing of compaction as follows:

1. Maximum density and optimum water content determination by the ASTM D-1557-09 or AASHTO T-180 Modified Proctor laboratory test for "Suitable Backfill" for subgrade and crushed stone base for safety surfacing at play area.
2. On-site: Provide one field density test of the subgrade, and one field density test of in each compacted layer of stone base layer, in 4 separate locations within playground area.

3.05 INSPECTION OF BASE

- A. Verify that base is installed to correct slopes, grades and tolerances prior to installation of poured in place surfacing. Crushed stone base should be sloped 2% to allow run-off of any excess water. Prior to application of the poured in place system, the applicator shall evaluate the substrate's structural performance, and notify all contractors and the Engineer of any deficiencies. Work shall not proceed until unsatisfactory conditions are corrected.
- B. Provide inspection by CPSI and manufacturer's representative as specified in Paragraph 1.11. Make adjustment to base grades as necessary.

3.06 PREPARATION

- A. Surface Preparation: Using a brush or short nap roller, apply primer to the substrate perimeter and any adjacent vertical barriers such as playground equipment support legs, curbs or slabs that will contact the surfacing system at the rate of 300 ft²/gal (7.5 m²/L).

3.07 INSTALLATION

- A. Do not proceed with playground surfacing installation until all applicable site work, including substrate preparation, fencing, playground equipment installation and other relevant work, has been completed.
- B. Basemat Installation:
 1. Using screeds and hand trowels, install the basemat at a consistent density of 29 pounds, 1 ounce per cubic foot (466 kg/m³) to the specified thickness.
 2. Allow basemat to cure for sufficient time so that indentations are not left in the basemat from applicator foot traffic or equipment.
 3. Do not allow foot traffic or use of the basemat surface until it is sufficiently cured.
- C. Primer Application: Using a brush or short nap roller, apply primer to the basemat perimeter and any adjacent vertical barriers such as playground equipment support legs, curbs or slabs that will contact the surfacing system at the rate of 300 ft²/gal (7.5 m²/L).
- D. Top Surface Installation:
 1. Using a hand trowel, install top surface at a consistent density of 58 pounds, 9 ounces per cubic foot (938 kg/m³) to a nominal thickness of 1/2" (12.7 mm).
 2. Allow top surface to cure for a minimum of 48 hours.

3. At the end of the minimum curing period, verify that the top surface is sufficiently dry and firm to allow foot traffic and use without damage to the surface.
4. Do not allow foot traffic or use of the surface until it is sufficiently cured.

3.05 PROTECTION

- A. Protect the installed playground surface from damage resulting from subsequent construction activity on the site.

END OF SECTION

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SECTION 32 31 16 WELDED WIRE FENCE & GATES

PART 1 - GENERAL

1.01 Include General Conditions and all other Division 1 – General Requirements as part of the Section.

- A. All of the Contract Documents, including the Contract Form, General Provisions, General Conditions, Supplemental Conditions, and all Attachments to the General Provisions, and Division 1 - General Requirements, apply to the work of this Section.
- B. Coordinate work with trades affecting, or affected by, work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.
- C. The contractor shall provide all labor, materials and appurtenances necessary for the complete installation of the industrial steel ornamental fence system as specified.

1.02 WORK INCLUDED

- A. Furnish and install welded steel wire fence and gates at play area and splashpad area.
- B. Provide lock and simple latch for gates.
- C. Related Work in other Sections:
 - 1. Section 31 20 00 - Earth Moving
 - 2. Section 03 30 00 - Cast-in-Place Concrete.

1.03 QUALITY ASSURANCE

- A. The work of this Section shall be coordinated with the work of other Sections. Verify dimensions and work of other trades which adjoin materials of the Section before installing items specified.

1.04 SUBMITTALS

- A. Product Information: Provide manufacturer's product data and information showing installation and limitations in use. Supply Certificates of Compliance for all materials required for fabrication and installation on all components. Provide color samples of surface finish for approval before fabrication.
- B. Shop Drawings:
 - 1. Shop drawings for welded steel wire fence shall show size and thicknesses of all members, types of materials, methods of connection and assembly, complete dimensions and layout, clearances, anchorage, relationship to surrounding work by other trades, shop paint and protective coatings, and other pertinent details

of fabrication and installation.

2. Indicate elevation, sections, sizes, connection attachments, reinforcing, anchorage, openings, size and type of fasteners, size of welds, and any accessories.
- C. Certificate of Conformance: Provide certificate verifying that each item was prepared, coated, inspected, and repairs made in accordance with this specification.
- D. Warranty: Provide warranty that all materials furnished and work executed under this Section comply with Specifications and authorized changes.
- E. Structural Certification: Provide written certification that structural requirements meet or exceed specifications included in Article 1.05 Performance Requirements.

1.05 PRODUCT HANDLING AND STORAGE

- A. Upon receipt at the job site, all materials shall be checked to ensure that no damage occurred during shipping or handling. Materials shall be stored in such a manner to ensure proper ventilation and drainage and to protect against damage, weather, vandalism and theft.

PART 2 - MATERIALS

2.01 Welded steel wire fence

- A. The welded wire fence system shall be Legi welded wire fence (OuterSpace Landscape Furnishings, 7533 Draper Ave., La Jolla, CA 92037 858-459-0994) or approved equal.
- B.
 1. Mesh panels shall be Legi R-S.H-O Mesh, or equal conforming to the following:
 - a) Panels for playground perimeter shall be straight or arched, as indicated on the drawings.
 - 1) Straight Panels shall be 4' ht nominal and arched panels 4'-6" nominal.
 - 2) Mesh shall be 50 x 200 mm (1.9" x 7.9") rectangular mesh openings, manufactured from 6 mm (.24") o.d. vertical wire, 8 mm (.31") o.d. double horizontal wire as shown on the Drawings.
 2. Fence Posts shall be Legi "R" fence post, or equal, conforming to the following:

- a) Post shall be rectangular steel tube (2.4" x 1.6") in cross section, with welded top cap (1.6" x 3.5") and 40 mm wide backing plate x the length of the mesh. Interior threaded inserts to receive bolts shall be spaced 7.9" o.c. along back of post.
 - b) On center post-spacing shall be 2500mm (98.4" or 8.2').
 - 3. Bolts shall be .31" x 1.8" V2A stainless steel security one-way vandal resistant bolts removable only with a special tool.
 - 4. Mesh ends to be overlapped behind post. Bolts to be passed through backing plate and mesh ends into threaded insrts. Overlapping mesh ends shall be 2.75" wide, which shall allow up to 0.8" tolerance in post spacing. Extra mesh shall be taken up at the corner panels, as shown on the drawings. Corners panels shall be field cut, and finished as shown on the Drawings.
- C. Gates, Hinges & Latches
 - 1. Gate shall be Legi "Klassik" single swing gate or approved equal, and as shown on the Drawings.
 - a) Gate posts shall consist of square tube steel 100 mm square with welded head and foot plates.
 - b) Gate leafs shall be composed of rectangular tube frames 60 x 40 mm or larger with mesh welded directly the frame.
 - c) The gate hinges shall have 65 x 40 mm mounting plate, brass washer and hinge pin welded to gate post.
 - d) Gate hinge plate 260 mm wide (10.2") with oval holes shall allow for a 0.4 inch adjustment of the gate wing.
 - e) Gates hinges shall be completely contained within the gate profile.
 - 2. Provide gate with manufacturer's standard simple latch.
- D. Finish: All material, unless otherwise indicated, shall be hot-dip galvanized after fabrication, with a zinc layer a minimum of 1.8 oz/sq.ft., stainless steel sand-blasted for optimum coating adhesion, and polyester powder-coated in non-lead, UV stable, thermally set powder paints.
 - 1. Fence and gate color shall be chosen by the Owner from manufacturer's standard color choices.

PART 3 - EXECUTION

3.01 INSTALLATION - GENERAL

- A. The installation shall be laid out by the contractor in accordance with the construction documents.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true and free of rack; and measured from established lines and levels.
- C. Provide temporary bracing or anchors in formwork for items that are to be built or embedded into concrete, masonry or similar construction.
- D. Fit exposed connections accurately together to form hairline joints. Do not weld, cut, or abrade surfaces of exterior units that are for bolted or screwed field connections. 3.02

3.02 INSTALLATION - WELDED WIRE FENCE

- A. Field verify and adjust sections of the work prior to anchoring to ensure matching alignments and stability of members at abutting joints.
- B. Install Ornamental Fencing posts plumb. Erect panels plumb true and free from rack and still maintain minimum, maximum, and typical clearances of bottom rail from finish grade. When holding panel true is not possible without exceeding those tolerances, rake assembled panels to approximate finished grade in as long and smooth gradients as possible.
- C. Post Footings:
 - 1. Coordinate installation of posts with construction of concrete walls and curbs.
 - 2. When cutting/drilling rails or posts adhere to the following requirements:
 - a. Remove all metal shavings from cut area.
 - b. Apply zinc-rich primer to thoroughly cover cut edge and/or drilled hole.
 - c. Apply 2 coats of custom finish paint matching fence color.
 - 2. Manufacturers spray cans or paint pens shall be used to prime and finish exposed surfaces; it is recommended that paint pens be used to prevent overspray.

3.03 GATE INSTALLATION

- A. Install Gate posts and gate leaves plumb. Erect gate posts and leaves plumb true and free from rack and still maintain minimum, maximum, and typical clearances of bottom rail from finish grade.
 - 1. Manufacturer's gate drawings shall identify all necessary gate hardware required for the complete and proper installation of gates.
 - 2. Gate hardware shall be installed per manufacturer's recommendations.

3.04 ADJUSTING AND CLEANING

- A. Touch-up Painting: Immediately after erection, clean bolted connections and abraded areas per manufacturer's recommendations, and paint exposed areas with the same material (from the same paint lot) as used for shop painting to comply with SSPC-PA 1 and manufacturer's instructions for touching up shop-painted surfaces.
 - 1. Apply by paint pen or spray can to provide a minimum 2.0 mil (0.05mm) dry film thickness.
- B. The contractor shall clean the job site of excess materials, and legally dispose of off-site.

END OF SECTION

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32 31 29 FENCING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. The conditions of the Contract, including Division 00 and Division 01, apply to the work under this Section.
- B. All references to products by manufacturer, trade name or performance Specifications bearing the connotation "or approved equal" shall be as determined by the Landscape Architect and the City.

1.2 WORK INCLUDED

- A. Provide all labor, equipment, implements and materials required to furnish, install, construct and perform all site improvements complete as shown on the Drawings and specified herein.
- B. To be included, but not limited to the following:
 - 1. 4' High Black Permafused Chain Link Fence & Gates at Sport Court area.

1.3 REFERENCES

- A. Examine all other Sections of the Specifications and all Drawings for the relationship of the work under this Section and the work of other trades. Cooperate with all trades and all departments of the City of Waltham and coordinate all work under this Section therewith.
- B. The following related items are included under the Sections listed below:
 - 1. Section 31 20 00—Earth Moving

1.4 SUBMITTALS

- A. Shop Drawings of all Fences and Gates
- B. All Manufacturer's product literature
- C. Sample permafused chain link fabric

1.5 SHOP DRAWINGS AND SAMPLES

- A. Provide complete Shop Drawings and/or samples and catalog cuts for all items called for on the Drawings and as specified and in accordance with applicable requirements under Division 01.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's original unopened and undamaged packages with labels legible and intact.

- B. Store materials in unopened packages in a manner to prevent damage from the environment and construction operations.
- C. Handle in accordance with manufacturer's instructions.

1.7 DEFINITIONS

- A. The following items are included herein and shall mean:
 - 1. S.S.H.B. - Standard Specifications for Highway and Bridges, the Commonwealth of Massachusetts, Department of Public Works, latest edition.
 - 2. A.S.T.M. - American Society for Testing and Materials. The following standard specifications are applicable to the associated items as listed.
 - a. A36 ...Steel
 - b. A153...Zinc Coating (hot-dip) on hardware
 - c. A307...Carbon Steel bolts 66000 psi tensile
 - 3. AAB: Architectural Access Board.
 - 4. ADA: Americans with Disabilities Act and its current regulations.
 - 5. AWS: American Welding Society.
 - 6. CPSC: Consumer Product Safety Council.
 - 7. SSPS: Steel Structures Painting Council.

PART 2 - PRODUCT

2.1 4' HIGH BLACK PERMAFUSED CHAIN LINK FENCE & GATE

- A. Steel Framework:
 - 1. The steel material used to manufacture fence pipes shall be cold-formed, circular, ASTM A-120 Schedule 40 pipe, zinc-coated. All structural shapes shall be galvanized by the hot-dip process conforming to ASTM A 123.
 - 2. The manufactured framework shall be subjected to a complete thermal stratification coating process (multi-stage, high-temperature, multi-layer) including, at a minimum, a six-stage pretreatment/wash with zinc phosphate, an electrostatic spray application of an epoxy base, and a separate electrostatic spray application of a polyester finish.
 - 3. The material used for the base coat shall be a zinc-rich, gray color thermosetting epoxy; the minimum thickness of the base coat shall be two (2) mils. The material used for the finish coat shall be a thermosetting, no-mar TGIC polyester powder; the minimum thickness of the finish coat shall be two (2) mils. The stratification-coated pipe shall demonstrate the ability to endure a salt-spray resistance test in accordance with ASTM 8117 without loss of

adhesion for a minimum exposure time of 3500 hours. Additionally, the coated pipe shall demonstrate the ability to withstand exposure in a weather-ometer apparatus for 1000 hours without failure in accordance with ASTM D1499 and to show satisfactory adhesion when subjected to the crosshatch test, Method B, in ASTM D3359. The polyester finish coat shall not crack, blister, or split open under normal use.

4. The finish coat color for all framework shall be black.
5. Post, rail, and bracing sizes shall be as indicated in the drawings.
6. Rails to be furnished in manufacturers' standard lengths of approximately 21'-0" with outside sleeve type coupling, at least 6" long for each joint. One coupling in each five shall have an expansion spring. Provide means for attaching rail securely to each corner, pull, and end post. Rail shall form continuous brace from end to end of each run of fence.

B. Fence Fabric:

1. The material for chain link fence fabric shall be manufactured from 6 gauge steel core wire, hot-dipped galvanized to Type I, AISI Specifications, and shall be mesh of a size indicated by the drawings made from a medium high carbon quality steel wire. The tensile strength shall be 80,000 PSI unless otherwise noted.
2. The coating color shall be class 668-28, thermally fused wire - black.
3. Selvage Edges: Top and bottom of fabric shall have knuckled selvage, both sides.
4. Accessories: All of the following fittings and fasteners shall be manufactured of stainless steel unless otherwise specified below, and shall all be galvanized and polyester-coated through the same process required for the framework (see above); the color shall match the framework.
 - a. Post Tops shall be manufactured of pressed steel or malleable iron, designated as a weather-tight closure cap (for tubular posts). Provide one (1) cap for each post. Where top rail is used, provide tops to permit passage of top rail.
 - b. Stretcher Bars shall be one-piece lengths equal to the full height of fabric with a minimum cross-section of 3/16" by 3/4". Provide one (1) stretcher bar for each end post and two (2) for each corner and pull post. Tension bands and brace bands, if utilized, shall be 7/8" by 12 gauge, beveled, galvanized, sized to fit pipe sizes, and furnished with galvanized fasteners.
 - c. Stretcher Bar Bands shall be manufactured of heavy pressed steel or malleable iron of 1/8" by 3/4" minimum cross-section and be of sufficient size to secure stretcher bars to end, corner, and pull posts.
 - d. Rail Clamps shall be standard clamps (boulevard clamps) furnished complete with fasteners with ASTM designation A 153.
 - e. Ties for fastening fabric to posts, rails, and braces shall use minimum 9- gauge galvanized, annealed steel wire ties – aluminum not accepted. Color shall be black.
5. Modifications to the above which are standard manufacturers' practice will be permitted if strength and security are maintained.

- C. Gate as indicated shall be 5' ADA compliant, latchable and capable of being locked by a padlock. Gate, latch and closing mechanism to be approved by Landscape Architect and Owner.

PART 3 - EXECUTION

3.1. 4' HIGH BLACK PERMAFUSED CHAIN LINK FENCE & GATE POSTS

- A. Posts shall be placed straight and true. See drawings.
- B. Posts shall be a maximum distance of 10'-0" on center.
- C. Fence Erection
 - 1. Rails: Rail shall form a continuous brace from end to end of each fence run. Couplings shall be located a maximum of 12" from line posts.
 - 2. Brace Assemblies: Install braces so posts are plumb when diagonal rod is under proper tension.
 - 3. Fabric: Leave approximately 1-1/2" between finish grade and bottom selvage. Pull fabric taut and tie to posts and rails. Install fabric on street side of fence and anchor to framework so that fabric remains in tension after pulling force is released.
 - 4. Stretcher Bars: Thread through fabric and secure to posts with approved fasteners spaced not over 12" O.C.
 - 5. Steel Ties: Steel ties shall be placed 12" O.C. and securely fastened.
 - 6. Fasteners: Install nuts for tension band and hardware bolts on side of fence opposite fabric side.

END OF SECTION

32 91 13 SOIL PREPARATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Planting soils specified by composition of the mixes.
- B. Related Requirements:
 - 1. Section 32 92 00 Lawns. For placing planting soils for lawns.
 - 2. Section 32 93 00 Plants and Planting. For placing planting soils for trees, shrubs and perennials.
 - 3. Division 01 Section "Summary" for requirements relating to diesel engine emissions for construction vehicles and equipment.
 - 4. Division 01 Section "Environmental Protections" for requirements relating to construction waste recycling.

1.2 DEFINITIONS

- A. Imported Soil: Soil that is transported to Project site for use.
- B. Manufactured Soil: Soil produced by blending soils, sand, stabilized organic soil amendments, and other materials to produce planting soil.
- C. Planting Soil: Existing, on-site soil, imported soil or manufactured soil that has been modified, as specified, with soil amendments and fertilizers to produce a soil mixture best for plant growth.
- D. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- E. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.
- F. Imported Soil: Soil that is transported to the project site for use.

1.3 PRE-INSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Verification: For each bulk-supplied material, a 1-gal. volume of each in sealed containers labeled with content, source, and date obtained. Each sample shall be typical of

the lot of material to be furnished; provide an accurate representation of composition, color, and texture.

C. Installer Qualifications:

1. An installer with at least five years experience who has completed unit paver installations similar in material, design, and extent to that indicated for this project and whose work has resulted in construction with a record of successful in-service performance.
2. Submit installer qualifications per Division 01.

1.5 IMPORTED SOIL AND COMPOST TESTING

- A. Provide soil test results and recommendations for all imported topsoil, manufactured planning soil and compost per Testing Requirements article.
- B. Provide soil test and recommendations for each 500 CY of imported topsoil.

1.6 TESTING REQUIREMENTS

- A. General: Perform tests on soil samples according to requirements in this article.
- B. Physical Testing:
 1. Soil Texture: Soil-particle, size-distribution analysis by one of the following methods according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods":
 - a. Sieving Method: Report sand-gradation percentages for very coarse, coarse, medium, fine, and very fine sand; and fragment-gradation (gravel) percentages for fine, medium, and coarse fragments; according to USDA sand and fragment sizes.
 - b. Hydrometer Method: Report percentages of sand, silt, and clay.
 2. Total Porosity: Calculate using particle density and bulk density according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
 3. Water Retention: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
 4. CEC: Analysis by sodium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 3- Chemical Methods."
 5. Metals Hazardous to Human Health: Test for presence and quantities of RCRA metals including aluminum, arsenic, barium, copper, cadmium, chromium, cobalt, lead, lithium, and vanadium. If RCRA metals are present, include recommendations for corrective action.
 6. Phytotoxicity: Test for plant-available concentrations of phytotoxic minerals including aluminum, arsenic, barium, cadmium, chlorides, chromium, cobalt, copper, lead, lithium, mercury, nickel, selenium, silver, sodium, strontium, tin, titanium, vanadium, and zinc.
- C. Fertility Testing: Soil-fertility analysis according to standard laboratory protocol of , including the following:
 1. Percentage of organic matter.
 2. CEC, calcium percent of CEC, and magnesium percent of CEC.

3. Soil reaction (acidity/alkalinity pH value).
 4. Buffered acidity or alkalinity.
 5. Nitrogen ppm.
 6. Phosphorous ppm.
 7. Potassium ppm.
 8. Manganese ppm.
 9. Manganese-availability ppm.
 10. Zinc ppm.
 11. Zinc availability ppm.
 12. Copper ppm.
 13. Sodium ppm.
 14. Soluble-salts ppm.
 15. Presence and quantities of problem materials including salts and metals cited in the Standard protocol. If such problem materials are present, provide additional recommendations for corrective action.
 16. Other deleterious materials, including their characteristics and content of each.
- D. Organic-Matter Content: Analysis using loss-by-ignition method according to SSSA's "Methods of Soil Analysis - Part 3- Chemical Methods."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and compliance with state and Federal laws if applicable.
- B. Bulk Materials:
1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 3. Do not move or handle materials when they are wet or frozen.
 4. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.
- C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- E. Store liquids in tightly closed containers protected from freezing.

1.8 PROJECT CONDITIONS

- A. Cold Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Regional Materials: Imported soil manufactured planting soil and soil amendments and fertilizers shall be manufactured within 500 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.

2.2 TOPSOIL

- A. Imported, naturally formed soil from off-site sources and consisting of sandy loam or loam soil according to USDA textures.
- B. Sources: Take imported, unamended soil from sources that are naturally well-drained sites where topsoil occurs at least 4 inches deep, not from agricultural land, bogs, or marshes; and that do not contain undesirable organisms; disease-causing plant pathogens; or obnoxious weeds and invasive plants including, but not limited to, quackgrass, Jonsongrass, posion ivy, nutsedge, nimblewill, Canda thistle, bindweed, bentgrass, wild garlic, ground ivy, peremmial sorrel, and bromegrass.
- C. Additional Properties of Imported topsoil before Amending: Soil reaction of pH 6 to 7 and miminum of 2 percent organic-matter content, friable, and with sufficient structure to give good tilth and aeration.

2.3 PLANTING SOILS SPECIFIED BY COMPOSITION

- A. General: Soil amendments, fertilizers, and rates of application specified in this article are guidelines that may need revision based on testing laboratory's recommendations after preconstruction soil analyses are performed.
 - 1.
 - 2. Planting-Soil Type - Tree Planting: If additional planting soil is required beyond existing stockpiled topsoil: Blend existing, on-site surface soil with the following soil amendments and fertilizers in the following quantities to produce planting soil.
 - a. Mix one third (1/3) existing on-site surface soil with one third (1/3) imported topsoil and one third (1/3) compost by volume with additional amendments and fertilizer per soil test recommendations.
 - 3. Planting-Soil Type - Shrub Planting for placement in continuous planting soil beds: If additional planting soil is required beyond existing stockpiled topsoil:
 - a. Mix two thirds (2/3) imported topsoil and one third (1/3) compost by volume with additional amendments and fertilizer per soil test recommendations.
 - a.
 - 4. Planting-Soil Type - Seeded or Sodded Lawn Planting for placement on subgrade at final elevation before placement of planting soil: If additional planting soil is required beyond existing stockpiled topsoil:
 - a. Mix three quarters (3/4) topsoil and one quarter (1/4) compost by volume with additional amendments per soil test recommendations.

2.4 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-composted, stable, and weed-free organic matter produced by composting feedstock, and bearing USCC's "Seal of Testing Assurance," and as follows:
 - 1. Reaction: pH of 5.5 to 8 .
 - 2. Soluble-Salt Concentration: Less than 4 dS/m.
 - 3. Moisture Content: 35 to 55 percent by weight.
 - 4. Carbon:Nitrogen Ratio: less than 25:1
 - 5. Organic-Matter Content: 30 to 40 percent of dry weight.
 - 6. Particle Size: Minimum of 98 percent passing through a 2-inch sieve.

2.5 FERTILIZERS

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 - 1. Composition: 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
 - 2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.
- B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 - 1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
 - 2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.
- C. Chelated Iron: Commercial-grade FeEDDHA for dicots and woody plants, and commercial-grade FeDTPA for ornamental grasses and monocots.

PART 3 - EXECUTION

3.1 GENERAL

- A. Place planting soil and fertilizers according to requirements in other Specification Sections.
- B. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in planting soil.

3.2 PREPARATION OF UNAMENDED, ON-SITE SOIL BEFORE AMENDING

- A. Excavation: Excavate soil from designated area(s) and stockpile until amended.
- B. Unacceptable Materials: Clean soil of concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.

- C. Unsuitable Materials: Clean soil to contain a maximum of 8 percent by dry weight of stones, roots, plants, sod, clay lumps, and pockets of coarse sand.
- D. Screening: Pass un-amended soil through a 2-inch sieve to remove large materials.

3.3 PLACING AND MIXING PLANTING SOIL OVER EXPOSED SUBGRADE

- A. General: Apply and mix un-amended soil with amendments on-site to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.
- B. Subgrade Preparation: Till subgrade to a minimum depth of 6 inches. Remove stones larger than 2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
- C. Mixing: Spread un-amended soil to total depth of 8 inches, but not less than required to meet finish grades after mixing with amendments and natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.
 - 1. Amendments: Apply soil amendments and fertilizer, if required, evenly on surface, and thoroughly blend them with un-amended soil to produce planting soil.
 - a. Mix lime and sulfur with dry soil before mixing fertilizer.
 - b. Mix fertilizer with planting soil no more than seven days before planting.
 - c.
 - 2. Lifts: Apply and mix unamended soil and amendments in lifts not exceeding 8 inches in loose depth for material compacted by compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- D. Compaction: Compact each blended lift of planting soil to 75 to 82 percent of maximum Standard Proctor density according to ASTM D 698 and tested in-place.
- E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.4 PLACING MANUFACTURED PLANTING SOIL OVER EXPOSED SUBGRADE

- A. General: Apply manufactured soil on-site in its final, blended condition. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.
- B. Subgrade Preparation: Till subgrade to a minimum depth of 6 inches. Remove stones larger than 2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
- C. Application: Spread planting soil to total depth of 8 inches, but not less than required to meet finish grades after natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet. Place drainage geotextile over compacted base course, overlapping ends and edges at least 12 inches.
 - 1. Lifts: Apply planting soil in lifts not exceeding 8 inches in loose depth for material compacted by compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

- D. Compaction: Compact each lift of planting soil to 75 to 82 percent of maximum Standard Proctor density according to ASTM D 698.
- E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform the following tests and inspections:
 - 1. Compaction: Test planting-soil compaction after placing each lift and at completion using a densitometer or soil-compaction meter calibrated to a reference test value based on laboratory testing according to ASTM D 698. Space tests at no less than one for each 2000 sq. ft. of in-place soil or part thereof.
- C. Soil will be considered defective if it does not pass tests and inspections.
- D. Label each sample and test report with the date, location keyed to a site plan or other location system, visible conditions when and where sample was taken, and sampling depth.

3.6 PROTECTION

- A. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:
 - 1. Storage of construction materials, debris, or excavated material.
 - 2. Parking vehicles or equipment.
 - 3. Vehicle traffic.
 - 4. Foot traffic.
 - 5. Erection of sheds or structures.
 - 6. Impoundment of water.
 - 7. Excavation or other digging unless otherwise indicated.
 - 8. Dispose of excess subsoil and unsuitable materials on-site where directed by Owner.

END OF SECTION

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SECTION 32 92 00 LAWNS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Lawn Seeding.

- B. Related Requirements:
 - 1. Section 32 91 13 "Soil Preparation"
 - 2. Section 32 93 00 "Plants and Planting"
 - 3. Division 01 Section "Summary" for requirements relating to diesel engine emissions for construction vehicles and equipment.

1.2 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting soil.

- B. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 32 91 13 "Soil Preparation".

- C. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 INFORMATIONAL SUBMITTALS

- A. Certification of grass seed: From seed vendor for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
 - 1. Certification of seed mixture for SEED TYPE 1 – LAWN.
 - 2. Certification of seed mixture for SEED TYPE 2 – RESOURCE AREA.

- B. Product certificates: For fertilizers, from manufacturer.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of turf during a calendar year. Submit before expiration of required maintenance periods.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful turf establishment.
 - 1. Experience: Five years' experience in turf installation in addition to requirements in Section 01 40 00 "Quality Requirements."
 - 2. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable.
- B. Bulk Materials:
 - 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
 - 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 - 3. Accompany each delivery of bulk materials with appropriate certificates.

1.8 FIELD CONDITIONS

- A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of planting completion.
 - 1. Spring Planting: April 15 – May 30
 - 2. Fall Planting: September 15 – October 15
- B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

1.9 ACCEPTANCE AND WARRANTY

- A. An inspection of work completed shall be conducted by the Landscape Architect and Owner's Representative for the purpose of initial acceptance. Any outstanding items revealed on inspection and identified on the punch list shall be corrected within two (2) weeks. Initial acceptance shall be withheld until those items are completed. Acceptance can be on partially completed work. Warranty, for a period of one year, shall begin after landscape inspection and initial acceptance.
- B. Warrant in writing that all lawns, placed on this Project will remain alive and be in healthy vigorous condition for a period of one year after completion and initial acceptance of entire project.

- C. During the warranty period replace, in accordance with the drawings and specifications, all lawns that are in an unhealthy or unsightly condition, or more than 25% dead.
- D. Final Inspection and Acceptance: An inspection will be conducted with the Landscape Contractor, Landscape Architect and Owner at the end of the one year warranty period for purposes of Final Acceptance.
- E. Warranty shall not include damage or loss of plants due to vandalism, fire, severe winds, extreme cold, or negligence on the Owner's part.
- F. Owner's maintenance shall begin upon initial acceptance of plant material.

PART 2 - PRODUCTS

2.1 SEED

- A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Rules for Testing Seeds" for purity and germination tolerances.
 1. Seed Type 1 – LAWN: Ernst Seeds Commercial Conservation Mix or approved equal. Ernst Seeds (1-800-873-3321) <https://www.ernstseed.com/product/commercial-conservation-mix/?anchor=0>
 2. Seed Type 2 – RESOURCE AREAS: New England Erosion Control / Restoration Mix for Detention Basins and Moist Sites. New England Wetland Plants, Inc. (413-548-8000) <https://newp.com/data/2018/08/Moist-site-mix-8132018-no-percent.pdf>
- B. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 1. Composition: 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight. Final application rate per soil test recommendations.

2.2 MULCHES

- A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.
- B. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch sieve; soluble salt content of 2 to 5 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings.

2.3 PESTICIDES

- A. General: Pesticide, registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.
 - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
 - 2. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
 - 3. Uniformly moisten excessively dry soil that is not workable or which is dusty.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.2 PREPARATION

- A. Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 SEEDING

- A. Limit of seeding shall be shown on the Drawings. All areas on the plan shall be loamed and seeded only after written approval of the finished grading or as directed by the Landscape Architect. ALL AREAS ARE TO BE HYDROSEEDDED. The actual planting of seed shall be done, however, only during periods within this season which are normal for such work as determined by weather conditions and the accepted practice in this locality. The Contractor may plant seed under unseasonable conditions at the Contractor's responsibility and without additional compensation, but subject to Landscape Architect's approval as to time and methods.
- B. Planting may be done between August 15 and October 15 or between April 15 and June 15.
- C. Soil additives shall be spread and thoroughly incorporated into the loam and upper 1 inch of the underlying subsoil by harrowing or other methods approved by the Landscape Architect. The following soil additives shall be incorporated:
 - 1. Ground limestone as required by soil analysis to achieve a pH of 6.0 to 6.5.
 - 2. Fertilizer as required by soil analysis.
 - 3. Superphosphate at the rate of 20 lbs. per 1,000 sq. ft.
 - 4. Humus as required by soil analysis.

- D. Seeding of lawns shall be done only by experienced workmen under the supervision of a qualified foreman. Seeding shall consist of soil preparation, rolling, hydroseeding, weeding, fertilization, watering and otherwise providing all labor and materials necessary to secure the establishment of acceptable turf.
- E. The soil on which the seed is spread shall be reasonably moist and shall be watered, if directed by the Landscape Architect. The seeded areas shall be watered evenly and at a rate of 5 gallons per square yard, unless otherwise directed by the Architect.
- F. Contractor shall place and maintain barriers around hydroseeded areas to keep people off during the first sixty (60) days.
- G. The application of grass seed, fertilizer, limestone, and a suitable wood fiber or other mulch shall be accomplished in one operation for hydroseeding.

3.4 TURF MAINTENANCE

- A. General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
 - 1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
 - 2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
 - 3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.
- B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches.
 - 1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
 - 2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.
- C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings.

3.5 SATISFACTORY TURF

- A. Turf installations shall meet the following criteria as determined by Architect:

1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.
- B. Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory.

3.6 CLEANUP AND PROTECTION

- A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.
- C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.
- D. Remove nondegradable erosion-control measures after grass establishment period.

3.7 MAINTENANCE SERVICE

- A. Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in "Turf Maintenance" Article. Begin maintenance immediately after each area is planted and continue until acceptable turf is established, but for not less than the following periods:
 1. Seeded Turf: 60 days from date of planting completion or until building completion and initial acceptance, whichever is longer.
 - a. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.

END OF SECTION

SECTION 32 93 00 – PLANTS AND PLANTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Deciduous and evergreen tree and shrub planting
 - 2. Maintenance
- B. Related sections include:
 - 1. Section 32 91 13 "Soil Preparation"
 - 2. Section 32 92 00 "Lawns"

1.2 SUBMITTALS

- A. Submit a list of all nurseries that will supply plants.
- B. Qualification Data: For qualified landscape Installer.
- C. Soil Samples and Soil Test Reports: See 32 91 13 "Soil Preparation"
- D. Plant Photographs: Submit color photographs of representative specimens of each type of tree on the plant list. Photos shall be 3"x5" taken from an angle that depicts the size and condition of the typical plant to be furnished. A scale rod or other measuring device shall be included in the photograph. Label each photograph with the plant name, size and name of growing nursery.
- E. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of exterior plants during a calendar year. Submit before expiration of required maintenance periods.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Installer shall have not less than 5 years documented successful experience in landscape installations and be a member of the Landscape Contractors Association. Installer shall submit evidence of qualifications including photographs, locations and references of owners for review by the Landscape Architect and the Owners Representative.
- B. Plant material observation: Landscape Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size and quality. Landscape Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.
 - 1. Notify Landscape Architect two weeks in advance of plant observation / tagging schedule.

2. Notify Landscape Architect of sources of planting materials seven days in advance of delivery to site.
- C. The contractor shall maintain continuously a competent supervisor, satisfactory to the Owner's Representative, with authority to act in all matter pertaining to this work.
- D. Conference: Before any work is started a conference shall be held between the Contractor, the Owner's Representative and the Landscape Architect concerning the work under this contract.
- E. Provide quality, size, genus, species, and variety of exterior plants indicated, complying with applicable requirements in ANSI Z60.1, "American Standard for Nursery Stock."
- F. It is the Landscape Contractor's responsibility to coordinate and cooperate with the other Contractors to enable work to proceed rapidly and efficiently. Coordinate with all adjacent Contractors' work including all paving, lawn, electrical, etc.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver exterior plants freshly dug.
- B. Do not prune trees and shrubs before delivery except as approved by Landscape Architect. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of exterior plants during delivery.
- C. Deliver exterior plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set exterior plants and trees in shade, protect from weather and mechanical damage, and keep roots moist. Plants shall not be stored on site longer than 1 week.

1.5 PROJECT CONDITIONS

- A. Plant material should be installed within the following dates: March 1 – June 1 or September 1 – November 15, or as approved by the Landscape Architect. Plant material may not be dug after May 15.
 1. If the plants are installed outside of the designated planting season, the contractor is responsible for providing an additional 9 month warranty.
- B. Weather limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

1.6 MAINTENANCE SERVICE

- A. Initial Planting Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until completion of building construction and initial acceptance.

- B. Continuing Maintenance Proposal: From Installer to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

1.7 ACCEPTANCE AND WARRANTY

- A. An inspection of work completed shall be conducted by the Landscape Architect and Owner's Representative for the purpose of initial acceptance. Any outstanding items revealed on inspection and identified on the punch list shall be corrected with two weeks. Initial acceptance shall be withheld until those items are completed. Acceptance can be on partially completed work. Warranty, for a period of one year, shall begin after landscape inspection and initial acceptance.
- B. Warrant in writing that all plant material, including groundcovers, placed on this Project will remain alive and be in healthy vigorous condition for a period of 1 year after completion and initial acceptance of entire project.
- C. During the warranty period replace, in accordance with the drawings and specifications, all plants that are in an unhealthy or unsightly condition, or more than 25% dead. Warrant all replacement trees for an additional one year period.
- D. Final Inspection and Acceptance: An inspection will be conducted with the Landscape Contractor, Landscape Architect and Owner at the end of the one year warranty period for purposes of Final Acceptance.
- E. Warranty shall not include damage or loss of plants due to vandalism, fire, severe winds, extreme cold, or negligence on the Owner's part.
- F. Owner's maintenance shall begin upon initial acceptance of plant material.

PART 2 - PRODUCTS

2.1 TREE MATERIAL

- A. Root balls shall comply with ANSI 260.1 standards and shall meet sizes laid out in the ANSI 260.1 standards as well as being intact and undamaged when they arrive on the site. Trees that have deteriorated root balls will not be accepted.
- B. If formal arrangements or consecutive order of trees shown, select stock for uniform height and spread, and number label to assure symmetry in planting.

2.2 SHADE TREES

- A. Shade Trees: Single-stem trees with straight trunk, well-balanced crown, and intact leader, of height and caliper indicated, complying with ANSI Z60. 1 for type of trees required.
 - 1. Provide balled and burlapped trees.
 - 2. All trees shall have their north side marked in the nursery prior to digging. Set trees in the hole with the marker facing north.

2.3 EVERGREENS

- A. Form and Size: Normal-quality, well-balanced, unsheared evergreens, of type, height, spread, and shape required.

2.4 TOPSOIL AND PLANT MIX: See Section 32 91 13 Soil Preparation.

2.5 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight. Organic matter to be "Leaf Gro Compost" or approved equal.

2.6 FERTILIZER

- A. All fertilizers shall be uniform in composition, free flowing and suitable for application with approved equipment. Applications shall be determined by soil test recommendations.
- B. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium.
- C. Slow-Release Fertilizer: Granular or pellet fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium.
- D. Planting tablets: Tightly compressed chip type, long lasting, slow release, commercial grade planting fertilizer in tablet form.

2.7 MULCHES

- A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of shredded hardwood. Natural color only.

2.8 STAKES AND GUYS

- A. Upright and Guy Stakes: Rough-sawn, sound, new hardwood or pressure-preservative-treated softwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch by length indicated, pointed at one end.
- B. Guys and Tie Wires: No. 12 gauge galvanized wire.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, and lawns and existing exterior plants from damage caused by planting operations.
- B. Lay out plants at locations directed by Landscape Architect. Stake locations of individual trees and shrubs and outline areas for multiple plantings.

3.2 TREE PIT EXCAVATION

- A. Tree Pits: Excavate circular pits with sides sloped inward, as shown on the Drawings. Trim base leaving center area raised slightly to support root ball and assist in drainage. Do not further disturb base. Scarify sides of plant pit smeared or smoothed during excavation.
 - 1. Excavate approximately three times as wide as ball diameter.
 - 2. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
 - 3. Do not excavate subgrades of adjacent paving, structures, hardscapes or other new or existing improvements.
- B. Tree Pits within Paving: Tree pits within paved areas shall be excavated to the extents of surrounding paving and to depth specified.
- C. Subsoil and topsoil from excavations may be used as a component of the planting soil upon approval of the Landscape Architect.
- D. Notify Landscape Architect if unexpected rock, obstructions or impermeable soils detrimental to trees or shrubs are encountered in excavations. Notify Landscape Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

3.3 TREE PLANTING

- A. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements. Do not use planting stock if root ball is cracked or broken before or during planting operation.
- B. Set plants to the elevations shown on the drawings. Place a maximum 2" soil on top of root ball. Set trees on compacted pads as shown. Use plant mix specified to backfill pit approximately 2/3 full. Water thoroughly before installing remainder of the plant mix to top of pit, eliminating all air pockets. Repeat watering until no more water is absorbed. Water again after placing and tamping final layer of planting soil mix.
- C. Place planting tablets in each tree planting pit when pit is approximately one half filled, in amounts recommended in soils reports from soil testing laboratory. Place tablets beside the root ball about one inch from root tips.
- D. Cut ropes and strings from top of tree root balls after plant has been set. Remove burlap or cloth wrapping from around top half of balls, do not remove from under root balls. Do not turn under and bury any portion of burlap.
- E. Smooth planting areas to conform to the grades indicated after full settlement has occurred and mulch has been applied. Thoroughly water plants after mulching.

3.4 TREE PRUNING

- A. Prune, thin, and shape trees as only as directed by Landscape Architect.

3.5 SHRUB PLANTING

- A. Preparation of planting beds: Excavate entire planting bed to specified depths as shown on Drawings. Till subsurface to a depth of 6 inches. Place planting soil per specified depths, allowing for settlement.
- B. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in shrub planting beds.
- C. Mulch entire planting bed with mulch. Thoroughly water plants after mulching

3.6 GUYING AND STAKING

- A. Stake trees as shown on drawings.

3.7 CLEANUP AND PROTECTION

- A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.
- B. Protect exterior plants from damage due to landscape operations, operations by other contractors and trades, and others. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

3.8 MAINTENANCE

- A. Contractor is responsible for the following maintenance period by pruning, cultivating, watering, weeding, fertilizing, restoring planting saucers, tightening and repairing stakes and guy supports, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings. Spray as required to keep trees and shrubs free of insects and disease.
 - 1. Maintenance Period: Until initial acceptance of all plant material.
- B. Maintenance between initial acceptance and final acceptance shall be the responsibility of the Owner.

END OF SECTION

SECTION 33 05 14 - MANHOLES AND STRUCTURES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Modular precast concrete manholes and structures with tongue-and-groove joints with masonry transition to cover frame, covers, anchorage, and accessories.
 - 2. Bedding and cover materials.
- B. Related Sections:
 - 1. Section 31 20 00 – Earth Moving.
 - 2. Section 33 05 15 – Polyethylene Drain Basins.
 - 3. Section 33 41 13 – Storm Drainage Piping.

1.2 REFERENCES

- A. American Association of State Highway Transportation Officials:
 - 1. AASHTO M288 - Geotextiles.
 - 2. AASHTO M306 - Drainage Structure Castings.
- B. American Concrete Institute:
 - 1. ACI 530/530.1 - Building Code Requirements for Masonry Structures and Specifications for Masonry Structures.
- C. ASTM International:
 - 1. ASTM A48/A48M - Standard Specification for Gray Iron Castings.
 - 2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 3. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections.
 - 4. ASTM C497 - Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings: Indicate structure locations, elevations, piping sizes and elevations and location of penetrations.
- C. Product Data: Submit manhole catch basin covers, component construction, features, configuration and dimensions.

1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record location of drain basins, connections, and invert elevations.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with State of Massachusetts Department of Transportation standards.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years experience.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Comply with precast concrete manufacturer's instructions for unloading, storing and moving precast manholes and drainage structures.
- B. Store precast concrete manholes and drainage structures to prevent damage to Owner's property or other public or private property. Repair property damaged from materials storage.
- C. Mark each precast structure by indentation or waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers shown on Drawings to indicate its intended use.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Maintain materials and surrounding air temperature to minimum 50 degrees F prior to, during, and 48 hours after completion of masonry work.

PART 2 PRODUCTS

2.1 MANHOLES AND STRUCTURES

- A. Precast Reinforced Round Concrete Manholes, Catch basins, and Recharge Basins:
 - 1. Riser Sections:
 - a. ASTM C890.
 - b. Rubber composite, Infra-Riser or equal.
 - 2. Joints between riser sections as specified on Drawings or one of the following:
 - a. Rubber Gaskets: ASTM C 443.
 - b. Butyl Joint Sealant: ConSeal CS-202 by Concrete Sealants, Inc., 8917 S. Palmer Rd., P. O. Box 176, New Carlisle, OH 45344, (513) 845-8776 or approved equal.
 - 3. Concrete for Precast Units: Air content 6 percent by volume with an allowable tolerance of plus or minus 1.5 percent. Minimum compressive strength of 5,000 psi after 28 days.
 - a. Minimum wall thickness for circular structures 12 feet deep or less: 5 inches.
 - b. Minimum Wall thickness for circular structures greater than 12 feet deep: 6 inches
 - 4. Load Rating: AASHTO HS-20 with 30% impact and 130 lb/cf equivalent soil pressure unless noted otherwise in the Drawings.

2.2 FRAMES AND COVERS

- A. Manufacturers:
 - 1. Manhole and Catch basin Frames, Grates and Covers:
 - a. Neenah Foundry Company
 - b. East Jordan Iron Works, Inc.
 - c. Syracuse Castings Sales Corp
 - d. Or approved equal.
- B. Product Description:
 - 1. Made in America.
 - 2. Meet AASHTO HS20 wheel loading requirements.
 - 3. Conform to AASHTO M306-89-Standard Specification for Drainage Structure Castings.
 - 4. Material:
 - a. Cast iron: ASTM A48, Class 30B or 35B.
 - b. Delivered to Project site free of any coatings, unless otherwise specified.
 - 5. Frames:
 - a. Round for manholes, rectangular for catchbasins with a min. 24-inch clear opening unless otherwise specified.
 - 6. Drainage and Other Covers:
 - a. Round.
 - b. Solid lid, top surface checkered and provided with suitable concealed lifting notches, and lettering cast into cover to indicate "DRAIN".
 - c. Local municipal Standard when required.
 - 7. Drainage Grates:
 - a. Rectangular – 24 inch.
 - b. Minimum open area: 232 sq inches.
 - c. Bicycle safe.
 - 8. Manufacturers:
 - a. Neenah Foundry Company
 - b. East Jordan Iron Works, Inc.
 - c. Syracuse Castings Sales Corp
 - d. Or approved equal.

2.3 COMPONENTS

- A. Manhole and Structure Steps: Formed Steel reinforced copolymer polypropylene steps conforming to ASTM C478 rungs; 3/4 inch diameter. Formed integral with manhole sections.

2.4 CONFIGURATION

- A. Shaft Construction: Reinforced precast Concrete pipe sections, lipped male/female dry joints, sleeved to receive pipe sections.
- B. Shape: Cylindrical.
- C. Clear Inside Dimensions: As indicated on Drawings.

- D. Design Depth: As indicated on Drawings.
- E. Clear Cover Opening: As indicated on Drawings.
- F. Pipe Entry: Furnish openings as indicated on Drawings.
- G. Structure Joint Gaskets: ASTM C361; rubber.
- H. Steps: As required by code.

2.5 ACCESSORIES

- A. Mortar: ASTM C 270, Type M.
- B. Brick: ASTM C-32, Grade SS.
- C. Oil and Debris Hood
 - 1. The oil and debris hood is to be the Eliminator by Ground Water Rescue, Inc. or an approved equivalent. Install with a watertight at the opening in the precast concrete structure.
 - 2. Suppliers include, but are not limited to:
 - a. Billerica WinWater (Billerica, MA)
 - b. Scituate Concrete Pipe (Scituate, MA)
 - c. Water Supply LLC (North Andover, MA)
- D. Bedding and backfilling to conform to the details shown on the Drawings.
- E. Provide Weir plate as indicated on the Drawings.

2.6 FINISHING - STEEL

- A. Galvanizing: ASTM A123/A123M; hot dip galvanize after fabrication.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify of existing conditions before starting work.
- B. Verify items provided by other sections of Work are properly sized and located.
- C. Verify built-in items are in proper location, and ready for roughing into Work.
- D. Verify correct size of manhole and structure excavation.

3.2 PREPARATION

- A. Coordinate placement of inlet and outlet pipe required by other sections.

- B. Do not install manholes and structures where site conditions induce loads exceeding structural capacity of manholes or structures.
- C. Inspect precast concrete manholes and structures immediately prior to placement in excavation to verify manholes and structures are internally clean and free from damage. Remove and replace damaged units.
- D. Openings: Provide openings and install pipe connectors in strict accordance with the recommendation of the connector manufacturer.

3.3 INSTALLATION - GENERAL

- A. Structures to be installed as indicated on Drawings.
- B. Excavation and Backfill:
 1. Excavate for manholes and structures in accordance with Section 31 20 00 in location and to depth shown. Provide clearance around sidewalls of manhole or structure for construction operations, granular backfill.
 2. When groundwater is encountered, prevent accumulation of water in excavations. Place manholes or structures in dry trench.
 3. Where possibility exists of watertight manhole or structure becoming buoyant in flooded excavation, anchor manhole or structure to avoid flotation.

3.4 PRECAST CONCRETE MANHOLE AND STRUCTURE INSTALLATION

- A. Construct concrete structures with precast reinforced riser sections to the dimensions shown in the Drawings.
- B. Lift precast manholes and structures at lifting points designated by manufacturer.
- C. When lowering manholes and structures into excavations and joining pipe to units, take precautions to ensure interior of pipeline and manhole or structure remains clean.
- D. Set precast manholes and structures bearing firmly and fully on compacted crushed stone bedding as shown on Drawings.
- E. Assemble multi-section manholes and structures by lowering each section into excavation. Install rubber gasket joints between precast sections in accordance with manufacturer's recommendations. Lower, set level, and firmly position base section before placing additional sections.
- F. Remove foreign materials from joint surfaces and verify sealing materials are placed properly. Maintain alignment between sections by using guide devices affixed to lower section.
- G. Joint sealing materials may be installed on site or at manufacturer's plant. Seal joints between precast riser sections with material specified
- H. Verify manholes and structures installed satisfy required alignment and grade.

- I. Remove knockouts or cut structure to receive piping without creating openings larger than required to receive pipe. Fill annular space with mortar.
- J. Cut pipe to finish flush with interior of manhole or structure.

3.5 CASTINGS INSTALLATION

- A. Set frame and cover flush with finished grade.
- B. Set frames using mortar and masonry as indicated on Drawings. Install radially laid concrete brick with 1/4 inch thick vertical joints at inside perimeter. Lay concrete brick in full bed of mortar and completely fill joints. Where more than one course of concrete brick is required, stagger vertical joints.

3.6 FIELD QUALITY CONTROL

- A. Test concrete manhole and structure sections in accordance with ASTM C497.
- B. Vertical Adjustment of Existing Manholes and Structures:
 - 1. Where required, adjust top elevation of existing manholes and structures to finished grades shown on Drawings.
 - 2. Reset existing frames, grates and covers, carefully removed, cleaned of mortar fragments, to required elevation in accordance with requirements specified for installation of castings.
 - 3. Remove concrete without damaging existing vertical reinforcing bars when removal of existing concrete wall is required. Clean vertical bars of concrete and bend into new concrete top slab or splice to required vertical reinforcement, as indicated on Drawings.
 - 4. Clean and apply sand-cement bonding compound on existing concrete surfaces to receive cast-in-place concrete in accordance with Section 03 30 00.

END OF SECTION

SECTION 33 05 15 - POLYETHYLENE DRAIN BASINS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Polyethylene Drain basin.
 - 2. Bedding and cover materials.
- B. Related Sections:
 - 1. Section 31 20 00 – Earth Moving.
 - 2. Section 33 05 14 – Manholes and Structures.
 - 3. Section 33 41 13 – Storm Drainage Piping.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM A48/A48M - Standard Specification for Gray Iron Castings.
 - 2. ASTM A536 - Standard Specification for Ductile Iron Castings.
 - 3. ASTM D1248 - Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable.
 - 4. ASTM D3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.

1.3 DEFINITIONS

- A. Bedding: Fill placed under drain basin prior to subsequent backfill operations.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data indicating polyethylene drain basins and accessories.
- C. Manufacturer's Installation Instructions: Submit instructions for installation of drain basins.
- D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.5 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record location of drain basins, connections, and invert elevations.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with manufacturer's requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Accept drain basins on site. Inspect for damage.
- B. Store drain basins in areas protected from weather, moisture, or damage. Do not store directly on ground. Take precautions to prevent damage to interior or exterior surfaces when handling.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Conduct operations not to interfere with, interrupt, damage, destroy, or endanger integrity of surface structures or utilities, in immediate or adjacent areas.

1.9 FIELD MEASUREMENTS

- A. Verify field measurements and elevations prior to fabrication.

1.10 SCHEDULING

- A. Schedule work after excavation and aggregate bedding work and prior to connecting piping work.

1.11 COORDINATION

- A. Coordinate the Work with Section 33 47 30

PART 2 PRODUCTS

2.1 POLYETHYLENE DRAIN BASINS

- A. Manufacturers:
 - 1. Nyloplast a division of Advanced Drainage Systems, Inc.
 - 2. Engineer approved equivalent.
- B. Drain basin:
 - 1. High Density Polyethylene (HDPE).
 - a. HDPE3408 material, cell classification ASTM D3350.
 - b. ASTM D1248, Type III, Class C, Category 5, Grade P34.
- C. Drainage pipe connection stubs: The drainage pipe connection stubs shall be manufactured from PVC pipe stock and formed to provide a watertight connection with the specified pipe system.
 - 1. PVC pipe stock: ASTM D3034, ASTM F1336
 - 2. Watertight connection: ASTM D3212
 - 3. The pipe bell spigot shall be joined to the main body of the drain basin or catch basin.
- D. Frames and Dome Grates:
 - 1. Frames: As indicated on Drawings.
 - 2. Grates: As indicated on Drawings.

2.2 BEDDING MATERIALS

- A. Bedding: Fill Type as indicated on Drawings.

2.3 BACKFILL MATERIAL

- A. As indicated on the Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify of existing conditions before starting work.
- B. Verify excavation base is ready to receive work and excavations, dimensions, and elevations are as indicated on Drawings.

3.2 PREPARATION

- A. Correct over excavation with coarse aggregate.
- B. Remove large stones or other hard matter impeding consistent backfilling or compaction.

3.3 BEDDING

- A. Place bedding material at trench bottom, level materials in continuous layer not exceeding 12 inches.
- B. Maintain optimum moisture content of bedding material to attain required compaction density.

3.4 INSTALLATION

- A. Excavate for drain basins in accordance with Section 31 20 00 and 33 49 23.
- B. Form bottom of excavation to correct elevation.
- C. Establish elevations and pipe inverts for inlets and outlets as indicated on Drawings.
- D. Mount frame and cover level, secured to top cone section to elevation as indicated on Drawings.
- E. Backfill uniformly in accordance with ASTM D2321.
- F. If necessary, the drain basin body will be cut at the time of the final grade so as to maintain a one piece, leak proof structure.
- G. No brick, stone or concrete block will be used to set the grate to the final grade height.

3.5 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Protect drain basin from damage or displacement until backfilling operation is in progress.

END OF SECTION

SECTION 331417 - SITE WATER SERVICE UTILITY LATERALS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipe and fittings for 2-inch water service connections to buildings.
2. Corporation stop assemblies.
3. Curb stop assemblies.
4. Backflow preventers.
5. Meter setting equipment.
6. Meter boxes.
7. Trenching, bedding, and cover.

1.2 SUBMITTALS

- A. Product Data: Manufacturer information regarding pipe materials, pipe fittings, corporation stop assemblies, curb stop assemblies, meters, meter setting equipment, service saddles, backflow preventers, and accessories.
- B. Manufacturer's Certificate: Products meet or exceed specified requirements.
- C. Manufacturer Instructions: Installation requirements, including storage and handling procedures.
- D. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- E. Qualifications Statement:
 1. Qualifications for manufacturer.

1.3 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of piping mains, curb stops, connections, thrust restraints, pressure-pipe centerline elevations, and gravity-pipe invert elevations.
- B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.4 QUALITY ASSURANCE

- A. Perform Work according to City of Waltham Water & Sewer Division requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials according to manufacturer instructions.
- B. Protection:
 - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 - 2. Provide additional protection according to manufacturer instructions.

PART 2 - PRODUCTS

2.1 WATER PIPING AND FITTINGS

- A. PE Pipe:
 - 1. Water pipe up to 2 -inch shall be PE 3408 tubing complying with AWWA C901 for 200 psi pressure rating or according to City of Waltham Water & Sewer Division requirements.
 - 2. Fittings:
 - a. Type: Molded.
 - b. Comply with AWWA C901.
 - 3. Joints: Compression.

2.2 CORPORATION STOP ASSEMBLIES

- A. Corporation Stops:
 - 1. Furnish materials according to City of Waltham Water & Sewer Division requirements.

2.3 CURB STOP ASSEMBLIES

- A. Curb Stops:
 - 1. Furnish materials according to City of Waltham Water & Sewer Division requirements.
- B. Curb Boxes and Covers:
 - 1. Furnish materials according to City of Waltham Water & Sewer Division requirements.

2.4 BACKFLOW PREVENTERS

- A. Reduced-Pressure Backflow Preventers:
 - 1. Furnish materials according to City of Waltham Water & Sewer Division requirements.
- B. Double-Check Valve Assemblies:

1. Comply with ASSE 1012.
2. Materials:
 - a. Body: Bronze.
 - b. Internal Parts: Corrosion resistant.
 - c. Springs: Stainless steel.
3. Check Valves:
 - a. Quantity: Two, operating independently.
 - b. Intermediate atmospheric vent.

2.5 WATER METERS

- A. Furnish materials according to City of Waltham Water & Sewer Division requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that building service connections and municipal utility water main sizes, locations, and inverts are as indicated.

3.2 PREPARATION

- A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, and remove burrs.
- B. Remove scale and dirt from inside and outside of piping before assembly.
- C. Prepare pipe connections to equipment with flanges or unions.

3.3 INSTALLATION

- A. Corporation Stop Assemblies:
 1. Make connection for each different kind of water main, using suitable materials, equipment, and methods as approved by Architect/Engineer.
 2. Provide service clamps for mains constructed of materials other than cast iron or ductile iron.
 3. Location:
 - a. Screw corporation stops directly into tapped and threaded iron main at 10- and 2-o'clock positions along main's circumference.
 - b. Exercise care against crushing or causing other damage to mains at time of tapping or installation of service clamp or corporation stop.

4. Use seals or other devices such that no leaks are present in mains at points of tapping.
 5. Do not backfill and cover service connections until installation has been approved by Architect/Engineer.
- B. Bedding:
1. Excavate pipe trench as specified in Section 32 20 00 Earth Moving.
 2. Placement:
 - a. Place bedding material as indicated.
 - b. Level fill materials in one continuous layer not exceeding 6 inches of compacted depth.
 - c. Compact to 95 percent maximum density.
 3. Backfill around sides and to top of pipe with cover fill, tamp in place, and compact to 95 percent maximum density.
 4. Maintain optimum moisture content of fill material to attain required compaction density.
- C. Pipe and Fittings:
1. Installation Standards: Install Work according to City of Waltham Water & Sewer Division requirements.
- D. Curb Stop Assemblies:
1. Set curb stops on compacted soil.
 2. Boxes:
 - a. Center and plumb curb boxes over curb stops.
 - b. Set box cover flush with finished grade.
- E. Water Meters: Install positive displacement meters according to AWWA M6, with isolating valves on inlet and outlet as indicated or according to City of Waltham Water & Sewer Division requirements.
- F. Backflow Preventers:
1. Install backflow preventers where indicated and according to the City of Waltham Water & Sewer Division requirements.
 2. Testing and Installation Requirements: Comply with local water company requirements and plumbing codes.
- G. Service Connections:
1. Install water service according to City of Waltham Water & Sewer Division requirements.
- H. Disinfection of Water Piping System: Flush and disinfect system as specified by the City of Waltham Water & Sewer Division requirements.

- I. Installation Standards: Install Work according to City of Waltham Water & Sewer Division requirements.

3.4 FIELD QUALITY CONTROL

- A. Perform pressure test on water distribution system according to City of Waltham standards.
- B. Compaction Testing for Bedding:
 - 1. Comply with ASTM D1556 and ASTM D1557.
 - 2. If tests indicate Work does not meet specified requirements, remove Work, replace, and retest.
 - 3. Frequency of Compaction Tests: every 12-inch of fill.

END OF SECTION 331417

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SECTION 33 31 00 - SANITARY SEWERAGE PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Sanitary sewerage piping.
 - 2. Bedding and cover materials.

1.2 DEFINITIONS

- A. Bedding: Fill placed under, beside, and directly over pipe, prior to subsequent backfill operations.

1.3 SUBMITTALS

- A. Product Data: Manufacturer information indicating pipe material to be used, and pipe accessories[.
- B. Manufacturer's Certificate: Products meet or exceed specified requirements.
- C. Source Quality-Control Submittals: Indicate results of factory tests and inspections.
- D. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- E. Qualifications Statement:
 - 1. Qualifications for manufacturer and installer.

1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record finished locations of pipe runs, connections, manholes, cleanouts, and invert elevations.
- B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.5 QUALITY ASSURANCE

- A. Perform Work according to City of Waltham Water & Sewer Division requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Storage:

1. Store materials according to manufacturer instructions.
2. Store valves in shipping containers with labeling in place.

B. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Block individual and stockpiled pipe lengths to prevent moving.
3. Provide additional protection according to manufacturer instructions.

1.7 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

B. COORDINATION

1. Coordinate all connections with City of Waltham Water & Sewer Division.

PART 2 - PRODUCTS

2.1 SANITARY SEWERAGE PIPING

A. Plastic Pipe:

1. Material: PVC. SDR 35.
2. Comply with ASTM D3034.
3. Inside Nominal Diameter: 6 inches or indicated on the Drawings.
4. End Connections: Bell and spigot with solvent-sealed ends.
5. Fittings: PVC.
6. Joints:
 - a. Push-on joint with elastomeric gaskets secured in place in the bell of the pipe. The bell shall consist of an integral wall section with a solid cross section elastomeric gasket, factory assembled, securely locked in place to prevent displacement during assembly.
 - b. Elastomeric gasket shall conform to ASTM D3212.

2.2 FLEXIBLE COUPLINGS

- A. Furnish materials according to City of Waltham Water & Sewer Division requirements.
- B. Description:
 - 1. Material: Resilient, chemical-resistant, elastomeric PVC.
 - 2. Attachment: Two Series-300 stainless-steel clamps, screws, and housings.

2.3 FLEXIBLE PIPE BOOTS FOR MANHOLE PIPE ENTRANCES

- A. Furnish materials according to City of Waltham Water & Sewer Division requirements.
- B. Description:
 - 1. Material: EPDM.
 - 2. Comply with ASTM C923.
 - 3. Attachment: Series-300 stainless-steel clamp and hardware.

2.4 MATERIALS

- A. Bedding and Cover:
 - 1. As indicated on the Drawings.

2.5 ACCESSORIES

- A. Pipe Markers: As specified in Section 330597 - Identification and Signage for Utilities.

2.6 SOURCE QUALITY CONTROL

- A. Provide shop inspection and testing of pipe.
- B. Certificate of Compliance:
 - 1. If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.
 - 2. Specified shop tests are not required for Work performed by approved manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that excavation base is ready to receive Work of this Section.
- B. Verify that excavations, dimensions, and elevations are as indicated.

3.2 PREPARATION

- A. Correct over-excavation with fine aggregate.
- B. Remove large stones or other hard materials that could damage pipe or impede consistent backfilling or compaction.
- C. Protect and support existing sewer lines, utilities, and appurtenances.
- D. Utilities:
 - 1. Maintain profiles of utilities.
 - 2. Coordinate with other utilities to eliminate interference.
 - 3. Notify Architect/Engineer if crossing conflicts occur.

3.3 INSTALLATION

- A. Bedding:
 - 1. Excavate pipe trench as specified in Section 31 20 00 Earth Moving.
 - 2. Place bedding material at trench bottom.
 - 3. Level materials in continuous layer not exceeding 6 inches.
 - 4. Maintain optimum moisture content of bedding material to attain required compaction density.
- B. Piping:
 - 1. Install pipe, fittings, and accessories according to ASTM D3212, and seal joints watertight.
 - 2. Lay pipe to slope gradients as indicated.
 - 3. Begin at downstream end of system and progress upstream.
 - 4. Bedding: As indicated.
 - 5. Lay bell-and-spigot pipe with bells upstream.
 - 6. Backfill and compact as specified in Section 312316.13 - Trenching.
 - 7. Connect to municipal sewer system.
 - 8. Pipe Markers: As specified in Section 330597 - Identification and Signage for Utilities.
 - 9. Installation Standards: Install Work according to City of Waltham Water & Sewer Division requirements.

C. Manholes: As specified on the Drawings.

D. Backfilling:

1. Backfill around sides and to top of pipe with cover fill in minimum lifts of 8 inches.
2. Tamp fill in place, and compact to 95 percent of maximum density.
3. Place and compact material immediately adjacent to pipes to avoid damage to pipe and prevent pipe misalignment.
4. Maintain optimum moisture content of bedding material as required to attain specified compaction density.

3.4 FIELD QUALITY CONTROL

A. Request inspection by Owner prior to and immediately after placing bedding.

B. Testing:

1. If tests indicate that Work does not meet specified requirements, remove Work, replace, and retest.
2. Perform testing on Site sanitary sewage system according to local code of City of Waltham Water & Sewer Division requirements.
3. Compaction Testing:
 - a. Comply with ASTM D1556 and ASTM D1557.
 - b. Testing Frequency: every 12 inches.

3.5 PROTECTION

A. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

B. Cap open ends of piping during periods of Work stoppage.

END OF SECTION 333100

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33 41 13 - STORM DRAINAGE PIPING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Storm drainage piping.
 - 2. Accessories.
 - 3. Underground pipe markers.
 - 4. Bedding and cover materials.
 - 5. Concrete encasement and cradles.

- B. Related Sections:
 - 1. Section 31 20 00 – Earth Moving
 - 2. Section 33 05 14 – Manholes and Structures
 - 3. Section 33 05 15 – Polyethylene Drain Basins.
 - 4. Section 33 47 30 – Bioretention.
 - 5. Section 33 47 40 – Vegetated Sand Filter.

1.2 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

- B. Product Data: Submit data indicating pipe material, dimensions, joints, fittings and pipe accessories.

- C. Manufacturer's Installation Instructions: Submit special procedures required to install Products specified.

1.3 CLOSEOUT SUBMITTALS

- A. Project Record Documents:
 - 1. Accurately record actual locations of pipe runs, connections, manholes, inlets, catch basins, and invert elevations.
 - 2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with State of Massachusetts Department of Transportation standards.

- B. Inspection of the pipe may also be made after delivery. The pipe is subject to rejection at any time due to failure to meet any of the specification requirements. Mark rejected pipe after delivery for identification and remove from the site at once.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Block individual and stockpiled pipe lengths to prevent moving.
- B. Do not place pipe or pipe materials on private property or in areas obstructing pedestrian or vehicle traffic.
- C. Do not place pipe flat on ground. Cradle to prevent point stress.
- D. Store UV sensitive materials out of direct sunlight.
- E. Inspect all materials before placement and replace any defective material found from any cause, including damage caused by handling. Replace any materials determined to be unacceptable.

1.7 COORDINATION

- A. Coordinate unrecorded or variations in site conditions, and corresponding adjustments to construction requirements.

PART 2 PRODUCTS

2.1 STORM DRAINAGE PIPING

- A. High Density Corrugated Polyethylene Pipe and Fittings: ASTM D3350 smooth interior, inside nominal diameter as indicated on the Drawings.
 - 1. High density polyethylene conforming to the following minimum requirements of cell classification:
 - a. 435400C for 12 to 60 inches diameters, as defined and described in the latest version of ASTM D3350, except that carbon black content should not exceed 4%.
 - 1) Comply with the notched constant ligament-stress (NCLS) test as specified in Sections 9.5 and 5.1 of AASHTO M294 and ASTM F2306, respectively.
 - 2. 12 to 60 inches: AASHTO M294, Type S or ASTM F2306.
 - a. Comply with the notched constant ligament-stress (NCLS) test as specified in Sections 9.5 and 5.1 of AASHTO M294 and ASTM F2306, respectively.
 - 3. Pipe and fittings to be manufactured by the same company.
 - 4. Pipe to be joined with a gasketed integral bell & spigot joint meeting ASTM F2736 for respective diameters.
 - a. 12 to 60 inches Watertight according to the requirements of ASTM D3212.
 - 1) Reinforced bell with a polymer composite band installed by the manufacturer
 - b. Spigots gaskets meet the requirements of ASTM F477 by the pipe manufacturer and covered with a removable, protective wrap to ensure the gasket is free from

debris. Use a joint lubricant available from the manufacturer on the gasket and bell during assembly.

5. Fittings to conform to ASTM F2736, ASTM F2881 and AASHTO MP-21-11, for the respective diameters.
6. All materials for storm drainage system to be new and unused.
7. Manufacturers:
 - a. Advanced Drainage Systems (ADS).
 - b. Contech Construction Products, Inc.
 - c. Hancor, Inc.
 - d. approved equivalent.

B. Reinforced Concrete Pipe: ASTM C76, Class IV with Wall Type B

1. Fittings: Reinforced concrete.
2. Joints: ASTM C443 or AASHTO M198 rubber compression gasket.

2.2 BEDDING AND COVER MATERIALS

- A. Backfill and Bedding in accordance with all manufacturers recommended guidelines.
- B. As indicated on Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify trench cut excavation base is ready to receive work and excavations, dimensions, and elevations are as indicated on the Drawings.

3.2 PREPARATION

- A. Hand trim excavations to required elevations. Correct over excavation with fine aggregate.
- B. Remove large stones and other hard or organic matter capable of damaging piping or impeding consistent backfilling or compacting.

3.3 EXCAVATION AND BEDDING

- A. Excavate pipe trench in accordance with Section 31 20 00. Hand trim excavation for accurate placement of pipe to elevations indicated.
- B. Dewater excavations to maintain dry conditions to preserve final grades at bottom of excavation.
- C. Place bedding material at trench bottom, level materials in continuous layers not exceeding 6 inches compacted depth.

- D. Install pipe on compacted subgrade meeting bedding requirements. Cradle bottom 20 percent of diameter to avoid point load.
- E. Compact according to manufacturer's requirements.
- F. Place geotextile fabric over backfill.

3.4 INSTALLATION - PIPE

- A. Lay all pipes accurately to the lines and grades as indicated on Drawings.
- B. Install pipe, fittings, and accessories in accordance with ASTM D2321. Seal joints watertight.
- C. Maximum fill heights depend on embedment material and compaction level; refer to manufacturer's recommendations and installation guidelines.
- D. Excavation, backfilling and compaction as specified in manufacturers most current published installation guidelines
- E. Maintain optimum moisture content of bedding material to attain required compaction density.

3.5 INSTALLATION - DRAINAGE STRUCTURES

- A. Install catch basins, inlets, and manholes in accordance with Section 33 05 14.

3.6 FIELD QUALITY CONTROL

- A. Clean the entire drainage system of all debris and obstructions after site stabilization. This includes the removal of all formwork from structures, concrete and mortar droppings, construction debris and dirt. Furnish all necessary hose, pumps, pipe and other equipment that may be required for this purpose. Do not flush debris into existing drains, underground stormwater chambers, storm drains and/or streams.
- B. The work is not complete until all requirements for line, grade, cleanliness, and other requirements have been met.
- C. Compaction Testing: In accordance with ASTM D1557 or AASHTO T180.
- D. When tests indicate work does not meet specified requirements, remove work, replace and retest.

3.7 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is complete.

1. Take care not to damage or displace installed pipe and joints during construction of pipe supports, backfilling, testing, and other operations.
2. Repair or replace pipe that is damaged or displaced from construction operations.

END OF SECTION

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SECTION 33 41 33 – PRECAST CONCRETE CULVERT, HEADWALLS AND WINGWALLS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Precast concrete inlets for storm drains including cast iron frame and plate or grate.
 - 2. Precast concrete headwalls and wingwalls.
 - 3. Materials, tools, labor and equipment and performing all operations necessary for fabricating and installing precast reinforced concrete culverts.
 - 4.
 - 5. Accessories.
- B. Related Sections:
 - 1. Section 31 20 00 – Earth Moving.
 - 2. Section 33 05 14 - Manholes and Structures.
 - 3. Section 33 41 13 –Storm Drainage Piping.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
- B. ASTM A615 / A615M - 09b: Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
- C. ASTM C150 / C150M - 11 Standard Specification for Portland Cement
- D. ASTM C443 - 11 Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
- E. ASTM C 1433-19: Standard Specifications for Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers
- F. ASTM D3963 / D3963M - 01(2007) Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars
- G. AASHTO M 198: Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets
- H. AASHTO M 259: Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers
- I. AASHTO M 273: Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers with Less Than 2 Feet of Cover Subjected to Highway Loadings

- J. NPCA QC Manual: National Precast Concrete Association Quality Control Manual for Precast Concrete Plants.
- K. ACI 318-19 Building Code Requirements for Structural Concrete.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Submit shop drawings for approval of design and construction details for precast concrete inlets, headwalls, and wingwalls. Precast units differing from standard designs indicated on Drawings will be rejected unless shop drawing submittals are approved.
 - 1. Design calculations under the signature and seal of a Professional Engineer registered in Massachusetts.
 - 2. In accordance with the approved drawings.
- C. Product Data: Submit data indicating details for frames, grates, rings and covers.

1.4 QUALITY ASSURANCE

- A. The basis of acceptance of the precast concrete units in accordance with ASTM C1433-19.

1.5 CLOSEOUT SUBMITTALS

- A. Project Record Documents:
 - 1. Accurately record actual locations of pipe runs, connections, inlets, headwall, and invert elevations.
 - 2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store precast units on level blocking. Do not place loads until design strength is reached. Shipment of acceptable units may be made when 28-day strength requirements have been met. Block individual and stockpiled pipe lengths to prevent moving.
- B. Inspect all materials before placement and replace any defective material found from any cause, including damage caused by handling. Replace any materials determined by the Engineer to be unacceptable.

1.7 COORDINATION

- A. Coordinate the Work with termination of storm drains, trenching, connection to storm drains.
- B. Coordinate unrecorded or variations in site conditions, and corresponding adjustments to construction requirements.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Concrete: Provide concrete for precast machine-made units meeting requirements of ASTM C 76 regarding reinforced concrete, cement, aggregate, mixture, and concrete test.
1. Concrete Curing: ASTM C 1433-01.
 2. Minimum Cement Content: 564 lb./cu. yd. of concrete
 3. Maximum Water / Cement Ratio: 0.15 gal/lb.
 4. Minimum 28-day Compressive Strength: 5,000
 5. Unit Weight : 150 pcf
- B. Reinforcing Steel: Place reinforcing steel to conform to details indicated on Drawings and as follows:
1. Provide positive means for holding steel cages in place throughout production of concrete units. Maximum variation in reinforcement position is plus or minus 10 percent of wall thickness or plus or minus 1/2 inch, whichever is less. Regardless of variation, maintain minimum cover of concrete over reinforcement as indicated on Drawings.
 2. Welding of reinforcing steel is not permitted unless noted on Drawings.
 3. ASTM A 615 Grade 60.
 4. Epoxy coated to prevent corrosion and conform to ASTM D3963.

2.2 SOURCE QUALITY CONTROL

- A. Tolerances: Allowable casting tolerances for concrete units are plus or minus 1/4 inch from dimensions indicated on Drawings. Concrete thickness in excess of that required will not constitute cause for rejection provided that excess thickness does not interfere with proper jointing operations.
- B. Precast Unit Identification: Mark date of manufacture and name or trademark of manufacturer clearly on inside of inlet, headwall, or wingwall.
- C. Rejection: Precast units rejected for non-conformity with these specifications and for following reasons:
1. Fractures or cracks passing through shell, except for single end crack that does not exceed depth of joint.
 2. Surface defects indicating honeycombed or open texture.
 3. Damaged or misshaped ends, where damage would prevent making satisfactory joint.
- D. Replacement: Immediately remove rejected units from Project site and replace with acceptable units.

2.3 ACCESSORIES

- A. Mortar and Grout:
1. Grout: Non-shrink, non-metallic with a compressive strength of at least 5,000 psi at 3 day
- B. Frame and grates: As indicated on Drawings.

- C. CLOSED CELL RUBBER GASKET
 - 1. Meet ASTM C 443 and AASHTO M 198.
 - 2. One (1) inch minimum initial thickness.
 - 3. Two (2) square inches minimum in cross section.

2.4 LIFTING HOLES

- A. Provide lifting holes in the top slab adequate for lifting the culvert section, as shown on the Contract Drawings.
- B. Locate holes to avoid interference with the reinforcing steel.

2.5 JOINT TIES

- A. Provide lifting holes in the top slab adequate for lifting the culvert section, as shown on the Contract Drawings.
- B. Locate holes to avoid interference with the reinforcing steel.

2.6 BEDDING AND COVER MATERIALS

- A. As indicated on Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify lines and grades are correct. Notify Architect/Engineer of discrepancies.
- B. Verify compacted subgrade will support loads imposed by inlets.

3.2 INSTALLATION

- A. Install units complete in place to dimensions, lines, and grades as indicated on Drawings.
- B. Excavate in accordance with requirements of 31 20 00 – Earth Moving.
- C. Bed precast concrete units on foundations of firm, stable material shaped to conform to shape of unit bases.
- D. Provide adequate means to lift and place concrete units in accordance with manufacturer's installation instructions.
- E. Installation with 2 feet or less cover, follow AASHTO M 273.

3.3 PLACING SECTIONS

- A. Do not place sections until the Engineer has approved the depth of excavation and the suitability of the foundation material, and other associated bedding requirements.

- B. Lay precast sections on dry, unyielding foundation, unless other bedding requirements are indicated in the plans and specifications.

3.4 CONNECTIONS

- A. Connect storm drains to inlets and headwalls as indicated on Drawings. Seal connections inside and outside with hydraulic cement. Make connections watertight.
- B. Where precast sections join cast-in-place concrete, project the reinforcing steel a minimum of 12 inches out of the precast section and square off the concrete face.

3.5 FIELD QUALITY CONTROL

- A. Verify that inlets are free of leaks. Repair leaks in approved manner.

3.6 REPAIRS

- A. Repair sections only when directed and approved in advance by the Engineer.
- B. Making repairs in advance of approval will be cause for rejection.

3.7 BEDDING AND BACKFILL

- A. Backfill in accordance with requirements of 31 20 00 – Earth Moving.
- B. Excavate the material under the culvert location in compliance with the Drawings.
- C. Place controlled density fill culvert base in conformance with the Drawings and Specifications.
- D. Backfill with gravel borrow or suitable excavated material as approved by the Engineer.
- E. Compact backfill material to conform to the Contract Drawings and Specifications.

3.8 PROTECTION OF FINISHED WORK

- A. Protect inlets, headwalls and wingwalls cover from damage or displacement until backfilling operation is complete.

END OF SECTION

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SECTION 33 47 30 - BIORETENTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes: all materials, labor, equipment and other incidental items required to furnish, install, and stabilize the bioretention area. Complete work in conjunction with the forebay, spillway and overflow as required in other sections of the specifications
 - 1. Excavation
 - 2. Grading
 - 3. Underdrain.
 - 4. Backfill.
 - 5. Outlet structure.
 - 6. Planting.
 - 7. Slope stabilization.

- B. Related Sections:
 - 1. Section 31 10 00 – Site Clearing.
 - 2. Section 31 20 00 - Earthmoving.
 - 3. Section 31 25 00 – Erosion and Sedimentation Controls.
 - 4. Section 32 92 00 – Lawns.
 - 5. Section 32 93 00 – Plants and Plantings.
 - 6. Section 33 05 15 – Polyethylene Drain Basins

1.2 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of bioretention soil.

- B. Bioretention Soil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments.

- C. Subgrade: Surface or elevation of subsoil remaining after excavation is complete or top surface of a fill or backfill before bioretention soil is placed.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

- B. Product Data: Submit complete information concerning all materials of construction and fabrication including:
 - 1. Soil
 - 2. Pea gravel
 - 3. Mulch
 - 4. Landscape stone
 - 5. Under drainpipe, connections and cleanouts
 - 6. Filter Fabric

- 7. Outlet Structure(s)
 - 8. Erosion Control Blanket
- C. Materials Source: Submit name of materials sources.
- D. Manufacturer's Certificate/Documentation: Certify the following products meet or exceed specified design requirements.
- E. Samples: Submit, 2 lb. sample to the Engineer for approval:
- 1. Pea Gravel
 - 2. Bioretention soil
 - 3. and landscape stone
- F. Bioretention Soil Analysis: Provide a minimum of one test per each soil source from a qualified testing agency. If bioretention areas are to be constructed at different times and more than one soil delivery is required a soil analysis for each delivery must be provided.
- 1. Submit soil analysis by a qualified soil testing laboratory indicating and interpreting test results for compliance the following with parameters (See Section 2.1 for parameter requirements):
 - a. USDA Unified Soil Classification
 - b. Gradation and percentages of sand, silt, and clay content.
 - c. Percent organic matter.
 - d. pH
 - e. Magnesium (ppm)
 - f. Phosphorous (ppm)
 - g. Potassium (ppm).
 - h. Soluble salts (ppm)
 - 2. Recommended Soil Testing Laboratories
 - a. UMASS
Soil and Plant Tissue Testing Lab
West Experiment Station
682 North Pleasant Street
University of Massachusetts
Amherst, MA 01003
Phone: (413) 545-2311 or
(413) 545-5304 lab
Fax: (413) 545-1931
email: soiltest@psis.umass.edu
website: <http://www.umass.edu/soiltest/>
 - b. Briggs Engineering and Testing
100 Weymouth Street
P.O. Box 369
Rockland, MA 02370
Phone: (781) 871-6040
Fax: (781) 871-7982
website: <http://www.briggsengineering.com/services.shtml>

- c. UCONN
Soil Nutrient Analysis Laboratory
6 Sherman Place, U-5102
University of Connecticut, Storrs, CT 06269-5102
Phone: 860-486-4274
Fax: 860-486-4562
email: soiltest@uconn.edu
website: <http://www.soiltest.uconn.edu>

1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents:
 - 1. As-built survey required: Record actual size, location(s) and elevations of bioretention area(s), outlet structure and underdrains.
 - 2. Complete as-built forms: See as-built forms – attached.

1.5 QUALITY ASSURANCE

- A. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
- B. Mandatory construction field visits and Engineer approval of construction prior to continuing construction as indicated on Drawings.
- C. Provide an experienced full-time supervisor on the Project site when planting is in progress.

1.6 QUALIFICATIONS

- A. Installer: A qualified contractor specializing in the installation of stormwater management facilities specified in this section with minimum two years experience.

1.7 PRE-INSTALLATION MEETINGS

- A. Convene at the Project site a minimum one week prior to commencing work of this section.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Soil and Gravel:
 - 1. Deliver soil, gravel, and other bioretention materials to a pre-approved location in separate piles. Surround stockpiles left for extended period (over a week) by containment strawbales or approved other. Completely cover with an approved blanket material to prevent erosion and invasive seed contamination.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Conduct operations not to interfere with, interrupt, damage, destroy, or endanger integrity of surface structures or utilities, in immediate or adjacent areas.

- B. Weather limitations: Proceed with bioretention installation only when existing and forecasted weather conditions permit. Do not plant during inclement weather including but not limited to heavy rain, high winds, frost and similar conditions.
- C. Coordinate bioretention installation periods with planting periods in Section 32 93 00.

1.10 SCHEDULING

- A. Schedule work after demo, site clearing and excavation and prior to connecting stormwater piping work and paving.

1.11 COORDINATION

- A. Coordinate the Work with connection to drainage system, and pavement installation.

PART 2 PRODUCTS

2.1 BIORETENTION SOIL

- A. A uniform soil mix, free of noxious weeds stones, stumps, roots or other similar objects larger than 1 inch.
- B. USDA Unified Soil Classification: loamy sand.
- C. Provide a textural analysis including the gradation and percentages of sand, silt, and clay content.
 - a. 85-88% sand. (<10% coarse sand)
 - b. 8-12% silt and clay (< 2% clay).
- D. Organic Content: 3%
 - 1. Well aged (6-12 months), well aerated, leaf compost or approved equivalent.
- E. Provide a soil test of the bioretention soil for conformance to the following criteria:
 - 1. pH range: 5.2-7.0.
 - 2. Magnesium: minimum 32 ppm.
 - 3. Phosphorous (P2O5): not to exceed 69 ppm.
 - 4. Potassium (K2O): minimum 78 ppm.
 - 5. Soluble salts: not to exceed 500 ppm or 0.75 dS/m (electric conductivity)

If the soil pH is not within the acceptable range, amend with lime to raise the pH or with iron sulfate to lower the pH, as necessary. All testing should be performed by the same testing facility to maintain consistent results. Submit the soil sample results to the Engineer review and approval prior to delivery to the Project site.

- F. Volume of filter media based on 110% of plan volume to account for settling or compaction.

- G. Do not mix, dump or store any other materials or substances that may be harmful to plant growth or prove a hindrance to the planting maintenance or operations within the bioretention area.

2.2 FILTER FABRIC

- A. Non-woven geotextile fabric with flow rate of > 125 gallon/minutes/square foot
- B. Apparent opening size: Class 'C' (#80 sieve)
- C. Puncture strength: 125 lb. (ASTM D-751)
- D. Mullen Burst strength: 400 psi (ASTM D-1117)
- E. Tensile strength: 200 lb. (ASTM D-1682)

2.3 PEA GRAVEL

- A. 3/8" washed stone

2.4 UNDERDRAIN GRAVEL

- A. 3/4" crushed washed stone, clean and free of all fines and meeting AASHTO M-43.

2.5 UNDERDRAIN

1. 4" rigid schedule 40 PVC pipe, with 3/8" perforations @ 6" o.c. meeting ASTM D 1785 or AASHTO M-278.
2. T's and Y's fittings as required for the underdrain configuration indicated on Drawings.

2.6 CONNECTIONS TO STORM DRAIN SYSTEM.

- A. Non-perforated pipe as indicated on Drawings.
- B. UNDERDRAIN CLEANOUTS
 1. Non-perforated schedule 40 PVC pipe, PVC elbows, caps, and all associated fittings.

2.7 EROSION CONTROL BLANKET (3:1 SIDE SLOPES ONLY)

- A. See 31 25 00

2.8 OUTLET STRUCTURE

- A. Size as indicated on Drawings.
- B. Fiberglass reinforced plastic manholes of size indicated on Drawings.

2.9 EMERGENCY SPILLWAY

- A. Includes overflow spillway excavation, fill, grading, soil material, stone, filter fabric, and all other materials:

- B. As indicated on Drawings

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements {01300 - Administrative Requirements}:
Verification of existing conditions before starting work.
- B. Verify layout and orientation of bioretention area and connections.
- C. Verify excavation base is ready to receive work and excavations, dimensions, and elevations are as indicated on Drawings.

3.2 PREPARATION

- A. Call Digsafe not less than three working days before performing Work.
 - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Identify required lines, levels, contours, and datum.
- C. Clear and grub the proposed bioretention area.

3.3 EXCAVATION

- A. Excavate bioretention area in accordance with Section 31 20 00 .
- B. Work from the sides of the bioretention area excavation. Excavate to appropriate design depth and dimensions.
- C. Provide excavating equipment with adequate reach to minimize work within in the footprint of the bioretention area. If applicable and as directed by the Engineers, utilize a cell construction approach in larger bioretention basin. Divide the basin into 500 to 1000 square foot temporary cells with a 10 to 15 foot earth bridge in between to allow cells to be excavated from the sides.
- D. Excavate sediment forebays at the size and locations indicated on Drawings to trap sediments prior to bioretention construction.
- E. Rough grade the bioretention area during general construction. Excavate the bioretention facilities to within 1 foot of underdrain bottom.
- F. If the bioretention area is to be used as a temporary drainage storage basin during the early stages of project construction, the side slopes should be temporarily stabilized, and silt fence installed along the toe of the rough graded bioretention slopes to minimize excessive sedimentation of the bioretention floor.

3.4 COMPACTION

- A. Minimize compaction of both the base of the bioretention area and the required backfill. Compaction will significantly contribute to design failure.
- B. Use excavator or backhoes to excavate the bioretention area as indicated in Section 3.3.
- C. If the bioretention area is excavated using a loader, the contractor should use wide track or marsh track equipment, or light equipment with turf type tires to minimize compaction.
- D. Use of equipment with narrow tracks or narrow tires, rubber tires with large lugs, or high pressure tires will cause excessive compaction resulting in reduced infiltration rates and storage volumes and is not acceptable.
- E. Compaction can be alleviated at the base of the bioretention facility by using a primary tilling operation such as a chisel plow, ripper, or subsoiler. These tilling operations are performed to refracture the soil profile through the 12-in compaction zone. Substitute methods must be approved by the Engineer. Rototillers typically do not till deep enough to reduce the effects of compaction from heavy equipment.
- F. Do not compact bioretention soil with mechanical equipment.

3.5 EMBANKMENT/BERM

- A. Construct Embankment/berm in accordance with Section 31 20 00 and as indicated on Drawings.

3.6 INSTALLATION

- A. Do not construct the bioretention area until all disturbed areas within the contributing drainage areas have been graded and stabilized.
- B. Remove sediment accumulated along the excavation floor during site construction prior to continuing with the bioretention facility construction.
- C. Confirm the bottom of excavation is the correct area and elevation.
- D. Rough grade side slopes as indicated on Drawings. 3:1 slope max. Incorrect side slopes will be required to be re-graded.
- E. Install temporary erosion and sediment controls to divert stormwater away from the bioretention area during final construction and until it is completed. Special protection measures such as erosion control fabrics may be needed to protect vulnerable side slopes from erosion during the construction process.
- F. If the bioretention area is designed to infiltrate (no liner), scarify the bottom soils to a depth of six inches to promote greater infiltration.
- G. Filter Fabric

1. Install the filter fabric along the excavation side walls as specified in the Drawings. Place the filter fabric on the sides of the bioretention area with a minimum six inch overlap at all joints.
- H. Install the overflow outlet structure as indicated on Drawings.
1. Establish elevations and pipe inverts for inlets and outlets as indicated on Drawings
- I. Underdrain
1. Install the underdrain the location and depths as indicated on the Drawings.
 2. Install underdrain, including 4 inch perforated pipe, gravel and filter fabric on top of the underdrain gravel as indicated on Drawings.
 3. Place gravel around the underdrain pipe as shown in the details.
 4. Do not wrap the underdrain pipe with filter fabric
- J. Cleanouts
1. Provide clean-out as indicated on Drawings.
- K. Pea Gravel
1. Installed at the depths as indicated on the Drawings.

3.7 SOIL BACKFILL

- A. Backfill with approved bioretention soil to the design grade as specified in the Drawings.
- B. Place soil in 12 inch lifts until desired top elevation of bioretention is achieved. Do not use heavy equipment within the bioretention basin. Heavy equipment can be used around the perimeter of the basin to supply soils and sand. Wait 3 days to check for settlement, and add additional media as needed
- C. Do not compact bioretention soil with mechanical equipment. Place bioretention soil with light equipment such as a compact loader, excavator or a dozer/loader with marsh tracks. Hand grade bioretention soil.
- D. Stabilize remaining disturbed areas and side slopes with seeding, hydroseeding, and/or erosion control blankets as indicated on Drawings.

3.8 FINAL GRADING

- A. Adjust sand filter and side slope grading as necessary prior to placement of topsoil.
- B. Place topsoil carefully along side slopes and sand filter.
- C. Do not use heavy equipment in the bottom of the sand filter during topsoil placement.
- D. Hand-roll topsoil.

3.9 PLANTING

- A. Plant bioretention area in accordance with Section 32 93 00 and as indicated on Drawings.

- B. The primary function of the bioretention area is to improve water quality. Do not add fertilizers or other soil amendments to the bioretention soils unless instructed by the Engineer. The planting soil specifications provide enough organic material to adequately supply nutrients from natural cycling.
- C. Remove any sediment accumulated in the bioretention area during the planting phase.
- D. Do not plant before the remaining disturbed areas surrounding the facility are stabilized.
- E. If satisfactory vegetative cover has not been established along the bioretention side slopes prior to planting, install a silt fence perimeter at the toe of the bioretention slopes to remain in place until an approved vegetative cover has been established.
- F. Remove remaining erosion and sediment controls only after surrounding disturbed areas have been properly stabilized.
- G. Conduct final construction inspection with Engineer.

3.10 TOLERANCES

- A. Top of Sand Filter Elevation: +/- ¼ inch
- B. Outlet Structure Rim Elevation: +/- ¼ inch
- C. Bottom Area: +/- 3 square feet
- D. Emergency Spillway Elevation: +/- ½ inch
- E. Emergency Spillway Depth: +/- ¼ inch
- F. Maximum Side Slopes: .08% or .5' per run

3.11 PROTECTION

- A. Install silt fence or silt sock along the perimeter of the toe of the sand filter slope to protect the sand filter from sedimentation and clogging until the site and side slopes are stabilized and satisfactory grass growth established.
- B. Install erosion controls (silt sack, straw wattles, etc.) at the sand filter inlets and overflow outlets until site is stabilized.
- C. Maintain and remove erosion controls until acceptance of stabilization and grass establishment.
- D. Do not mow until satisfactory grass growth has been established.

3.12 FIELD QUALITY CONTROL

- A. Mandatory Engineer Field Visits:

1. Mandatory field visit notification to and approval by the Engineer is required at the following stages prior to proceeding with next phase of construction.
 - a. Bottom of Bed: Excavate the bioretention area to the bottom invert of the subdrain system and install the filter fabric along the excavation side walls.
 - b. Cover: Install underdrain, perforated pipe, gravel and filter fabric on top of the underdrain gravel as specified in the drawings
 - c. Final inspection: Stabilize, maintain and cleanup all bioretention areas Engineer to inspect the following:
 - 1) 90% mulch and vegetative cover has been achieved in the bottom of bed, and depth of remaining mulch.
 - 2) Winter or salt-killed vegetation. Presence of accumulated sand, sediment and trash in pretreatment cell or filter beds.
 - 3) Evidence of any rill or gully erosion along slopes or upgradient grass filter strip.
 - 4) Evidence of mulch flotation, excessive ponding, dead plants or concentrated flows
 - 5) Sediment accumulation and clogging at inflow points.
 - 6) Bare soil or sediment sources in the contributing drainage area.
2. Take appropriate remedial action to repair any deficiencies identified during the above Engineer field visits.

3.13 CLEANING

- A. After completion of the work, remove and properly dispose all debris, construction materials, rubbish, excess soil, etc., from the Project site. Promptly repair any identified deficiencies and leave the Project site in a clean and satisfactory condition.

3.14 MAINTENANCE

- A. Provide service and maintenance of the sand filter for, one year, from date of Substantial Completion.
- B. Maintenance as indicated in the Operation and Maintenance Plan. At a minimum it includes:
 1. First mowing
 2. Erosion repairs
 3. Sediment removal
 4. Cleaning or inlet and outlet structures

3.15 ATTACHMENTS

- A. As-built Forms.

END OF SECTION

SECTION 33 47 40 - VEGETATED SAND FILTER

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes: all materials, labor, equipment and other incidental items required to furnish, install, and stabilize the vegetated sand filter. Complete work in conjunction with the forebay, spillway and overflow as required in other sections of the specifications
 - 1. Excavation
 - 2. Grading
 - 3. Underdrain.
 - 4. Backfill.
 - 5. Outlet structure.
 - 6. Slope stabilization.

- B. Related Sections:
 - 1. Section 31 10 00 – Site Clearing.
 - 2. Section 31 20 00 - Earthmoving.
 - 3. Section 31 25 13 – Erosion and Sedimentation Controls.
 - 4. Section 32 92 00 - Lawns

1.2 SUBMITTALS

- A. Product Data: Submit complete information concerning all materials of construction and fabrication including:
 - 1. Sand
 - 2. Pea gravel
 - 3. Filter Fabric

- B. Materials Source: Submit name of materials sources.

- C. Manufacturer's Certificate/Documentation: Certify the following products meet or exceed specified design requirements.
 - 1. Samples: Submit, 2 lb sample to the Engineer for approval:
 - a. Sand
 - b. Pea Gravel

- D. Sand Analysis: Provide a minimum of one test per each soil source from a qualified testing agency.
 - 1. Submit sand analysis by a qualified soil testing laboratory indicating and interpreting test results for compliance the following with parameters (See Section 2.1 for parameter requirements):
 - 2. Gradation and percentages of sand in conformance with ASTM C-33

1.3 CLOSEOUT SUBMITTALS

- A. Project Record Documents:

1. As-built survey required: Record actual size, location(s) and elevations of vegetated sand filter, outlet structure and underdrains.
2. Complete as-built forms: See as-built forms – attached.

B. Final field visit – See Section 3.11

1.4 QUALITY ASSURANCE

A. Installer: A qualified contractor specializing in the installation of stormwater management facilities specified in this section with minimum two years experience.

1.5 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.

B. Convene at the Project site a minimum one week prior to commencing work of this section.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Soil and Gravel:

1. Deliver soil, sand, gravel, and other materials to a pre-approved location in separate piles. Surround stockpiles left for extended period (over a week) by containment silt socks or approved other.
2. Completely cover with an approved blanket material to prevent erosion, sedimentation and invasive seed contamination.

1.7 EXISTING CONDITIONS

A. Field Measurements: Verify field measurements prior to ordering materials and construction.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements {01600 - Product Requirements}: Environmental conditions affecting products on site.

B. Conduct operations not to interfere with, interrupt, damage, destroy, or endanger integrity of surface structures or utilities, in immediate or adjacent areas.

C. Weather limitations: Proceed with bioretention installation only when existing and forecasted weather conditions permit. Do not plant during inclement weather including but not limited to heavy rain, high winds, frost and similar conditions.

D. Coordinate installation periods with seeding periods in Section 32 92 19.

1.9 SCHEDULING

A. Schedule work after demo, site clearing and excavation and prior to connecting stormwater piping work and paving.

1.10 COORDINATION

- A. Coordinate the Work with connection to drainage system, and pavement installation.

PART 2 PRODUCTS

2.1 SAND

- A. Clean AASHTO M-6 or ASTM C-33 concrete sand
- B. Grain size: Size 0.02" to 0.04"
- C. Sand substitutions such as on site un-tested material, diabase and graystone #10, calcium carbonated, or dolomitic sand rock dust are not acceptable.

2.2 FILTER FABRIC

- A. Non-woven geotextile fabric with flow rate of > 125 gallon/minutes/square foot
- B. Apparent opening size: Class 'C' (#80 sieve)
- C. Puncture strength: 125 lb (ASTM D-751)
- D. Mullen Burst strength: 400 psi (ASTM D-1117)
- E. Tensile strength: 200 lb (ASTM D-1682)

2.3 PEA GRAVEL

- A. 3/8" washed stone

2.4 UNDERDRAIN

- A. Oblong corrugate HDPE flat drainpipe for use in subsurface drainage applications.
 - 1. Outside Dimensions: 1.5" thick by 12.5" wide
 - 2. Internal bracing adjoining each long wall to prevent crushing under typical loading.
- B. 4" HDPE end outlet to connect to PVC drain basin.
- C. T's and Y's fittings as required for the underdrain configuration indicated on Drawings.

2.5 UNDERDRAIN GRAVEL

- A. 3/4" crushed washed stone, clean and free of all fines and meeting AASHTO M-43.

2.6 CLEANOUTS

- A. Non-perforated schedule 40 PVC pipe, PVC elbows, caps, and all associated fittings.

2.7 CONNECTIONS TO STORM DRAIN SYSTEM

- A. Non-perforated pipe in accordance with Section 33 41 13 and as indicated on Drawings.

2.8 OUTLET STRUCTURE

- A. In accordance with Section 33 05 15 and as indicated on Drawings.

2.9 EMERGENCY SPILLWAY

- A. Includes overflow spillway excavation, fill, grading, soil material, stone, filter fabric, and all other materials:
- B. As indicated on Drawings

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of existing conditions before starting work.
- B. Verify layout and orientation of bioretention area and connections.
- C. Verify excavation base is ready to receive work and excavations, dimensions, and elevations are as indicated on Drawings.

3.2 PREPARATION

- A. Call Digsafe not less than three working days before performing Work.
 - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Identify required lines, levels, contours, and datum.
- C. Clear and grub the proposed bioretention area.

3.3 EXCAVATION

- A. Excavate sand filter area in accordance with Section 31 20 00.
- B. It is very important to minimize compaction of both the subgrade of the sand filter area and the required backfill. Use an excavator to remove original soil. Use of equipment with narrow tracks or narrow tires, rubber tires with large lugs, or high pressure tires will cause excessive compaction resulting in reduced infiltration rates and storage volumes and is not acceptable. Compaction will significantly contribute to design failure.
- C. Work from the sides of the sand filter excavation. Excavate to appropriate design depth and dimensions.

- D. Provide excavating equipment with adequate reach to minimize work within in the footprint of the area. If applicable and as directed by the Engineers, utilize a cell construction approach in larger sand filters. Divide the basin into 500 to 1000 square foot temporary cells with a 10 to 15 foot earth bridge in between to allow cells to be excavated from the sides.
- E. Excavate sediment forebays at the size and locations indicated on Drawings to trap sediments prior to bioretention construction.
- F. Rough grade the area during general construction. Excavate to within 1 foot of underdrain bottom.
- G. If the sand filter is to be used as a temporary drainage storage basin during the early stages of project construction, the side slopes should be temporarily stabilized, and silt fence installed along the toe of the rough graded bioretention slopes to minimize excessive sedimentation of the bioretention floor.

3.4 COMPACTION

- A. Compaction can be alleviated at the base of the bioretention facility by using a primary tilling operation such as a chisel plow, ripper, or subsoiler. These tilling operations are performed to refracture the soil profile through the 12-in compaction zone. Substitute methods must be approved by the Engineer. Rototillers typically do not till deep enough to reduce the effects of compaction from heavy equipment.
- B. Do not use heavy equipment for sand or topsoil compaction.

3.5 EMBANKMENT/BERM

- A. Construct Embankment/berm in accordance with Section 31 20 00 and as indicated on Drawings.

3.6 INSTALLATION

- A. Do not begin the installation of the undrain, gravel or sand backfill until all disturbed areas within the contributing drainage areas have been graded and stabilized.
- B. Remove sediment accumulated along the excavation floor during site construction prior to continuing with the sand filter construction.
- C. Confirm the bottom of excavation is the correct area and elevation.
- D. Rough grade side slopes as indicated on Drawings. 3:1 slope max. Incorrect side slopes will be required to be re-graded.
- E. Install temporary erosion and sediment controls to divert stormwater away from the sand filter area during final construction and until it is completed. Special protection measures such as erosion control fabrics may be needed to protect vulnerable side slopes from erosion during the construction process.

- F. If the sand filter is designed to infiltrate (no liner), scarify the bottom soils to a depth of six inches to promote greater infiltration.
- G. Filter Fabric
 - 1. Install the filter fabric along the excavation side walls as specified in the Drawings. Place the filter fabric on the sides of the bioretention area with a minimum six inch overlap at all joints.
- H. Install the overflow outlet structure as indicated on Drawings.
 - 1. Establish elevations and pipe inverts for inlets and outlets as indicated on Drawings
- I. Underdrain
 - 1. Install the underdrain the location and depths as indicated on the Drawings.
 - 2. Install underdrain, including 4 inch perforated pipe, gravel and filter fabric on top of the underdrain gravel as indicated on Drawings.
 - 3. Place gravel around the underdrain pipe as shown in the details.
 - 4. Do not wrap the underdrain pipe with filter fabric
- J. Cleanouts
 - 1. Provide clean-out as indicated on Drawings.
- K. Pea Gravel
 - 1. Installed at the depths as indicated on the Drawings.

3.7 SAND BACKFILL

- A. Backfill with approved sand to the design grade as specified in the Drawings.
- B. When backfilling the area, place sand in 12" lifts. Bring surface to design depths and grades as indicated on the Drawings.
- C. Grade sand by hand or with light equipment only.
- D. Do not use heavy equipment within the sand filter. Heavy equipment can be used around the perimeter of the basin to supply soils and sand.

3.8 FINAL GRADING

- A. Adjust sand filter and side slope grading as necessary prior to placement of topsoil.
- B. Place topsoil carefully along side slopes and sand filter.
- C. Do not use heavy equipment in the bottom of the sand filter during topsoil placement.
- D. Hand-roll topsoil.

3.9 TOLERANCES

- A. Top of Sand Filter Elevation: +/- ¼ inch

- B. Outlet Structure Rim Elevation: +/- ¼ inch
- C. Bottom Area: +/- 3 square feet
- D. Emergency Spillway Elevation: +/- ½ inch
- E. Emergency Spillway Depth: +/- ¼ inch
- F. Maximum Side Slopes: .08% or .5' per run

3.10 PROTECTION

- A. Install silt fence or silt sock along the perimeter of the toe of the sand filter slope to protect the sand filter from sedimentation and clogging until the site and side slopes are stabilized and satisfactory grass growth established.
- B. Install erosion controls (silt sack, straw wattles, etc) at the sand filter inlets and overflow outlets until site is stabilized.
- C. Maintain and remove erosion controls until acceptance of stabilization and grass establishment.
- D. Do not mow until satisfactory grass growth has been established.

3.11 FIELD QUALITY CONTROL

- A. Field visits and reports required by Engineer.
 - 1. Bottom be Bed
 - a. Bottom of the excavation of the sand filter, installation the filter fabric along the excavation side walls. Prior to placement of gravel or underdrain.
 - 2. Cover
 - a. Installation of gravel underdrain and pipe. Prior to the covering the underdrain.
 - 3. Grading
 - a. Upon completion of the placement of the sand and side slope grading. Prior to the placement of topsoil.
 - 4. Final inspection: Stabilize, maintain and cleanup all bioretention areas Engineer to inspect the following:
 - 1) Vegetative cover has been achieved in the bottom of bed.
 - 2) Presence of accumulated sand, sediment and trash in sediment forebay or sand filter beds.
 - 3) Evidence of any rill or gully erosion along slopes or upgradient grass filter strip.
 - 4) Evidence of excessive ponding or concentrated flows
 - 5) Sediment accumulation and clogging at inflow points.
 - 6) Bare soil or sediment sources in the contributing drainage area.
- B. Take appropriate remedial action to repair any deficiencies identified during the above Engineer field visits.

3.12 CLEANING

- A. After completion of the work, remove and properly dispose all debris, construction materials, rubbish, excess soil, etc., from the Project site. Promptly repair any identified deficiencies and leave the Project site in a clean and satisfactory condition.

3.13 MAINTENANCE

- A. Provide service and maintenance of the sand filter for, one year, from date of Substantial Completion.
- B. Maintenance as indicated in the Operation and Maintenance Plan. At a minimum it includes:
 - 1. First mowing
 - 2. Erosion repairs
 - 3. Sediment removal
 - 4. Cleaning or inlet and outlet structures

3.14 ATTACHMENTS

- A. As-built Forms.

END OF SECTION

SECTION 34 71 13 – TIMBER GUARDRAIL

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Wood posts and rails.
 - 2. Excavating for post foundation.
 - 3. Accessories for timber guardrail.
- B. Related Sections:
 - a. Section 033000 – Cast-In-Place Concrete.
 - b. Section 312000 – Earth Moving

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
- B. American Wood-Preservers' Association:
- C. AWPA C14 - Wood for Highway Construction - Preservative Treatment by Pressure Processes.
- D. Forest Stewardship Council:
 - 1. FSC Guidelines - Forest Stewardship Council Guidelines.

1.3 SYSTEM DESCRIPTION

- A. Rail Height:
 - 1. As indicated on drawings.
- B. Post Spacing:
 - 1. At intervals as indicated on drawings.
- C. Post Foundation Depth:
 - 1. Minimum 48 inches below finish grade.
- D. Post Foundation Diameter: 24 inch.

1.4 SUBMITTALS

- A. Product Data: Wood rails, wood posts, and accessories.

B. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, anchorage, and schedule of components.

C. Manufacturer's Installation Instructions: Concrete anchors, and epoxy.

D. Manufacturer's Certificate: Products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

A. Perform Work according with the construction drawings.

1.6 FIELD MEASUREMENTS

A. Verify field measurements are as indicated. Notify engineer immediately of any discrepancies.

PART 2 PRODUCTS

2.1 MATERIALS

A. Furnish materials according to construction drawings and specifications.

B. Timber

1. Timber Species: Southern Yellow Pine, or ENGINEER approved equal.
2. Timber Grade: SPIB Grade: Rails - No. 1 SR, Posts – No. 2 SR.
3. Dressing: Provide timber which has been dressed on 4 sides (S4S) at the mill, prior to grading. Comply with grade sizes.
4. Softwood timber, pressure preservative treated to AWPA C14 using waterborne preservatives, size per construction drawings. Bolt holes shall be shop drilled or drilled in the field to a width 1/8" smaller than the bolt width.
5. Post to be ground contact pressure treated wood timber only.
 - a. Rails
 - 1) Same species as the post, and shall be stress grade 1,500 psi or more, extreme fiber in bending. Posts and rails shall be predrilled and cut to the required dimensions prior to treatment.
 - b. Rails to be above ground pressure treated wood timbers.
 - c. Hardware: Steel, bolts, nuts and washers to suit rail profile.
 - 1) Bolts shall be galvanized carriage bolts with a smooth exterior face.
 - 2) All bolts shall be equipped with washers and nuts to suit.

2.2 ACCESSORIES

A. Concrete: Normal Portland cement, 4000 psi strength at 28 days. See Section 03 30 00

B. Hardware: Steel brackets, bolts, nuts and washers as indicated on the drawings.

2.3 FINISHES

- A. Galvanizing: ASTM A123/A123M; hot dip galvanize after fabrication.
- B. Galvanizing for Nuts, Bolts and Washers: ASTM A153/A153M, 1.8 oz per sq ft coating.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify location of underground utilities and adjust location of posts to avoid damaging utilities.

3.2 INSTALLATION

- A. Layout centerline of timber guard rail and posts locations as indicated on the drawings. Notify engineer for field confirmation of layout prior to installation.
- B. Set posts plumb, in concrete footings with top of footing 6 inches below finish grade. Slope top of concrete for water run-off. Post Footing Depth Below Finish Grade: 48 inches
- C. Attach rails securely to posts with hardware as indicated on the drawings.
- D. General Sealing: Where treated members are cut or damaged during erection, apply a heavy brush coat of the same treatment solution to the cut surfaces in accordance with AWPA Standard M4.
- E. Wood Posts:
 - 1. Install as indicated in the Drawings and in accordance with one of the following methods:
 - a. Hydraulic drive post plumb with adequate installation machinery. Replace damaged post and excavate rock or refusal where necessary.
 - b. Excavate by auger and set wood posts in ground. The bottom of post holes shall be tamped to grade. Post shall be set plumb at the required location. Machine tamp backfill in 4 inches layers around posts and structural base. Backfill material shall be as shown in the Drawings. Posts shall be installed level and rails shall be installed parallel to finish grade.
- F. Rails:
 - 1. Attach to offset blocks or to posts as indicated with the alignment resulting in a smooth continuous rail conforming to the required line and grade. Butt adjoining rail sections with a maximum separation between adjoining rail sections of 1/16 inch. Rails shall be butt jointed at alternate posts or as directed, and shall be securely attached with galvanized carriage bolts, as specified in the Drawings, of sufficient length to secure with washer and nut. Hammering or other forceful method of inserting bolt shall not be used. Rails shall be spliced accordingly.

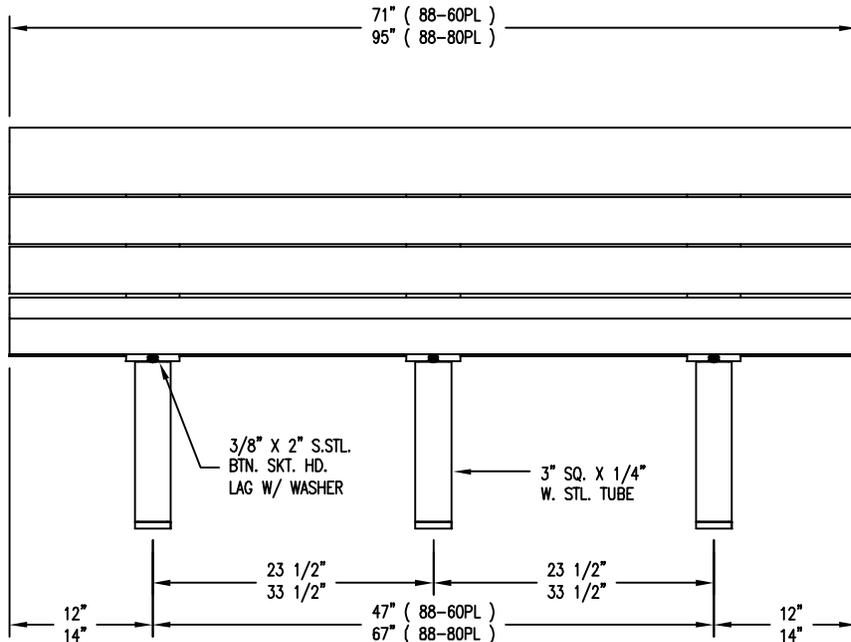
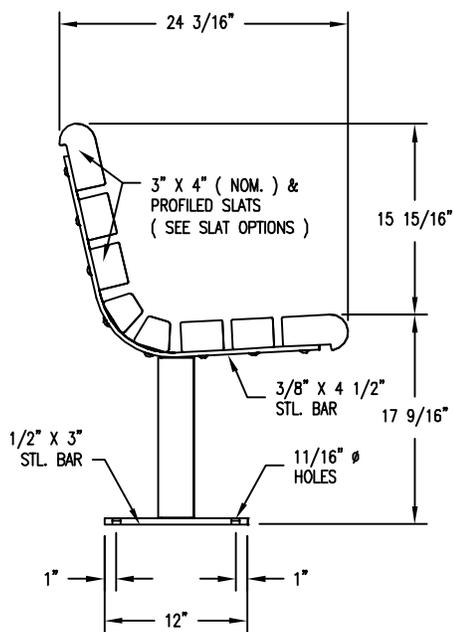
3.3 ERECTION TOLERANCES

- A. Posts - Maximum Variation from Plumb: 1/2 inch.
- B. Rail - Maximum Offset from Indicated Position: 1 inch.
- C. Rail - Maximum Variation from Indicated Height: 1/2 inch.
- D. Minimum distance from property line: 6 inches.

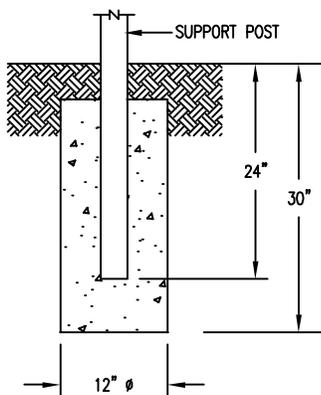
END OF SECTION

APPENDIX

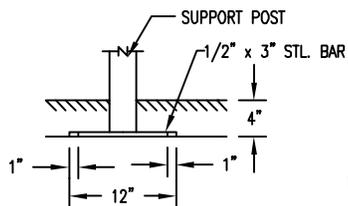
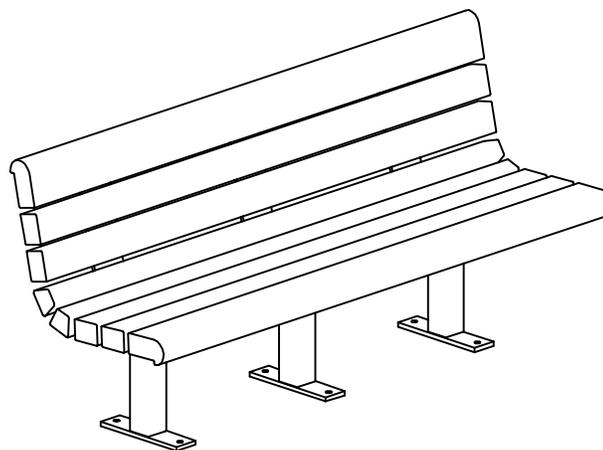
SITE FURNISHINGS



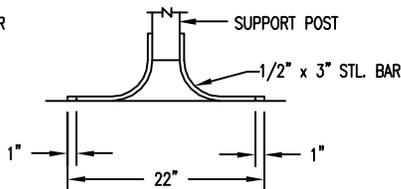
S-2 SURFACE



S-1 EMBEDMENT



S-4 SUB FLOOR



S-3 GULL WING

LENGTH OPTIONS

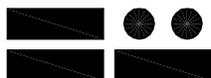
- 6' BENCH
- 8' BENCH

SLAT OPTIONS

- "CEDAR" RECYCLED PLASTIC
- "GREY" RECYCLED PLASTIC
- "REDWOOD" RECYCLED PLASTIC
- "WALNUT" RECYCLED PLASTIC
- OTHER _____

NOTES

- 1.) ALL STL. MEMBERS COATED W/ ZINC RICH EPOXY THEN FINISHED W/ POLYESTER POWDER COATING.
- 2.) 1/2" X 3 3/4" EXPANSION ANCHOR BOLT PROVIDED FOR S-2, S-3 & S-4 OPTIONS.



DuMor, inc.

P.O. Box 142 Mifflintown, PA 17059-0142

SCALE : NONE
 DATE DRAWN : 7/31/95
 DRAWN BY : AH
 DATE REV. : 10/25/11
 REV. BY : RDH

TITLE : BENCH

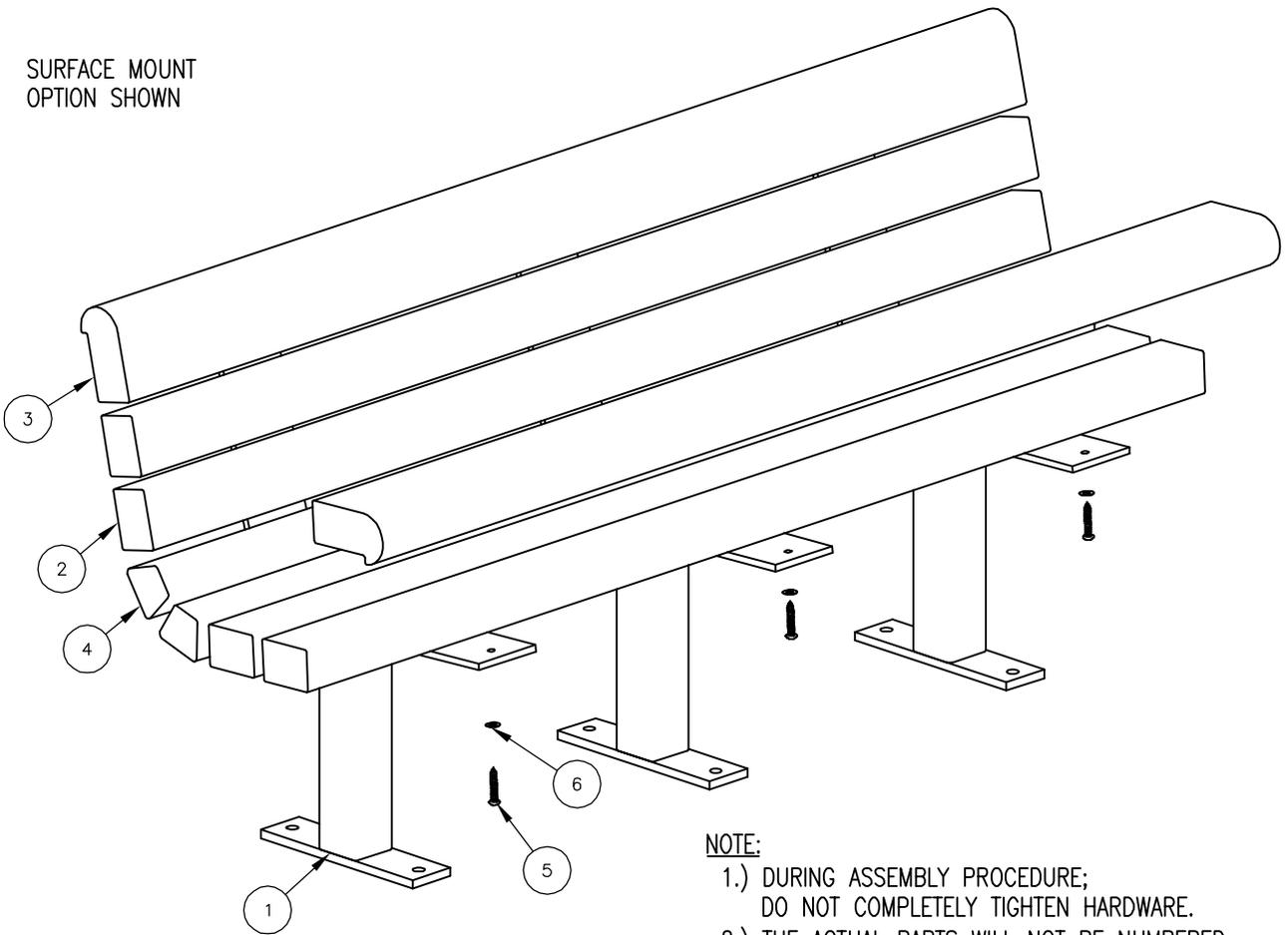
REV. D

DRAWING NUMBER

88 SERIES PL

SHEET 1 OF 2

SURFACE MOUNT
OPTION SHOWN



NOTE:

- 1.) DURING ASSEMBLY PROCEDURE;
DO NOT COMPLETELY TIGHTEN HARDWARE.
- 2.) THE ACTUAL PARTS WILL NOT BE NUMBERED:
NUMBERS ONLY APPLY TO DRAWING.
- 3.) SEE SPEC. SHEET 1 FOR MOUNTING OPTION.

STEP 1:

- USE 3 - PCS. SUPPORT FOR SURFACE MOUNT (1)
- 4 - PCS. 3" X 4" X 71" PLASTIC INT'R SLAT (2)
- 2 - PCS. 71" PLASTIC EDGE SLAT (3)
- 2 - PCS. 71" PLASTIC TRAP SLAT (4)
- 24 - PCS. 3/8" X 2" SS. BTN. SKT. HD. LAG SCR. (5)
- 24 - PCS. 3/8" SS. FLAT WASHER (6)

ATTACH SLATS (2, 3, & 4) TO SUPPORT FOR SURFACE MOUNT (1) USING HARDWARE (5 & 6). TIGHTEN TO SNUG FIT.
REPEAT UNTIL ALL SLATS ARE ATTACHED.

STEP 2:

UPON COMPLETION OF BENCH ASSEMBLY SQUARE ALL COMPONENTS THEN TIGHTEN ALL HARDWARE.

STEP 3:

ANCHOR ACCORDING TO SUPPORT OPTION USED.

ITEM	QTY	PART NO	DESCRIPTION
1	3	0-88-00-01/S-2	BENCH SUPPORT FOR SURFACE MOUNT
2	4	0-88-60PL-02	3" X 4" X 71" PLASTIC INT'R SLAT
3	2	0-88-60PL-03	71" PLASTIC EDGE SLAT
4	2	0-88-60PL-04	71" PLASTIC TRAP SLAT
5	24	1-13-016	3/8" X 2" SS BTN SKT HD LAG SCR
6	24	1-22-024	3/8" SS FLAT WASHER



DuMor, inc.

P.O. Box 142 Mifflintown, PA 17059-0142

SCALE : NONE
DATE DRAWN : 7/31/95
DRAWN BY : AH
DATE REV. : 10/25/11
REV. BY : RDH

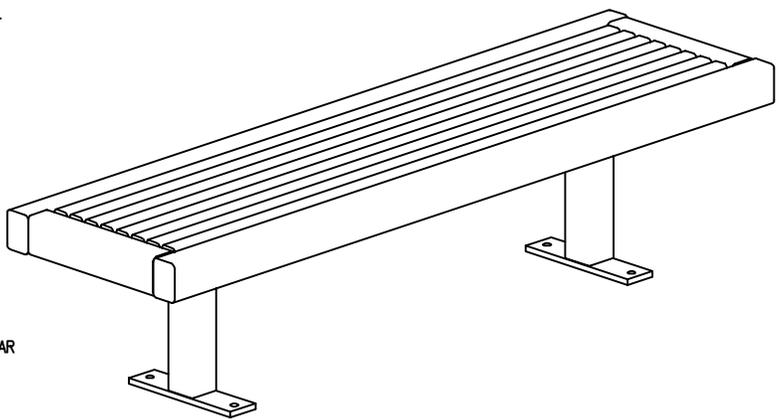
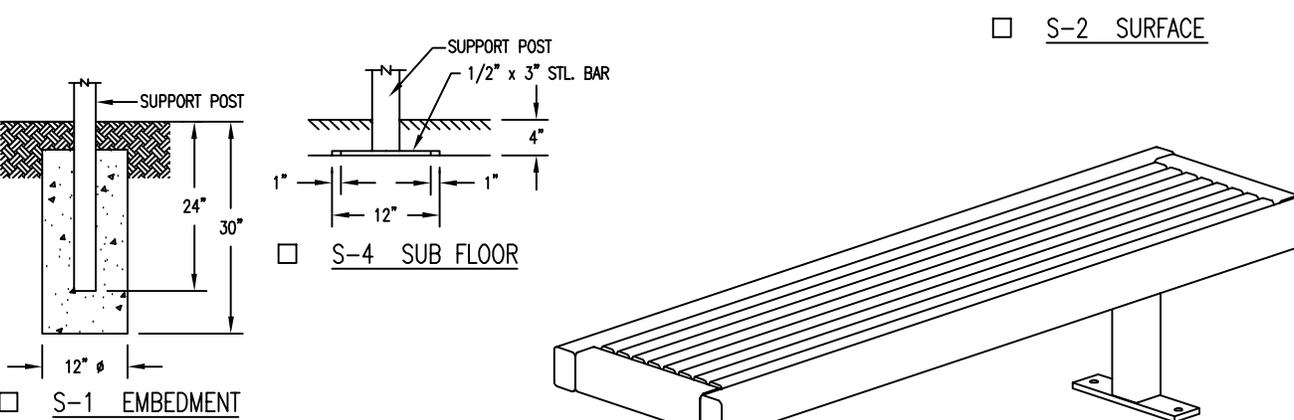
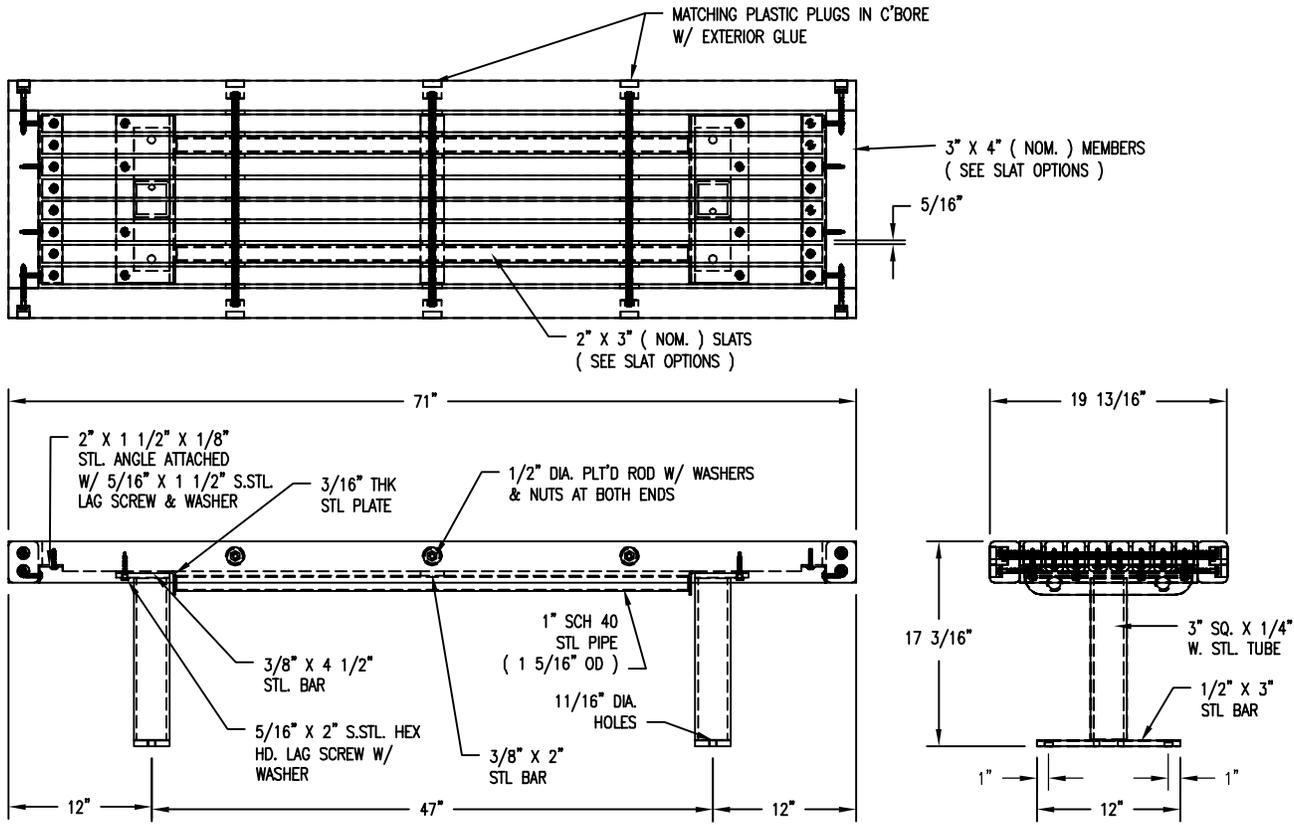
TITLE : BENCH ASSEMBLY

REV. D

DRAWING NUMBER

88 SERIES PL

SHEET 2 OF 2



- SLAT OPTIONS**
- "CEDAR" RECYCLED PLASTIC
 - "GREY" RECYCLED PLASTIC
 - "REDWOOD" RECYCLED PLASTIC
 - "WALNUT" RECYCLED PLASTIC
 - OTHER _____

NOTES

- 1.) ALL STL. MEMBERS COATED W/ ZINC RICH EPOXY THEN FINISHED W/ POLYESTER POWDER COATING.
- 2.) 1/2" X 3 3/4" EXPANSION ANCHOR BOLTS PROVIDED FOR S-2, S-3 & S-4 OPTIONS.

	BENCH	DATE DRAWN : 08/28/03	REV.	DRAWING NUMBER 163-60PL	SHEET 1 OF 2
		DRAWN BY : AWH	D		
		DATE REV. : 11/17/15			
		REV. BY : JSB			

NOTES:

- 1.) DURING ASSEMBLY PROCEDURE;
DO NOT COMPLETELY TIGHTEN HARDWARE.
- 2.) THE ACTUAL PARTS WILL NOT BE NUMBERED.
NUMBERS ONLY APPLY TO DRAWING.
- 3.) UPON COMPLETION OF ASSEMBLY SQUARE
ALL COMPONENTS THEN TIGHTEN ALL HARDWARE.
- 4.) MOUNT AND ANCHOR AS SPECIFIED.

TOOLS REQ'D

- 3/4" WRENCH
- 1/4" ALLEN WRENCH
- 1/2" MASONRY DRILL BIT
DRILL

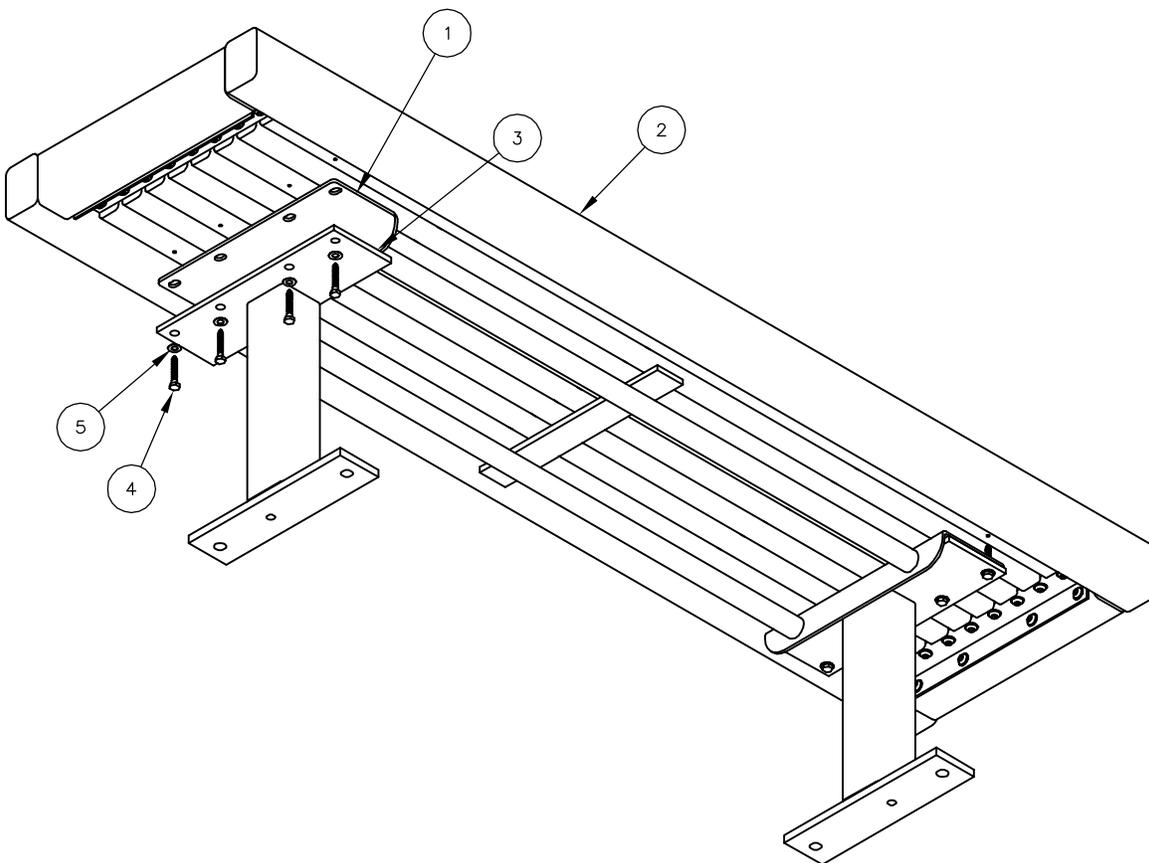
PARTS LIST FOR S-2

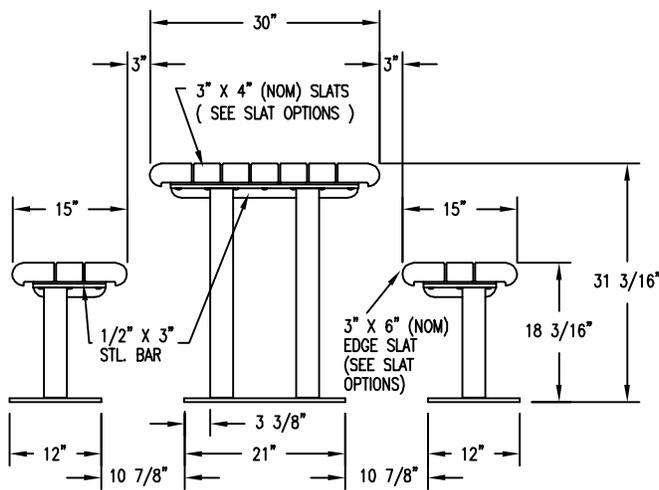
ITEM	QTY	PART NO	DESCRIPTION
1	1	0-163-60-08	6" SEAT BRACE
2	1	0-163-60PL-01	6" SEAT ASSEMBLY, PLASTIC
3	2	0-37-00-02/S-2	SUPPORT FOR SURFACE MOUNT
4	8	1-13-038	5/16" X 2" SS HEX HD LAG SCR
5	8	1-22-017	5/16" SS FLAT WASHER

KITS PROVIDED FOR S-2

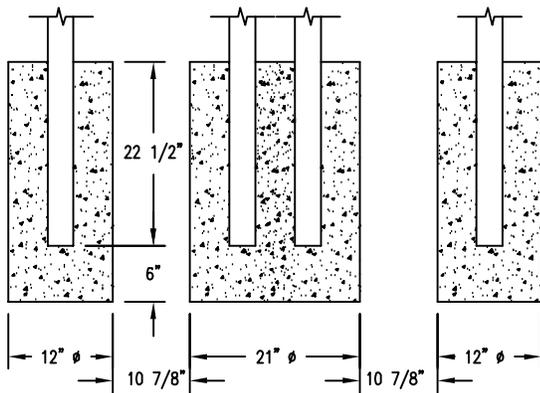
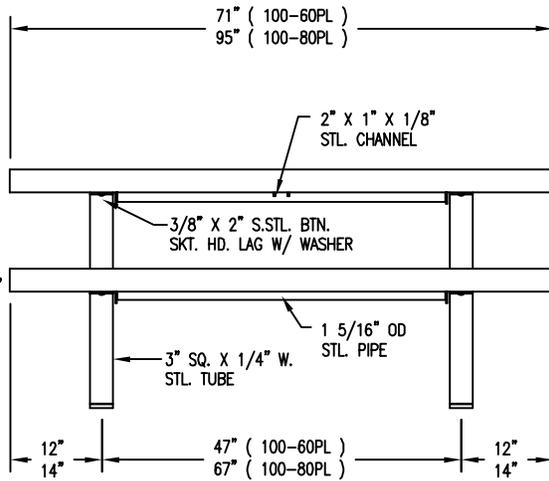
ITEM	QTY	PART NO	DESCRIPTION
5	1	K-ANCO860-4	1/2" X 3 3/4" SS ANCHOR KIT (4PC)
6	1	K-HL0532-8	5/16" LAG HARDWARE KIT (8PC)

① ATTACH SEAT TO SUPPORTS.

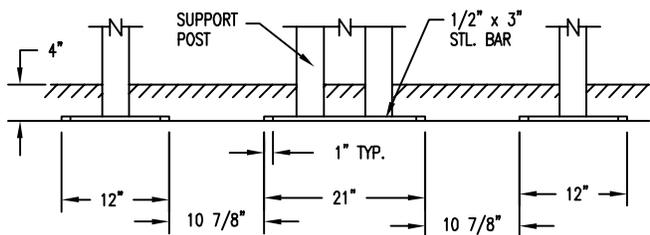
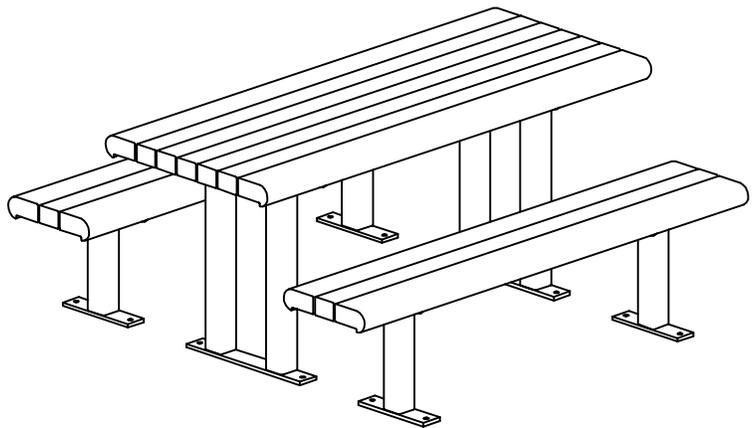




S-2 SURFACE MOUNT



S-1 EMBEDMENT



S-4 SUB FLOOR

LENGTH OPTIONS

- 6' TABLE
- 8' TABLE

SLAT OPTIONS

- "CEDAR" RECYCLED PLASTIC
- "GREY" RECYCLED PLASTIC
- "REDWOOD" RECYCLED PLASTIC
- "WALNUT" RECYCLED PLASTIC
- OTHER _____

NOTES:

- 1.) ALL STL. MEMBERS COATED W/ ZINC RICH EPOXY THEN FINISHED W/ POLYESTER POWDER COATING.
- 2.) 1/2" X 3 3/4" EXPANSION ANCHOR BOLTS PROVIDED. FOR OPTIONS S-2 & S-4.



TABLE

DATE DRAWN : 10/10/95
 DRAWN BY : AH
 DATE REV. : 01/14/14
 REV. BY : ESS

REV.
F

DRAWING
NUMBER

100 SERIES PL

SHEET
1 OF 2

PARTS LIST FOR S-2

ITEM	QTY	PART NO	DESCRIPTION
1	2	0-100-00-01/S-2	TABLE TOP SUPPORT FOR SURFACE
2	4	0-100-00-02/S-2	SEAT SUPPORT FOR SURFACE MT
3	1	0-100-60-05	6' TABLE TOP BRACE
4	2	0-100-60-06	6' SEAT BRACE
5	7	0-88-60PL-02	3" X 4" X 71" INT'R SLAT, PLASTIC
6	6	0-88-60PL-03	71" EDGE SLAT, PLASTIC
7	39	1-13-016	3/8" X 2" SS BTN SKT HD LAG SCR
8	39	1-22-024	3/8" SS FLAT WASHER

NOTE:

- 1.) DURING ASSEMBLY PROCEDURE;
DO NOT COMPLETELY TIGHTEN HARDWARE.
- 2.) THE ACTUAL PARTS WILL NOT BE NUMBERED.
NUMBERS ONLY APPLY TO DRAWING.
- 3.) UPON COMPLETION OF ASSEMBLY SQUARE
ALL COMPONENTS THEN TIGHTEN ALL HARDWARE.
- 4.) MOUNT AND ANCHOR AS SPECIFIED.

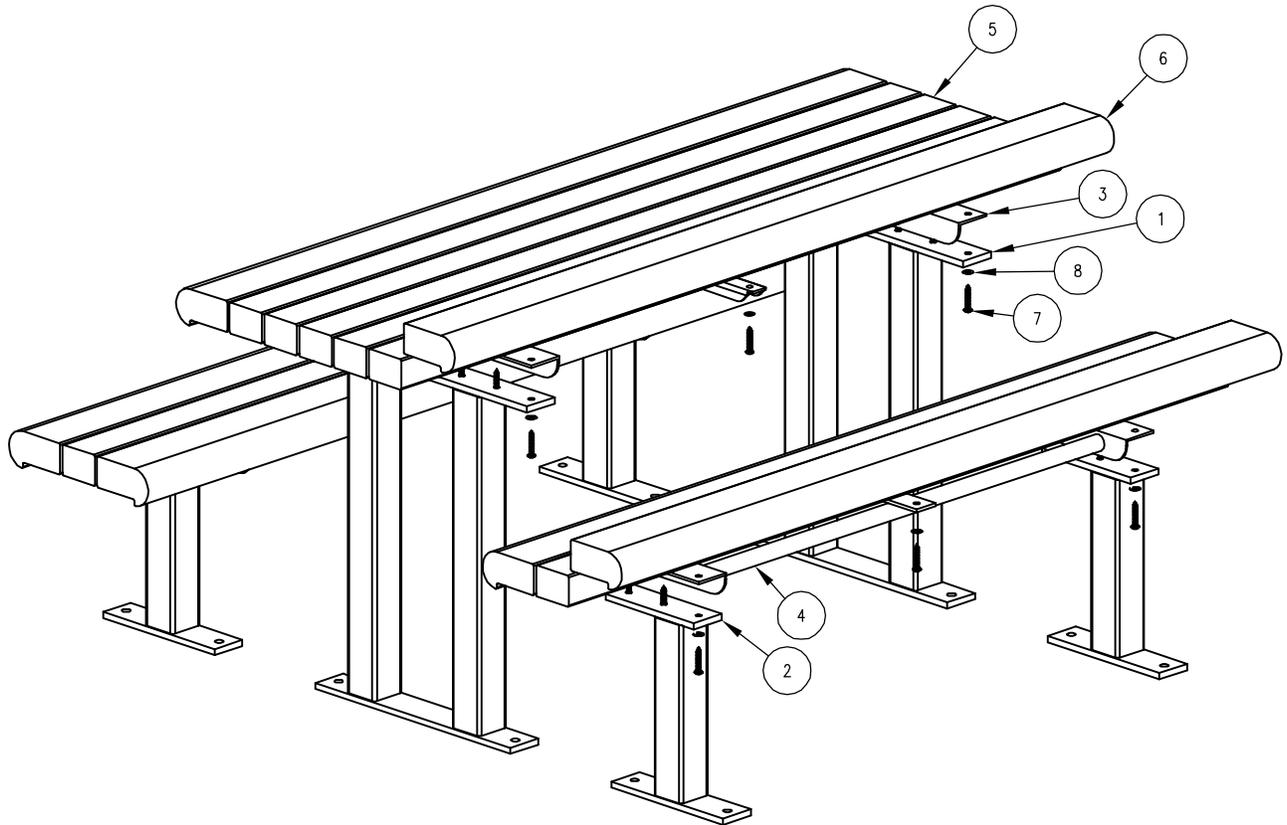
TOOLS REQ'D

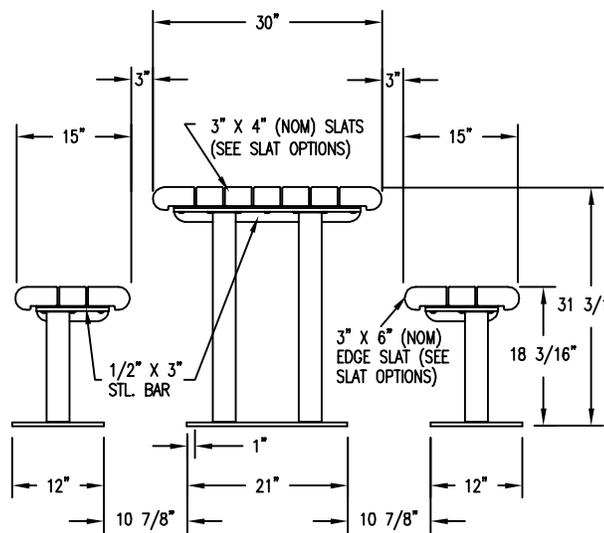
- 3/4" WRENCH
1/4" ALLEN WRENCH
1/2" MASONRY DRILL BIT
DRILL

KITS PROVIDED FOR S-2

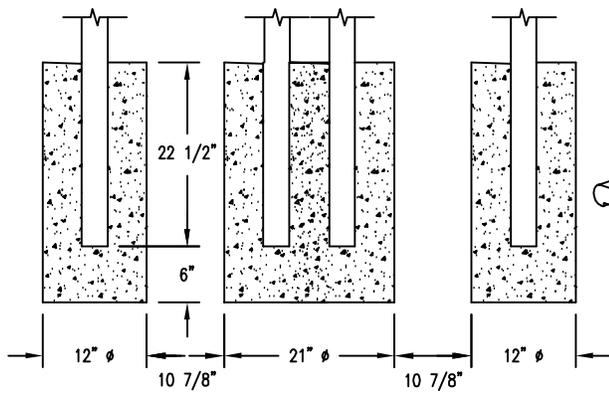
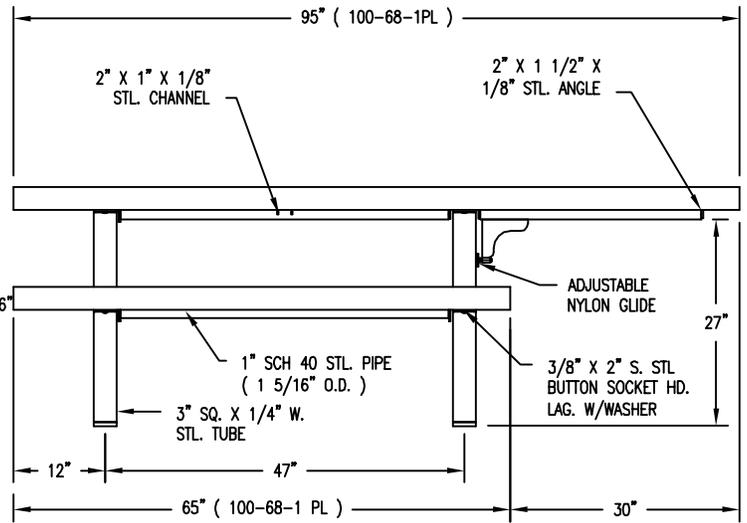
ITEM	QTY	PART NO	DESCRIPTION
9	3	K-ANCO860-4	1/2" X 3 3/4" SS ANCHOR KIT (4PC)
10	1	K-BL0632-40	3/8" LAG HARDWARE KIT (40PC)

① ATTACH SLATS & BRACES TO SUPPORTS.

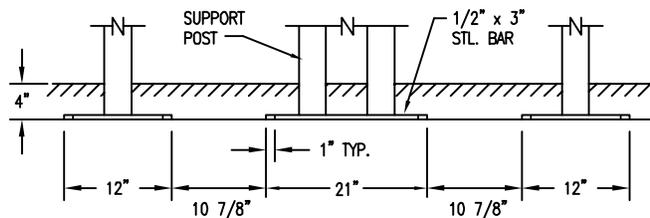
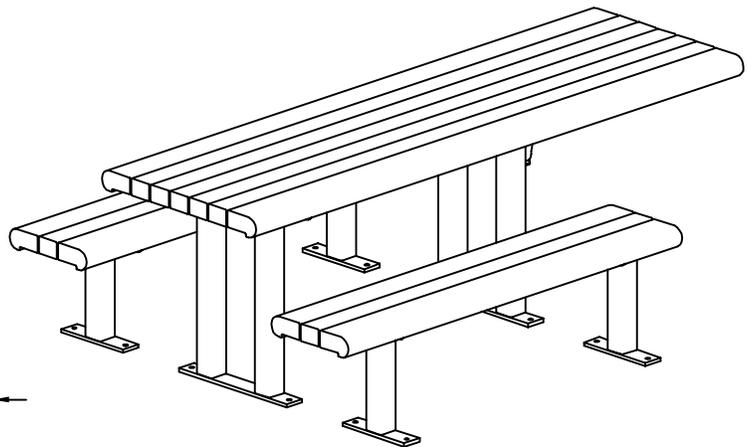




S-2 SURFACE MOUNT



S-1 EMBEDMENT



S-4 SUB FLOOR

NOTES:

- 1.) ALL STL. MEMBERS COATED W/ ZINC RICH EPOXY THEN FINISHED W/ POLYESTER POWDER COATING.
- 2.) 1/2" X 3 3/4" EXPANSION ANCHOR BOLTS PROVIDED FOR OPTIONS S-2 & S-4.

SLAT OPTIONS

- "CEDAR" RECYCLED PLASTIC
- "GREY" RECYCLED PLASTIC
- "REDWOOD" RECYCLED PLASTIC
- "WALNUT" RECYCLED PLASTIC
- OTHER _____



TABLE

DATE DRAWN : 04/01/96
 DRAWN BY : AWH
 DATE REV. : 01/14/14
 REV. BY : ESS

REV.
F

DRAWING NUMBER

100-68-1 PL

SHEET
1 OF 2

PARTS LIST FOR S-2

ITEM	QTY	PART NO	DESCRIPTION
1	2	0-100-00-01/S-2	TABLE TOP SUPPORT FOR SURFACE
2	4	0-100-00-02/S-2	SEAT SUPPORT FOR SURFACE MT
3	2	0-100-60-06	6' SEAT BRACE
4	1	0-100-68-1-05	TABLE TOP BRACE, HANDICAPPED
5	5	0-100-681PL-1	3" X 4" X 95" INT'R TABLE SLAT, PLASTIC
6	1	0-100-681PL-2	95" RIGHT EDGE TABLE SLAT, PLASTIC
7	2	0-100-681PL-3	3" X 4" X 65" INT'R SEAT SLAT, PLASTIC
8	2	0-100-681PL-4	65" RIGHT EDGE SEAT SLAT, PLASTIC
9	1	0-100-681PL-8	95" LEFT EDGE TABLE SLAT, PLASTIC
10	2	0-100-681PL-9	65" LEFT EDGE SEAT SLAT, PLASTIC
11	46	1-13-016	3/8" X 2" SS BTN SKT HD LAG SCR
12	46	1-22-024	3/8" SS FLAT WASHER
13	2	5-48-076	3/8" X 1 1/2" SWIVEL GLIDE

NOTE:

- 1.) DURING ASSEMBLY PROCEDURE;
DO NOT COMPLETELY TIGHTEN HARDWARE.
- 2.) THE ACTUAL PARTS WILL NOT BE NUMBERED.
NUMBERS ONLY APPLY TO DRAWING.
- 3.) UPON COMPLETION OF ASSEMBLY SQUARE
ALL COMPONENTS THEN TIGHTEN ALL HARDWARE.
- 4.) MOUNT AND ANCHOR AS SPECIFIED.

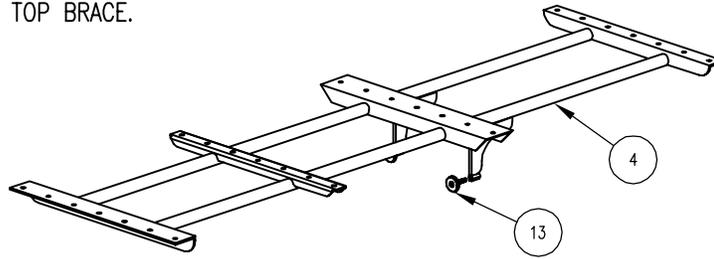
TOOLS REQ'D

- 3/4" WRENCH
9/16" WRENCH
1/4" ALLEN WRENCH
1/2" MASONRY DRILL BIT
DRILL

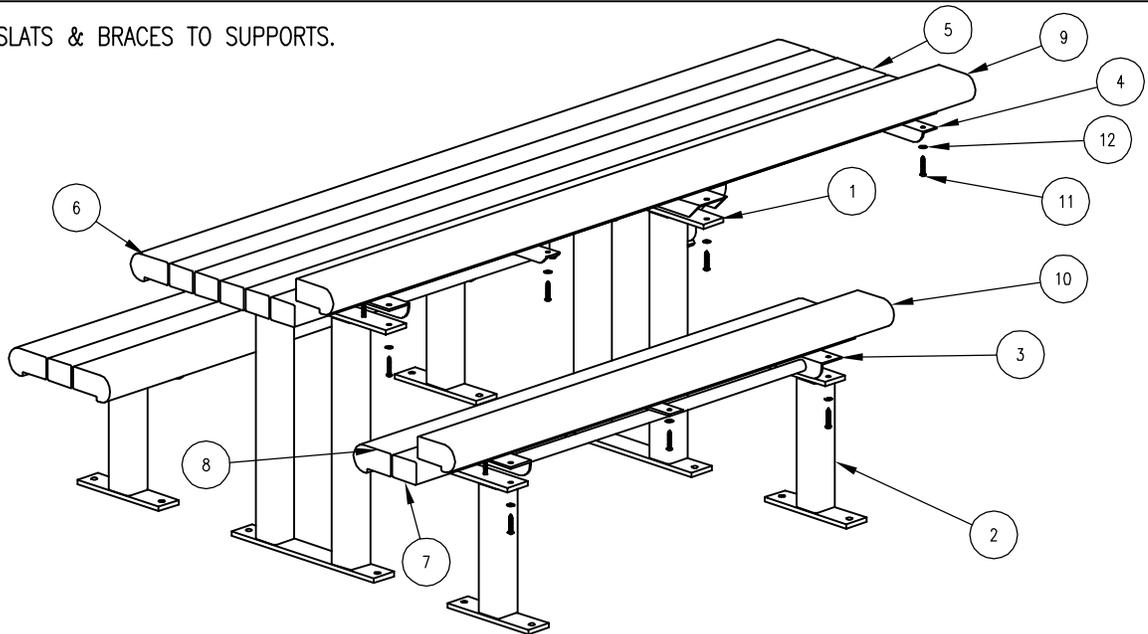
KITS PROVIDED FOR S-2

ITEM	QTY	PART NO	DESCRIPTION
14	3	K-ANCO860-4	1/2" X 3 3/4" SS ANCHOR KIT (4PC)
15	1	K-BL0632-48	3/8" LAG HARDWARE KIT (48PC)
16	1	K-GL0624-2	3/8" X 1 1/2" GLIDE KIT (2PCS)

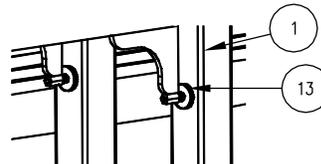
① ATTACH GLIDES TO TABLE TOP BRACE.

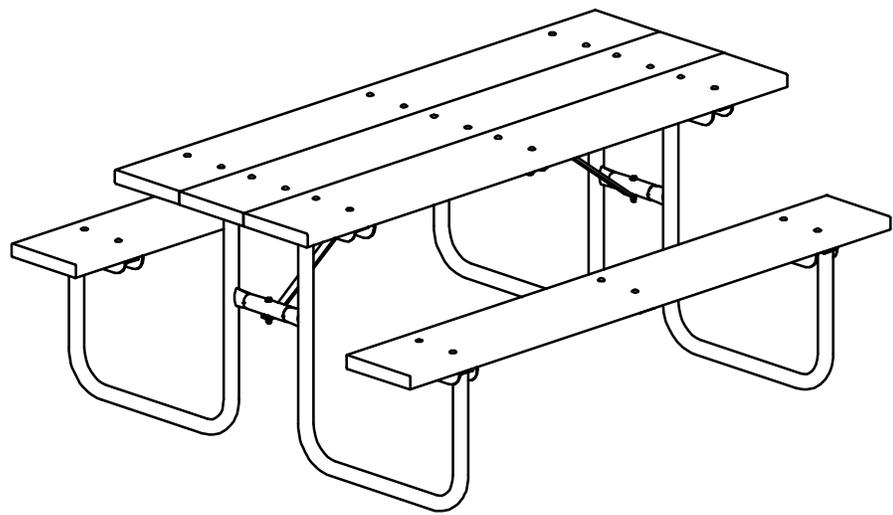
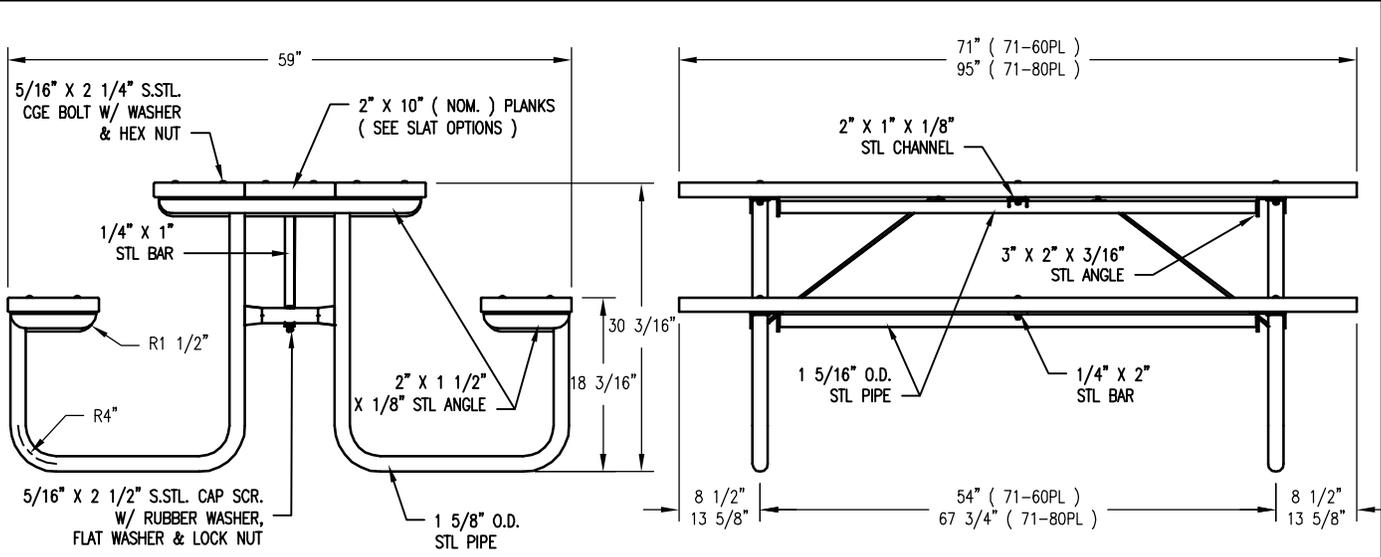


② ATTACH SLATS & BRACES TO SUPPORTS.



③ UNSCREW SWIVEL GLIDE SO IT FITS TIGHT AGAINST SUPPORT POST TUBE AND TIGHTEN.





LENGTH OPTIONS

- 6' TABLE
- 8' TABLE

FINISH OPTIONS:

- ALL STL. MEMBERS COATED W/ ZINC RICH EPOXY THEN FINISHED W/ POLYESTER POWDER COATING.
- HOT DIP GALV. AFTER FABRICATION.

SLAT OPTIONS

- "CEDAR" RECYCLED PLASTIC
- "GREY" RECYCLED PLASTIC
- "REDWOOD" RECYCLED PLASTIC
- "WALNUT" RECYCLED PLASTIC
- OTHER _____

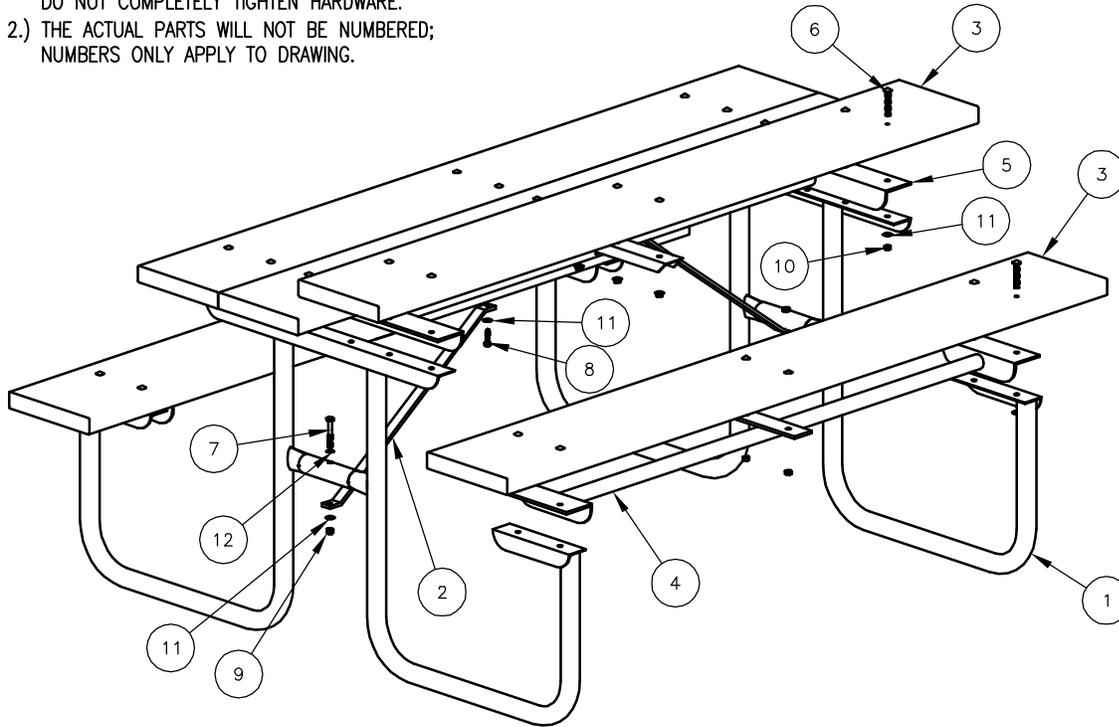
DuMor, inc.
P.O. Box 142 Mifflintown, PA 17059-0142

SCALE :	NONE
DATE DRAWN :	3/22/94
DRAWN BY :	CDC
DATE REV. :	10/27/11
REV. BY :	RDH

TITLE :	PICNIC TABLE		
REV.	G	DRAWING NUMBER	71 SERIES PL
			SHEET 1 OF 2

NOTE:

- 1.) DURING ASSEMBLY PROCEDURE;
DO NOT COMPLETELY TIGHTEN HARDWARE.
- 2.) THE ACTUAL PARTS WILL NOT BE NUMBERED;
NUMBERS ONLY APPLY TO DRAWING.



STEP 1:

- USE 3 - PCS. 2" X 10" X 71" PLASTIC SLATS (3)
 1 - PC. 6' TABLE TOP BRACE (5)
 6 - PCS. 5/16" X 2 1/4" SS CGE. BOLT (6)
 6 - PCS. 5/16" SS HEX NUT (10)
 6 - PCS. 5/16" SS FLAT WASHER (11)
 ATTACH 2" X 10" X 71" PLASTIC SLATS (3) TO CENTER OF 6' TABLE TOP BRACE (5) USING HARDWARE (6, 10, & 11). TIGHTEN TO SNUG FIT. REPEAT UNTIL ALL SLATS ARE ATTACHED.

STEP 2:

- USE 2 - PCS. END SUPPORT FRAME (1)
 12 - PCS. 5/16" X 2 1/4" SS CGE. BOLT (6)
 12 - PCS. 5/16" SS HEX NUT (10)
 12 - PCS. 5/16" SS FLAT WASHER (11)
 ATTACH STEP 1 ASSEMBLY TO END SUPPORT FRAME (1) USING HARDWARE (6, 10, & 11). TIGHTEN TO SNUG FIT.

STEP 3:

- USE 2 - PCS. 2" X 10" X 71" PLASTIC SLATS (3)
 2 - PCS. 6' SEAT BRACE (4)
 4 - PCS. 5/16" X 2 1/4" SS CGE. BOLT (6)
 4 - PCS. 5/16" SS HEX NUT (10)
 4 - PCS. 5/16" SS FLAT WASHER (11)
 ATTACH 2" X 10" X 71" PLASTIC SLATS (3) TO CENTER OF 6' SEAT BRACE (4) USING HARDWARE (6, 10, & 11). TIGHTEN TO SNUG FIT.

STEP 4:

- USE 8 - PCS. 5/16" X 2 1/4" SS CGE. BOLT (6)
 8 - PCS. 5/16" SS HEX NUT (10)
 8 - PCS. 5/16" SS FLAT WASHER (11)
 ATTACH STEP 3 ASSEMBLY TO STEP 2 ASSEMBLY USING HARDWARE (6, 10, & 11). TIGHTEN TO SNUG FIT.

STEP 5:

- USE 2 - PCS. DIAGONAL BRACE (2)
 2 - PCS. 5/16" X 2 1/2" SS HEX HD CAP SCR. (7)
 2 - PCS. 5/16" X 1 1/4" SS HEX HD LAG SCR. (8)
 2 - PCS. 5/16" SS NYLON LOCK NUT (9)
 4 - PCS. 5/16" SS FLAT WASHER (11)
 2 - PCS. 3/8" ID X 5/8" OD RUBBER WASHER (12)
 SQUARE STEP 4 ASSEMBLY THEN ATTACH DIAGONAL BRACE (2) USING HARDWARE (7, 8, 9, 11, & 12). NO PILOT HOLES FOR 5/16" X 1 1/4" SS HEX HD LAG SCR. (8).

STEP 6:

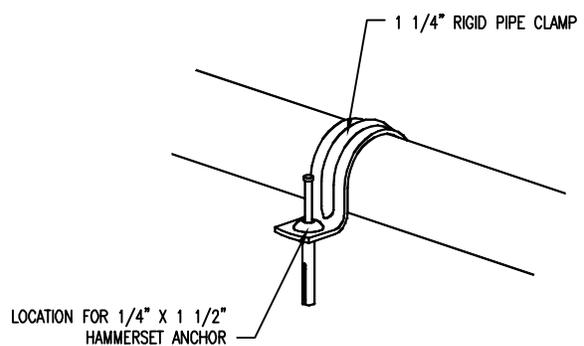
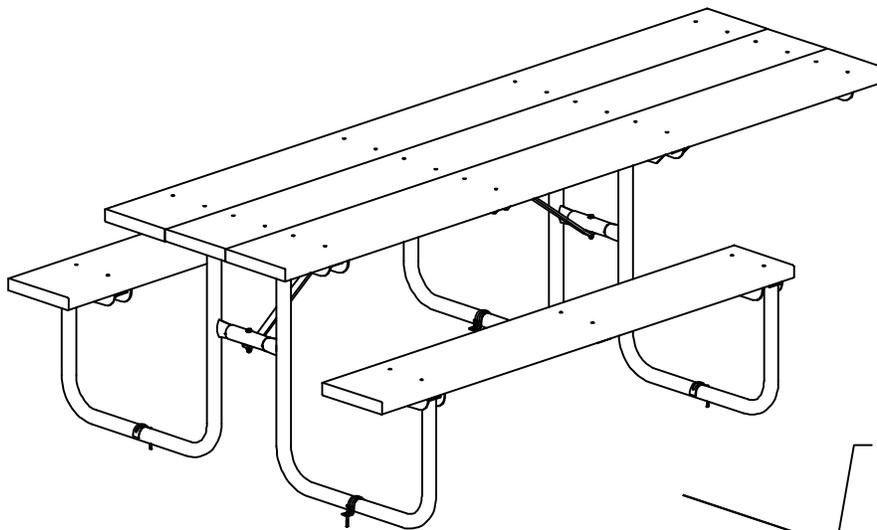
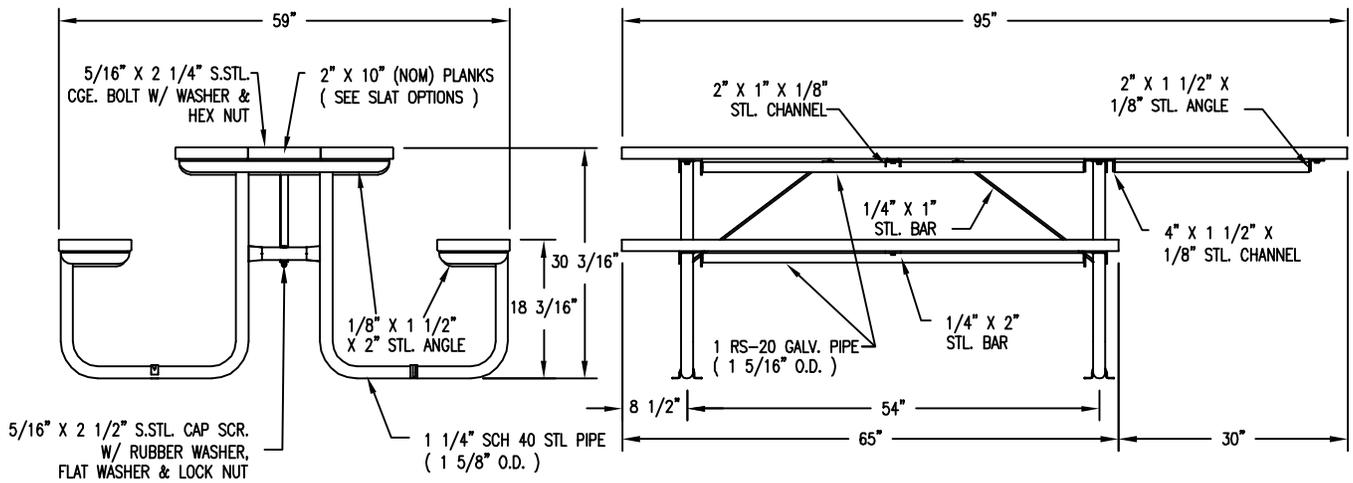
UPON COMPLETION OF TABLE ASSEMBLY TIGHTEN ALL HARDWARE.

ITEM	QTY	PART NO	DESCRIPTION
1	2	0-71-00-02	END SUPPORT FRAME
2	2	0-71-00-03	DIAGONAL BRACE
3	5	0-71-60PL-01	2" X 10" X 71" PLASTIC SLAT
4	2	0-77-60-14	6' SEAT BRACE
5	1	0-77-60-15	6' TABLE TOP BRACE
6	30	1-11-062	5/16" X 2 1/4" SS CGE BOLT
7	2	1-12-079	5/16" X 2 1/2" SS HEX HD CAP SCR
8	2	1-13-001	5/16" X 1 1/4" SS HEX HD LAG SCR
9	2	1-20-016	5/16" SS NYLON LOCKNUT
10	30	1-21-015	5/16" SS HEX NUT
11	34	1-22-017	5/16" SS FLAT WASHER
12	2	1-22-018	3/8" ID X 5/8" OD RUBBER WASHER

DuMor, inc.
 P.O. Box 142 Mifflintown, PA 17059-0142

SCALE : NONE
 DATE DRAWN : 3/22/94
 DRAWN BY : CDC
 DATE REV. : 10/27/11
 REV. BY : RDH

TITLE : PICNIC TABLE ASSEMBLY
 REV. G
 DRAWING NUMBER 71 SERIES PL
 SHEET 2 OF 2



ANCHORING DETAIL

NOTES

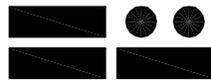
- 1.) 1/4" X 1 1/2" HAMMERSET ANCHORS AND 1 1/4" PIPE CLAMS PROVIDED (4 - PCS)

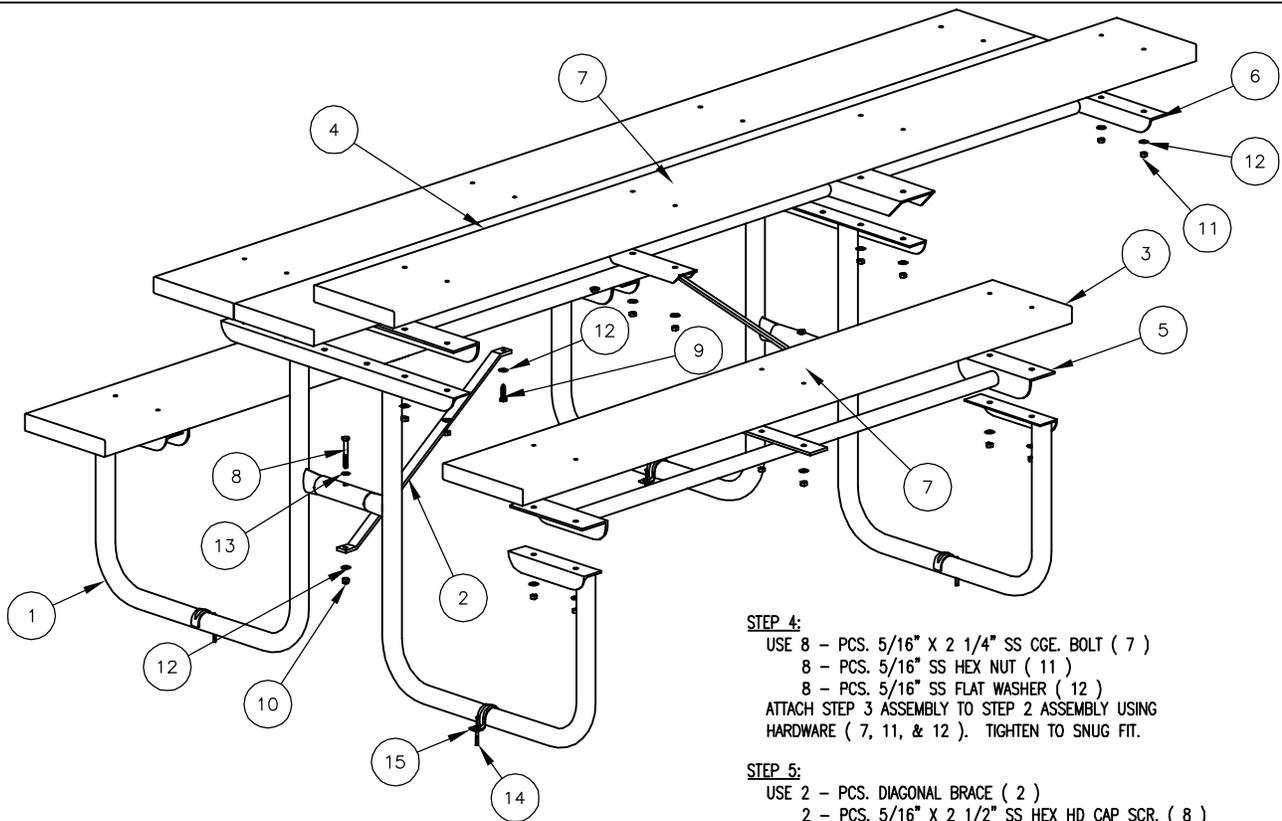
FINISH OPTIONS:

- ALL STL. MEMBERS COATED W/ ZINC RICH EPOXY THEN FINISHED W/ POLYESTER POWDER COATING.
- HOT DIP GALV. AFTER FABRICATION.

SLAT OPTIONS

- "CEDAR" RECYCLED PLASTIC
- "GREY" RECYCLED PLASTIC
- "REDWOOD" RECYCLED PLASTIC
- "WALNUT" RECYCLED PLASTIC
- OTHER _____

 DuMor, inc. P.O. Box 142 Mifflintown, PA 17059-0142	SCALE :	NONE	TITLE :		PICNIC TABLE	
	DATE DRAWN :	3/22/94	REV.	DRAWING NUMBER	71-68-1 PL	SHEET 1 OF 2
	DRAWN BY :	CDC	H			
	DATE REV. :	10/27/11				
REV. BY :	RDH					



NOTE:

- 1.) DURING ASSEMBLY PROCEDURE; DO NOT COMPLETELY TIGHTEN HARDWARE.
- 2.) THE ACTUAL PARTS WILL NOT BE NUMBERED; NUMBERS ONLY APPLY TO DRAWING.
- 3.) SEE SPEC. SHEET 1 FOR MOUNTING DETAILS.

STEP 1:

USE 3 - PCS. 2" X 10" X 95" PLASTIC SLATS (4)
 1 - PC. TABLE TOP BRACE, HANDICAPPED (6)
 12 - PCS. 5/16" X 2 1/4" SS CGE. BOLT (7)
 12 - PCS. 5/16" SS HEX NUT (11)
 12 - PCS. 5/16" SS FLAT WASHER (12)
 ATTACH 2" X 10" X 95" PLASTIC SLATS (4) TO CENTER AND TO END MARKED "A" OF TABLE TOP BRACE, HANDICAPPED (6) USING HARDWARE (7, 11, & 12). TIGHTEN TO SNUG FIT. REPEAT UNTIL ALL SLATS ARE ATTACHED.

STEP 2:

USE 2 - PCS. END SUPPORT FRAME (1)
 12 - PCS. 5/16" X 2 1/4" SS CGE. BOLT (7)
 12 - PCS. 5/16" SS HEX NUT (11)
 12 - PCS. 5/16" SS FLAT WASHER (12)
 ATTACH END SUPPORT FRAME (1) TO STEP 1 ASSEMBLY USING HARDWARE (7, 11, & 12). TIGHTEN TO SNUG FIT.

STEP 3:

USE 2 - PCS. 2" X 10" X 65" PLASTIC SLATS (3)
 2 - PCS. 6" SEAT BRACE (5)
 4 - PCS. 5/16" X 2 1/4" SS CGE. BOLT (7)
 4 - PCS. 5/16" SS HEX NUT (11)
 4 - PCS. 5/16" SS FLAT WASHER (12)
 ATTACH 2" X 10" X 65" PLASTIC SLATS (3) TO CENTER OF 6" SEAT BRACE (5) USING HARDWARE (7, 11, & 12). TIGHTEN TO SNUG FIT.

STEP 4:

USE 8 - PCS. 5/16" X 2 1/4" SS CGE. BOLT (7)
 8 - PCS. 5/16" SS HEX NUT (11)
 8 - PCS. 5/16" SS FLAT WASHER (12)
 ATTACH STEP 3 ASSEMBLY TO STEP 2 ASSEMBLY USING HARDWARE (7, 11, & 12). TIGHTEN TO SNUG FIT.

STEP 5:

USE 2 - PCS. DIAGONAL BRACE (2)
 2 - PCS. 5/16" X 2 1/2" SS HEX HD CAP SCR. (8)
 2 - PCS. 5/16" X 1 1/4" SS HEX HD LAG SCR. (9)
 2 - PCS. 5/16" SS NYLON LOCK NUT (10)
 4 - PCS. 5/16" SS FLAT WASHER (12)
 2 - PCS. 3/8" ID X 5/8" OD RUBBER WASHER (13)
 SQUARE STEP 4 ASSEMBLY THEN ATTACH DIAGONAL BRACE (2) USING HARDWARE (8, 9, 10, 12, & 13). NO PILOT HOLES FOR 5/16" X 1 1/4" SS HEX HD LAG SCR. (9).

STEP 6:

UPON COMPLETION OF TABLE ASSEMBLY TIGHTEN ALL HARDWARE.

STEP 7:

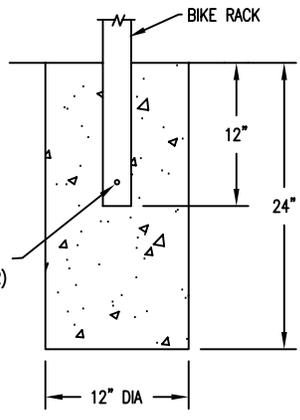
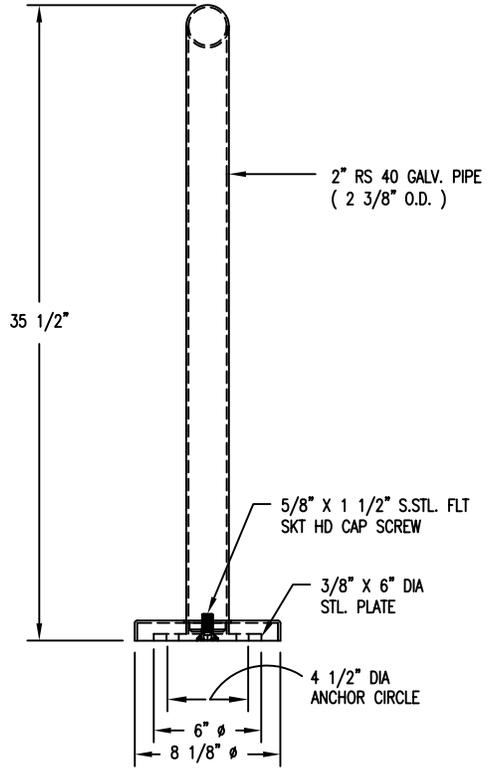
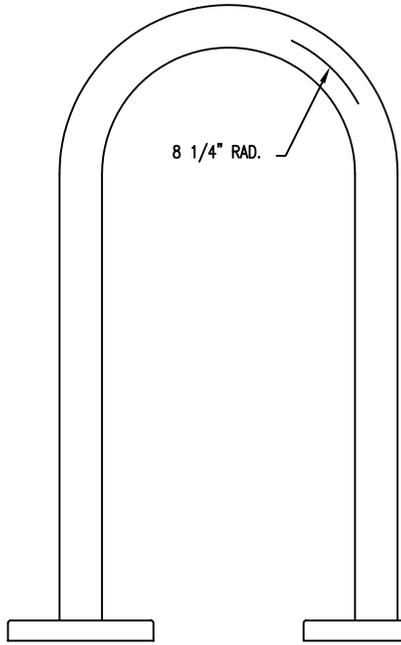
4 - PCS. 1/4" X 1 1/2" HAMMERSET ANCHORS (14)
 4 - PCS. 1 1/4" RIGID PIPE CLAMP (15)
 PLACE TABLE IN SITE LOCATION DESIRED. PLACE 1 1/4" RIGID PIPE CLAMP IN CENTER OF TABLE LEGS. MARK HOLES AND MOVE 1 1/4" RIGID PIPE CLAMPS. DRILL 1/4" DIA HOLE IN CONCRETE AT MARKED HOLE LOCATIONS APPROX. 2" DEEP. BLOW OUT DUST IN DRILLED HOLES. PLACE 1 1/4" RIGID PIPE CLAMPS IN OVER TABLE LEGS AND IN LINE WITH DRILLED HOLES. PLACE 1/4" X 1 1/2" HAMMERSET ANCHORS IN HOLES AND DRIVE IN WITH HAMMER.

ITEM	QTY	PART NO	DESCRIPTION
1	2	0-71-00-02	END SUPPORT FRAME
2	2	0-71-00-03	DIAGONAL BRACE
3	2	0-71-68-1PL-1	2" X 10" X 65" PLASTIC SLAT
4	3	0-71-68-1PL-2	2" X 10" X 95" PLASTIC SLAT
5	2	0-77-60-14	6" SEAT BRACE
6	1	0-77-68-1-15	TABLE TOP BRACE, HANDICAPPED
7	36	1-11-062	5/16" X 2 1/4" SS CGE BOLT
8	2	1-12-079	5/16" X 2 1/2" SS HEX HD CAP SCR
9	2	1-13-001	5/16" X 1 1/4" SS HEX HD LAG SCR
10	2	1-20-016	5/16" SS NYLON LOCKNUT
11	36	1-21-015	5/16" SS HEX NUT
12	40	1-22-017	5/16" SS FLAT WASHER
13	2	1-22-018	3/8" ID X 5/8" OD RUBBER WASHER
14	4	1-17-021	1/4" X 1 1/2" SS HAMMERSET ANCHOR
15	4	5-48-491	1 1/4" RIGID PIPE CLAMP, 3/8" DIA HOLE, PLTD

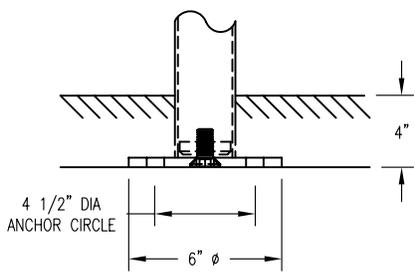
DuMor, inc.
 P.O. Box 142 Mifflintown, PA 17059-0142

SCALE : NONE
 DATE DRAWN : 3/22/94
 DRAWN BY : JSB
 DATE REV. : 10/27/11
 REV. BY : RDH

TITLE : PICNIC TABLE ASSEMBLY
 REV. H
 DRAWING NUMBER 71-68-1 PL
 SHEET 2 OF 2

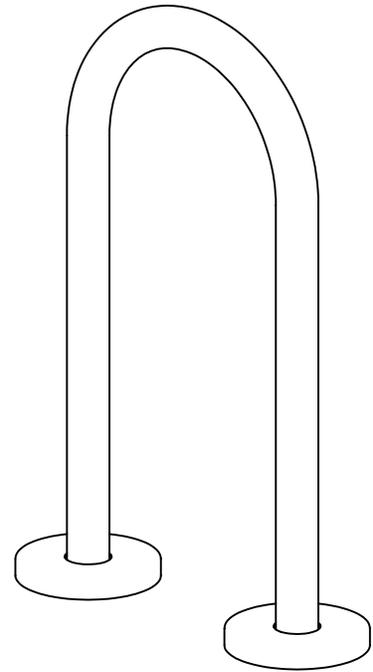


S-1 EMBEDMENT



S-4 SUB FLOOR

S-2 SURFACE MOUNT



FINISH OPTIONS

- GALV. FINISH
- COATED W/ ZINC RICH EPOXY THEN FINISHED W/ POLYESTER POWDER COATING.

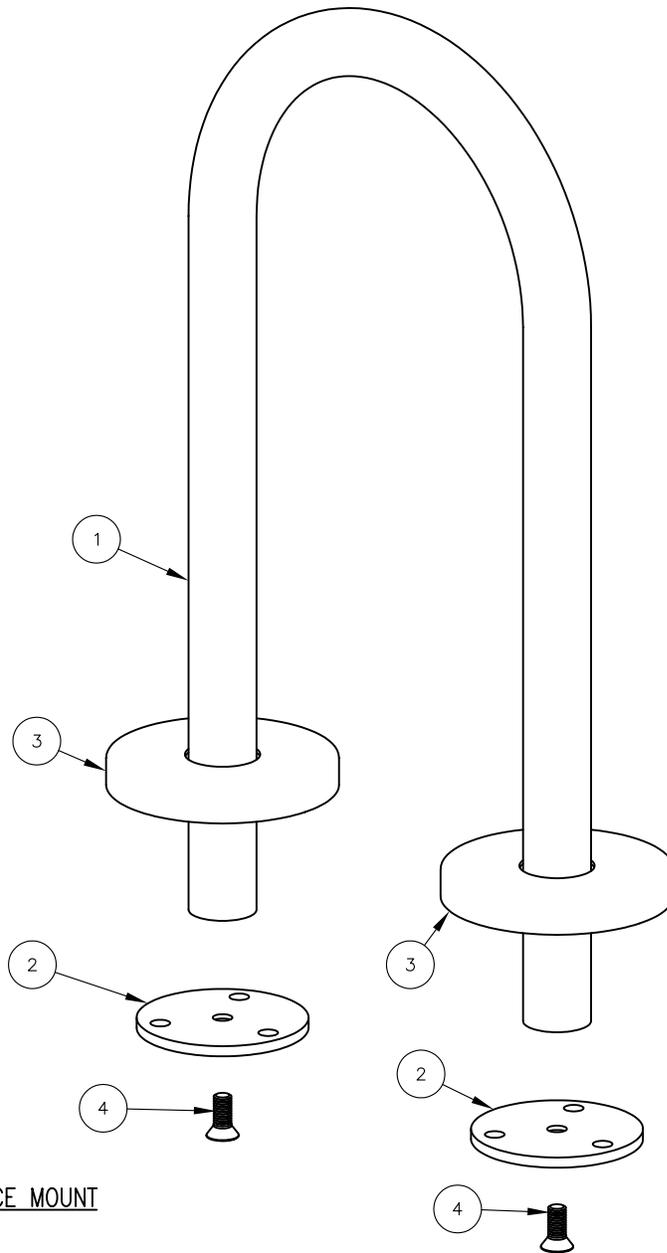
NOTE:

1.) 1/2" X 3 3/4" EXPANSION ANCHOR BOLTS PROVIDED FOR OPTIONS S-2 & S-4.

DuMor, inc.
P.O. Box 142 Mifflintown, PA 17059-0142

SCALE :	NONE
DATE DRAWN :	3/22/94
DRAWN BY :	CDC
DATE REV. :	11/11/09
REV. BY :	AWH

TITLE :	LOOP BIKE RACK	
REV. F	DRAWING NUMBER	83 SERIES
		SHEET 1 OF 2



INSTALLATION FOR SURFACE MOUNT

STEP 1:

- USE 1 - PC. BIKE LOOP, SURFACE MOUNT (1)
 - 2 - PCS. 3/8" THK SURFACE MOUNT PLATE (2)
 - 2 - PCS. 10 GA X 8" DIA ANCHOR PLATE COVER (3)
 - 2 - PCS. 5/8" X 1 1/2" SS FLT SKT HD CAP SCREW (4)
- SLIDE 10 GA X 8" DIA ANCHOR COVER (3) OVER BIKE LOOP, SURFACE MOUNT (1) LEGS. ATTACH 3/8" THK. SURFACE MOUNT PLATE (2) TO BIKE LOOP, SURFACE MOUNT (1) USING HARDWARE (4).

STEP 2:

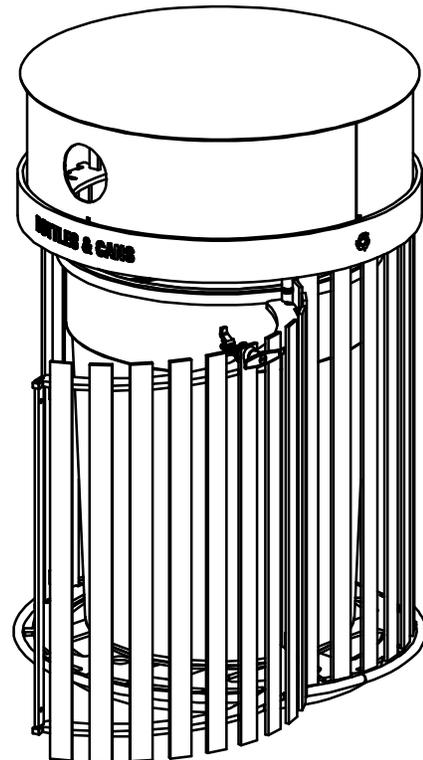
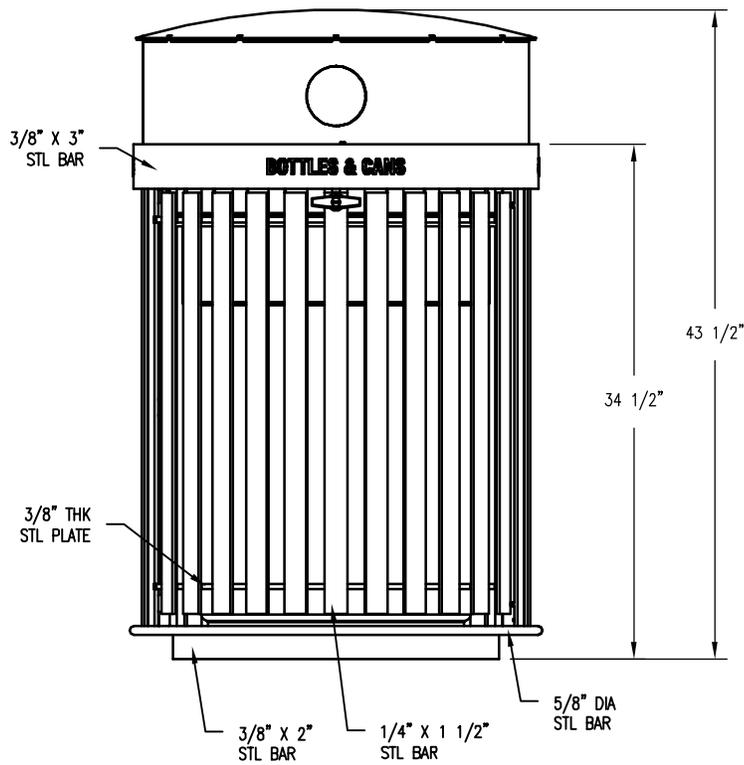
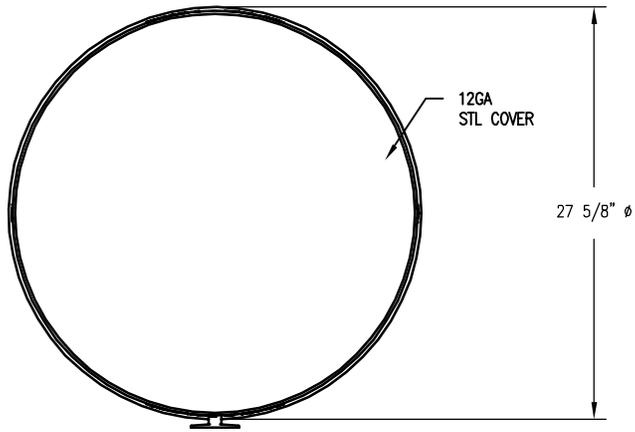
ANCHOR ACCORDINGLY.

INSTALLATION FOR SUB FLOOR

SAME AS SURFACE MOUNT BUT DO NOT USE 10 GA X 8" DIA ANCHOR PLATE COVER.

ITEM	QTY	PART NO	DESCRIPTION
1	1	0-83-00-01/S-2	BIKE LOOP, SURF MOUNT
2	2	0-83-00-03	3/8" THK SURFACE MOUNT PLATE
3	2	0-83-00-04	10 GA X 8" DIA STL ANCHOR PLATE COVER
4	2	1-12-102	5/8" X 1 1/2" SS FLT SKT HD CAP SCR

 <p>DuMor, inc. P.O. Box 142 Mifflintown, PA 17059-0142</p>	SCALE :	NONE	TITLE : LOOP BIKE RACK ASSEMBLY	
	DATE DRAWN :	3/22/94		
	DRAWN BY :	CDC	REV. :	DRAWING NUMBER
	DATE REV. :	11/11/09	F	83 SERIES
	REV. BY :	AWH		



NOTES

- 1.) ALL STL. MEMBERS COATED W/ ZINC RICH EPOXY THEN FINISHED W/ POLYESTER POWDER COATING.
- 2.) 1/2" X 3 3/4" EXPANSION ANCHOR BOLTS PROVIDED (QTY 3).
- 3.) RECYCLING UNIT HINGE FOR REMOVAL OF 32 GAL LINER.

PARTS LIST

NOTES:

- 1.) THE ACTUAL PARTS WILL NOT BE NUMBERED. NUMBERS ONLY APPLY TO DRAWING.
- 2.) MOUNT AND ANCHOR AS SPECIFIED.

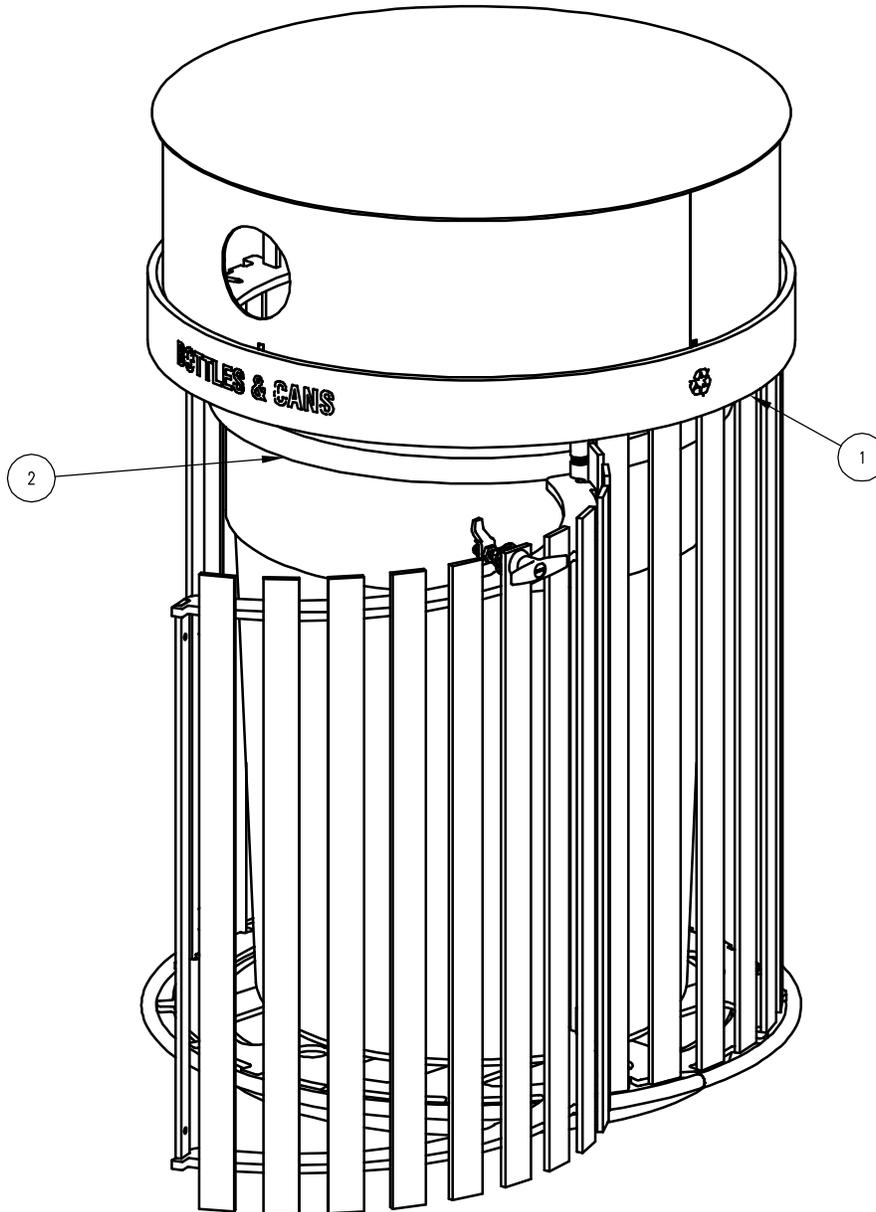
TOOLS REQ'D

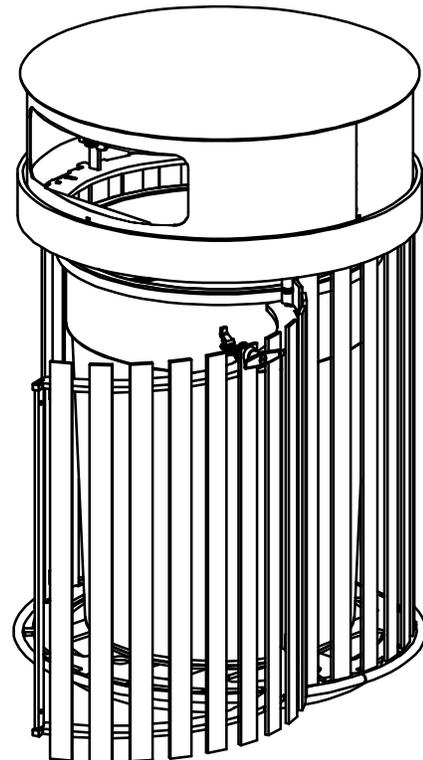
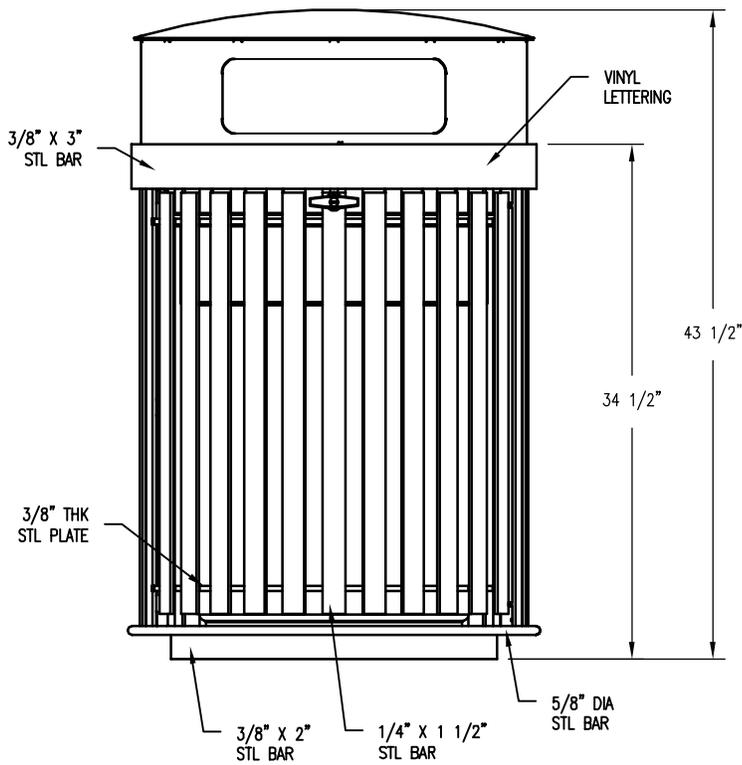
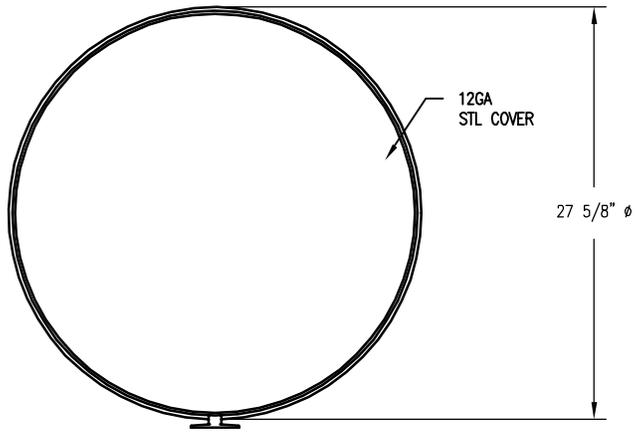
- 3/4" WRENCH
 1/2" MASONRY DRILL BIT
 DRILL

ITEM	QTY	PART NO	DESCRIPTION
2	1	49-32	32 GAL PL LINER W/ HANDLE, BLK
1	1	0-287-30-RC0001	30 GAL RECEPTACLE ASSEMBLY W/ 4" HOLES, BC

KITS PROVIDED

ITEM	QTY	PART NO	DESCRIPTION
3	1	K-ANC0860-4	1/2" X 3 3/4" SS ANCHOR KIT (4PC)





NOTES

- 1.) ALL STL. MEMBERS COATED W/ ZINC RICH EPOXY THEN FINISHED W/ POLYESTER POWDER COATING.
- 2.) 1/2" X 3 3/4" EXPANSION ANCHOR BOLTS PROVIDED (QTY 3).
- 3.) RECYCLING UNIT HINGE FOR REMOVAL OF 32 GAL LINER.

PARTS LIST

ITEM	QTY	PART NO	DESCRIPTION
1	1	0-287-30-S0	30 GAL RECEPTACLE ASSEMBLY W/ SIDE OPENING
2	1	49-32	32 GAL PL LINER W/ HANDLE, BLK

KITS PROVIDED

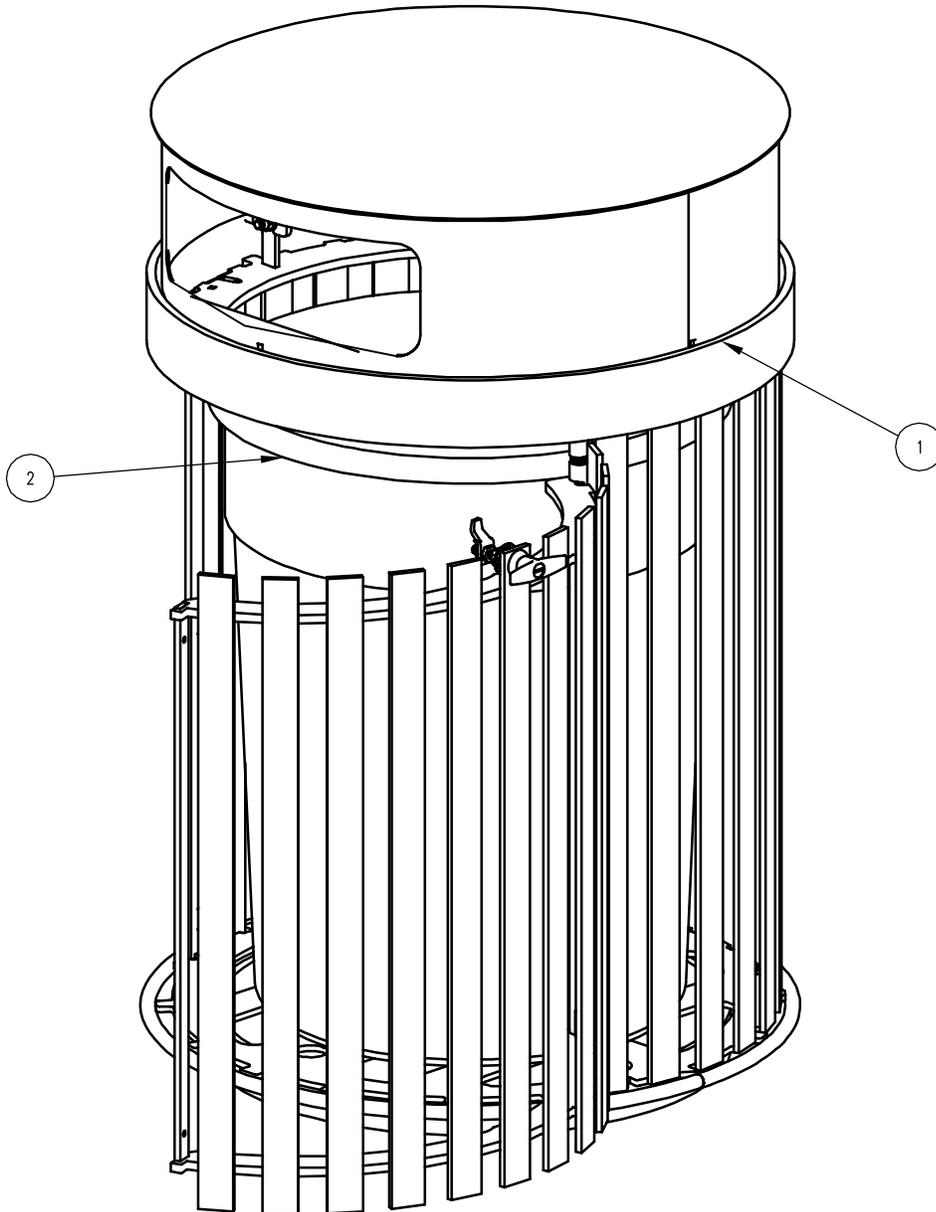
ITEM	QTY	PART NO	DESCRIPTION
3	1	K-ANC0860-4	1/2" X 3 3/4" SS ANCHOR KIT (4PC)

NOTES:

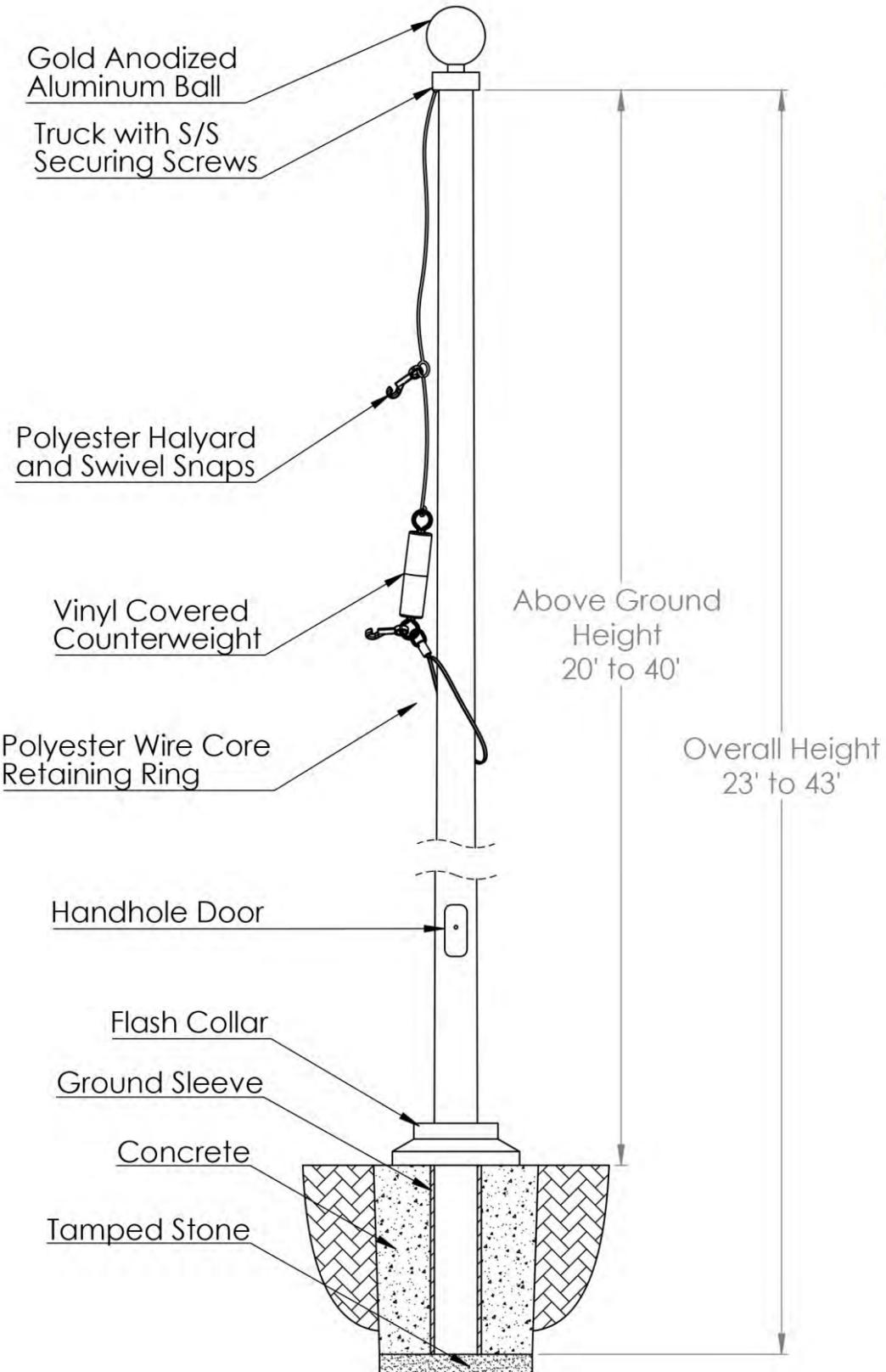
- 1.) THE ACTUAL PARTS WILL NOT BE NUMBERED. NUMBERS ONLY APPLY TO DRAWING.
- 2.) MOUNT AND ANCHOR AS SPECIFIED.

TOOLS REQ'D

- 3/4" WRENCH
 1/2" MASONRY DRILL BIT
 DRILL



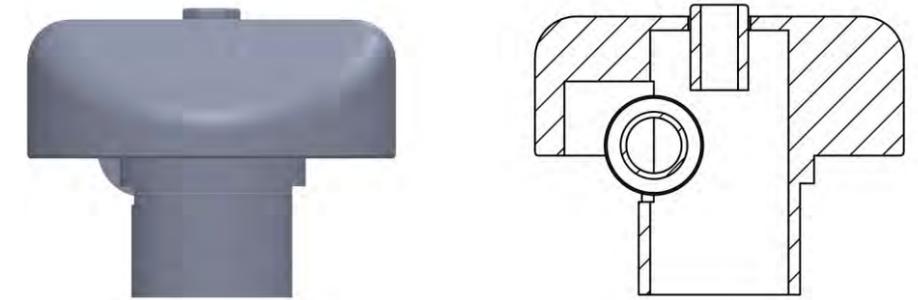
Aeolus Series Internal Ground Set 20I-40I



Internal Cam Cleat
and Hand Hole Door



Fiberglass Internal
Stationary Truck



Specifications and Accessories

Model	20I	25I	30I	35I	40I
Above Ground Height	20'	25'	30'	35'	39'
Overall Height	23'	28'	33'	39'	43'
Butt Diameter	5.75"	6"	6.75"	7"	7"
Top Diameter	3"	3"	3"	3"	3"
Pole Weight (lbs)	36	59	77	115	143
Shipping Weight (lbs)	105	113	151	197	219
Ground Sleeve I.D.	8"	8"	8"	8"	8"
Ground Sleeve Length	3' x 8"	3' x 8"	3' x 8"	4' x 8"	8"
Ball Diameter	5"	5"	6"	6"	8"
Halyard	40' of #10	50' of #10	60' of #10	70' of #10	#10
Flash Collar	16"	16"	16"	16"	16"
Truck	F/G	F/G	F/G	F/G	F/G
Brass Snaps	1 pair	1 pair	1 pair	1 pair	1 pair
Standard Flag Size	4'X6'	4'X6'	5'X8'	5'X8'	6'X10'
Vinyl Cover	1 pair	1 pair	1 pair	1 pair	1 pair

Specifications

Provide a Fiberglass Reinforced Composite (FRC) Ground set flagpole Model # **30I** as manufactured by PLP Composites, Fitzwilliam, NH 03447.

The flagpole shall have a mounting height of 30' and 3' below grade for an overall length of 33'.

The butt diameter shall be 6.75" and the top diameter 3". The pole weight shall be approximately 77 lbs. and a total shipping weight of 151 lbs.

The flagpole shall be manufactured of fiberglass woven roving and polyester resin with 75% of the reinforcing fibers oriented in the axial plane for maximum stiffness and 25% in the radial plane for required hoop strength. Load calculations shall be based on AASHTO and NAAMM standards with the pole designed with a two to one (2:1) safety factor for 125 mph winds, unflagged, with a 1.3 gust factor.

The flagpole shall have an Entasis taper and shall be void of vertical mold seams.

The flagpole shall be sanded smooth and coated with a high gloss Aliphatic Polyurea coating system which provides extended UV protection and weatherability.

Internal pole is equipped with a cam cleat, door with security screw, tab, & lock nut at the time of internalizing, prior to shipment.

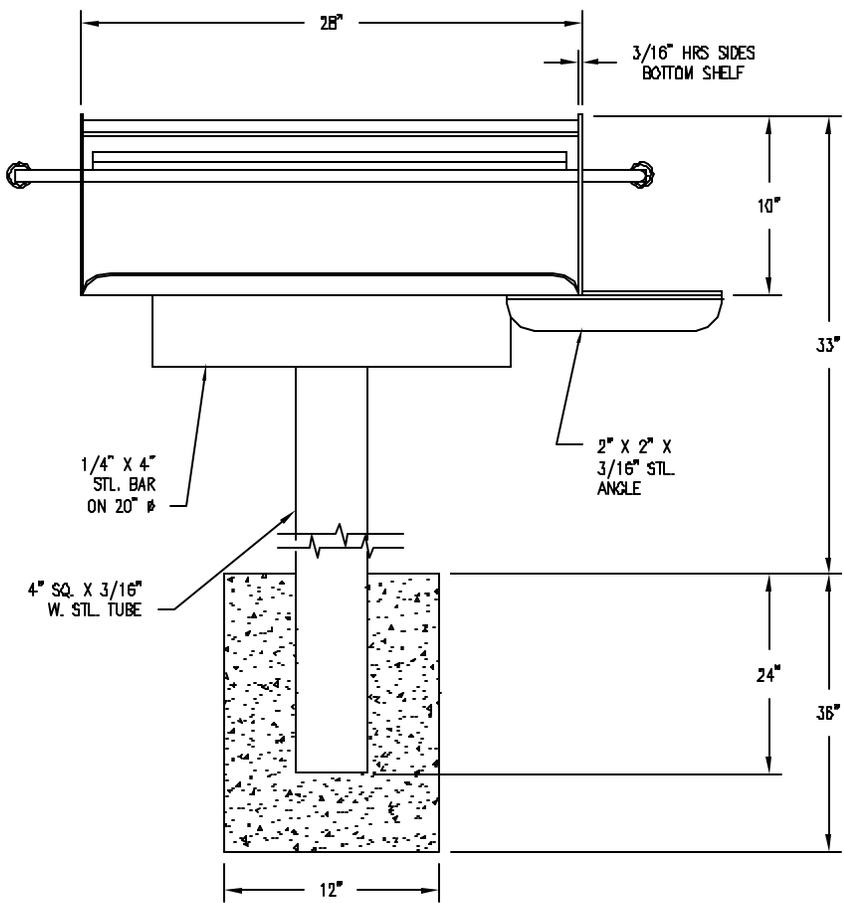
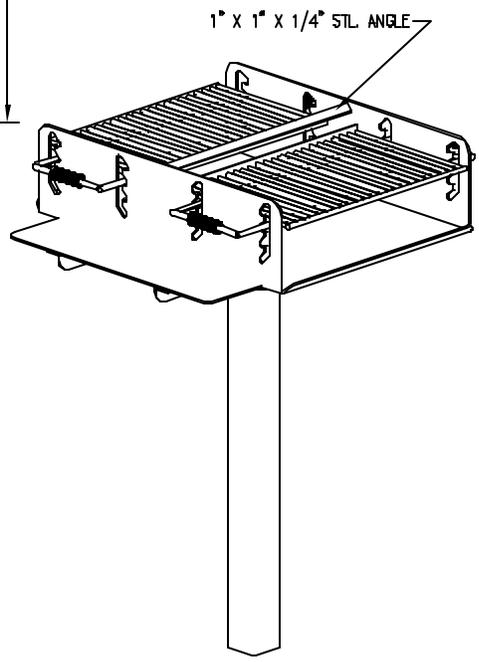
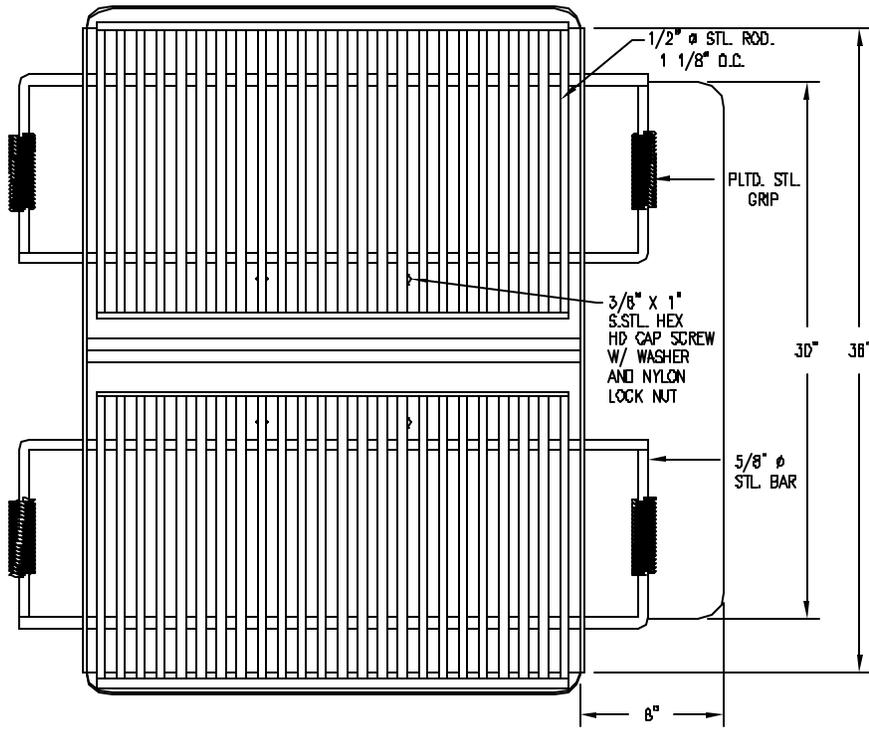
Standard colors include: White, Black, Bronze, Faux-Luminum, and Metallic Bronze



Aeolus Series - Model #30I	Standard Fittings:		Project:
30' Above Grade Height	6" Gold Anodized Ball	60' of #10 Polyester Halyard	
33' Overall Height	Cast FG Stationary Truck	16" Flash Collar	Location:
Top Diameter - 3"	1 pair of Brass Snaps	Small Retaining Ring	
Butt Diameter - 6.75"	1 pair of vinyl covers	Small Counterweight	Date:
	Security Driver	3' x 8" Ground Sleeve	

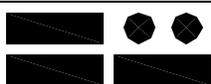
PLP Composites

57 Creamery Road - PO Box 429, Fitzwilliam, NH 03447 - Phone: 800-262-6075 - www.plpcomp.com or www.zeusflagpoles.com - info@plpcomp.com



NOTES

- 1.) GRILL FINISHED W/ HEAT RESISTANT BLACK ENAMEL.

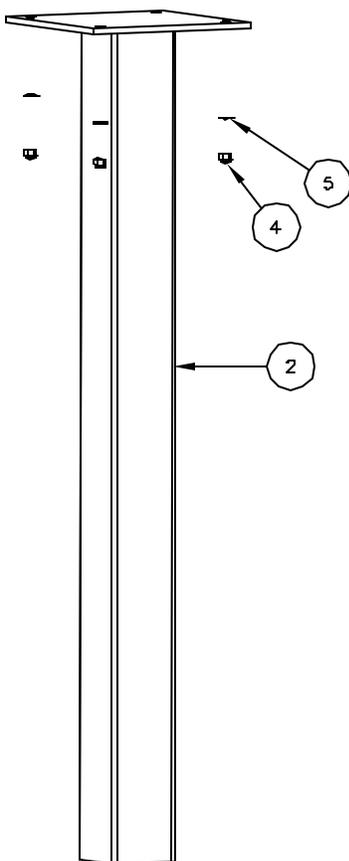
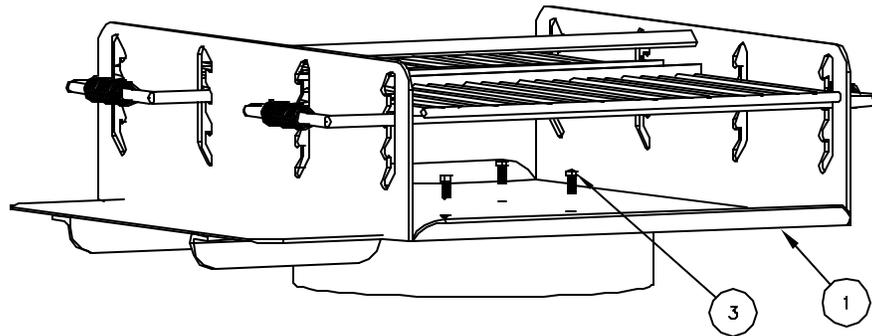


DuMor, inc.

P.O. Box 142 Mifflintown, PA 17059-0142

SCALE :	NONE
DATE DRAWN :	3/22/94
DRAWN BY :	CDC
DATE REV. :	2/14/03
REV. BY :	CDC

TITLE :	DUAL LEVEL GRILL	
REV.	DRAWING NUMBER	SHEET
B	24-00	1 OF 2



NOTE:

- 1.) DURING ASSEMBLY PROCEDURE;
DO NOT COMPLETELY TIGHTEN HARDWARE.
- 2.) THE ACTUAL PARTS WILL NOT BE NUMBERED;
NUMBERS ONLY APPLY TO DRAWING.

STEP 1:

USE 1 - PC. SUPPORT POST FOR EMBEDMENT (2)
MOUNT AND LEVEL EMBEDMENT POST (2) AS SPECIFIED
ON SHEET 1.

STEP 2:

USE 1 - PC. DUAL - LEVEL GRILL BODY ASSEMBLY (1)
4 - PCS. 3/8" X 1" SS HEX HD CAP SCR. (3)
4 - PCS. 3/8" SS NYLON LOCKNUT NUT (4)
4 - PCS. 3/8" SS FLAT WASHER (5)
AFTER CONCRETE HARDENS, ATTACH DUAL GRILL ASSEMBLY
(1) TO SUPPORT POST (2) USING HARDWARE (3, 4 & 5).
TIGHTEN TO SNUG FIT.

STEP 3:

UPON COMPLETION OF GRILL ASSEMBLY TIGHTEN ALL HARDWARE.

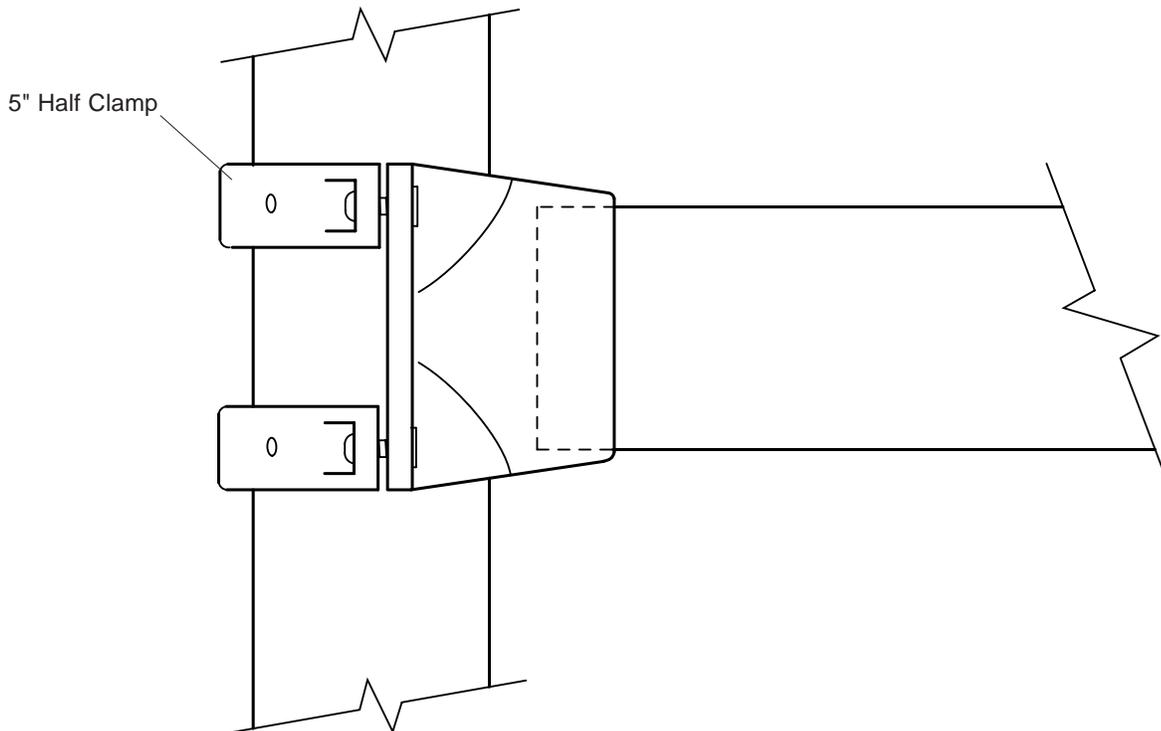
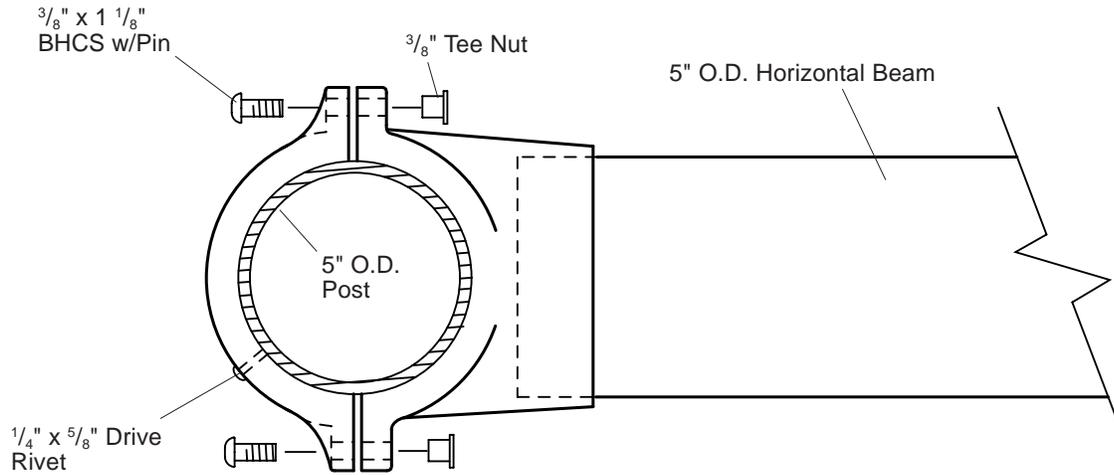
ITEM	QTY	PART NO	DESCRIPTION
1	1	0-24-00-01	DUAL-LEVEL GRILL BODY
2	1	0-24-00-02	SUPPORT POST FOR EMBEDMENT
3	4	1-12-018	3/8" X 1" SS HEX HD CAP SCR
4	4	1-20-007	3/8" SS NYLON LOCKNUT
5	4	1-22-024	3/8" SS FLAT WASHER

DuMor, inc.
P.O. Box 142 Mifflintown, PA 17059-0142

SCALE :	NONE
DATE DRAWN :	3/22/94
DRAWN BY :	CDC
DATE REV. :	2/14/03
REV. BY :	CDC

TITLE :		DUAL-LEVEL GRILL ASSEMBLY	
REV.	DRAWING NUMBER		
B	24-00		
		SHEET	2 OF 2

PLAYGROUND EQUIPMENT



Parts List

Part#	Description	Qty
105327-01	5" Half Clamp, Specify Color	2
100198-00	$\frac{3}{8}$ " x 1 $\frac{1}{8}$ " BHCS w/Pin, SST	4
100351-00	$\frac{3}{8}$ " Tee Nut, SST	4
100610-00	$\frac{1}{4}$ " x $\frac{5}{8}$ " 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. $\frac{1}{2}$ man hour

Weight: 2 lbs.

Installation Instructions

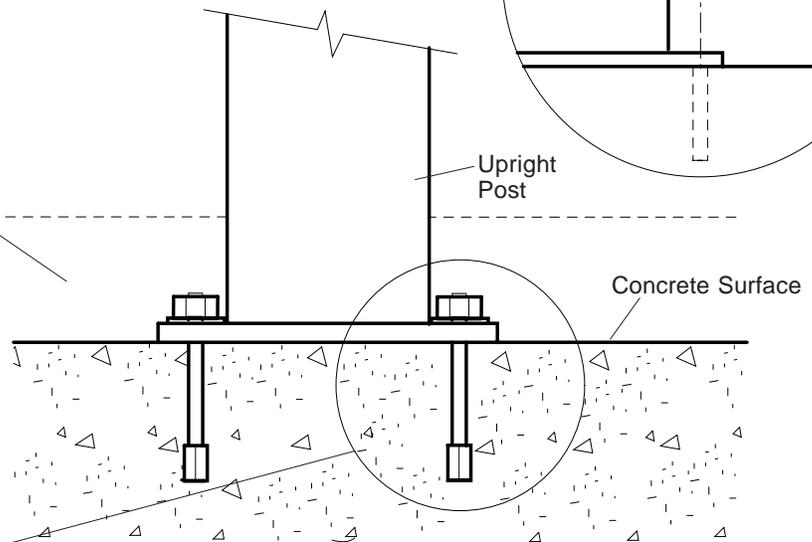
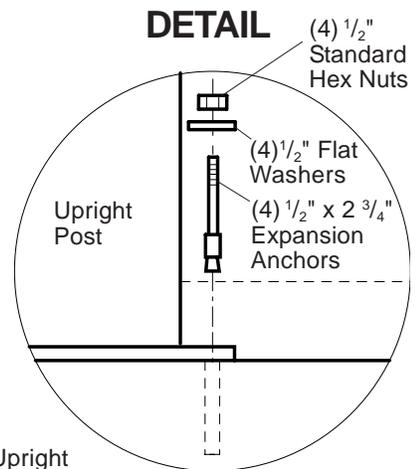
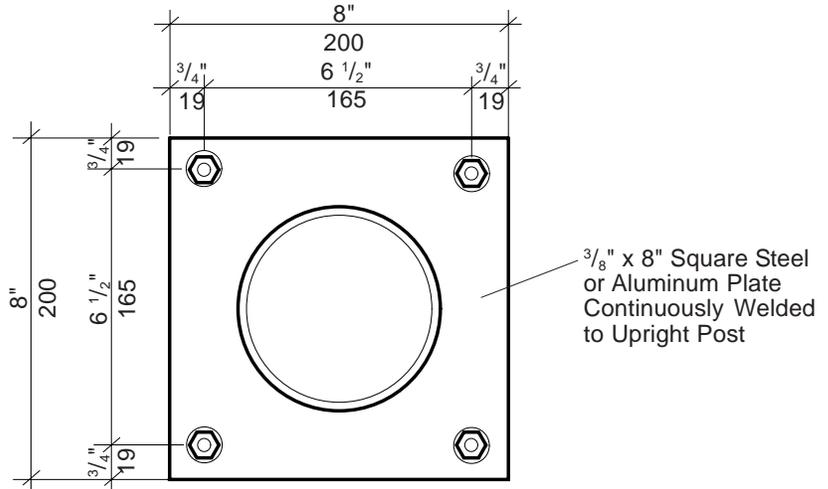
- 1) Locate and mark center of clamp location on 5" pipe.
- 2) With beam in position, fasten 5" half clamps to tee clamp using $\frac{3}{8}$ " x 1 $\frac{1}{8}$ " BHCS w/Pin and tee nuts as shown. Tighten cap screws evenly.
- 3) **IMPORTANT:** *Install drive rivets in half clamps by drilling holes in clamps and into 5" pipe using a $\frac{1}{4}$ " or "F"(only) drill bit. Insert rivet in hole, and hammer rivet pin in until it is flush with head.*

NOTE:
Surface mounting will not work in all applications. Consult Landscape Structures Inc. for your particular requirements.

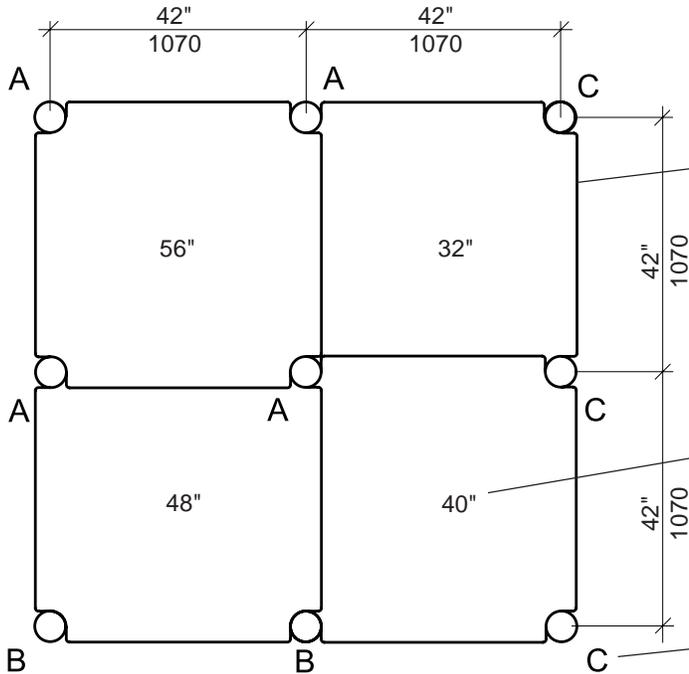
- CONCRETE SLAB SPECS**
- Base under slab to be 4" - 6" of sand over a stable subgrade.
 - Depth of concrete slab to be 4" - 6" with a wire mesh support.
 - Minimum of 7 days curing time full cure after 30 days.
 - Surface of concrete to be trowled smooth and acid etched.
 - Concrete: 3000 PSI (Min)
30 Days 3500 PSI
 $\frac{3}{4}$ " Minus Crushed Rock

NOTE: Sufficient protective surfacing must cover hardware to satisfy fall height requirements.

NOTE:
Drill 3" deep hole using hammer drill and $\frac{1}{2}$ " masonry bit. Tap anchors into concrete and secure with $\frac{1}{2}$ " standard hex nuts and $\frac{1}{2}$ " flat washers.



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.)

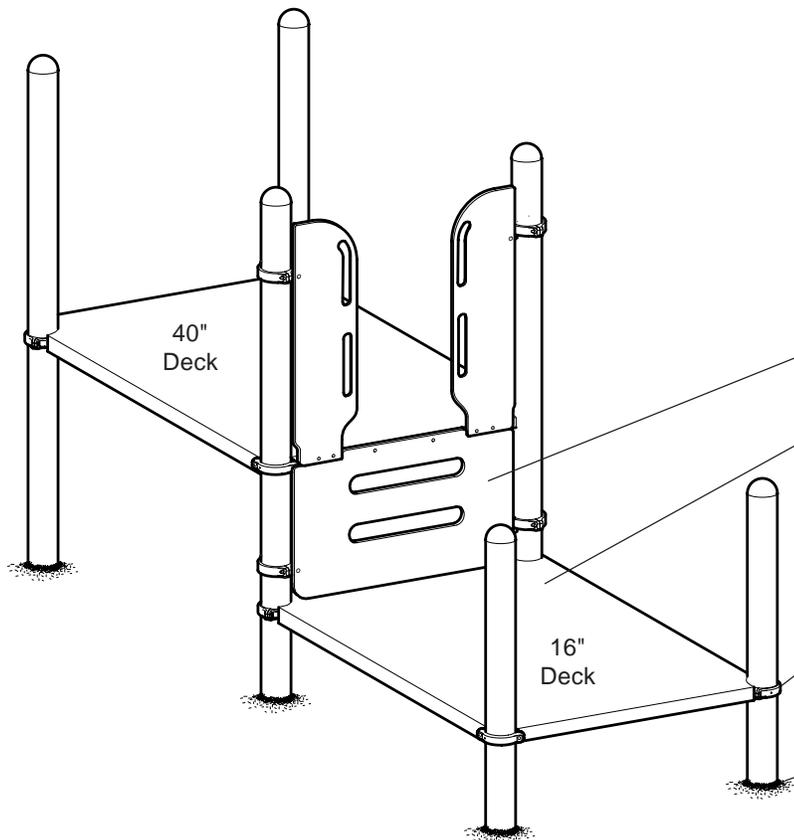


Enclosures or components are required on any decks higher than 28" as indicated on your plan drawing.

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.

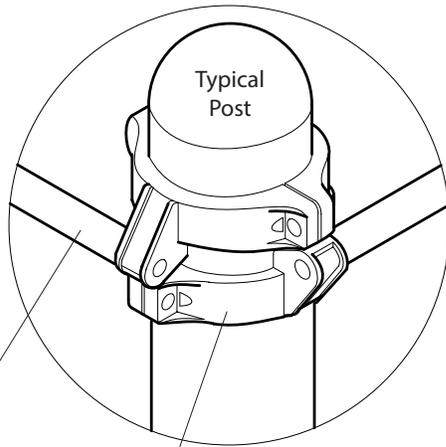
PlayBooster General Post/Tenderdeck Information

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.

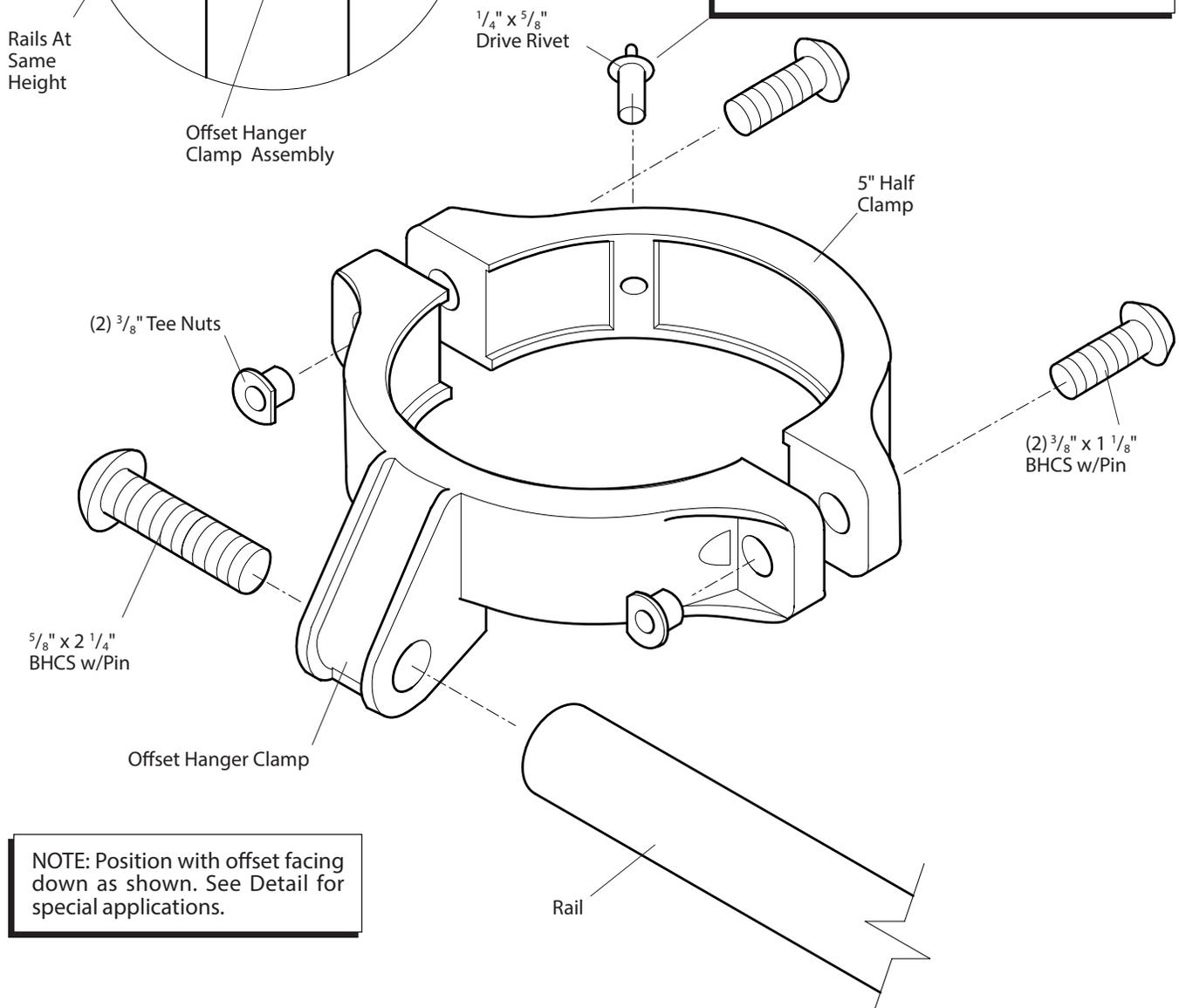
- 1) Dig footing holes spaced as shown on the plan and spec sheets. Refer to the Typical Concrete Footing Spec Sheet.
- 2) Note the post lengths as shown on the plan and set in their appropriate footing holes. The post length is indicated on the finished grade sticker on each post.
- 3) Mark the appropriate 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.

**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 General Rules for Use of Drive Rivets for more information.



NOTE: Position with offset facing down as shown. See Detail for special applications.

PlayBooster® 114261 Offset Hanger Clamp Assembly

Parts List

Part#	Description	Qty
100198-00	$\frac{3}{8}$ " x $1\frac{1}{8}$ " BHCS w/Pin, SST	2
100351-00	$\frac{3}{8}$ " Tee Nut, SST.....	2
100610-00	$\frac{1}{4}$ " x $\frac{5}{8}$ " Drive Rivet, AL/SST	1
105327-01	5" Half Clamp, Specify Color	1
113729-00	Offset Hanger Clamp, Specify Color	1
100203-00	$\frac{5}{8}$ " x $2\frac{1}{4}$ " BHCS w/Pin, SST	1

Specifications

Clamp: Cast aluminum. Finish: Powdercoat, color specified.

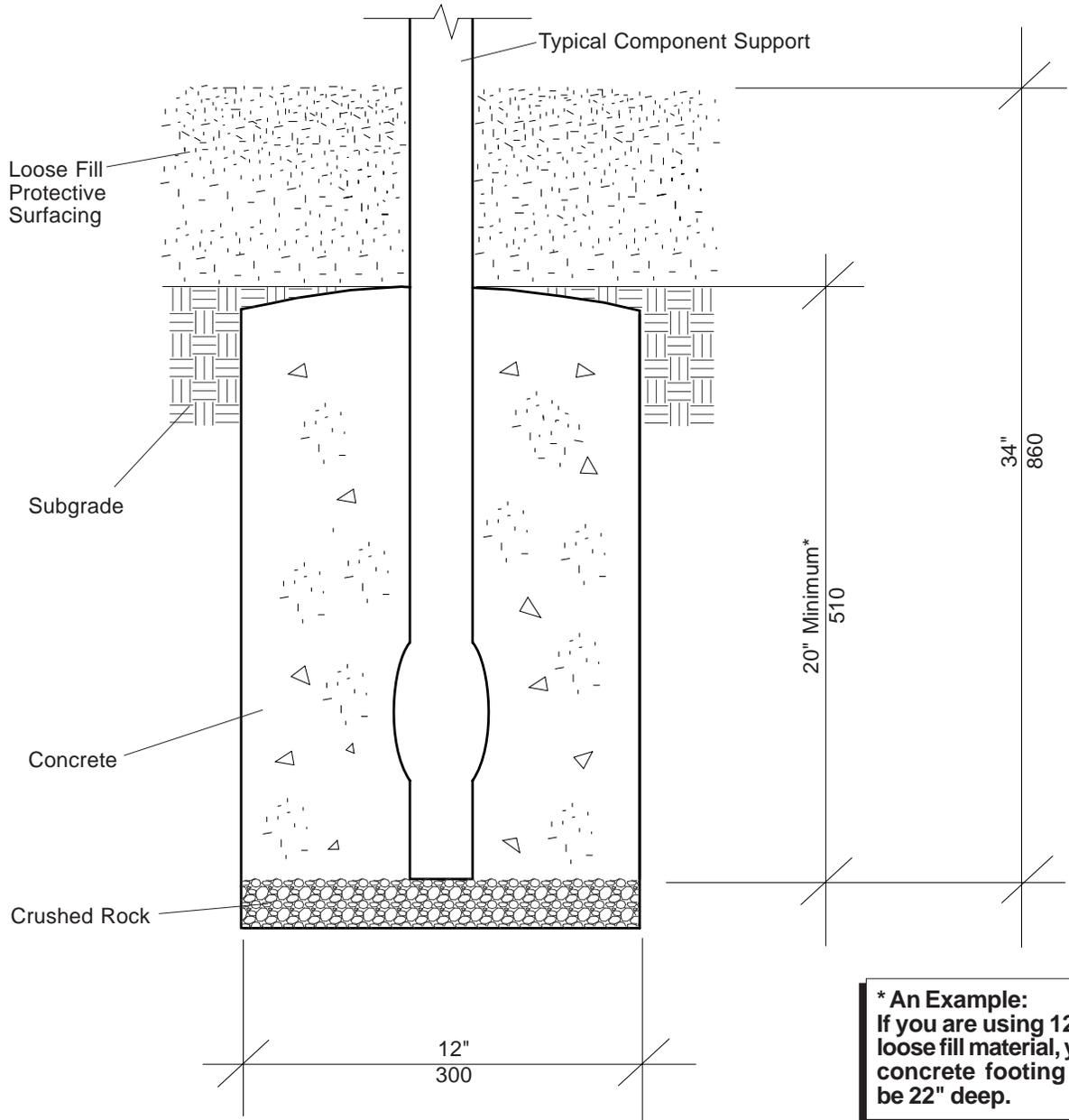
Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: Approx. $\frac{1}{4}$ 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 $\frac{3}{8}$ " x $1\frac{1}{8}$ " BHCS w/pin and $\frac{3}{8}$ " tee nuts as shown and lightly tighten. Position rail against clamp and screw in $\frac{5}{8}$ " x $2\frac{1}{4}$ " 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 $\frac{1}{4}$ " or "F" (only) drill bit, insert rivet in hole and hammer rivet pin in until it is flush with head.*



Minimum 1.2 Cubic Feet of Concrete Required per Support.

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 $\frac{1}{8}$ " to $\frac{1}{4}$ " 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 Electrical 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.

Tools Required

Tools required for installation are an auger, or other equipment for digging 14" diameter footing holes; shovels, rubber mallet, drill (with $\frac{1}{4}$ ", $\frac{7}{16}$ ", $\frac{9}{16}$ ", $\frac{11}{16}$ " and $\frac{3}{8}$ " drill bits), tape measure, hex keys or allen wrenches, level, $\frac{3}{8}$ " socket set, hammer, open end wrench set, screw driver, for surface mount a hammer drill, $\frac{3}{8}$ " and $\frac{1}{2}$ " 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.

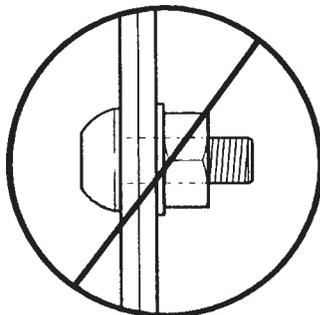
Installation Times

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.

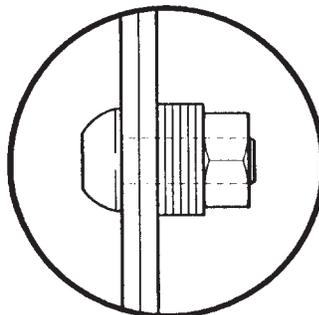
Technical Services

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).

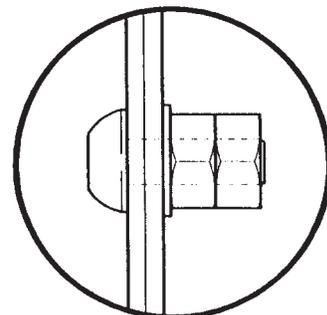
Illustrations For Note 10, (Reverse Side Of This Sheet)



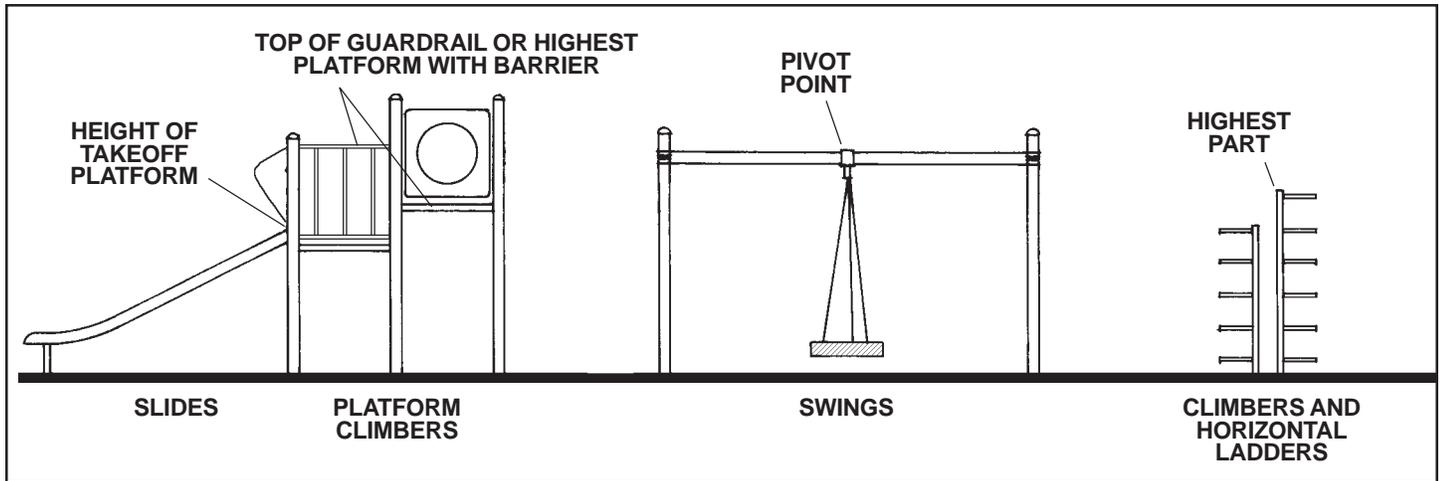
More Than Two (2)
Threads Exposed



Add Washers



Add Another Nut
(Align Flat Area)



- 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.



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.)

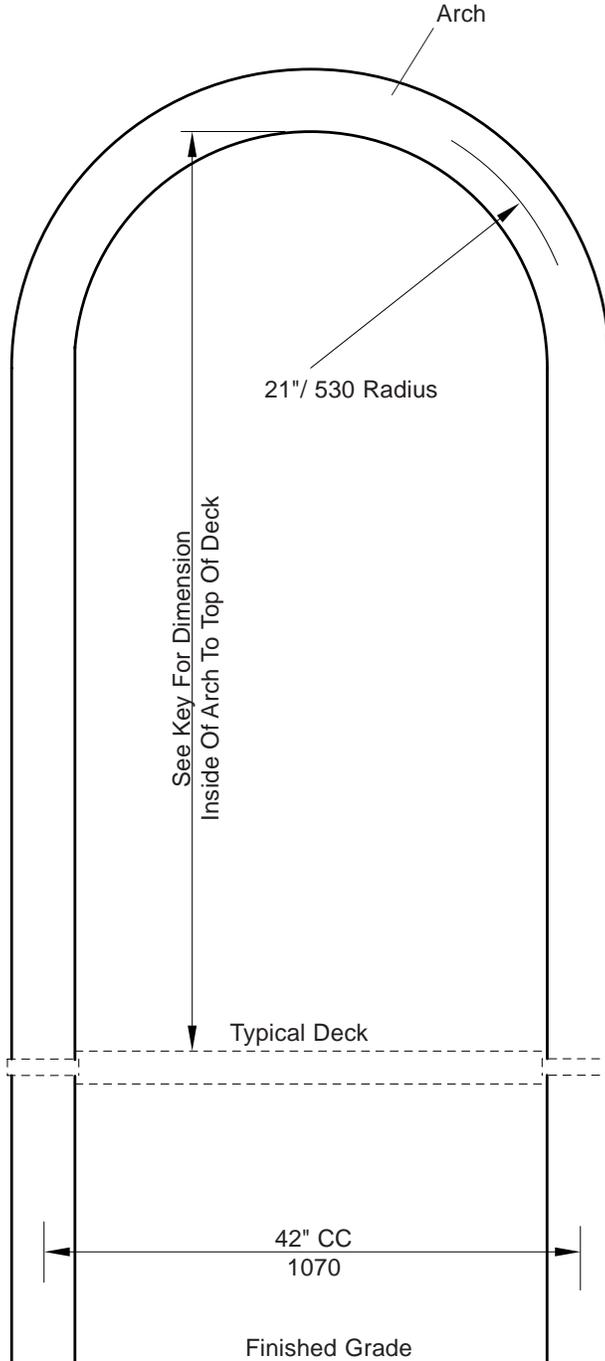
Critical Heights (in Feet)

Material	Uncompressed Depth			Compressed Depth *
	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



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.

"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.

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.

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.



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 Elwin 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.



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



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Harrisburg, PA 17110
www.ipema.org



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U.S. Consumer Product Safety Commission

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www.cpsc.gov

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100 Barr Harbor Dr.
P.O. Box C700
West Conshohocken, PA 19428
www.astm.org



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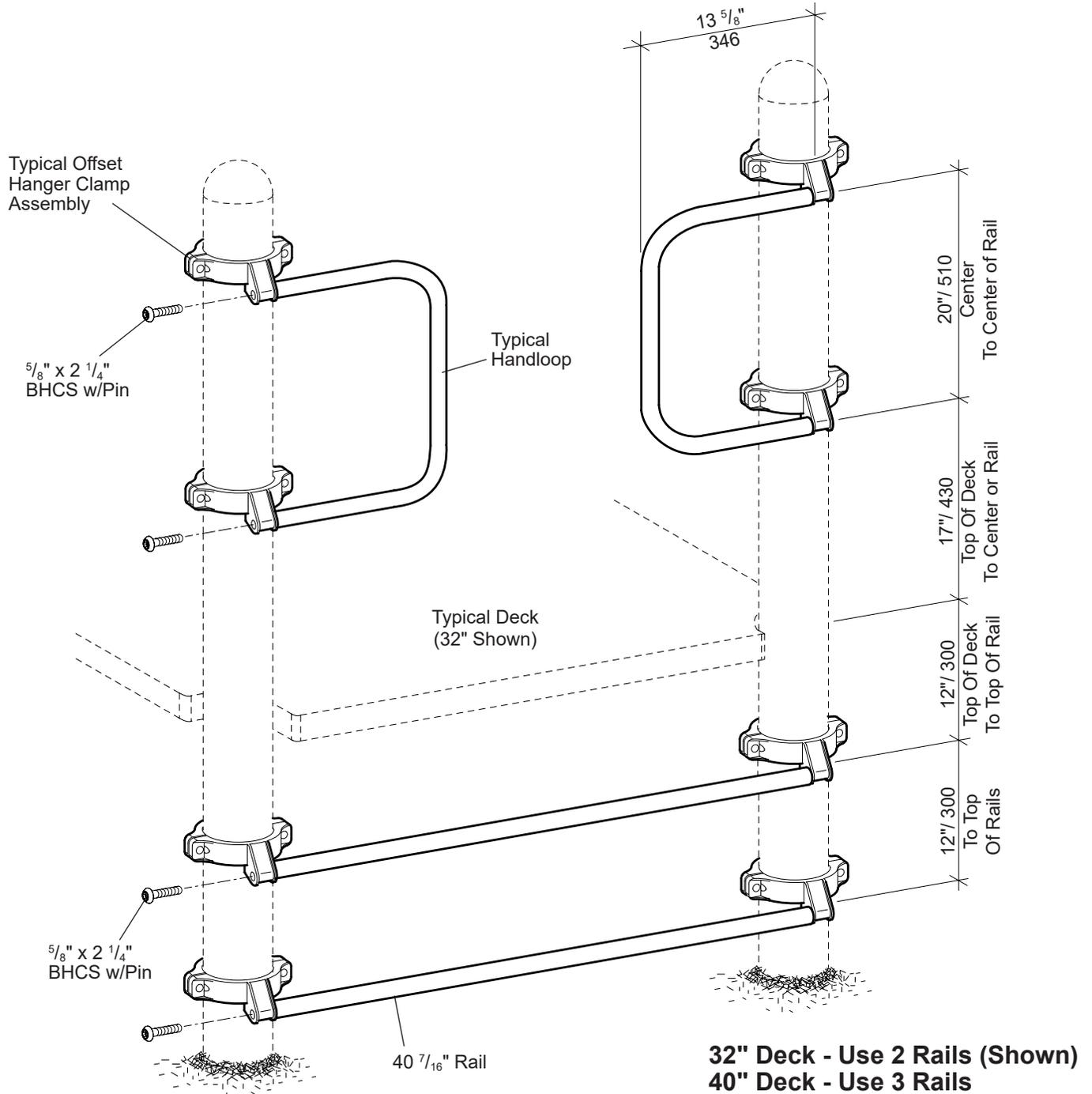
ISO 9001:2008 has a process-orientated structure, is customer focused and emphasizes continuous improvement in quality.



ISO 14001:2004 drives us toward operating in a manner that is environmentally conscious.



PS/PB/FP/Evos/Weevos Guidelines & Standards



Parts List

Part#	Description	Qty.
111275	Handloop Assembly	1
108542	Handloop, Specify Color	1
100198	$\frac{3}{8}$ " x $1\frac{1}{8}$ " BHCS w/Pin, SST	4
100203	$\frac{5}{8}$ " x $2\frac{1}{4}$ " BHCS w/Pin, SST	2
100351	$\frac{3}{8}$ " Tee Nut, SST	4
100610	$\frac{1}{4}$ " x $\frac{5}{8}$ " Drive Rivet, SST	2
105327	5" Half Clamp, Specify Color	2
113729	Offset Hanger Clamp, Specify Color	2
111276	Rail Assembly	1
108569	Rail, Specify Color	1
100198	$\frac{3}{8}$ " x $1\frac{1}{8}$ " BHCS w/Pin, SST	4
100203	$\frac{5}{8}$ " x $2\frac{1}{4}$ " BHCS w/Pin, SST	2
100351	$\frac{3}{8}$ " Tee Nut, SST	4
100610	$\frac{1}{4}$ " x $\frac{5}{8}$ " Drive Rivet, SST	2
105327	5" Half Clamp, Specify Color	2
113729	Offset Hanger Clamp, Specify Color	2

Handloop: Weldment comprised of 1.125" O.D. 11 GA (.120") steel tubing with 203 or 303 stainless steel inserts, with $\frac{5}{8}$ " 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 $\frac{5}{8}$ " 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. $\frac{3}{4}$ 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 $\frac{5}{8}$ " x $2\frac{1}{4}$ " BHCS w/pin.
- 3) Position rail/handloop on marked position on posts and attach using 5" half clamps and $\frac{3}{8}$ " x $1\frac{1}{8}$ " BHCS w/pin with $\frac{3}{8}$ " 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.

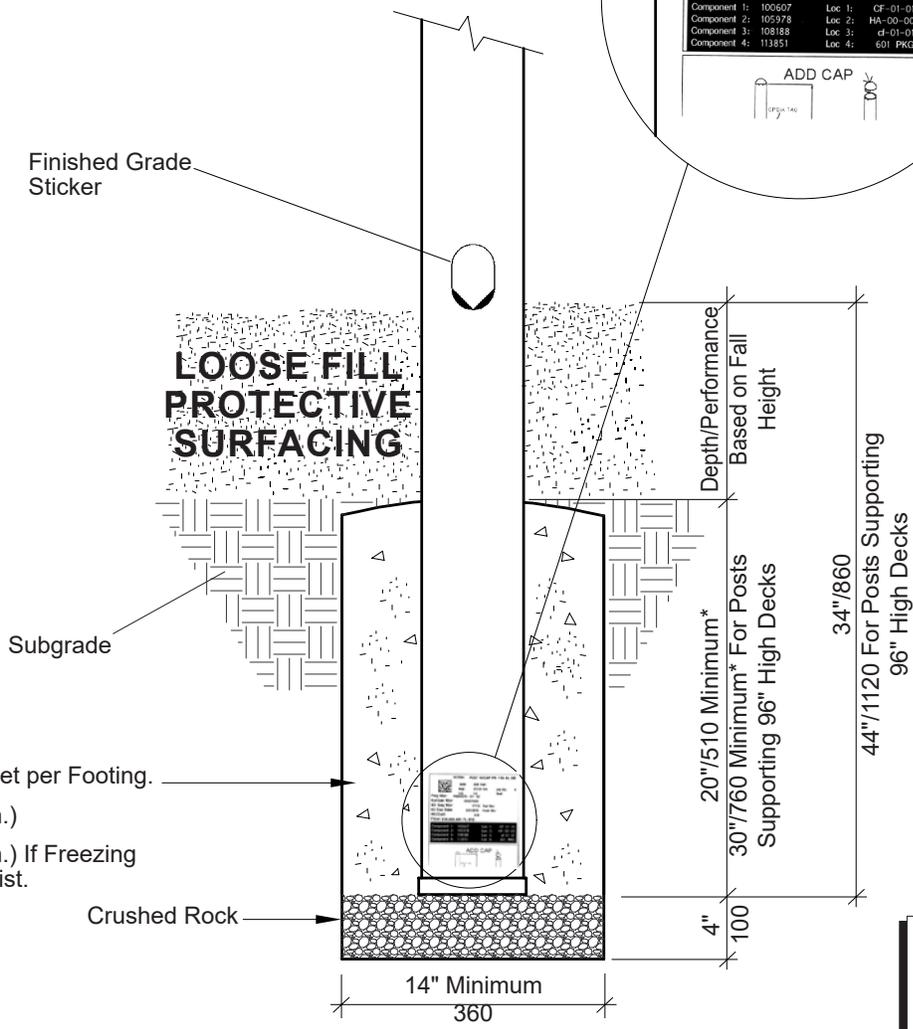
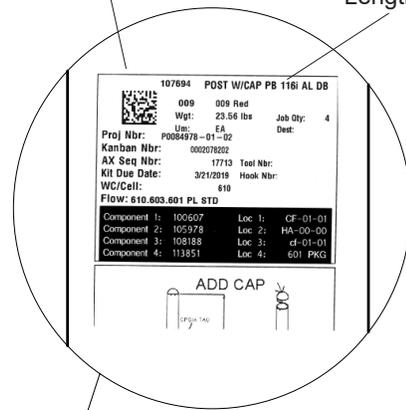
Post Post length shall vary depending upon the intended use and shall be a minimum of 42" above the deck height. All posts shall be powdercoated to color. All posts shall have a grade marker" positioned on the post identifying the 34" bury line (or 44" bury line for posts for 96" decks) required for correct installation and the top of the loose 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.

Part Number Label Example

Number Indicates Post Length



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 material, your concrete footing will be 22" deep.

PlayBooster® Concrete Footings, 5" Posts



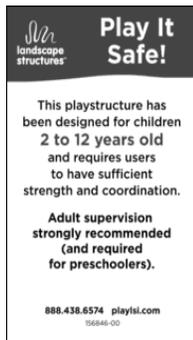
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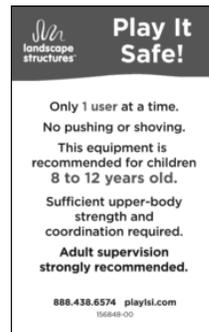
Part No. 182213-00-000



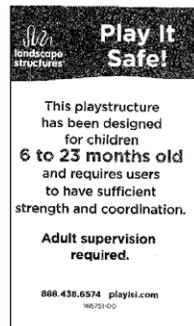
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Part No. 156846-00-000



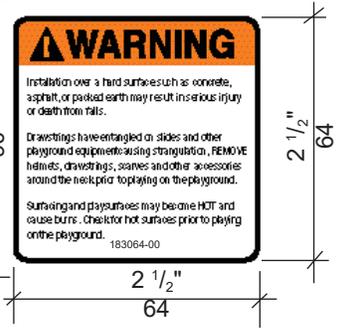
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Part No. 166751-00-000



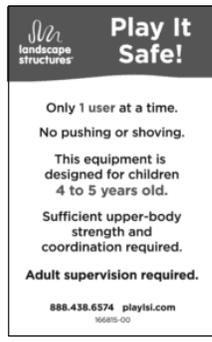
Part No. 182212-00-000



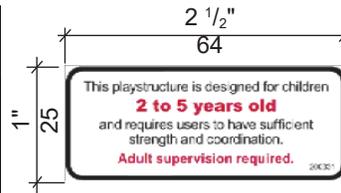
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Part No. 156850-00-000



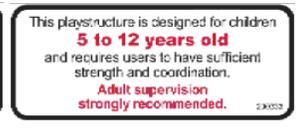
Part No. 166815-00-000



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.

INSTRUCTIONS:

Surface must be clean and dry prior to applying sticker. Peel backing sheet away from back of sticker and place sticker in position. Using backing sheet, rub over face of sticker to burnish down into place. Choose a location visible to adults in a conspicuous location on product. Stickers work best on painted parts. Where possible, avoid placing on rotationally-molded plastic parts, TenderT parts or where children may step and wear sticker. This applies to both Freestanding Play items and Composite Playstructures. Apply sticker adjacent to or visible from the primary entrance to the structure. Apply 4'-5' above the surface. Apply at least (1) one to every structure and (2) two to large Composite Playstructures.

Part No. 156847-00-000

Part No. 156845-00-000



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.)

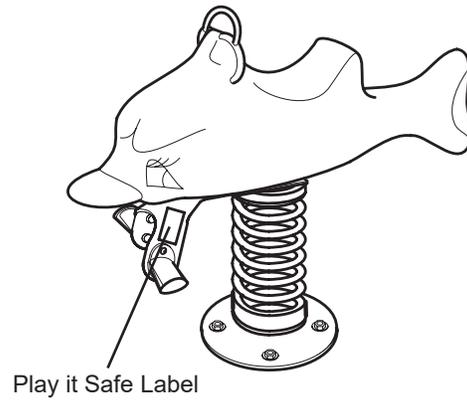
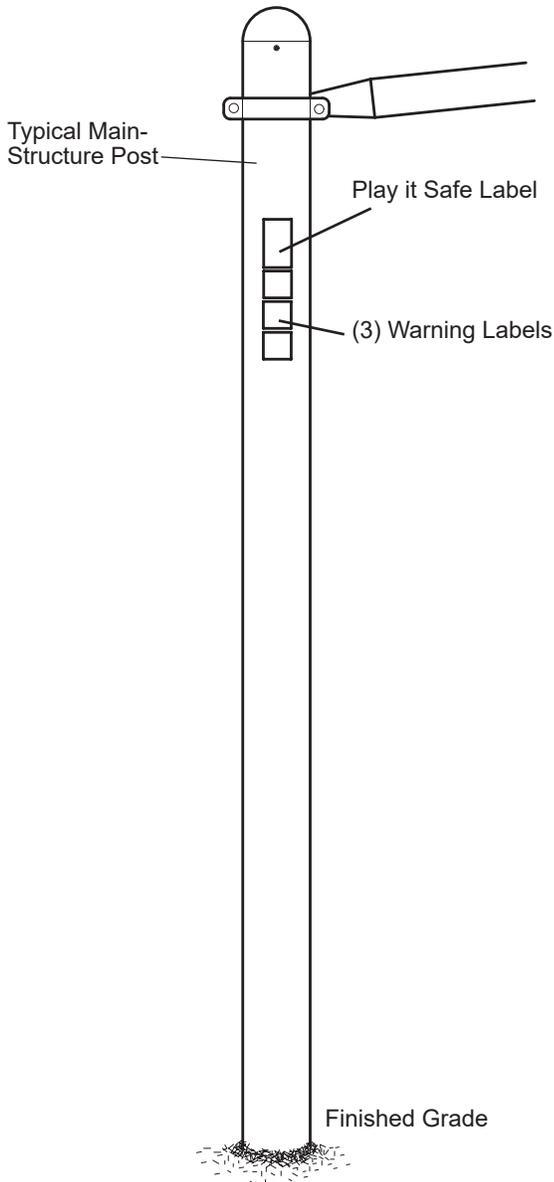
- 251714 5i Formed Play Safe Plate 6-23 Months w/Attaching HDW
- 251736 5i Formed Play Safe Plate 2-5 Years w/Attaching HDW
- 251712 5i Formed Play Safe Plate 2-12 Years w/Attaching HDW
- 251713 5i Formed Play Safe Plate 5-12 Years w/Attaching HDW
- 251715 5i Formed Play Safe Plate 1.5-5 Years w/Attaching HDW
- 251716 5i Formed Play Safe Plate 1.5-12 Years w/Attaching HDW

- 251720 3.5i Formed Play Safe Plate 6-23 Months w/Attaching HDW
- 251717 3.5i Formed Play Safe Plate 2-5 Years w/Attaching HDW
- 251718 3.5i Formed Play Safe Plate 2-12 Years w/Attaching HDW
- 251719 3.5i Formed Play Safe Plate 5-12 Years w/Attaching HDW
- 251721 3.5i Formed Play Safe Plate 1.5-5 Years w/Attaching HDW
- 251722 3.5i Formed Play Safe Plate 1.5-12 Years w/Attaching HDW

- 251726 Flat Large Play Safe Plate 6-23 Month w/Attaching HDW
- 251723 Flat Large Play Safe Plate 2-5 Years w/Attaching HDW
- 251724 Flat Large Play Safe Plate 2-12 Years w/Attaching HDW
- 251725 Flat Large Play Safe Plate 5-12 Years w/Attaching HDW
- 251727 Flat Large Play Safe Plate 1.5-5 Years w/Attaching HDW
- 251728 Flat Large Play Safe Plate 1.5-12 Years w/Attaching HDW

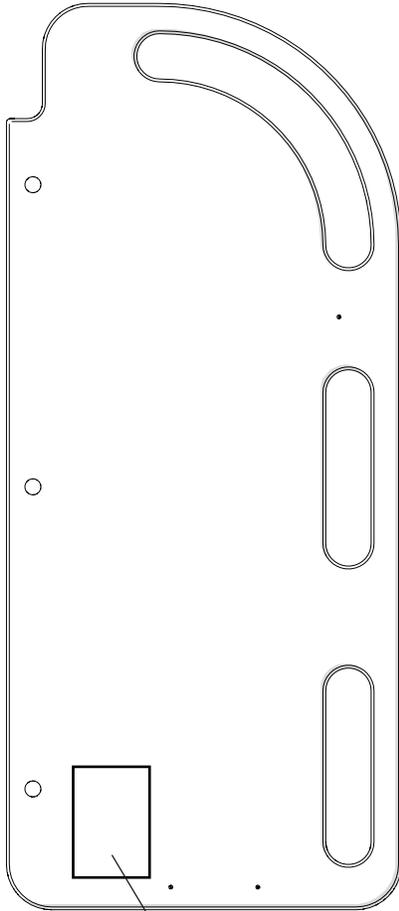
- 251731 Flat Small Play Safe Plate 6-23 Month w/Attaching HDW
- 251729 Flat Small Play Safe Plate 2-5 Years w/Attaching HDW
- 251730 Flat Small Play Safe Plate 2-12 Years w/Attaching HDW
- 251735 Flat Small Play Safe Plate 5-12 Years w/Attaching HDW
- 251732 Flat Small Play Safe Plate 1.5-5 Years w/Attaching HDW
- 251733 Flat Small Play Safe Plate 1.5-12 Years w/Attaching HDW





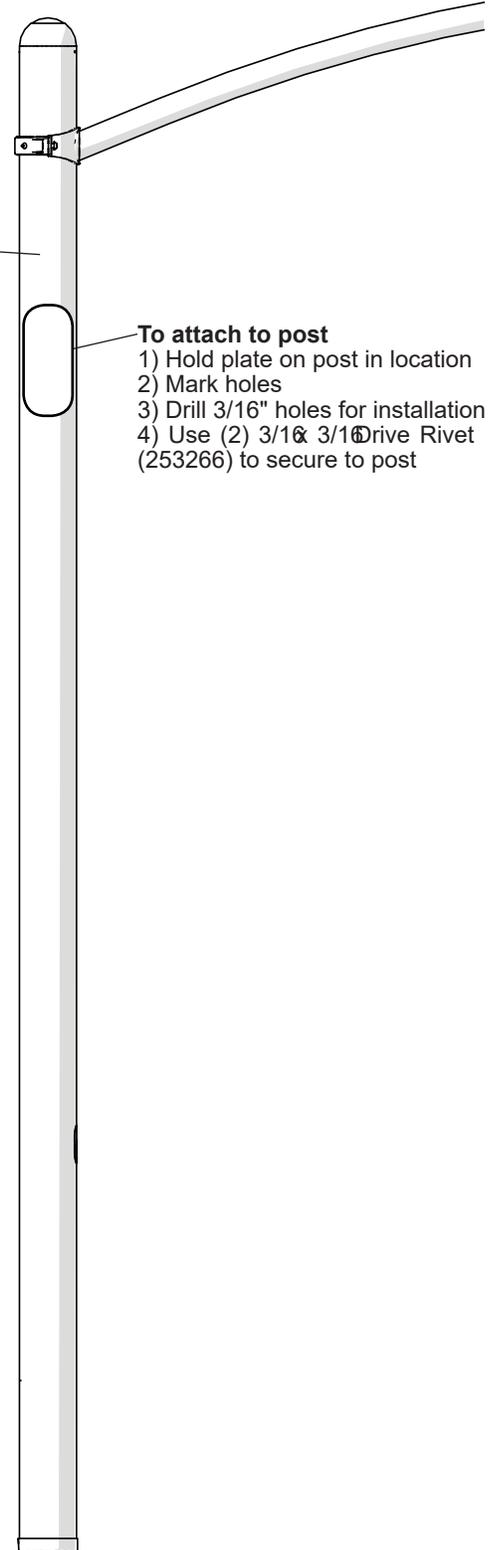
Warning Labels

5" formed plate mounts to 5" posts.
 3.5" formed plate mounts to 3.5" posts



- To attach to permalene**
- 1) Hold plate on surface in location
 - 2) Mark holes
 - 3) Drill 1/8" x 1/2" deep holes for installation
 - 4) Use (2) TorX #14 x 1/2" Cap Screw (129671) to attach to panel

Typical Main-Structure Post



- To attach to post**
- 1) Hold plate on post in location
 - 2) Mark holes
 - 3) Drill 3/16" holes for installation
 - 4) Use (2) 3/16" x 3/16" Drive Rivet (253266) to secure to post



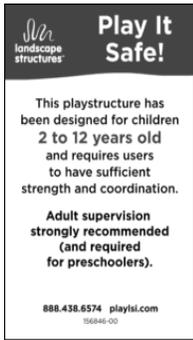
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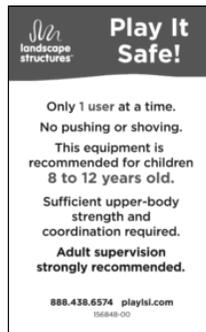
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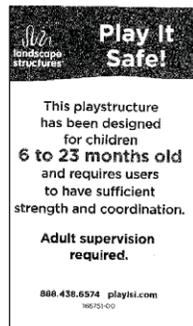
Part No. 115176-00-000



Part No. 156846-00-000



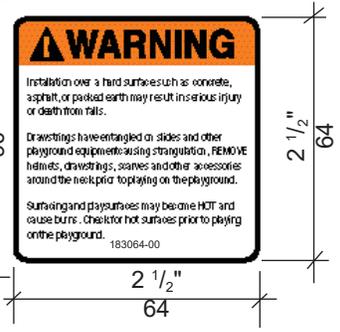
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Part No. 166751-00-000



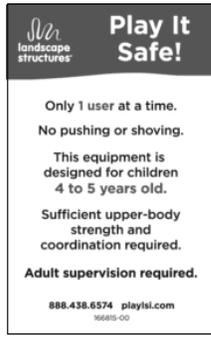
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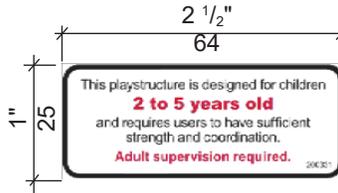
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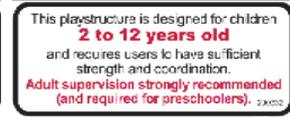
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Part No. 166815-00-000



Part No. 200331-00-000



Part No. 200332-00-000



Part No. 200333-00-000

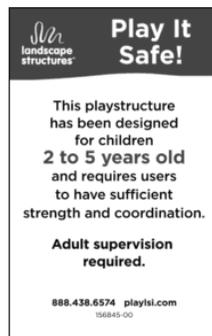
NOTE: The Playstructure design will determine which Play It Safe sticker will be supplied.

INSTRUCTIONS:

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Part No. 156847-00-000



Part No. 156845-00-000



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.)

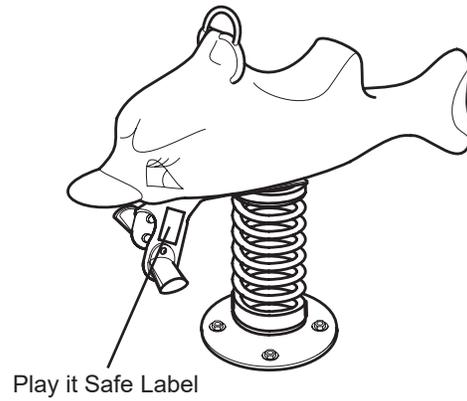
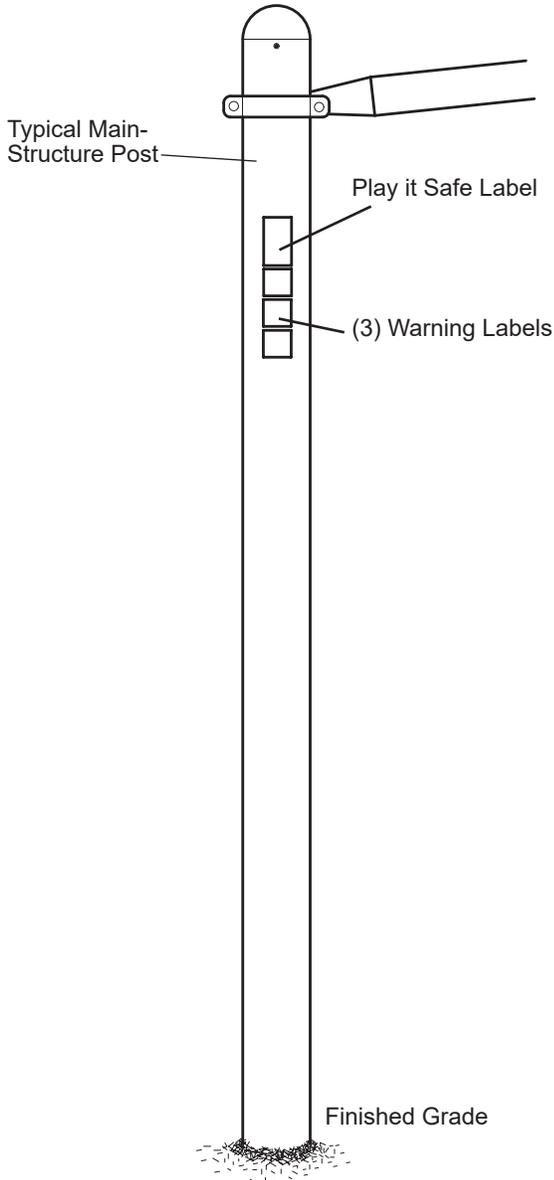
- 251714 5i Formed Play Safe Plate 6-23 Months w/Attaching HDW
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- 251720 3.5i Formed Play Safe Plate 6-23 Months w/Attaching HDW
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- 251722 3.5i Formed Play Safe Plate 1.5-12 Years w/Attaching HDW

- 251726 Flat Large Play Safe Plate 6-23 Month w/Attaching HDW
- 251723 Flat Large Play Safe Plate 2-5 Years w/Attaching HDW
- 251724 Flat Large Play Safe Plate 2-12 Years w/Attaching HDW
- 251725 Flat Large Play Safe Plate 5-12 Years w/Attaching HDW
- 251727 Flat Large Play Safe Plate 1.5-5 Years w/Attaching HDW
- 251728 Flat Large Play Safe Plate 1.5-12 Years w/Attaching HDW

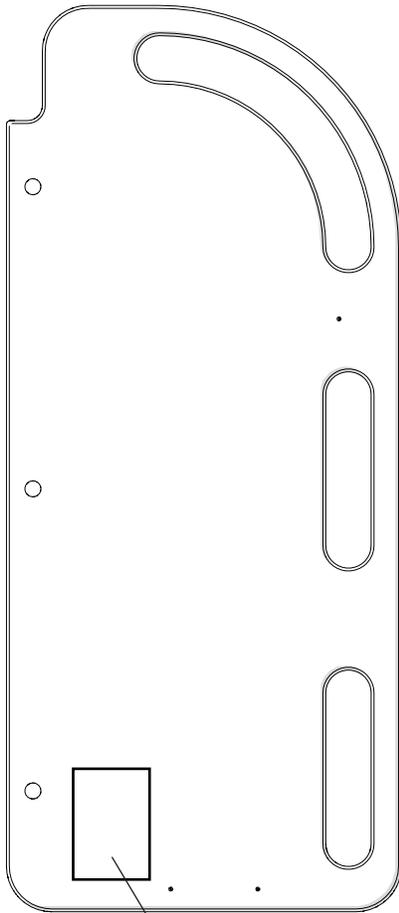
- 251731 Flat Small Play Safe Plate 6-23 Month w/Attaching HDW
- 251729 Flat Small Play Safe Plate 2-5 Years w/Attaching HDW
- 251730 Flat Small Play Safe Plate 2-12 Years w/Attaching HDW
- 251735 Flat Small Play Safe Plate 5-12 Years w/Attaching HDW
- 251732 Flat Small Play Safe Plate 1.5-5 Years w/Attaching HDW
- 251733 Flat Small Play Safe Plate 1.5-12 Years w/Attaching HDW





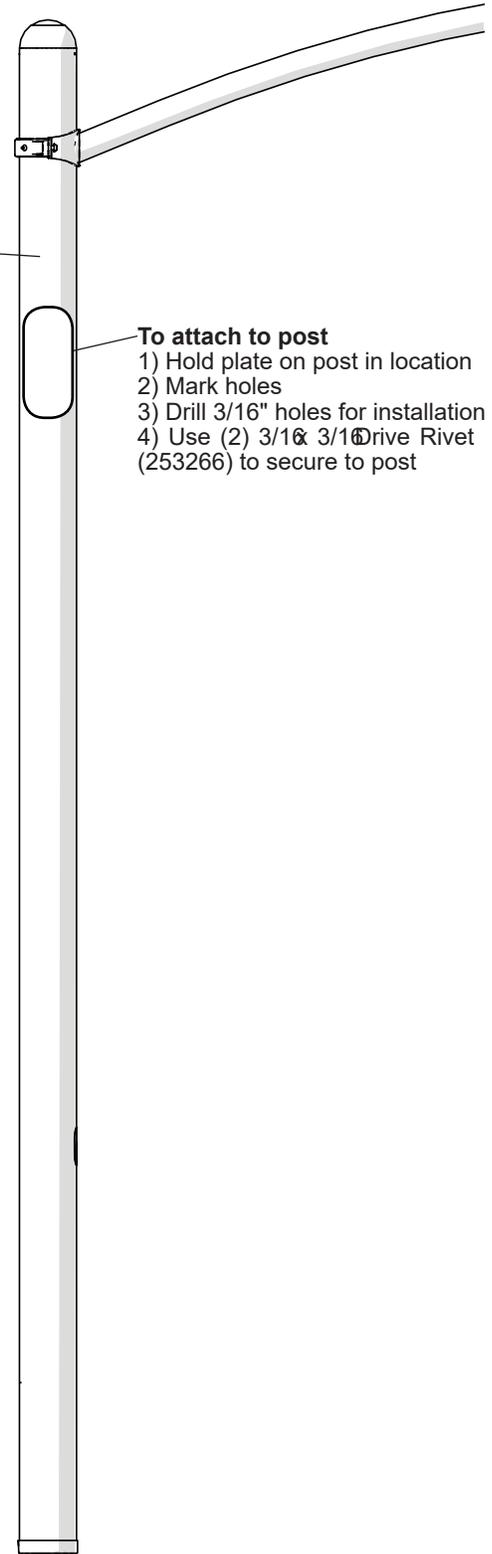
Warning Labels

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 3.5" formed plate mounts to 3.5" posts



- To attach to permalene**
- 1) Hold plate on surface in location
 - 2) Mark holes
 - 3) Drill 1/8" x 1/2" deep holes for installation
 - 4) Use (2) TorX #14 x 1/2" Cap Screw (129671) to attach to panel

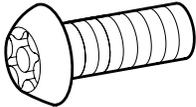
Typical Main-Structure Post



- To attach to post**
- 1) Hold plate on post in location
 - 2) Mark holes
 - 3) Drill 3/16" holes for installation
 - 4) Use (2) 3/16" x 3/16" Drive Rivet (253266) to secure to post

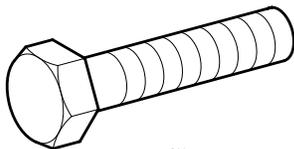
Common Parts & Fasteners

Button Head Cap Screws BHCS w/Pin



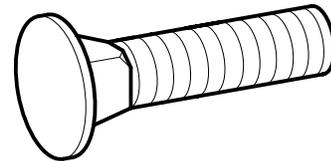
Part #	Inches	Sizes mm	Mat'l or Grade	Recommended Torque	
				Ft./lbs	Kgm
137277	1/4" x 3/8"	(6,4 x 9,5)	SST-PAT	10	1.4
131849	5/16" x 1/2"	(7,9 x 12,7)	SST-PAT	10	1.4
223807	5/16" x 3/4"	(7,9 x 19,0)	SST-PAT	10	1.4
132626	5/16" x 7/8"	(7,9 x 22,2)	SST-PAT	10	1.4
192071		M 8 x 24 mm	SST-PAT	10	1.4
100195	3/8" x 5/8"	(9,5 x 15,9)	SST-PAT	15	2
100196	3/8" x 7/8"	(9,5 x 22,2)	SST-PAT	15	2
100198	3/8" x 1 1/8"	(9,5 x 28,6)	SST-PAT	15	2
113027	3/8" x 1 3/8"	(9,5 x 34,9)	SST-PAT	15	2
100171	3/8" x 1 1/2"	(9,5 x 38,1)	SST-PAT	15	2
123224	3/8" x 1 11/16"	(9,5 x 42,9)	SST-PAT	15	2
100173	3/8" x 2"	(9,5 x 50,8)	SST-PAT	15	2
100199	3/8" x 2 1/4"	(9,5 x 57,2)	SST-PAT	15	2
100174	3/8" x 2 1/2"	(9,5 x 63,5)	SST-PAT	15	2
100175	3/8" x 2 3/4"	(9,5 x 69,9)	SST-PAT	15	2
100176	3/8" x 3"	(9,5 x 76,2)	SST-PAT	15	2
100168	3/8" x 3 1/4"	(9,5 x 82,6)	SST-PAT	15	2
100200	3/8" x 3 1/2"	(9,5 x 88,9)	SST-PAT	15	2
124460	3/8" x 3 3/4"	(9,5 x 95,2)	SST-PAT	15	2
100201	5/8" x 1 1/2"	(15,9 x 38,1)	SST-PAT	50	7
127551	5/8" x 1 1/2"	(15,9 x 38,1)	SST- ANTI-SEIZE	50	7
100203	5/8" x 2 1/4"	(15,9 x 57,2)	SST-PAT	50	7

Hex Cap Screws



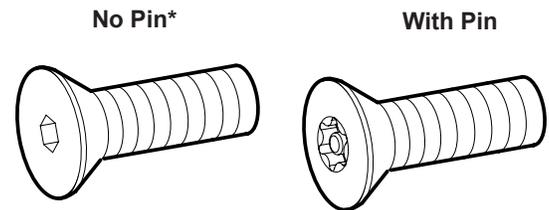
Part #	Inches	Sizes mm	Mat'l or Grade	Recommended Torque	
				Ft./lbs	Kgm
100206	3/8" x 1"	(9,5 x 25,4)	SST-PAT	15	2
100208	3/8" x 1 1/2"	(9,5 x 38,1)	SST-PAT	15	2
100209	3/8" x 1 3/4"	(9,5 x 44,4)	SST-PAT	15	2
135682	3/8" x 3 1/8"	(9,5 x 79,3)	SST-PAT	15	2
135683	3/8" x 4 5/8"	(9,5 x 117,5)	SST	15	2
100214	3/8" x 5"	(9,5 x 127)	SST-PAT	15	2
121499	7/16" x 1 3/4"	(11,1 x 114,3)	SST-PAT	15	2
100216	1/2" x 1 1/4"	(12,7 x 31,7)	SST	15	2
131862	1/2" x 2 1/4"	(12,7 x 57,1)	SST-PAT	20	2.8

Carriage Bolts



Part #	Inches	Sizes mm	Mat'l or Grade	Recommended Torque	
				Ft./lbs	Kgm
100135	5/16" x 1 1/4"	(7,9 x 31,8)	SST-PAT	5	0.7
100147	3/8" x 1 1/4"	(9,5 x 31,8)	SST-PAT	15	2
116017	3/8" x 1 1/2"	(9,5 x 38,1)	SST-PAT	15	2
100148	3/8" x 1 3/4"	(9,5 x 44,5)	SST-PAT	15	2

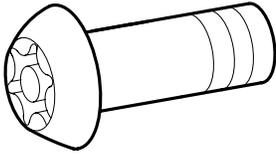
Flat Head Cap Screws (FHCS)



Part #	Inches	Sizes mm	Mat'l or Grade	Recommended Torque	
				Ft./lbs	Kgm
148686	3/8" x 3/4"	(9,5 x 19,05)	SST-PAT	13	1.8
100252*	3/8" x 1 1/4"	(9,5 x 31,8)	SST-PAT	13	1.8
151421	3/8" x 1 1/2"	(9,5 x 38,1)	SST-PAT	13	1.8
148765	3/8" x 3 1/2"	(9,5 x 88,9)	SST-PAT	13	1.8
130824*	1/2" x 2 1/4"	(12,5 x 57,2)	SST	20	2.8

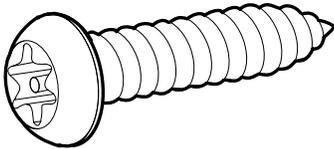
NOTE: These are recommended torque applications per fastener size. When fasteners are used with plastic or wood products, the torque will be excessive and we recommend that the installer apply some caution when tightening the fasteners. Plastic or wood products should begin to deform slightly. Fasteners indicated with "-Pat" includes a locking patch type material and should cure for 72 hours for maximum strength.

BHCS w/Pin Limited Thread Bolts



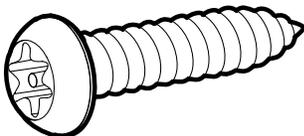
Part #	Sizes		Mat'l or Grade	Recommended Torque	
	Inches	mm		Ft./lbs	Kgm
100290	3/8" x 7/8"	(9,5 x 22,2)	SST-PAT	21	3
100292	3/8" x 1 1/4"	(9,5 x 31,8)	SST-PAT	21	3
157704	7/16" x 2"	(11,11x 51)	SST-PAT	40	5.5
127068	7/16" x 2 7/16"	(11,11x61,91)	SST-PAT	40	5.5

Lag Screws



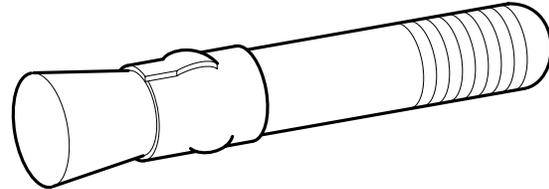
Part #	Sizes		Mat'l or Grade	Head Type
	Inches	mm		
100127	5/16" x 1 1/4"	(7,9 x 31,8)	SST	Hex Head
168198 (Shown)	3/8" x 1 1/2"	(9,5 x 38,1)	SST	Button Head
139039 (Shown)	3/8" x 2"	(9,5 x 50,8)	SST	Button Head

Screw, Type AB Thread BHCS w/Pin



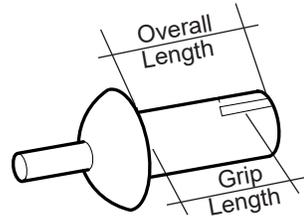
Part #	Size	Mat'l or Grade
129671	#14 x 1/2"	SST
127872	#14 x 3/4"	SST
136232	#14 x 1"	SST
129672	#14 x 1 1/4"	SST

Expansion Anchors (Used To Secure Components To Concrete Slabs)



Part #	Sizes		Mat'l or Grade	Recommended Torque	
	Inches	mm		Ft./lbs	Kgm
100263	3/8" x 2 3/4"	(9,5 x 69,9)	Alloy Steel	15	2
100266	1/2" x 2 3/4"	(12,7 x 69,9)	Alloy Steel	20	2.8

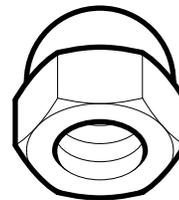
Drive Rivets



NOTE: For more detail see drive rivet detail page.

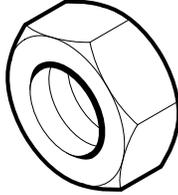
Part #	Sizes		Mat'l
	Inches	mm	
100612	3/16" x 3/8"	(4,7 x 9,5)	Alum Rivet/Alum Pin
100609	1/4" x 3/16"	(6,4 x 4,8)	Alum Rivet/Alum Pin
100611	1/4" x 3/8"	(6,4 x 9,5)	Alum Rivet/SST Pin
113300	1/4" x 1/2"	(6,4 x 12,7)	Alum Rivet/Alum Pin
100610	1/4" x 5/8"	(6,4 x 15,9)	Alum Rivet/SST Pin
139152	1/4" x 3/4"	(6,4 x 19,05)	Alum Rivet/Alum Pin
100613	1/4" x 7/8"	(6,4 x 22,2)	Alum Rivet/Alum Pin
118158	1/4" x 1"	(6,4 x 25,4)	Alum Rivet/Alum Pin

Low Crown Cap Nut



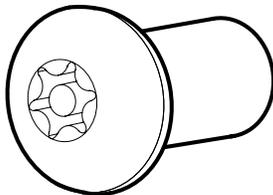
Part #	Size Inches	Mat'l
100349	3/8" -16 UNC	SST

Standard Hex Nuts



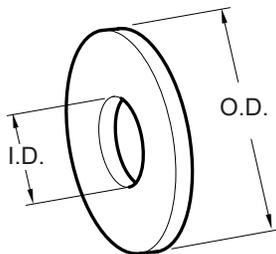
Part #	Sizes		Mat'l or Grade
	Inches		
100326	5/16-18 UNC		SST
100321	3/8-16 UNC		SST-Pat
100327	3/8-16 UNC		SST
128296	3/8-16 UNC (Jam Nut)		SST
100328	7/16-14 UNC		SST
145021	7/16-14 UNC (Jam Nut)		SST
100322	1/2-13 UNC		SST
129692	1/2-13 UNC		SST-Pat
129693	1/2-13 UNC (Jam Nut)		SST
100323	5/8-11 UNC		SST

Flange Nut w/Pin



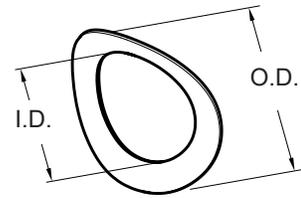
Part #	Sizes		Mat'l or Grade
	Inches		
175006	5/16 x 18 UNC		SST
192064	M 8 x 24 mm		SST
100353	3/8-16 UNC		SST

Flat Washers



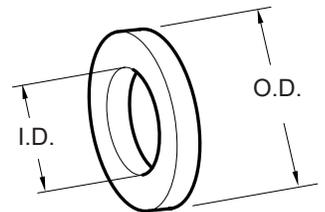
Part #	Sizes		or Grade	I.D.	O.D.
	Inches	mm			
122039	1/4"	(6,3)	SST	0.312	.734
100362	3/8"	(9,5)	SST	0.406	1.002
112793	7/16"	(11,1)	SST	0.505	1.262
100363	1/2"	(12,7)	SST	0.536	1.262
100366	5/8"	(15,9)	SST	0.688	1.750
123737	1 1/8"	(28,6)	SST	1.140	1.750

Curved Spring Washer



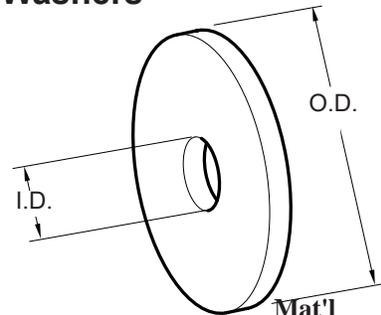
Part #	Sizes		Mat'l or Grade	I.D.	O.D.
	Inches	mm			
100380	1/2"	(12,7)	SST	0.531	0.795

SAE Flat Washers



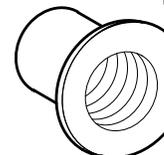
Part #	Sizes		Mat'l or Grade	I.D.	O.D.
	Inches	mm			
100364	1/4"	(6,35)	SST	0.281	0.625
223956	5/16"	(7,92)	SST	0.344	0.688
100365	3/8"	(9,5)	SST	0.411	0.816
113550	1/2"	(12,7)	SST	0.531	1.062
129500	5/8"	(15,9)	SST	0.686	1.342

Fender Washers



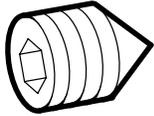
Part #	Sizes		Mat'l or Grade	I.D.	O.D.
	Inches	mm			
100378	3/8" x 1 1/2"	(9,53 x 38,1)	SST	0.406	1.500
100379	1/2" x 2"	(12,7 x 50,8)	SST	0.531	2.000

Tee Nut (PlayBooster Clamps)



Part #	Sizes		Mat'l or Grade
	Inches		
100351	3/8-16 UNC		SST

Set Screw



Part #	Sizes		Mat'l or Grade
	Inches	mm	
100298	3/8" x 7/16"	(9,5 x 11,1)	SST

Bolt Link



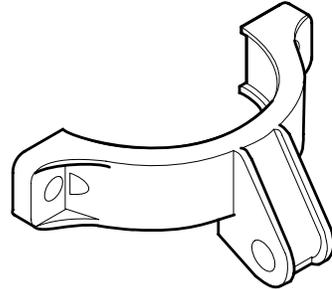
Part #	Mat'l or Grade
138915	SST

Double Clevis



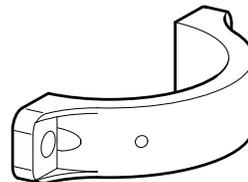
Part #	Mat'l or Grade
138917	SST

(PlayBooster)



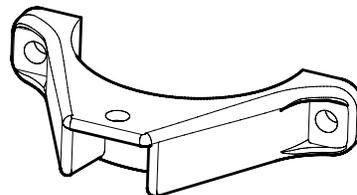
Part #	Mat'l
113729	Cast Aluminum

Half Clamp (PlayBooster)



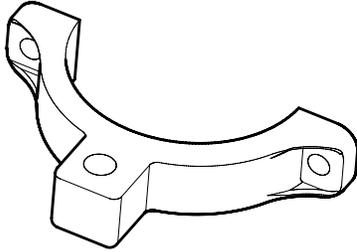
Part #	Mat'l
105327	Cast Aluminum

Deck Hanger Clamp (PlayBooster)



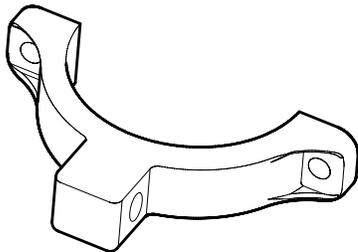
Part #	Mat'l
106022	Cast Aluminum

Swing Hanger Clamp



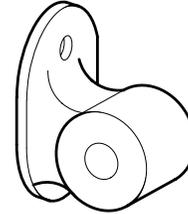
Part #	Mat'l
121289	Cast Aluminum

Ring/Rail Hanger Clamp (PlayBooster)



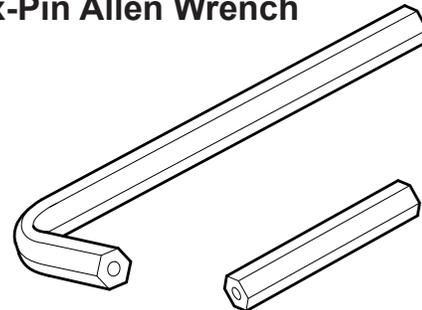
Part #	Mat'l
105330	Cast Aluminum

(PlayShaper)



Part #	Mat'l
113895	Cast Aluminum

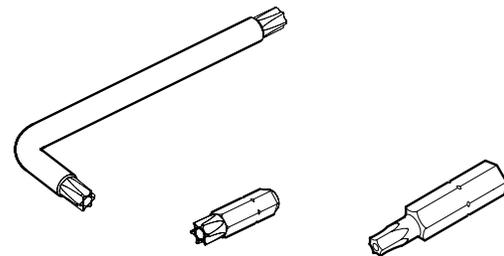
Hex-Pin Allen Wrench



Hex-Pin Driver

Part #	Description
100685	Hex-Pin Allen Wrench
100686	Hex-Pin Driver (Used With A 5/16" Socket)

6-Lobe Wrench

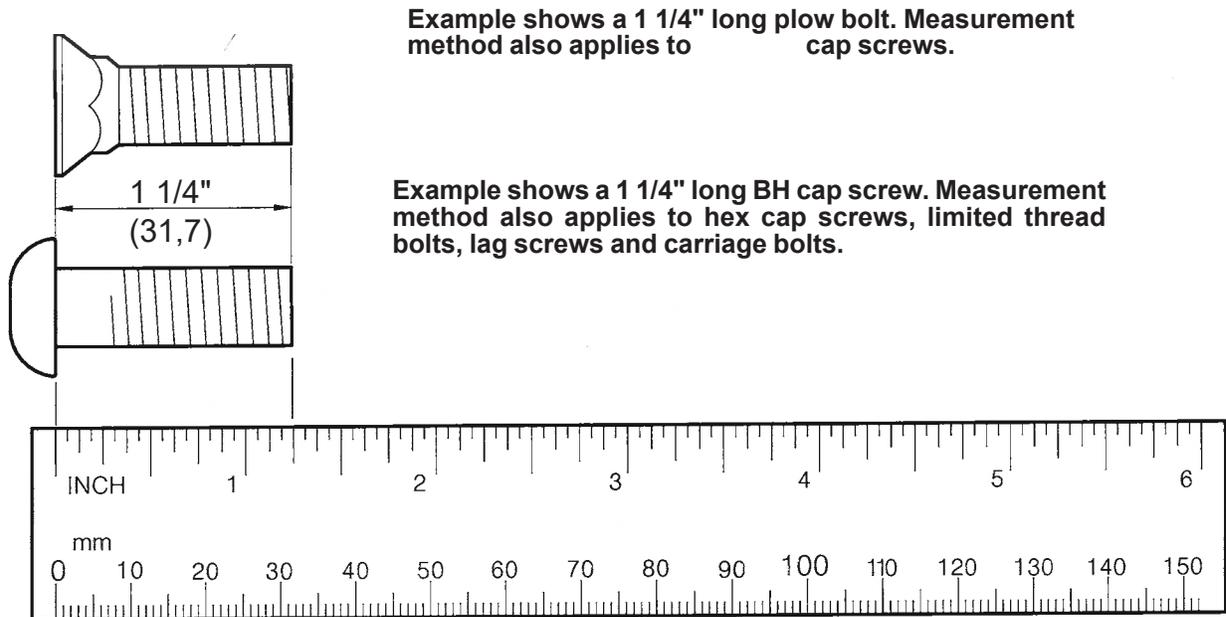


6-Lobe Driver

Torx-Pin Driver

Part #	Description
148680	6-Lobe Wrench (T-40)
146017	6-Lobe Wrench (T-45)
146007	6-Lobe Driver (T-45) (Used With A 5/16" Socket)
127463	Torx-Pin Driver (T-27) (Used With A 1/4" Socket)

HOW TO DETERMINE BOLT LENGTHS



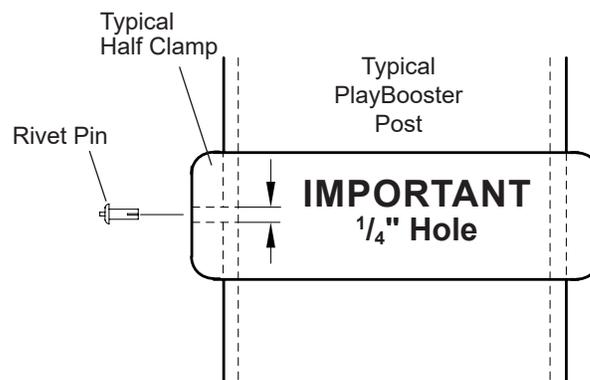
Example shows a 1 1/4" long plow bolt. Measurement method also applies to cap screws.

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.

General Rules For Use Of Drive Rivets

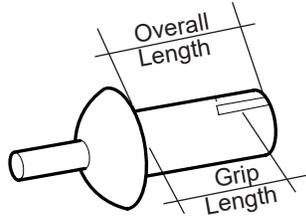
- Rivets are used to provide additional assurance for load carry capacity.
- Refer to the Spec Sheet Parts List and follow Installation Instructions for each component.
- Decks and Overhead Events always need rivets.



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.

Drive Rivets Details



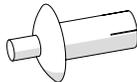
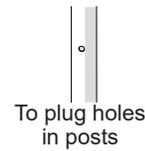
GL = Grip Length
OL = Overall Length

Drive Rivet



100609
1/4" x 3/16" GL (6,4 x 4,8)
1/4" x 11/32" OL (6,4 x 8, 7)
Alum Rivet/ Alum Pin

Common Use



100611
1/4" x 3/8" GL (6,4 x 9,5)
1/4" x 17/32" OL (6,4 x 13, 5)
Alum Rivet/ SST Pin



218924
Locking Clamp



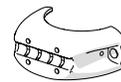
192691
Post Topper



100610
1/4" x 5/8" GL (6,4 x 15,9)
1/4" x 51/64" OL (6,4 x 20, 2)
Alum Rivet/ SST Pin



105327
5" Half Clamp

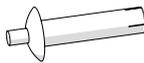


195922
Rope Clamp

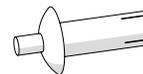


156806
Pod Casting

Other Speciality Drive Rivets



100613
1/4" x 7/8" GL (6,4 x 22,2)
1/4" x 63/64" OL (6,4 x 25, 4)
Alum Rivet/ Alum Pin



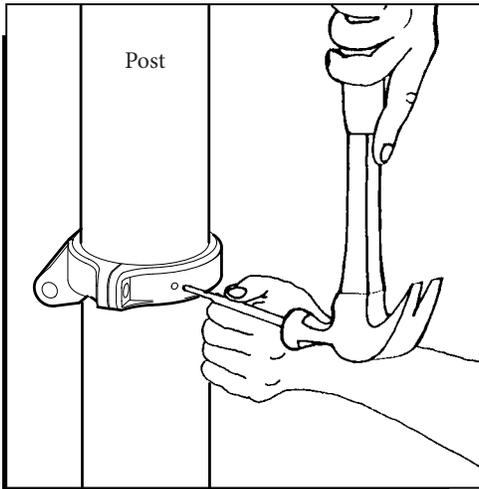
113300
1/4" x 1/2" GL (6,4 x 12,7)
1/4" x 21/32" OL (6,4 x 16, 7)
Alum Rivet/ Alum Pin



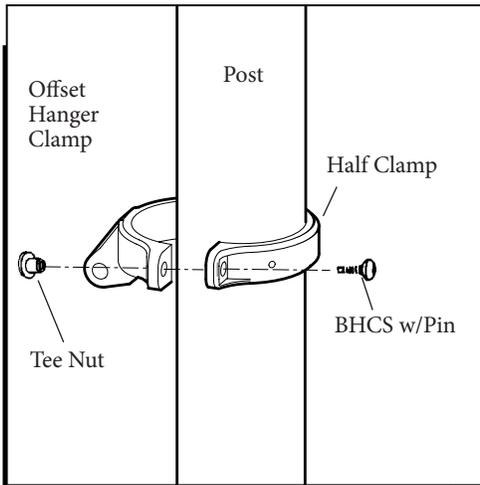
118158
1/4" x 7/8" GL (6,4 x 25,4)
1/4" x 1 5/32" OL (6,4 x 29, 3)
Alum Rivet/ Alum Pin



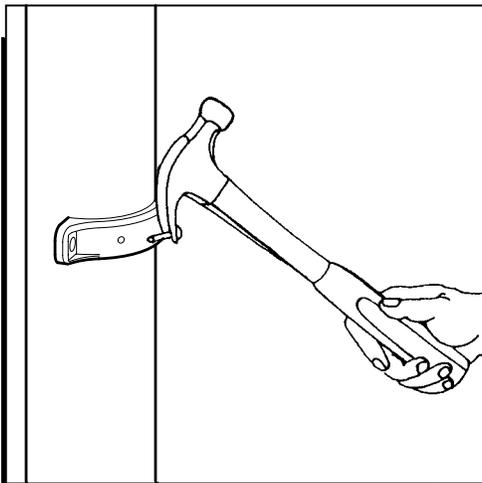
139152
1/4" x 3/4" GL (6,4 x 19,05)
1/4" x 29/32" OL (6,4 x 23, 0)
Alum Rivet/ Alum Pin



- 1) **Drive Center Pin of Rivet Straight into Post Using $\frac{1}{8}$ " 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
- $\frac{1}{8}$ " Diameter Steel Punch
- Tamperproof Hex Wrench

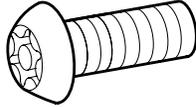


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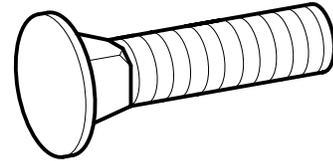
Common Parts & Fasteners

Button Head Cap Screws BHCS w/Pin



Part #	Inches	Sizes mm	Mat'l or Grade	Recommended Torque	
				Ft./lbs	Kgm
137277	1/4" x 3/8"	(6,4 x 9,5)	SST-PAT	10	1.4
131849	5/16" x 1/2"	(7,9 x 12,7)	SST-PAT	10	1.4
223807	5/16" x 3/4"	(7,9 x 19,0)	SST-PAT	10	1.4
132626	5/16" x 7/8"	(7,9 x 22,2)	SST-PAT	10	1.4
192071		M 8 x 24 mm	SST-PAT	10	1.4
100195	3/8" x 5/8"	(9,5 x 15,9)	SST-PAT	15	2
100196	3/8" x 7/8"	(9,5 x 22,2)	SST-PAT	15	2
100198	3/8" x 1 1/8"	(9,5 x 28,6)	SST-PAT	15	2
113027	3/8" x 1 3/8"	(9,5 x 34,9)	SST-PAT	15	2
100171	3/8" x 1 1/2"	(9,5 x 38,1)	SST-PAT	15	2
123224	3/8" x 1 11/16"	(9,5 x 42,9)	SST-PAT	15	2
100173	3/8" x 2"	(9,5 x 50,8)	SST-PAT	15	2
100199	3/8" x 2 1/4"	(9,5 x 57,2)	SST-PAT	15	2
100174	3/8" x 2 1/2"	(9,5 x 63,5)	SST-PAT	15	2
100175	3/8" x 2 3/4"	(9,5 x 69,9)	SST-PAT	15	2
100176	3/8" x 3"	(9,5 x 76,2)	SST-PAT	15	2
100168	3/8" x 3 1/4"	(9,5 x 82,6)	SST-PAT	15	2
100200	3/8" x 3 1/2"	(9,5 x 88,9)	SST-PAT	15	2
124460	3/8" x 3 3/4"	(9,5 x 95,2)	SST-PAT	15	2
100201	5/8" x 1 1/2"	(15,9 x 38,1)	SST-PAT	50	7
127551	5/8" x 1 1/2"	(15,9 x 38,1)	SST- ANTI-SEIZE	50	7
100203	5/8" x 2 1/4"	(15,9 x 57,2)	SST-PAT	50	7

Carriage Bolts

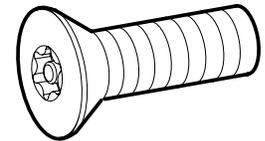
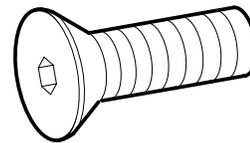


Part #	Inches	Sizes mm	Mat'l or Grade	Recommended Torque	
				Ft./lbs	Kgm
100135	5/16" x 1 1/4"	(7,9 x 31,8)	SST-PAT	5	0.7
100147	3/8" x 1 1/4"	(9,5 x 31,8)	SST-PAT	15	2
116017	3/8" x 1 1/2"	(9,5 x 38,1)	SST-PAT	15	2
100148	3/8" x 1 3/4"	(9,5 x 44,5)	SST-PAT	15	2

Flat Head Cap Screws (FHCS)

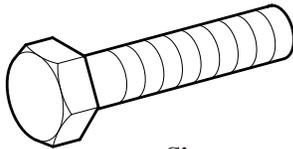
No Pin*

With Pin



Part #	Inches	Sizes mm	Mat'l or Grade	Recommended Torque	
				Ft./lbs	Kgm
148686	3/8" x 3/4"	(9,5 x 19,05)	SST-PAT	13	1.8
100252*	3/8" x 1 1/4"	(9,5 x 31,8)	SST-PAT	13	1.8
151421	3/8" x 1 1/2"	(9,5 x 38,1)	SST-PAT	13	1.8
148765	3/8" x 3 1/2"	(9,5 x 88,9)	SST-PAT	13	1.8
130824*	1/2" x 2 1/4"	(12,5 x 57,2)	SST	20	2.8

Hex Cap Screws



Part #	Inches	Sizes mm	Mat'l or Grade	Recommended Torque	
				Ft./lbs	Kgm
100206	3/8" x 1"	(9,5 x 25,4)	SST-PAT	15	2
100208	3/8" x 1 1/2"	(9,5 x 38,1)	SST-PAT	15	2
100209	3/8" x 1 3/4"	(9,5 x 44,4)	SST-PAT	15	2
135682	3/8" x 3 1/8"	(9,5 x 79,3)	SST-PAT	15	2
135683	3/8" x 4 5/8"	(9,5 x 117,5)	SST	15	2
100214	3/8" x 5"	(9,5 x 127)	SST-PAT	15	2
121499	7/16" x 1 3/4"	(11,1 x 114,3)	SST-PAT	15	2
100216	1/2" x 1 1/4"	(12,7 x 31,7)	SST	15	2
131862	1/2" x 2 1/4"	(12,7 x 57,1)	SST-PAT	20	2.8

NOTE: These are recommended torque applications per fastener size. When fasteners are used with plastic or wood products, the torque 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.

PS/PB/Evos/Weevos Common Parts/Torque Chart

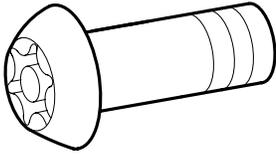
Sheet 1 of 9

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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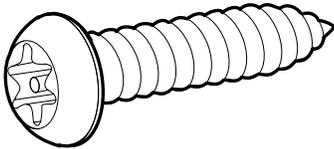
Document #26150400

BHCS w/Pin Limited Thread Bolts



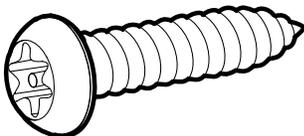
Part #	Sizes		Mat'l or Grade	Recommended Torque	
	Inches	mm		Ft./lbs	Kgm
100290	3/8" x 7/8"	(9,5 x 22,2)	SST-PAT	21	3
100292	3/8" x 1 1/4"	(9,5 x 31,8)	SST-PAT	21	3
157704	7/16" x 2"	(11,11x 51)	SST-PAT	40	5.5
127068	7/16" x 2 7/16"	(11,11x61,91)	SST-PAT	40	5.5

Lag Screws



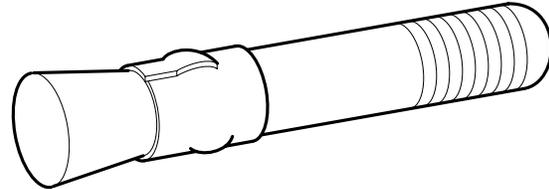
Part #	Sizes		Mat'l or Grade	Head Type
	Inches	mm		
100127	5/16" x 1 1/4"	(7,9 x 31,8)	SST	Hex Head
168198 (Shown)	3/8" x 1 1/2"	(9,5 x 38,1)	SST	Button Head
139039 (Shown)	3/8" x 2"	(9,5 x 50,8)	SST	Button Head

Screw, Type AB Thread BHCS w/Pin



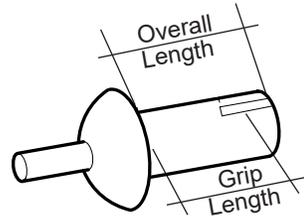
Part #	Size	Mat'l or Grade
129671	#14 x 1/2"	SST
127872	#14 x 3/4"	SST
136232	#14 x 1"	SST
129672	#14 x 1 1/4"	SST

Expansion Anchors (Used To Secure Components To Concrete Slabs)



Part #	Sizes		Mat'l or Grade	Recommended Torque	
	Inches	mm		Ft./lbs	Kgm
100263	3/8" x 2 3/4"	(9,5 x 69,9)	Alloy Steel	15	2
100266	1/2" x 2 3/4"	(12,7 x 69,9)	Alloy Steel	20	2.8

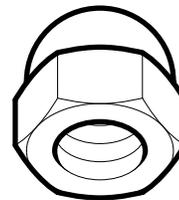
Drive Rivets



NOTE: For more detail see drive rivet detail page.

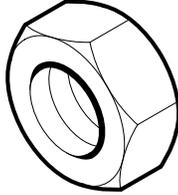
Part #	Sizes		Mat'l
	Inches	mm	
100612	3/16" x 3/8"	(4,7 x 9,5)	Alum Rivet/Alum Pin
100609	1/4" x 3/16"	(6,4 x 4,8)	Alum Rivet/Alum Pin
100611	1/4" x 3/8"	(6,4 x 9,5)	Alum Rivet/SST Pin
113300	1/4" x 1/2"	(6,4 x 12,7)	Alum Rivet/Alum Pin
100610	1/4" x 5/8"	(6,4 x 15,9)	Alum Rivet/SST Pin
139152	1/4" x 3/4"	(6,4 x 19,05)	Alum Rivet/Alum Pin
100613	1/4" x 7/8"	(6,4 x 22,2)	Alum Rivet/Alum Pin
118158	1/4" x 1"	(6,4 x 25,4)	Alum Rivet/Alum Pin

Low Crown Cap Nut



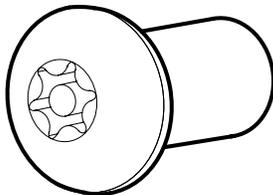
Part #	Size Inches	Mat'l
100349	3/8" -16 UNC	SST

Standard Hex Nuts



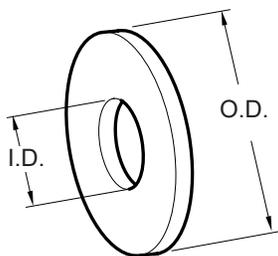
Part #	Sizes Inches	Mat'l or Grade
100326	5/16-18 UNC	SST
100321	3/8-16 UNC	SST-Pat
100327	3/8-16 UNC	SST
128296	3/8-16 UNC (Jam Nut)	SST
100328	7/16-14 UNC	SST
145021	7/16-14 UNC (Jam Nut)	SST
100322	1/2-13 UNC	SST
129692	1/2-13 UNC	SST-Pat
129693	1/2-13 UNC (Jam Nut)	SST
100323	5/8-11 UNC	SST

Flange Nut w/Pin



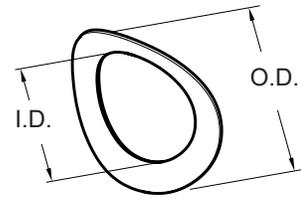
Part #	Sizes Inches	Mat'l or Grade
175006	5/16 x 18 UNC	SST
192064	M 8 x 24 mm	SST
100353	3/8-16 UNC	SST

Flat Washers



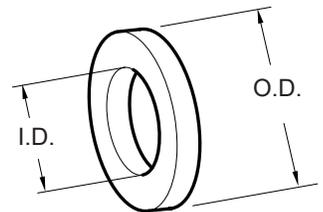
Part #	Sizes Inches	mm	or Grade	I.D.	O.D.
122039	1/4"	(6,3)	SST	0.312	.734
100362	3/8"	(9,5)	SST	0.406	1.002
112793	7/16"	(11,1)	SST	0.505	1.262
100363	1/2"	(12,7)	SST	0.536	1.262
100366	5/8"	(15,9)	SST	0.688	1.750
123737	1 1/8"	(28,6)	SST	1.140	1.750

Curved Spring Washer



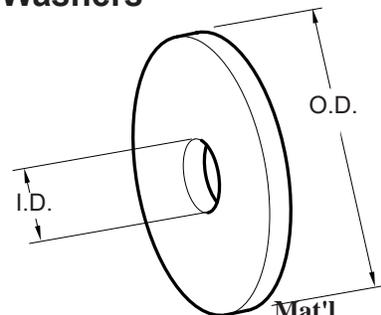
Part #	Sizes Inches	mm	Mat'l or Grade	I.D.	O.D.
100380	1/2"	(12,7)	SST	0.531	0.795

SAE Flat Washers



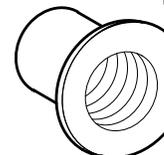
Part #	Sizes Inches	mm	Mat'l or Grade	I.D.	O.D.
100364	1/4"	(6,35)	SST	0.281	0.625
223956	5/16"	(7,92)	SST	0.344	0.688
100365	3/8"	(9,5)	SST	0.411	0.816
113550	1/2"	(12,7)	SST	0.531	1.062
129500	5/8"	(15,9)	SST	0.686	1.342

Fender Washers



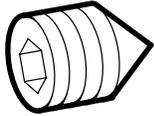
Part #	Sizes Inches	mm	Mat'l or Grade	I.D.	O.D.
100378	3/8" x 1 1/2"	(9,53 x 38,1)	SST	0.406	1.500
100379	1/2" x 2"	(12,7 x 50,8)	SST	0.531	2.000

Tee Nut (PlayBooster Clamps)



Part #	Sizes Inches	Mat'l or Grade
100351	3/8-16 UNC	SST

Set Screw



Part #	Sizes		Mat'l or Grade
	Inches	mm	
100298	3/8" x 7/16"	(9,5 x 11,1)	SST

Bolt Link



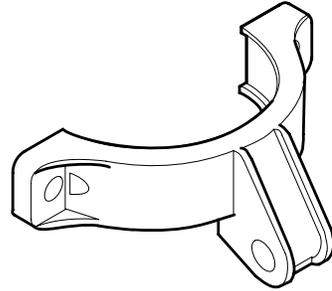
Part #	Mat'l or Grade
138915	SST

Double Clevis



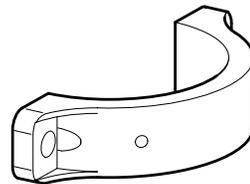
Part #	Mat'l or Grade
138917	SST

(PlayBooster)



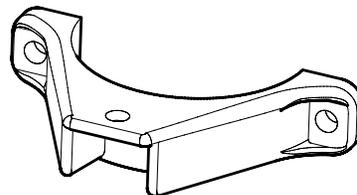
Part #	Mat'l
113729	Cast Aluminum

Half Clamp (PlayBooster)



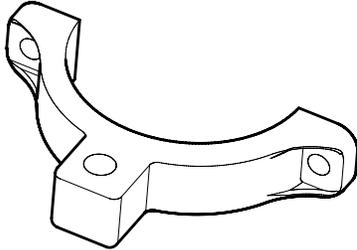
Part #	Mat'l
105327	Cast Aluminum

Deck Hanger Clamp (PlayBooster)



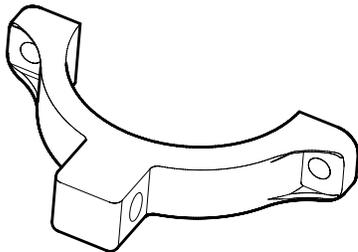
Part #	Mat'l
106022	Cast Aluminum

Swing Hanger Clamp



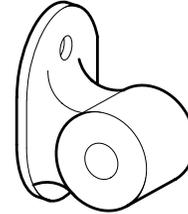
Part #	Mat'l
121289	Cast Aluminum

Ring/Rail Hanger Clamp (PlayBooster)



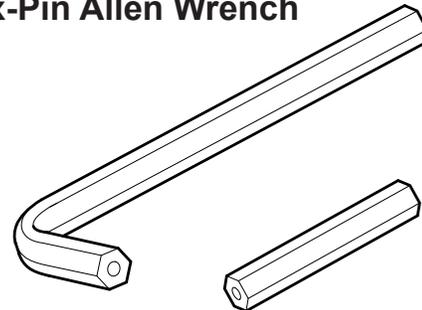
Part #	Mat'l
105330	Cast Aluminum

(PlayShaper)



Part #	Mat'l
113895	Cast Aluminum

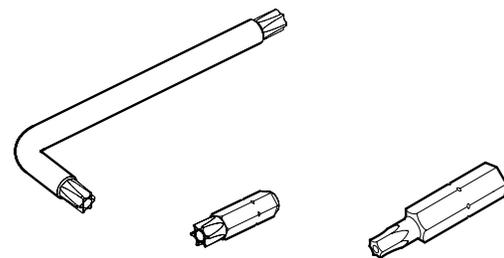
Hex-Pin Allen Wrench



Hex-Pin Driver

Part #	Description
100685	Hex-Pin Allen Wrench
100686	Hex-Pin Driver (Used With A 5/16" Socket)

6-Lobe Wrench

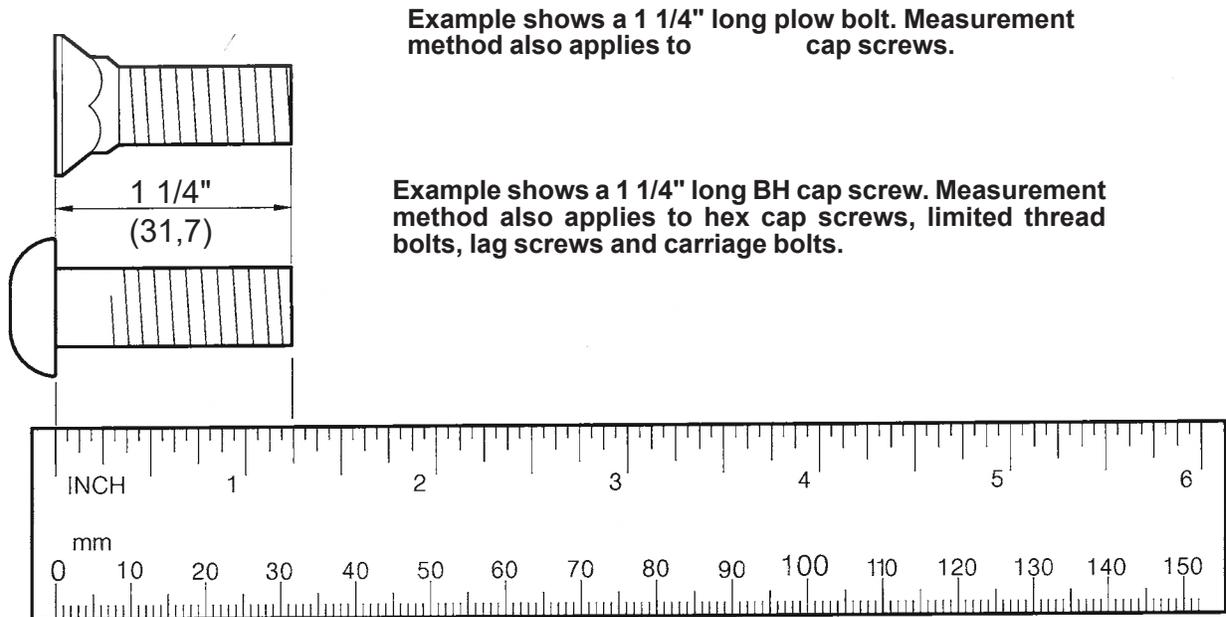


6-Lobe Driver

Torx-Pin Driver

Part #	Description
148680	6-Lobe Wrench (T-40)
146017	6-Lobe Wrench (T-45)
146007	6-Lobe Driver (T-45) (Used With A 5/16" Socket)
127463	Torx-Pin Driver (T-27) (Used With A 1/4" Socket)

HOW TO DETERMINE BOLT LENGTHS



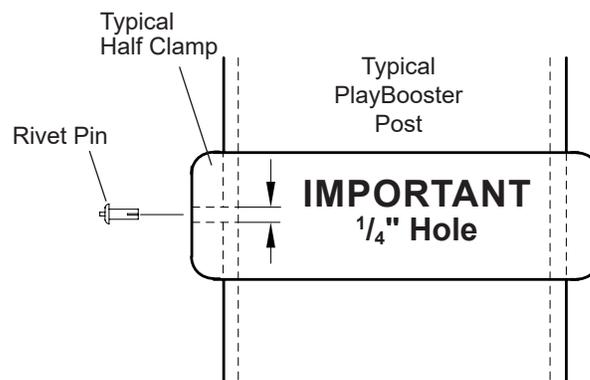
Example shows a 1 1/4" long plow bolt. Measurement method also applies to cap screws.

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.

General Rules For Use Of Drive Rivets

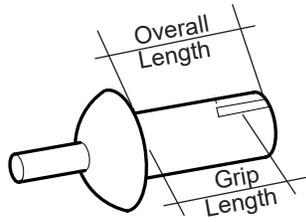
- Rivets are used to provide additional assurance for load carry capacity.
- Refer to the Spec Sheet Parts List and follow Installation Instructions for each component.
- Decks and Overhead Events always need rivets.



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.

Drive Rivets Details



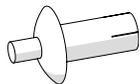
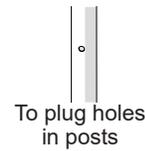
GL = Grip Length
OL = Overall Length

Drive Rivet



100609
1/4" x 3/16" GL (6,4 x 4,8)
1/4" x 11/32" OL (6,4 x 8, 7)
Alum Rivet/ Alum Pin

Common Use



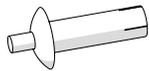
100611
1/4" x 3/8" GL (6,4 x 9,5)
1/4" x 17/32" OL (6,4 x 13, 5)
Alum Rivet/ SST Pin



218924
Locking Clamp



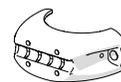
192691
Post Topper



100610
1/4" x 5/8" GL (6,4 x 15,9)
1/4" x 51/64" OL (6,4 x 20, 2)
Alum Rivet/ SST Pin



105327
5" Half Clamp



195922
Rope Clamp

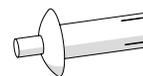


156806
Pod Casting

Other Speciality Drive Rivets



100613
1/4" x 7/8" GL (6,4 x 22,2)
1/4" x 63/64" OL (6,4 x 25, 4)
Alum Rivet/ Alum Pin



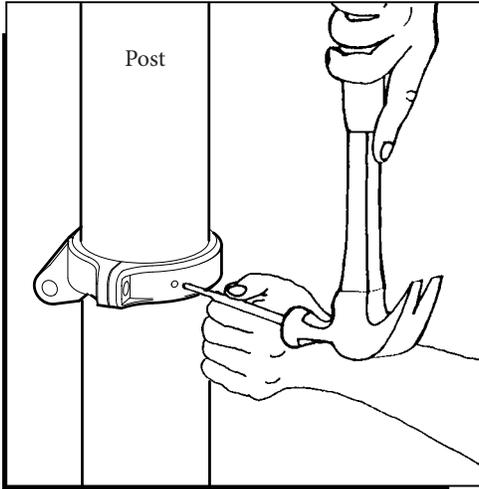
113300
1/4" x 1/2" GL (6,4 x 12,7)
1/4" x 21/32" OL (6,4 x 16, 7)
Alum Rivet/ Alum Pin



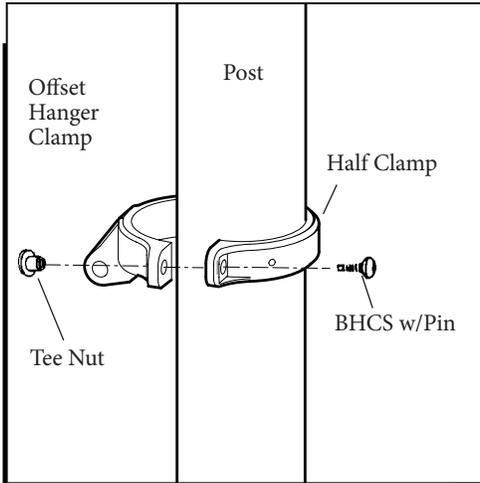
118158
1/4" x 7/8" GL (6,4 x 25,4)
1/4" x 1 5/32" OL (6,4 x 29, 3)
Alum Rivet/ Alum Pin



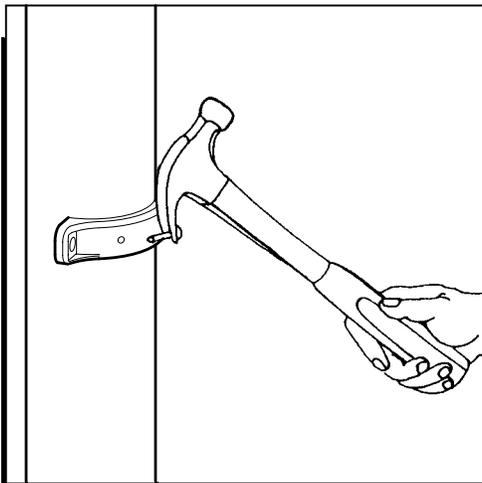
139152
1/4" x 3/4" GL (6,4 x 19,05)
1/4" x 29/32" OL (6,4 x 23, 0)
Alum Rivet/ Alum Pin



- 1) Drive Center Pin of Rivet Straight into Post Using $\frac{1}{8}$ " Diameter Punch and Hammer.



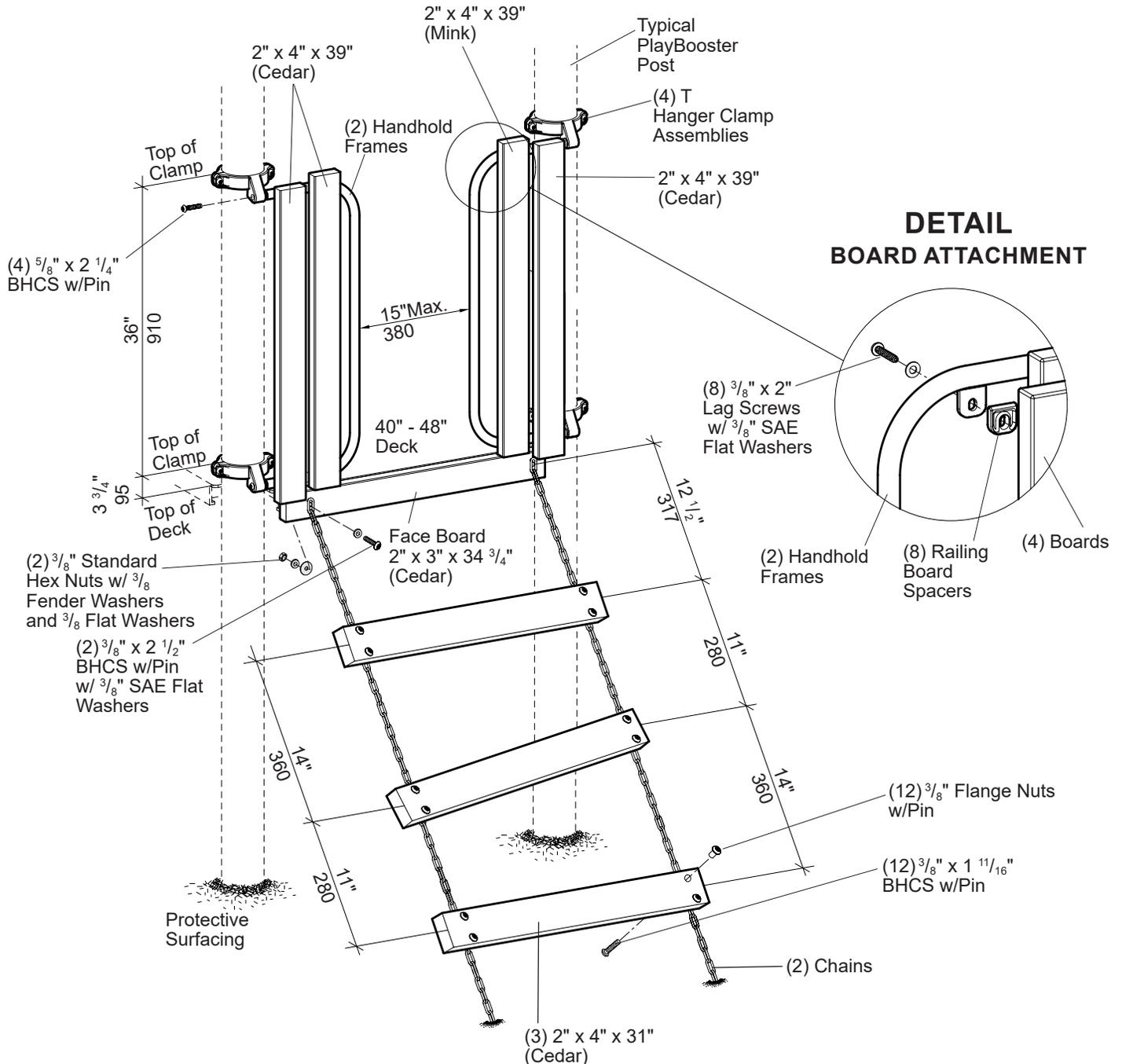
- 2) Unbolt BHCS w/Pin and Tee Nuts from Clamp Using Tamperproof Hex Wrench. Remove Offset Hanger Clamp. Lightly Tap on Half Clamp with Hammer Until Head of Drive Rivet Pulls Away From Half Clamp.



- 3) Pull Out Drive Rivet Using Claw End of Hammer.

Tools Needed:

- Claw Hammer
- $\frac{1}{8}$ " Diameter Steel Punch
- Tamperproof Hex Wrench



Play Naturally™

PlayBooster® 169318 Wood Wiggle Ladder, 40"-48" Deck

Sheet 1 of 2



PlayBooster® 169318 Wood Wiggle Ladder, 40"-48" Deck

Parts List

Part#	Description	Qty.
100610	1/4" x 5/8" Drive Rivet, AL/SST	4
105327	5" Half Clamp, Specify Color	4
113729	Offset Hanger Clamp, Specify Color	4
118029	Support (DB)	2
168211	Handhold Frame, Tan	2
168467	2" x 4" x 39" Board, Cedar or Mink	4
175267	2" x 3" x 34 3/4" Deck Face Board, Cedar	1
169120	2" x 4" x 31" Wiggle Ladder Board, Cedar	3
175251	3/16" x 57 7/16" Chain (40" Deck)	2
174404	3/16" x 67 7/8" Chain (48" Deck)	2
249718	Wiggle Ladder Hardware Package	1
100174	3/8" x 2 1/2" 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	8
100203	5/8" x 2 1/4" BHCS w/Pin, SST	4
100327	3/8" Standard Hex Nut, SST	4
100351	3/8" Tee Nut, SST	8
100353	3/8" Flange Nut w/Pin, SST	12
100365	3/8" SAE Flat Washer, SST	10
123224	3/8" x 1 11/16" BHCS w/Pin, SST	12
139039	3/8" x 2" Lag Screw, SST	8
207485	Railing Board Spacer, Tan	8
100378	3/8" Fender Washer	2
100362	3/8" Flat Washer	2

DB = Direct Bury

Fall Height: Deck Height

Installation Instructions

- 1) Drill 7/16" holes thru face board, using pilot holes as a guide. Attach chains and deck face board to the face of deck, using 3/8" x 2 1/2" BHCS w/pin with 3/8" SAE flat washers and 3/8" standard hex nuts with 3/8" flat washers and 3/8" fender washers.
- 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 frames to offset hanger clamps, using 5/8" x 2 1/4" BHCS w/Pin.
- 4) Line up pilot holes in boards with spacers and handhold frame tabs and attach, using 3/8" x 2" lag screws with 3/8" SAE flat washers. Refer to the Board Attachment Detail.
- 5) Attach boards to chains, using 3/8" x 1 11/16" BHCS w/pin and 3/8" flange nuts w/pin.
- 6) Determine footing locations by pulling chains tight and laying end on subgrade. Dig footing holes where chains meet subgrade to the width and depth shown.
- 7) Fasten chains to the supports using 3/8" x 7/8" BHCS w/pin and 3/8" standard hex nuts.
- 8) Pour concrete into footing holes. Push supports into concrete until chain is tight and top of support is positioned 1 3/4" above subgrade. Temporarily brace supports into position until concrete has cured. Refer to the Direct Bury Detail.
- 9) After concrete has cured a minimum of 72 hours, remove support brace and install protective surfacing before users are allowed to play on the structure.

Support (DB): Fabricated from 1.315" O.D. RS-20 (.080" - .090") galvanized steel tubing.

Chain/Uncoated: Steel 3/16" straight link chain, 800 lb. working load limit. Finish: ProGuard®.

Poly Board: Recycled high-density polyethylene, cedar or mink in color.

Handhold Frame: Weldment comprised of 1.125" O.D. 11 GA. (.120") steel tubing with 203 or 303 stainless steel inserts, with 3/8" internal thread and 1/4" HRPO steel plate. Finish: ProShield®, tan in color.

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).

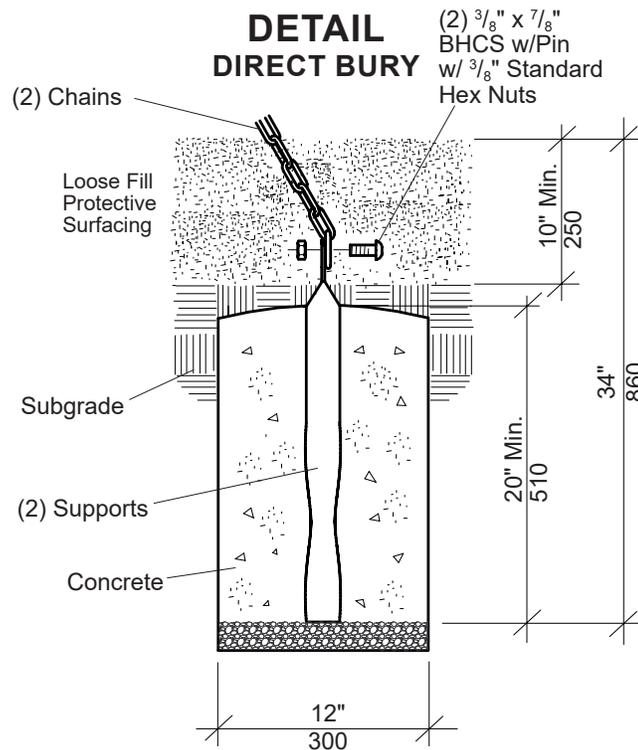
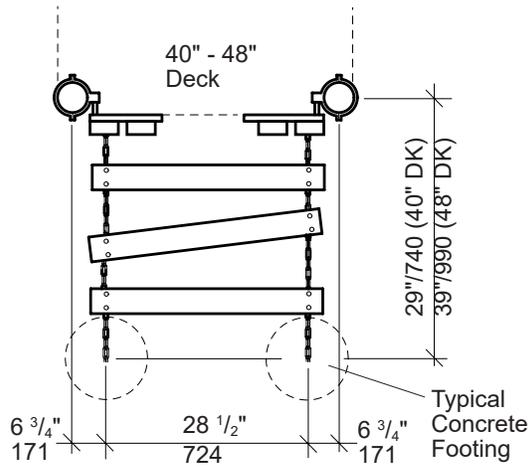
Installation Time: Approx. 3.5 man hours

Concrete: Approx. 2.6 cu. ft.

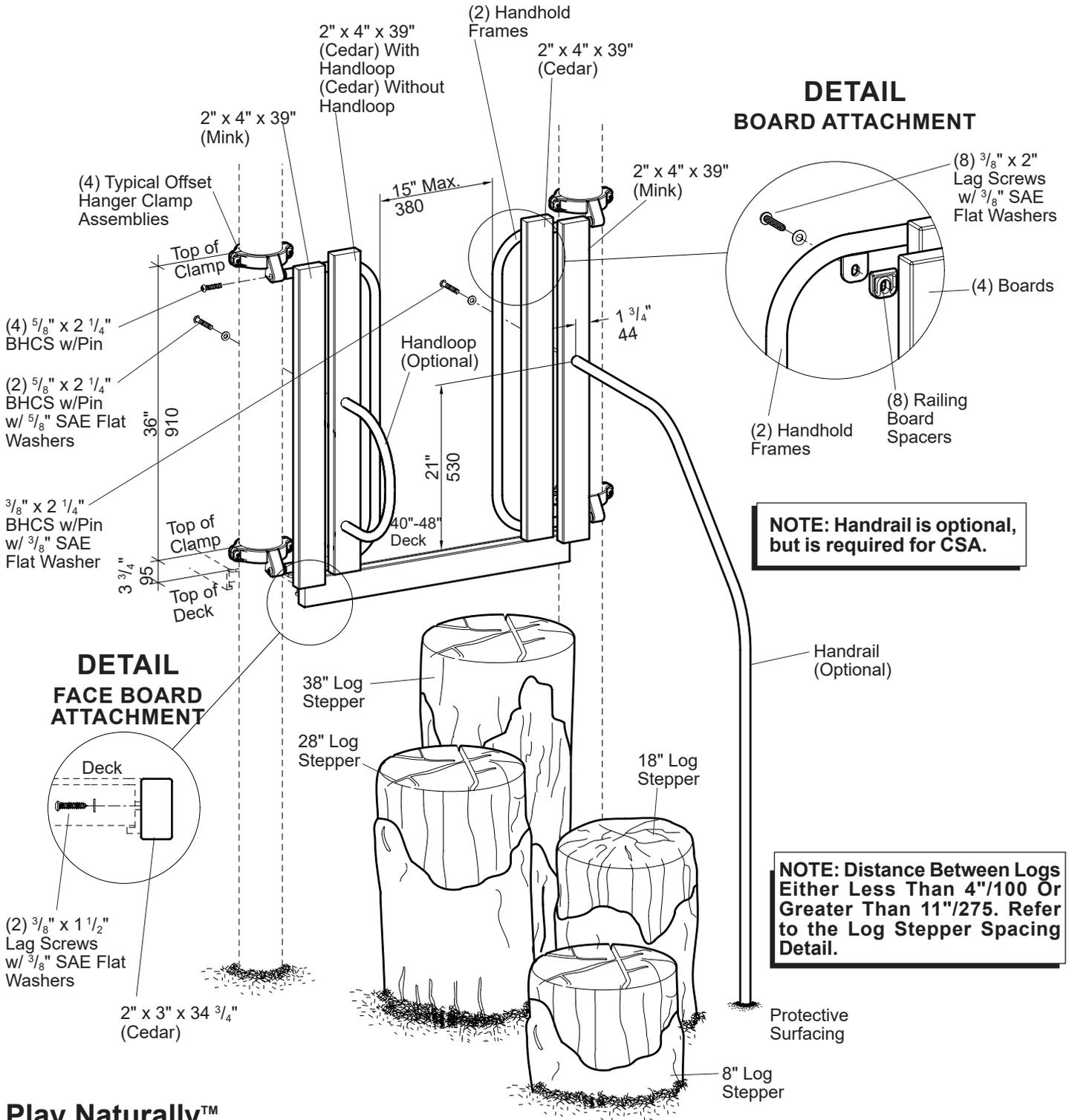
Weight: 79 lbs. (40" Deck)

79 lbs. (48" Deck)

PLAN VIEW/FOOTING LAYOUT



PlayBooster® 169318 Wood Wiggle Ladder, 40"-48" Deck



Play Naturally™

PlayBooster®

169320 Log Steppers, 40"-48"

Sheet 1 of 2

Parts List

Part#	Description	Qty.
100610	1/4" x 5/8" Drive Rivet, AL/SST.....	4
105327	5" Half Clamp, Specify Color.....	4
113729	Offset Hanger Clamp, Specify Color.....	4
165898	Handloop (Optional), Tan.....	1
169051	Handrail (Optional), Tan.....	1
168211	Handhold Frame, Tan.....	2
168467	2" x 4" x 39" Board, Cedar.....	1/2
168467	2" x 4" x 39" Board, Mink.....	2
168470	2" x 4" x 39" Handloop Board, Cedar.....	0/1
175267	2" x 3" x 34 3/4" Deck Face Board, Cedar.....	1
200691	8" Log Stepper (DB), Natural.....	1
200692	18" Log Stepper (DB), Natural.....	1
200693	28" Log Stepper (DB), Natural.....	1
200694	38" Log Stepper (DB), Natural.....	1
214729	Tree House HHold (PR) 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
100365	3/8" SAE Flat Washer, SST.....	16
139039	3/8" x 2" Lag Screw, SST.....	8
207485	Railing Board Spacer, Tan.....	8
169651	Recycled Deck FC/Kick Brd. Hardware Pkg.	1
100365	3/8" SAE Flat Washer, SST.....	4
168198	3/8" x 1 1/2" Lag Screw, SST.....	4
175291	Handloop Hardware Package (Optional)	1
100203	5/8" x 2 1/4" BHCS w/Pin, SST.....	2
129500	5/8" SAE Flat Washer, SST.....	2
175292	Tree House Handrail Hardware Pkg.(Optional)	1
100199	3/8" x 2 1/4" BHCS w/Pin, SST.....	1
100365	3/8" SAE Flat Washer, SST.....	1

DB = Direct Bury

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.

Poly Board: Recycled high-density polyethylene, cedar or mink in color.

Handloop: Weldment comprised of 1.125" O.D. x 11 GA (.120") steel tubing with 203 or 303 stainless steel inserts, with 5/8" internal thread. Finish: ProShield, tan in color.

Handrail: Weldment comprised of 1.315" O.D. RS20 (.080"-.090" wall) galvanized steel tube with 203 or 303 stainless steel inserts, with 5/8" internal thread. Finish: ProShield, tan in color.

Handhold Frame: Weldment comprised of 1.125" O.D. x 11 GA (.120") steel tubing with 203 or 303 stainless steel inserts, with 5/8" internal thread and 1/4" HRPO steel plate. Finish: ProShield, tan in color.

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. 5 man hours
Approx. 5 1/4 man hours (with handrail)

Concrete Req.: Approx. 7.12 cu. ft.
Approx. 8.42 cu. ft. (with handrail)

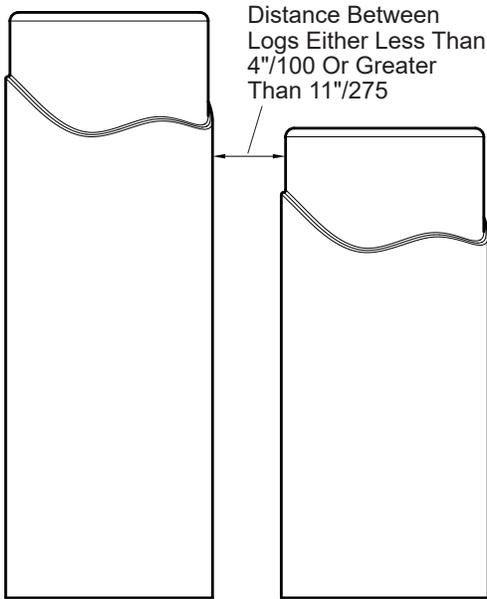
Weight: 1663 lbs.
1667 lbs. (with handloop)
1676 lbs. (with handrail)
1680 lbs. (with handloop & handrail)

Fall Height: Deck Height

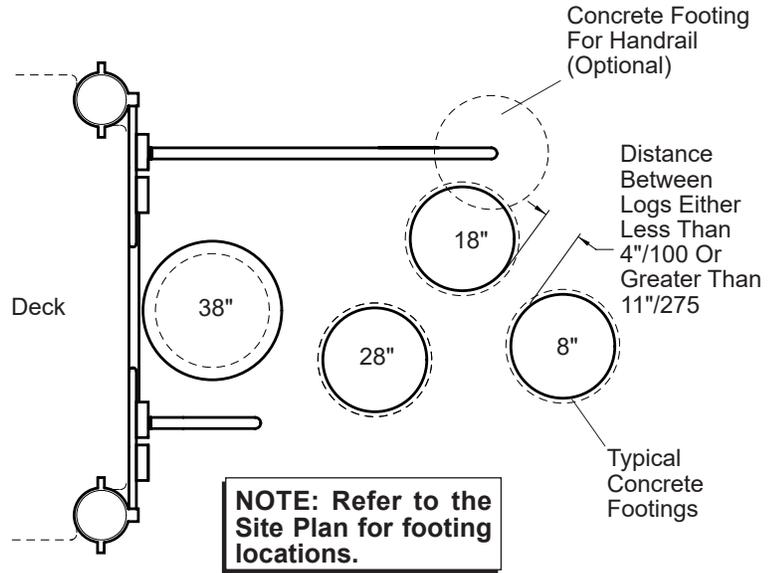
Installation Instructions

- (Direct Bury)** Dig footing holes as shown. Refer to the Plan View/Footing Layout.
- 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.
- Attach handhold frames to offset hanger clamps, using 5/8" x 2 1/4" BHCS w/pin.
- Line up pilot holes in boards with spacers and handhold frame tabs and attach, using 3/8" x 2" lag screws with 3/8" SAE flat washers. Refer to the Board Attachment Detail.
- Line up pilot holes in deck face board with holes in deck and attach, using 3/8" x 1 1/2" lag screws with 3/8" SAE flat washers. Refer to the Face Board Attachment Detail.
- (Optional Handloop) Attach handloop to handloop board, using 5/8" x 2 1/4" BHCS w/pin and 5/8" SAE flat washers.
- (Optional Handrail) Using a 1/4" drill bit, drill a pilot hole through board at dimensions shown. Use a 7/16" drill bit to drill through pilot hole. Attach handrail to board, using 3/8" x 2 1/4" BHCS w/pin and 3/8" SAE flat washer.
- 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.
- Install protective surfacing before users are allowed to play on the structure.
- NOTE: After installation if Touch-up/Repairs are needed to the concrete, contact Landscape Structures at 1-888-574-4678.**

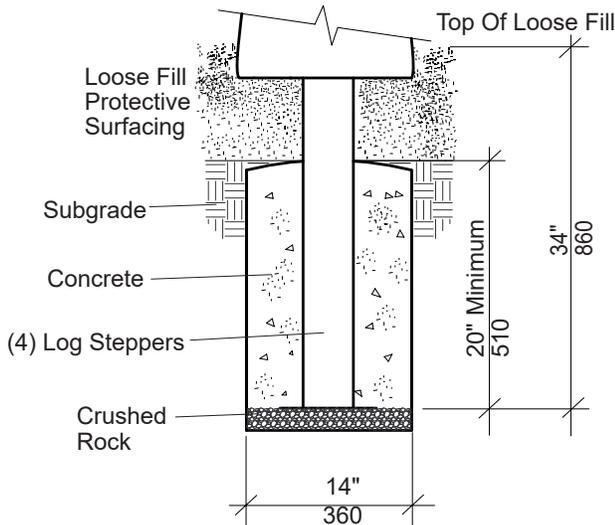
**DETAIL
 LOG STEPPER
 SPACING**



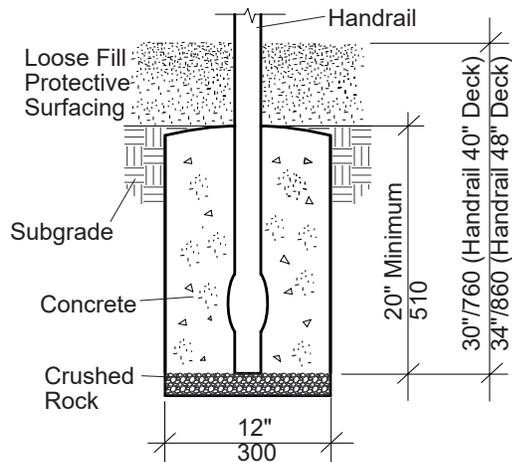
PLAN VIEW/FOOTING LAYOUT

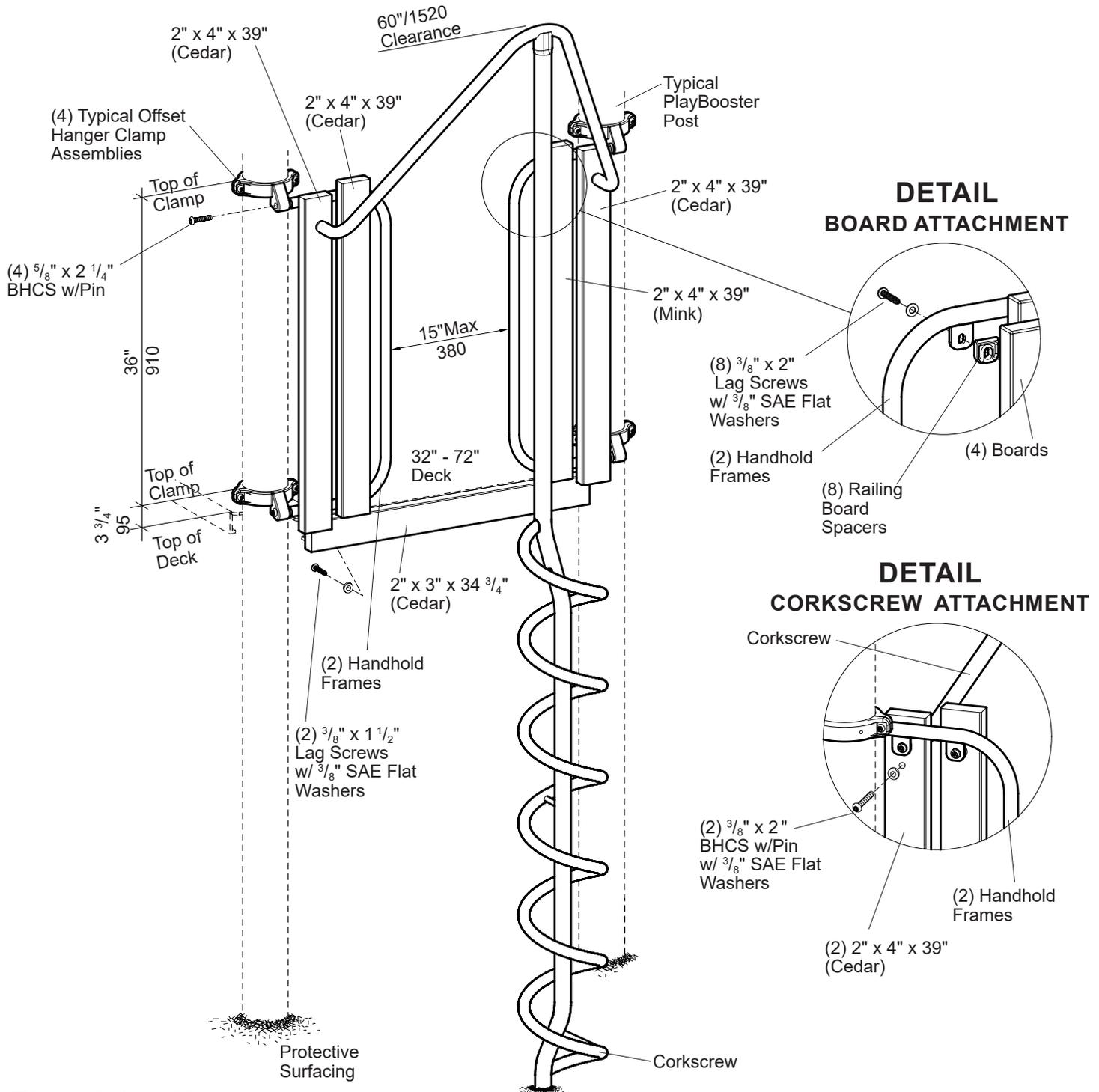


**DETAIL
 DIRECT BURY**



**DETAIL
 DIRECT BURY**





Play Naturally™

PlayBooster® 172666 Corkscrew, w/Recycled Wood GR. HHold

Sheet 1 of 2



PlayBooster® 172666 Corkscrew, w/Recycled Wood GR. H Holds

Parts List

Part#	Description	Qty.
100610	1/4" x 5/8" Drive Rivet, AL/SST	4
105327	5" Half Clamp, Specify Color	4
113729	Offset Hanger Clamp, Specify Color	4
147941	Corkscrew, 32" Deck (DB), Specify Color	1
147942	Corkscrew, 40" Deck (DB), Specify Color	1
147943	Corkscrew, 48" Deck (DB), Specify Color	1
146511	Corkscrew, 56" Deck (DB), Specify Color	1
146512	Corkscrew, 64" Deck (DB), Specify Color	1
146513	Corkscrew, 72" Deck (DB), Specify Color	1
146514	Corkscrew, 32" Deck (SM), Specify Color	1
146515	Corkscrew, 40" Deck (SM), Specify Color	1
146516	Corkscrew, 48" Deck (SM), Specify Color	1
146517	Corkscrew, 56" Deck (SM), Specify Color	1
146518	Corkscrew, 64" Deck (SM), Specify Color	1
146519	Corkscrew, 72" Deck (SM), Specify Color	1
168211	Handhold Frame, Tan	2
168467	2" x 4" x 39" Board, Cedar or Mink	2
168469	2" x 4" x 39" Firepole Board, Cedar	2
175267	2" x 3" x 34 3/4" Deck Face Board, Cedar	1
214694	Tree House Poles Hardware Package	1
100173	3/8" x 2" BHCS w/Pin, SST	2
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
100365	3/8" SAE Flat Washer, SST	12
139039	3/8" x 2" Lag Screw, SST	8
168198	3/8" x 1 1/2" Lag Screw, SST	2
207485	Railing Board Spacer, Tan	8
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

Installation Instructions

- (Direct Bury)** Dig footing hole as shown. Refer to the Plan View/Footing Layout.
 - 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.
 - Attach handhold frames to offset hanger clamps, using 5/8" x 2 1/4" BHCS w/Pin.
 - Line up pilot holes in boards with spacers and handhold frame tabs and attach, using 3/8" x 2" lag screws with 3/8" SAE flat washers. Refer to the Board Attachment Detail.
 - Line up pilot holes in deck face board with holes in deck and attach, using 3/8" x 1 1/2" lag screws with 3/8" SAE flat washers.
 - Attach corkscrew to corkscrew boards, using 3/8" x 2" BHCS w/pin with 3/8" SAE flat washers. Refer to the Corkscrew Attachment Detail.
 - (Direct Bury)** With corkscrew 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.
- Install protective surfacing before users are allowed to play on the structure.

Corkscrew: Weldment comprised of 1.900" O.D. RS-40 (.120" - .130") galvanized steel tubing, and 1.315" O.D. RS-20 (.080" - .090") galvanized steel tubing. Finish: ProShield®, color specified.

Poly Board: Recycled high-density polyethylene, cedar or mink in color.

Handhold Frame: Weldment comprised of 1.125" O.D. 11 GA. (.120") steel tubing with 203 or 303 stainless steel inserts, with 5/8" internal thread and 1/4" HRPO steel plate. Finish: ProShield, tan in color.

Clamps: Cast aluminum. Finish: ProShield, color specified.

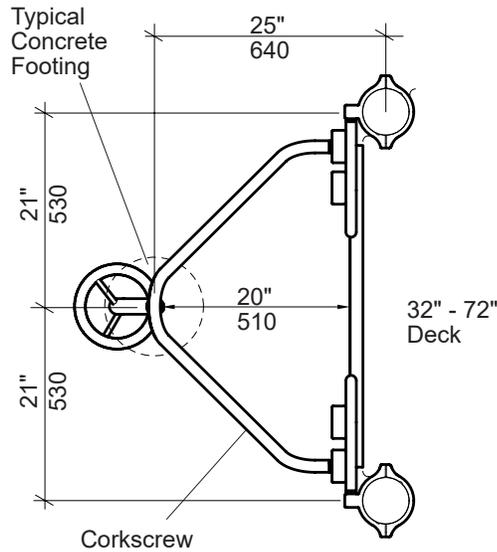
Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: SM - Approx. 1 1/2 man hours
DB - Approx. 2 man hours

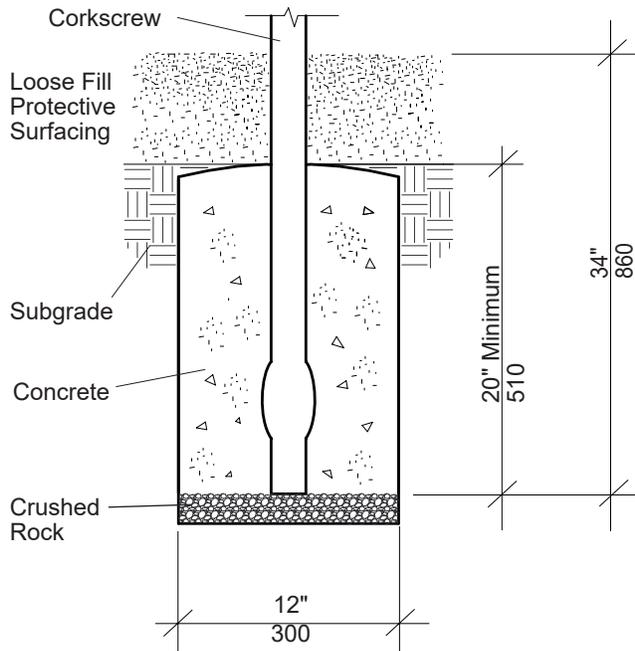
Concrete Req.: Approx. 1.3 cu. ft.
Weight: 97 lbs. (32"-48" Deck)
109 lbs. (56"-72" Deck)

Fall Height: Deck Height

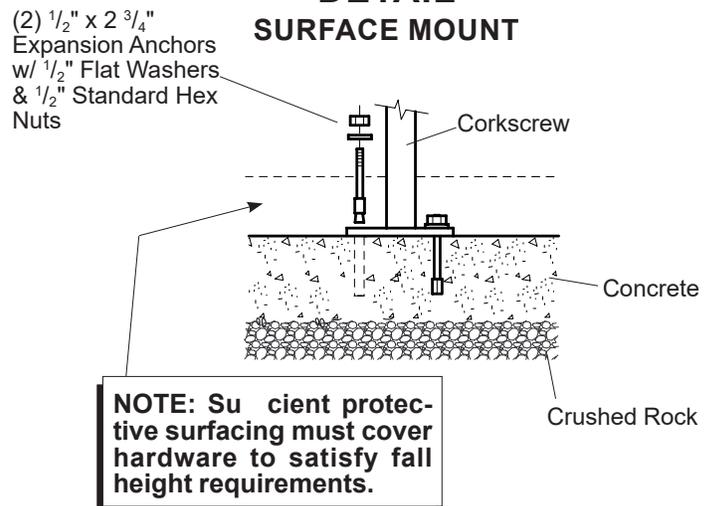
PLAN VIEW/FOOTING LAYOUT



DETAIL DIRECT BURY



DETAIL SURFACE MOUNT





NOTE: Deck and posts sold separately.

Play Naturally™

PlayBooster®

207581 The Ascent™ Rock

Sheet 1 of 5

**RECOMMENDED INSTALLATION TOOLS
 (NOT INCLUDED)**



PADDING FOR PROTECTION. ONLY NEEDED IF USING LIFTING STRAPS



COMPOSITE SHIMS FOR FINAL ROCK PLACEMENT



LINING UP THE ROCK WITH POSTS



INSTALL THE ROCKS WITH A TELEHANDLER. IN THE BASE OF EACH ROCK, THERE ARE ALIGNMENT CUT OUTS FOR EASE OF PLACING THE ROCKS. THE CUT OUTS ARE DESIGNED TO HELP LINE UP THE ROCKS WITH THE POSTS. USE THE CUT OUTS AS GUIDANCE FOR PROPER ROCK PLACEMENT.

STRAP LOCATIONS FOR LIFTING

THE ASCENT ROCK

USING THE PRY BAR FOR FINAL ROCK PLACEMENT

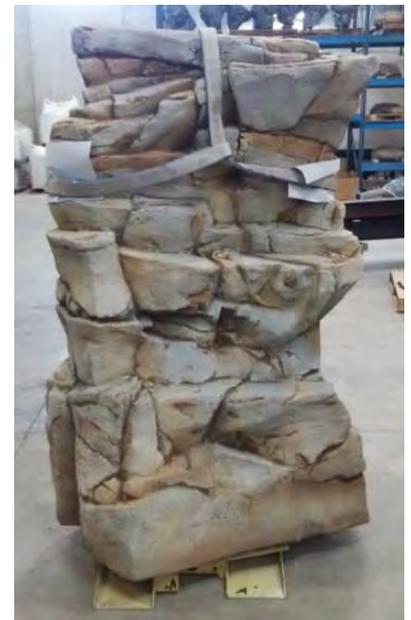


Correct



Incorrect

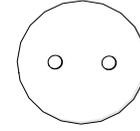
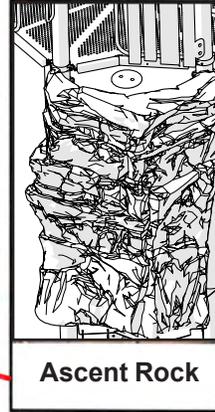
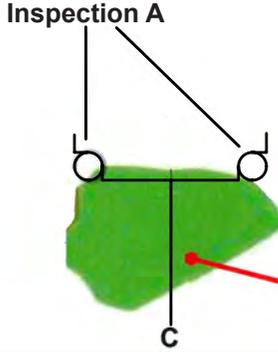
NOTE: When using pry bar, always use the steel baseplate as a contact point. Using the concrete only could damage the product.



ALWAYS USE FORK POCKETS FOR INSTALL. STRAPS SHOULD ONLY BE USED IF ROCKS ARE UNABLE TO BE PLACED USING THE FORK POCKETS. ALWAYS USE PADDING BETWEEN THE STRAPS AND ROCK FOR PROTECTION

POSITIONING INSPECTION

PERFORM THE INSPECTION TYPE IN THE AREAS IDENTIFIED BELOW.
SEE POSITIONING INSPECTION DESCRIPTION FOR DETAILS



Head template
9" Circle



Torso template
3.5" X 6.2"



WARNING

Failure to position rock panel correctly may result in serious injury.

POSITIONING INSPECTION DESCRIPTION

PRIOR TO SURFACING BEING INSTALLED, INSPECT OPENINGS TO VERIFY ROCKS ARE POSITIONED CORRECTLY



INSPECTION A

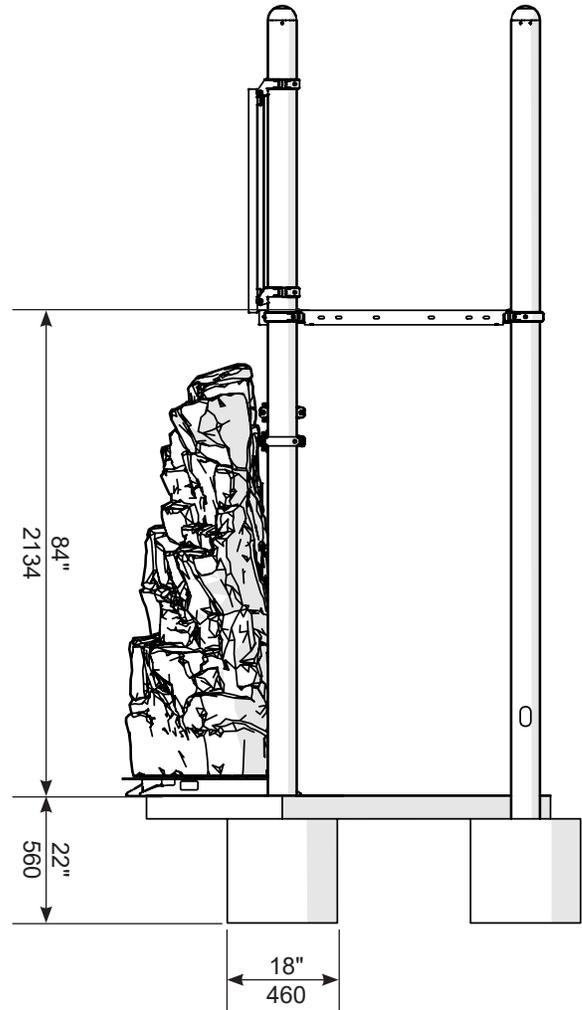
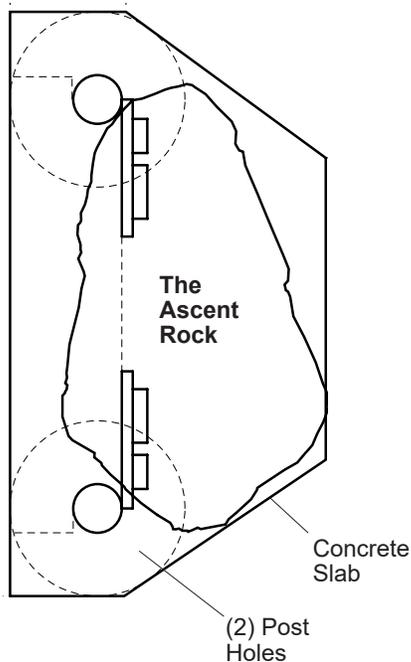
Place torso template between post and rock. (This inspection location is under deck, checking between post and rock) Template should be perpendicular to the opening.
Torso template shall not pass between post and rock.



INSPECTION C

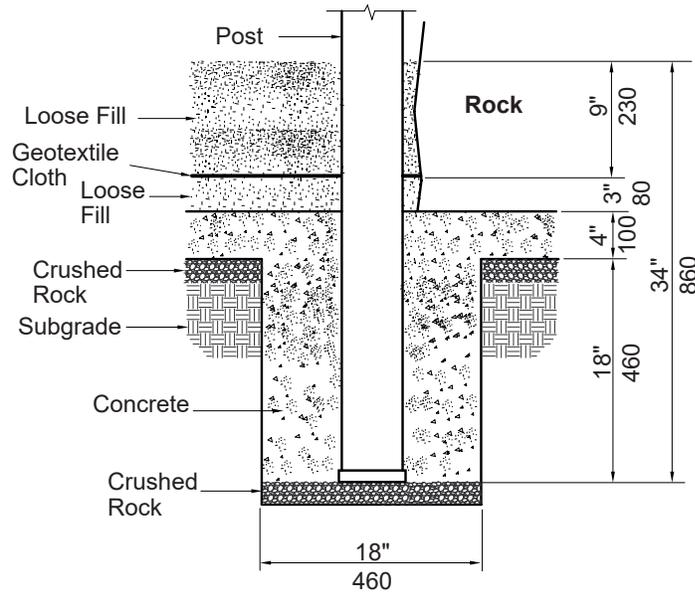
Place head template between deck and rock.
Template should be perpendicular to the opening.
Head template shall pass between deck and rock.

**DETAIL
CONCRETE SLAB DIMENSIONS**

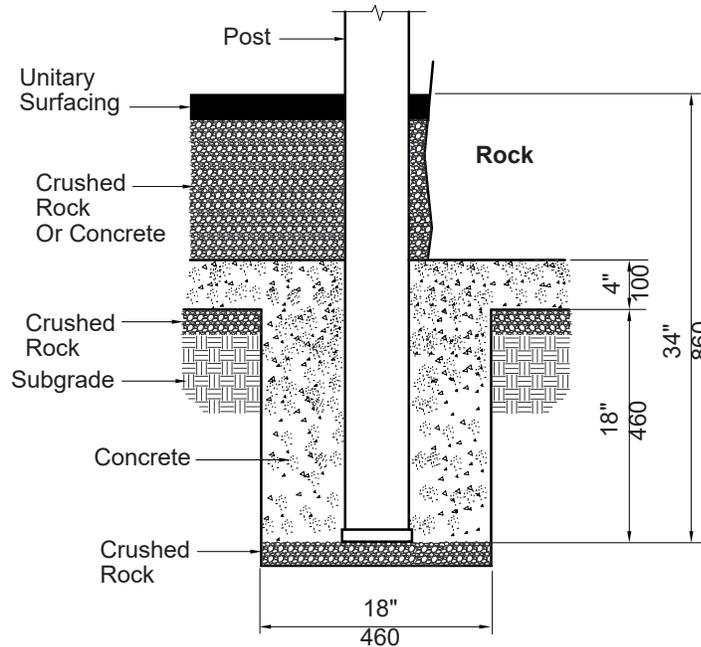


NOTE: Refer to Site Plan for footing & concrete slab locations.

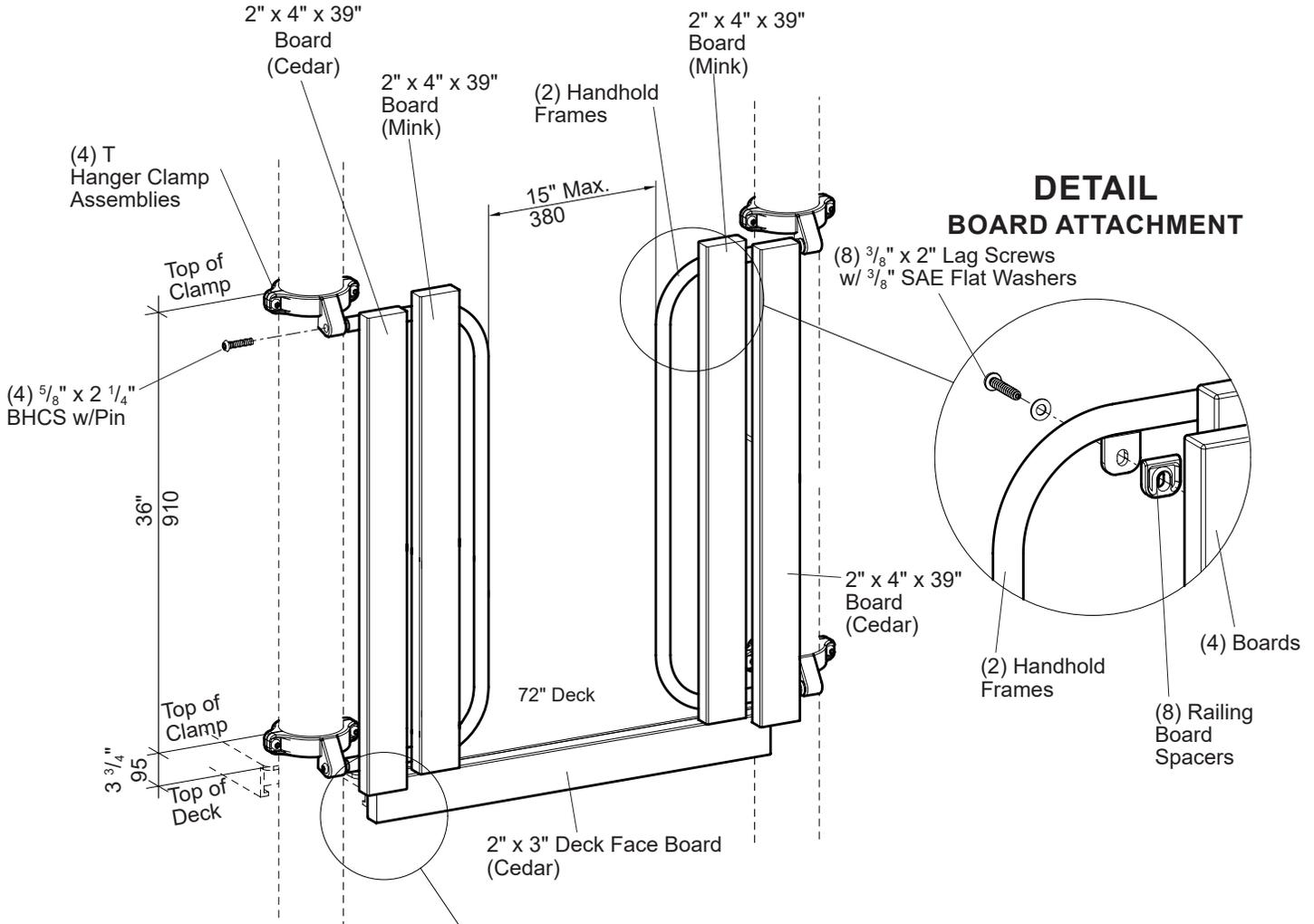
DETAIL
CONCRETE SLAB W/LOOSE FILL



DETAIL
CONCRETE SLAB W/POUR-IN PLACE

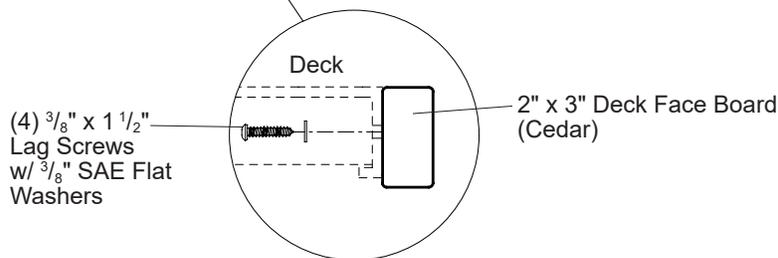


**DETAIL
FACE BOARD/HANDHOLD
ATTACHMENT**



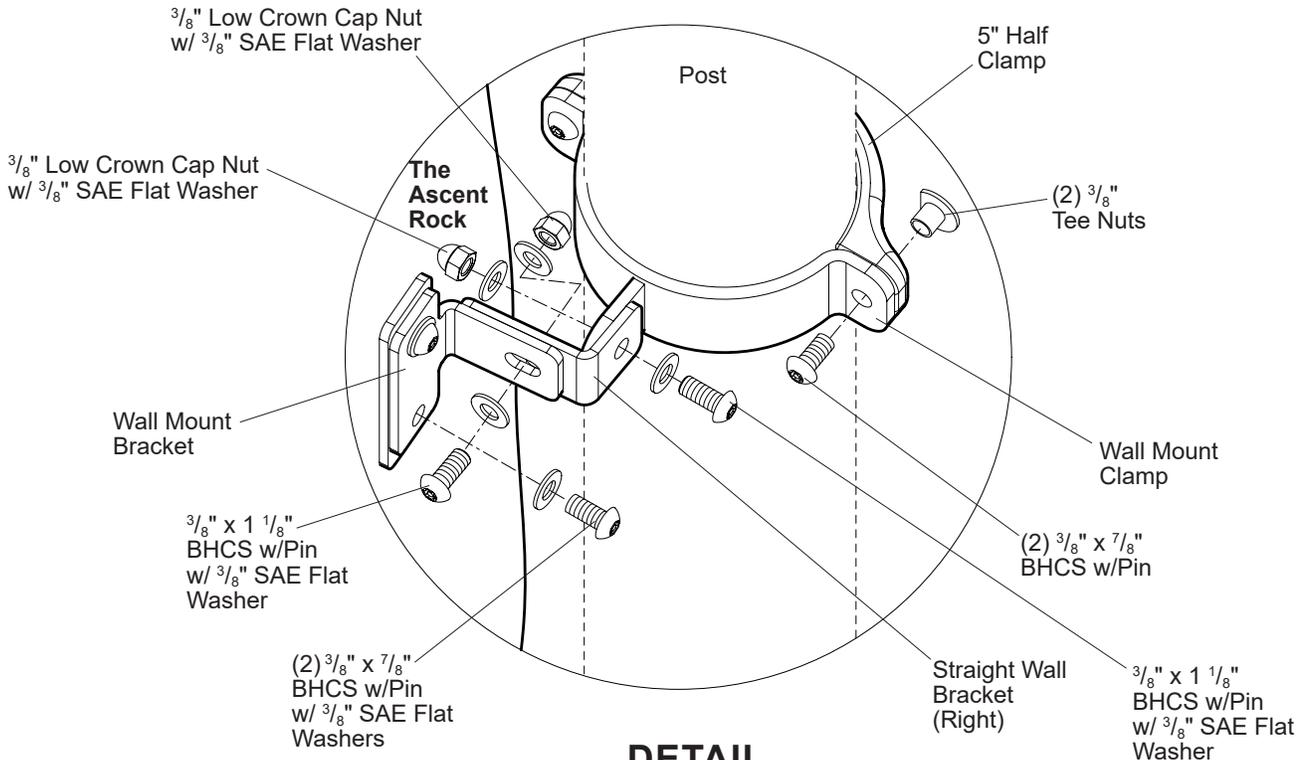
**DETAIL
BOARD ATTACHMENT**

**DETAIL
FACE BOARD
ATTACHMENT**

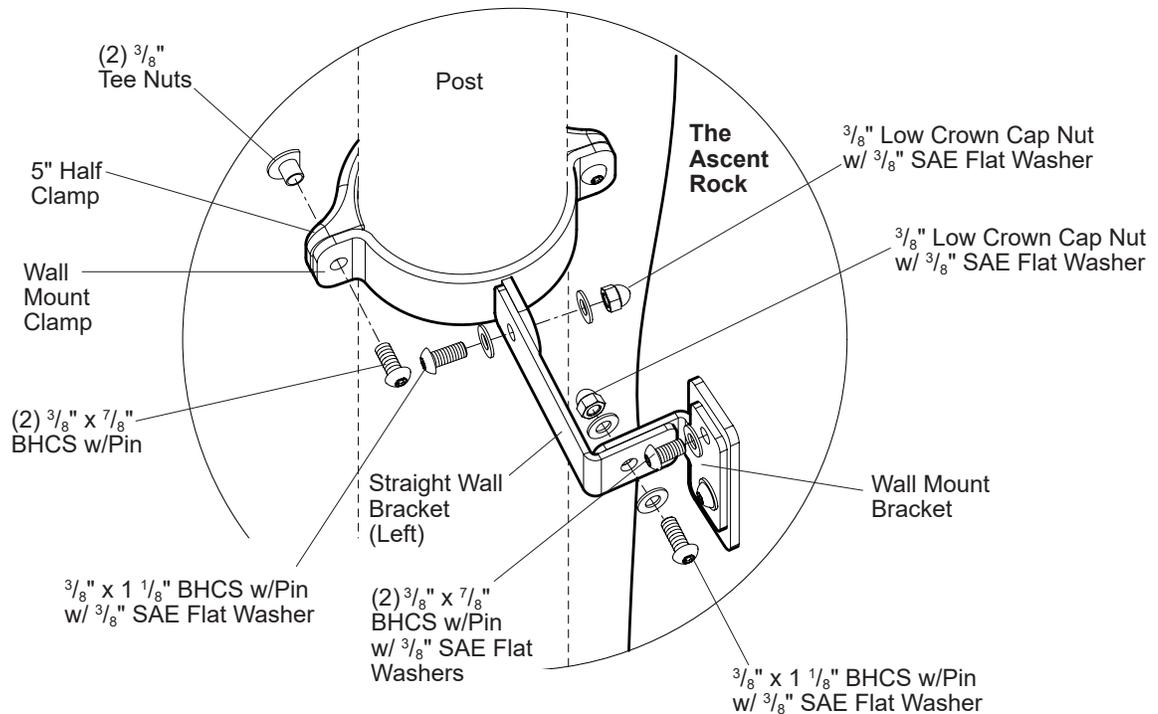


NOTE: Line up pilot holes in back of deck face board with holes in deck.

**DETAIL
STRAIGHT WALL BRACKET
(RIGHT)**



**DETAIL
STRAIGHT WALL BRACKET
(LEFT)**



Parts List

Part#	Description	Qty.
216289	The Ascent Rock, Natural Tree Color	1
105327	5" Half Clamp, Specify Color	6
113729	Offset Hanger Clamp, Specify Color.....	4
175267	2" x 3" Recycled Deck Face Board, Cedar.....	1
207485	Railing Board Spacer, Tan.....	8
206535	Wall Mount Bracket, Specify Color	2
206536	Wall Mount Clamp, Specify Color.....	2
207512	Straight Wall Bracket Left, Specify Color.....	1
207514	Straight Wall Bracket Right, Specify Color	1
168211	Handhold Frame, Tan	2
168467	2" x 4" x 39" Recycled Board, Cedar.....	2
168467	2" x 4" x 39" Recycled Board, Mink.....	2
100610	1/4" x 5/8" Drive Rivet, AL./SST.....	6
169651	Recycled Deck/Kick Board Hardware Pkg	1
100365	3/8" SAE Flat Washer, SST.....	4
168198	3/8" x 1 1/2" BH Lag Screw, SST.....	4
207877	Ascent Rock Clamp (Pair) Hardware Package	1
100196	3/8" x 7/8" BHCS w/Pin, SST	8
100351	3/8" Tee Nut, SST.....	4
100365	3/8" SAE Flat Washer, SST.....	12
100349	3/8" Low Crown Cap Nut, SST	4
100610	1/4" x 5/8" Drive Rivet, AL./SST	2
100198	3/8" x 1 1/8" BHCS w/Pin, SST	4
175287	Tree House Handhold (Pair) Hardware Pkg.	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
100365	3/8" SAE Flat Washer, SST.....	16
139039	3/8" x 2" BH Lag Screw, SST.....	8

Rock Panel: Weldment comprised of 5/8" (15,87 mm) & 3/4" (19,06 mm) rebar, 1/4" (6,35 mm) HRPO steel sheet and 7 GA. (.179") (4,55 mm) thick HRPO steel plate. Finish: ProShield®. **(Rock-fully assembled)** Wet cast solid pour concrete product. Finish: Latex paint made for concrete, natural colors.

Poly Board: Recycled high-density polyethylene, cedar or mink in color.

Handhold Frame: Weldment comprised of 1.125" (28,58 mm) O.D. 11 GA. (.120") (3,05 mm) steel tubing with 203 or 303 stainless steel inserts, with 5/8" (15,87 mm) internal threads, and 1/4" (6,35 mm) HRPO steel sheet. Finish: ProShield®, tan in color.

Spacer Tube: Made from 1 1/8" (28,57 mm) O.D. 6061-T6 aluminum tube. Finish: ProShield®, tan in color.

Wall Mount Brkt.: Fabricated from 7 GA. (.179") (4,55 mm) thick HRPO steel plate. Finish: ProShield®, color specified.

Straight Wall Brkt.: Fabricated from 7 GA. (.179") (4,55 mm) thick HRPO steel plate. Finish: ProShield®, color specified.

Wall Mount Clamp: Weldment comprised of 1/4" (6,35 mm) HRPO steel plate. Finish: ProShield®, color specified.

Clamp: 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

Fall Height: 72" (1,83 m)

Concrete: Approx. 9.12 cu. ft.

Weight: 2892 lbs.

Installation Instructions

1) **(Direct Bury)** Dig footing holes and build frame for concrete slab. Refer to Direct Bury Detail and Site Plan.

Warning: Never crawl under any part of the Rock Panels - especially when it is only supported by a forklift.

2) With posts plumb and deck level, pour concrete footings and slab. **NOTE: Concrete slab must be level. Top of the concrete slab must be 84" to the top of the deck.**

3) Allow concrete to cure a minimum of 24 hours before placing Rock Panel on concrete slab.

4) To unload a Rock Panel a "Lull" type material handler with at least an 8000 lb. capacity is recommended. **NOTE: At least 2 people are recommended for Rock Panel installation. One person to operate the material handling equipment and one person to spot for the operator.**

5) Pick up the Rock Panel by inserting the material handling forks into the forklift pockets. Be very careful to keep the Rock Panel level to the ground when raising or lowering. Do not tip the Rock Panel on a corner or edge. Do not contact the concrete face of the Rock Panel with material handler forks, chipping can occur. Refer to the Site Plan for proper orientation.

6) Attach Rock Panel to posts. Refer to the Wall Bracket Details. Check spaces for head and torso entrapments, shim if needed.

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 handhold frames to offset hanger clamps, using 5/8" x 2 1/4" BHCS w/pin.

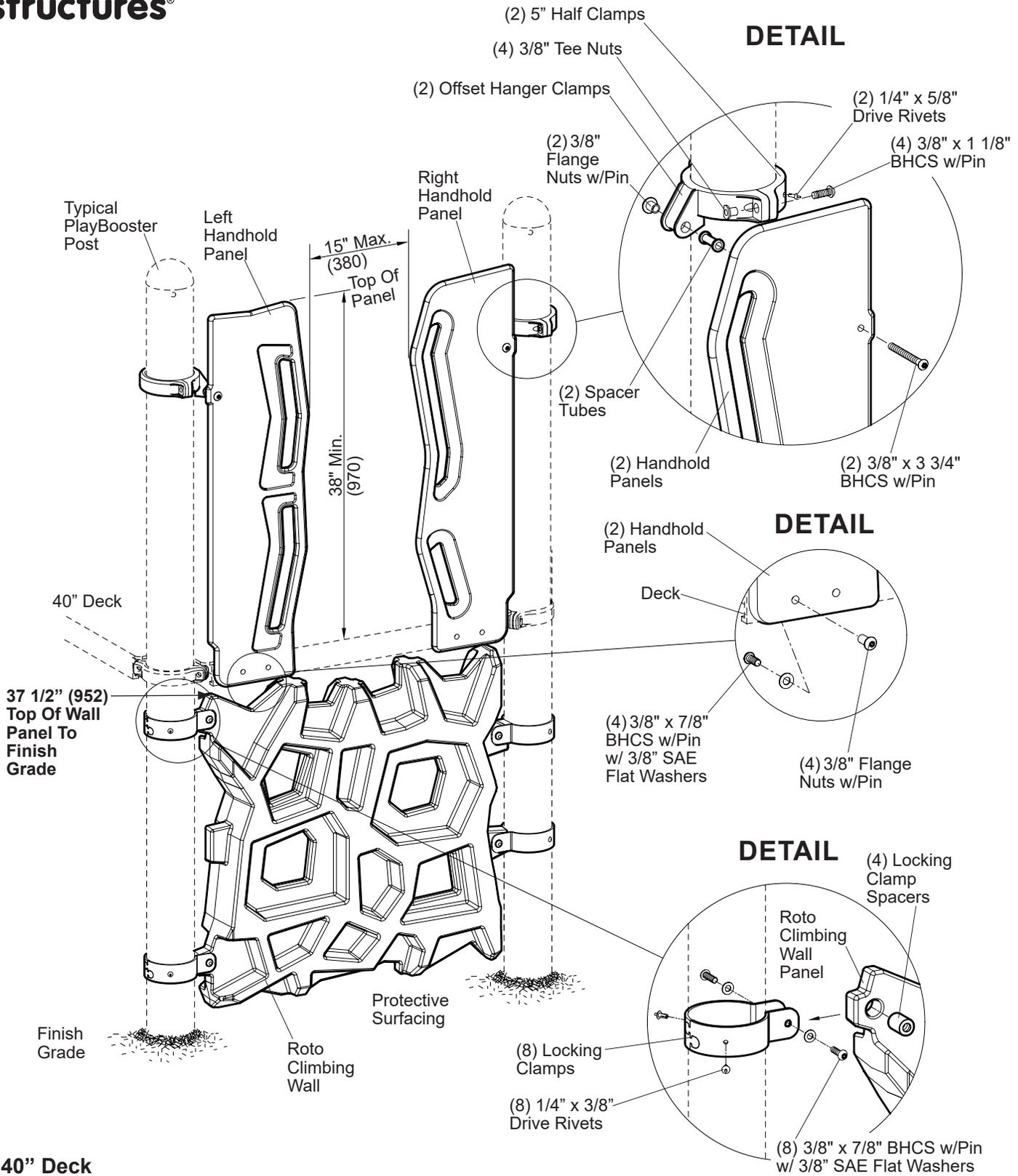
9) Line up pilot holes in boards with spacers and handhold frame tabs and attach, using 3/8" x 2" lag screws with 3/8" SAE flat washers. Refer to the Board Attachment Detail.

10) Line up pilot holes in deck face board with holes in deck and attach, using 3/8" x 1 1/2" lag screws with 3/8" SAE flat washers. Refer to the Face Board Attachment Detail. Check spaces for head and torso entrapments, shim if needed.

11) Install 1/4" x 5/8" drive rivets in all 5" half clamps. Refer to the Typical Offset Hanger Clamp Spec Sheet.

12) Install protective surfacing before users are allowed to play on the structure.

13) **NOTE: After installation if Touch-up/Repairs are needed, contact Landscape Structures at 1-888-574-4678.**



40" Deck
PB219509A-001

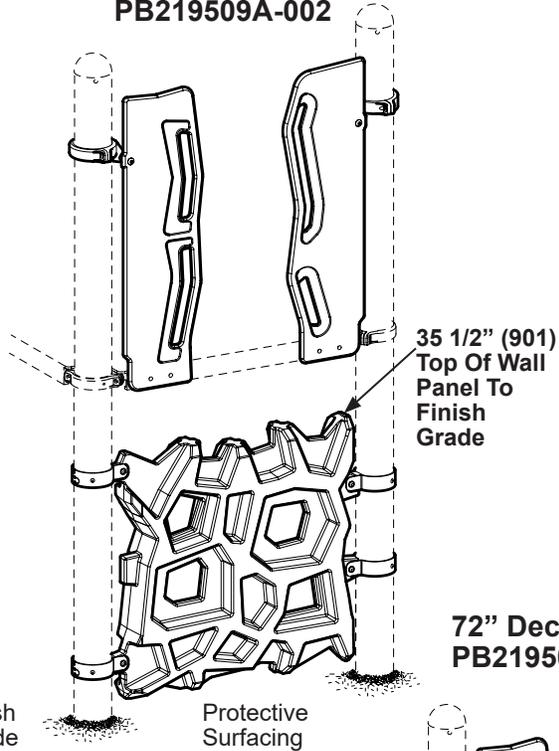
Part#	Description	Qty.
40", 48", 56" Deck Heights		
100611	1/4" x 3/8" Drive Rivet, AL./SST	8
100610	1/4" x 5/8" Drive Rivet, AL./SST	2
105327	5" Half Clamp, Specify Color	2
113729	Offset Hanger Clamp, Specify Color	2
113468	7/8" O.D. x 1 11/16" Spacer Tube, AL.,Specify Color ..	2
218734	Left Handhold Panel, Specify Color	1
218735	Right Handhold Panel, Specify Color	1
215288	Roto Climbing Wall Panel, Specify Color.....	1
218924	Locking Clamp, Specify Color.....	8
139861	Handhold Hardware Package	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
124460	3/8" x 3 3/4" BHCS w/Pin, SST.....	2
221222	Roto Molded Wall Hardware Package	1
100196	3/8" x 7/8" BHCS w/Pin, SST.....	8
100365	3/8" SAE Flat Washer, SST.....	8
215287	Locking Clamp Spacer, Aluminum	4
72" Deck Height		
100611	1/4" x 3/8" Drive Rivet, AL./SST	16
100610	1/4" x 5/8" Drive Rivet, AL./SST	2
105327	5" Half Clamp, Specify Color	2
113729	Offset Hanger Clamp, Specify Color	2
113468	7/8" O.D. x 1 11/16" Spacer Tube, AL.,Specify Color ..	2
218734	Left Handhold Panel, Specify Color	1
218735	Right Handhold Panel, Specify Color	1
215288	Roto Climbing Wall Panel, Specify Color.....	2
218924	Locking Clamp, Specify Color.....	16
139861	Handhold Hardware Package	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
124460	3/8" x 3 3/4" BHCS w/Pin, SST.....	2
221222	Roto Molded Wall Hardware Package	2
100196	3/8" x 7/8" BHCS w/Pin, SST.....	16
100365	3/8" SAE Flat Washer, SST.....	16
215287	Locking Clamp Spacer, Aluminum	8

Handhold Panel:	Recycled Permalene®, color specified.
Spacer Tube:	Made from 6061-T6 aluminum 7/8" (22,22 mm) O.D. x 1 11/16" (46,02 mm). Finish: ProShield®, color specified.
Locking Clamp:	Fabricated from 7GA. (.179")(4,54 mm) stainless steel. Finish: ProShield®, color specified.
Climbing Wall:	Rotationally molded from U.V. stabilized linear low density polyethylene, color specified. Wall measures 37" (939 mm) wide x 34" (863 mm) high.
Clamp:	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 1/4 labor hours (40/48/56" Decks) Approx. 3 labor hours (72" Deck)
Weight:	64 lbs. (40", 48", 56" Deck Height) 101 lbs. (72" Deck Height)
Fall Height:	Deck Height

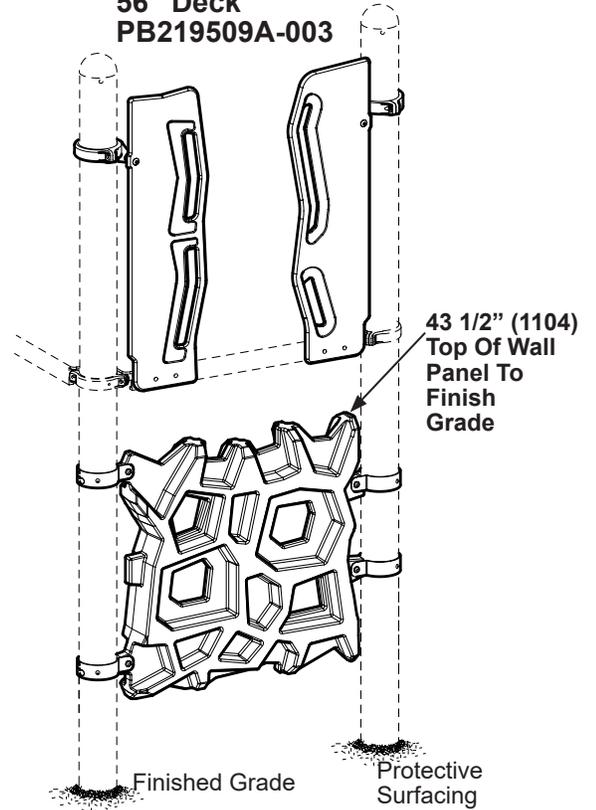
Installation Instructions

- 1) Attach handhold panels to the face of the deck. See Detail.
- 2) Attach panels to offset hanger clamp assemblies & posts. See Detail.
- 3) Attach roto molded wall panel to posts at height shown. See Detail.
- 4) Install 1/4" x 5/8" drive rivets in 5" half clamps. Drill through clamp and into 5" post with a 1/4" or "F" (only) drill bit, insert drive rivet in hole through clamp and into post. Hammer drive rivet pin in until flush with head.
- 5) Install 1/4" x 3/8" drive rivets in locking clamps. Drill through locking clamp and into 5" post with a 1/4" or "F" (only) drill bit, insert drive rivet in hole through clamp and into post. Hammer drive rivet pin in until flush with head.
- 6) Install protective surfacing before users are allowed to play on the structure.

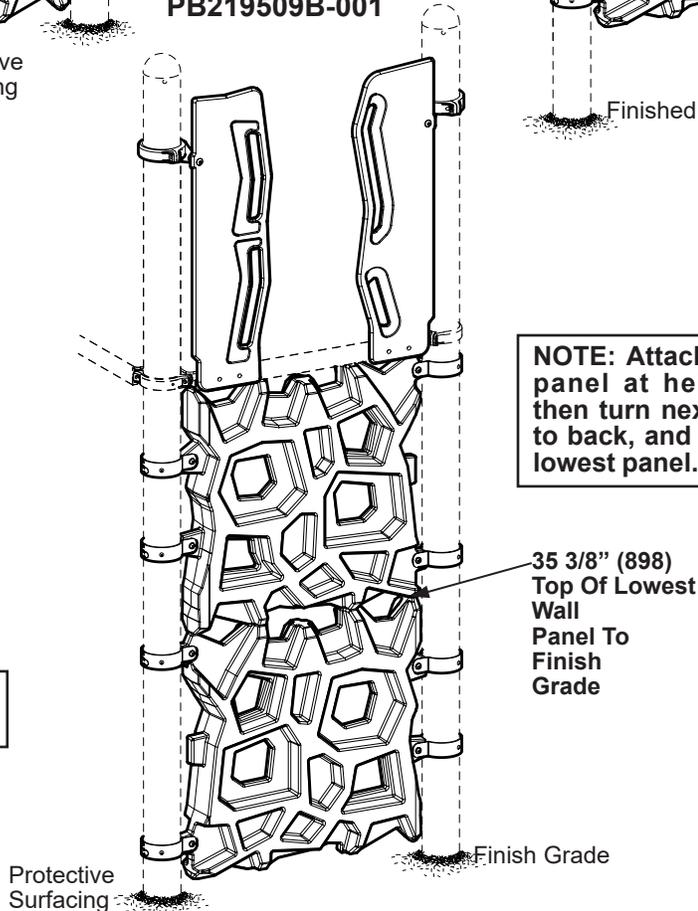
48" Deck
PB219509A-002



56" Deck
PB219509A-003

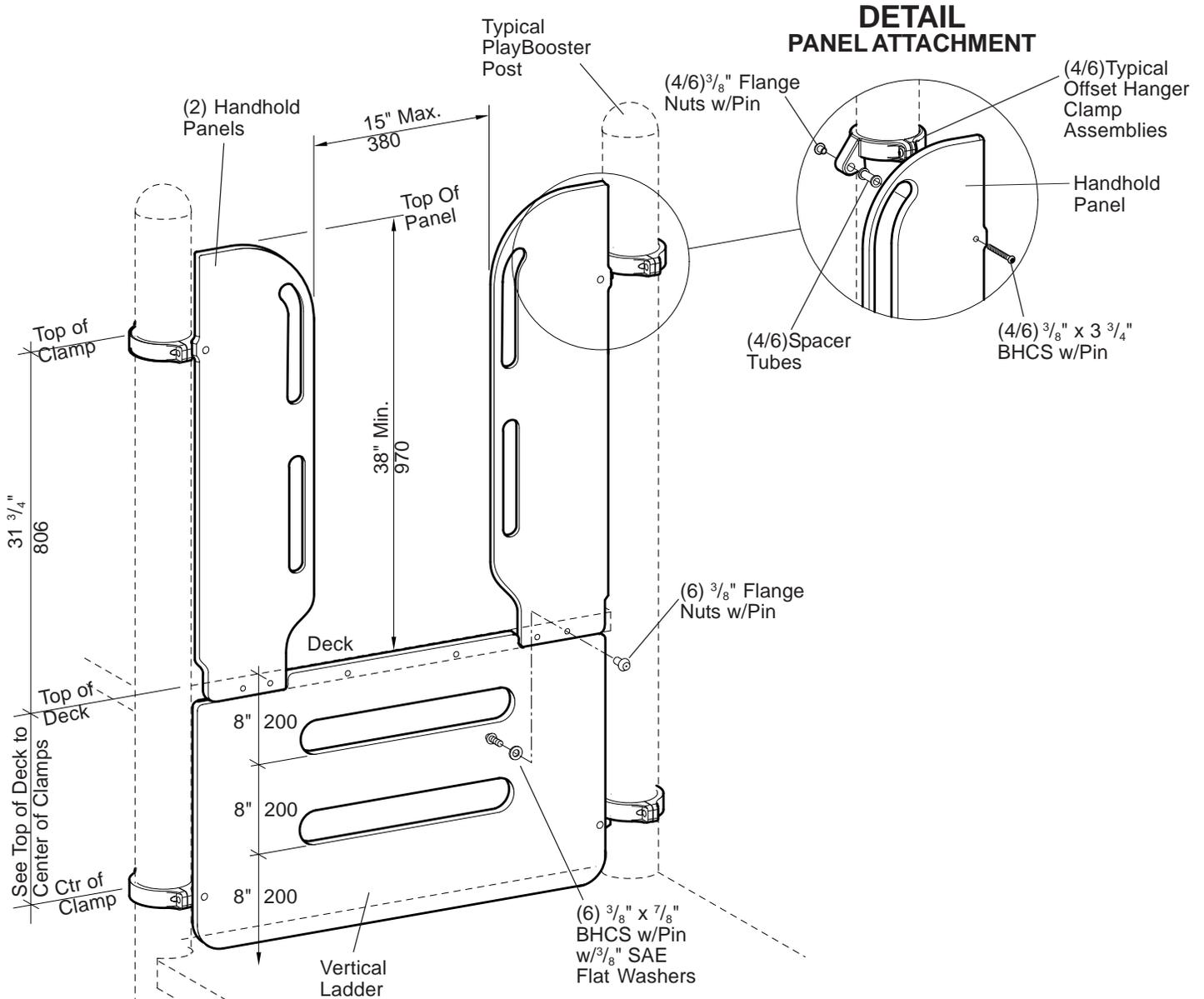


72" Deck
PB219509B-001



NOTE: Attach lowest wall panel at height shown, then turn next panel front to back, and set on top of lowest panel.

NOTE: Refer to sheet 1 for Installation Details.



Top of Deck to Center of Clamps

- 24" Deck - 19" /480 (Shown)
- 32" Deck - 27" /710
- 40" Deck - 35" /890
- 48" Deck - 23 1/4" /591
- 43" /1090
- 56" Deck - 26" /660
- 51" /1300
- 64" Deck - 31 1/4" /794
- 59" /1500
- 72" Deck - 34" /860
- 67" /1700

Parts List

Part#	Description	Qty.
142120	24" Vertical Ladder Panel, Specify Color	1
142119	32" Vertical Ladder Panel, Specify Color	1
142118	40" Vertical Ladder Panel, Specify Color	1
142117	48" Vertical Ladder Panel, Specify Color	1
142116	56" Vertical Ladder Panel, Specify Color	1
142115	64" Vertical Ladder Panel, Specify Color	1
142114	72" Vertical Ladder Panel, Specify Color	1
139563	Handhold Panel, Specify Color	2
105327	5" Half Clamp, Specify Color	4/6
113729	Offset Hanger Clamp, Specify Color	4/6
113468	Spacer Tube, Specify Color	4/6
100198	$\frac{3}{8}$ " x 1 $\frac{1}{8}$ " BHCS w/Pin, SST	8/12
100351	$\frac{3}{8}$ " Tee Nut, SST	8/12
139914	(24" through 40") Tenderdeck Hardware Pkg. . 1	
124460	$\frac{3}{8}$ " x 3 $\frac{3}{4}$ " BHCS w/Pin, SST	4
100196	$\frac{3}{8}$ " x $\frac{7}{8}$ " BHCS w/Pin, SST	6
100353	$\frac{3}{8}$ " Flange Nut w/Pin, SST	10
100365	$\frac{3}{8}$ " SAE Flat Washer, SST	6
139915	(48" through 72") Tenderdeck Hardware Pkg. . 1	
124460	$\frac{3}{8}$ " x 3 $\frac{3}{4}$ " BHCS w/Pin, SST	6
100196	$\frac{3}{8}$ " x $\frac{7}{8}$ " BHCS w/Pin, SST	6
100353	$\frac{3}{8}$ " Flange Nut w/Pin, SST	12
100365	$\frac{3}{8}$ " SAE Flat Washer, SST	6

Specifications

HandholdPanel/

Vertical Ladder: Solid color Permalene®, color specified.

Spacer Tube: Made from 6061-T6 aluminum $\frac{7}{8}$ " O.D. x 1 $\frac{11}{16}$ ".
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: 24"-40" - Approx. 1 $\frac{1}{4}$ man hour

48"-72" - Approx. 1 $\frac{1}{2}$ man hour

Weight: 24" Vertical Ladder - 40 lbs.

32" Vertical Ladder - 48 lbs.

40" Vertical Ladder - 54 lbs.

48" Vertical Ladder - 63 lbs.

56" Vertical Ladder - 68 lbs.

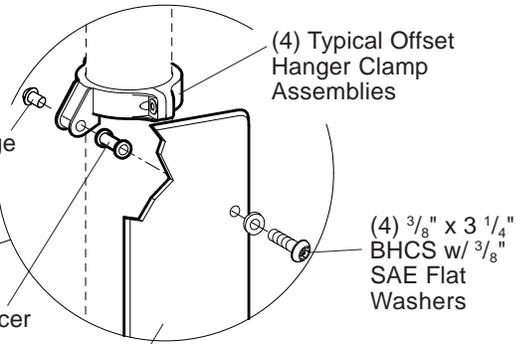
64" Vertical Ladder - 75 lbs.

72" Vertical Ladder - 81 lbs.

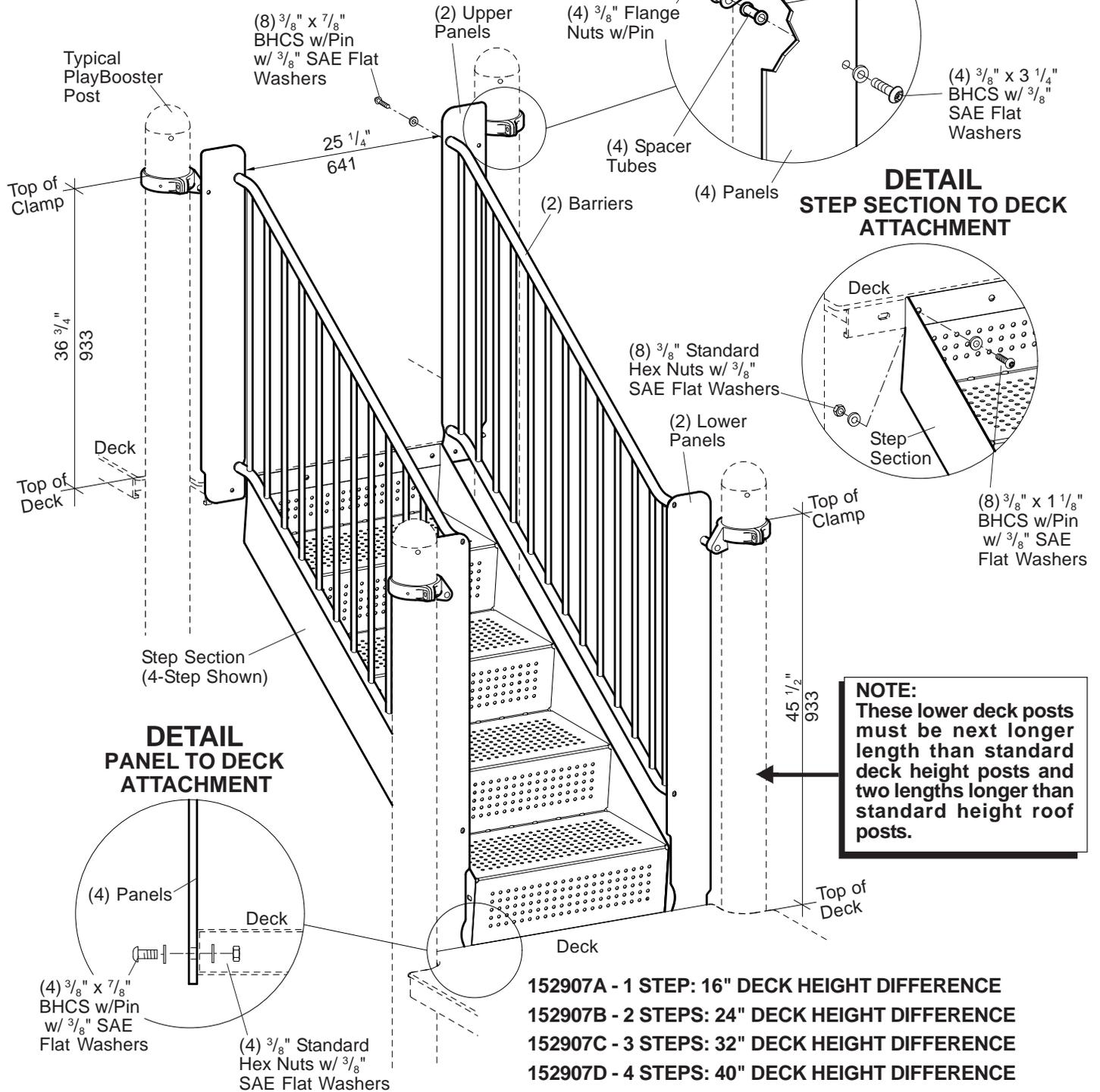
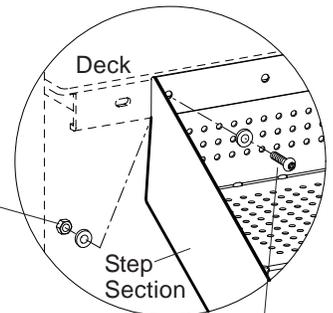
Installation Instructions

- 1) Attach vertical ladder and handhold panels to the face of the deck using $\frac{3}{8}$ " x $\frac{7}{8}$ " BHCS w/pin with $\frac{3}{8}$ " SAE flat washers and $\frac{3}{8}$ " flange nuts w/pin, as shown.
- 2) Attach offset hanger clamps to posts at heights shown. Using half clamps and $\frac{3}{8}$ " x 1 $\frac{1}{8}$ " BHCS w/pin with $\frac{3}{8}$ " tee nuts. Refer To The Typical Offset Hanger Clamp Spec Sheet.
- 3) Using a $\frac{3}{8}$ " drill bit, drill out the lower set of $\frac{1}{8}$ " pilot holes in ladder. **NOTE:** *If there is a clamp conflict using the holes in this position, drill out and use the upper set of holes instead.*
- 4) Attach vertical ladder and handhold panels to the offset hanger clamp assemblies using $\frac{3}{8}$ " x 3 $\frac{3}{4}$ " BHCS w/pin, spacer tubes and $\frac{3}{8}$ " flange nuts w/pin. See Panel Attachment Detail.
- 5) Install protective surfacing before users are allowed to play on the structure.

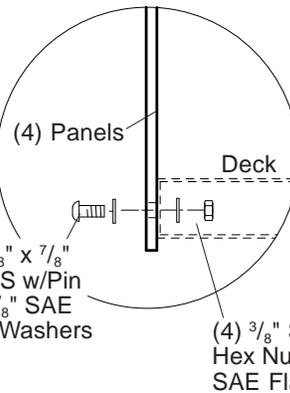
**DETAIL
PANEL TO CLAMP
ATTACHMENT**



**DETAIL
STEP SECTION TO DECK
ATTACHMENT**



**DETAIL
PANEL TO DECK
ATTACHMENT**



NOTE:
These lower deck posts must be next longer length than standard deck height posts and two lengths longer than standard height roof posts.

- 152907A - 1 STEP: 16" DECK HEIGHT DIFFERENCE
- 152907B - 2 STEPS: 24" DECK HEIGHT DIFFERENCE
- 152907C - 3 STEPS: 32" DECK HEIGHT DIFFERENCE
- 152907D - 4 STEPS: 40" DECK HEIGHT DIFFERENCE

Parts List

Part#	Description	Qty.
144696	1-Step Section, Specify Color	1
144698	2-Step Section, Specify Color	1
144700	3-Step Section, Specify Color	1
144702	4-Step Section, Specify Color	1
144703	1-Step Barrier, Specify Color	2
144705	2-Step Barrier, Specify Color	2
144707	3-Step Barrier, Specify Color	2
144709	4-Step Barrier, Specify Color	2
153896	Lower Panel, Specify Color	2
153895	Upper Panel, Specify Color	2
113468	Spacer Tube, Specify Color	4
100610	1/4" x 5/8" Drive Rivet, AL/SST	4
105327	5" Half Clamp, Specify Color	4
113729	Offset Hanger Clamp, Specify Color	4
156283	Deck Link Barr/Hrail Hardware Package	1
100168	3/8" x 3 1/4" BHCS, SST	4
100196	3/8" x 7/8" BHCS w/Pin, SST	12
100198	3/8" x 1 1/8" BHCS w/Pin, SST	16
100327	3/8" Standard Hex Nut, SST	12
100351	3/8" Tee Nut, SST	8
100353	3/8" Flange Nut w/Pin, SST	4
100365	3/8" SAE Flat Washer, SST	36

Specifications

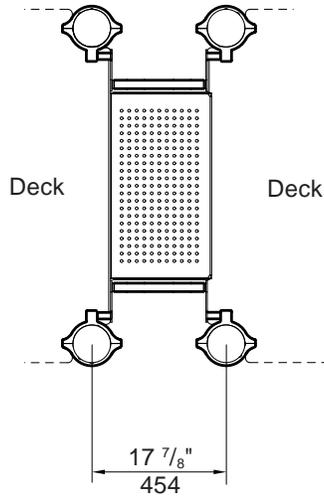
Panels:	Zinc plated 7 GA. (.179") HR flat steel. Finish: ProShield®, color specified.
Step Section:	Formed from 12 GA (.105) sheet steel conforming to ASTM A1011. Standing surface is 24 3/8" wide x 14" deep and is perforated with 5/16" diameter holes. Finish: TenderTuff, color specified.
Barrier:	Weldment comprised of 1.125" O.D. x 11 Ga. (.120" wall) steel tubing, 5/8" O.D. steel bar with 203 or 303 stainless steel inserts with 3/8" internal threads. Finish: TenderTuff, 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:	Approx. 1 1/2 man hours
Weight:	1-Step - 130 lbs. 2-Step - 182 lbs. 3-Step - 236 lbs. 4-Step - 296 lbs.
Fall Height:	Deck Height

Installation Instructions

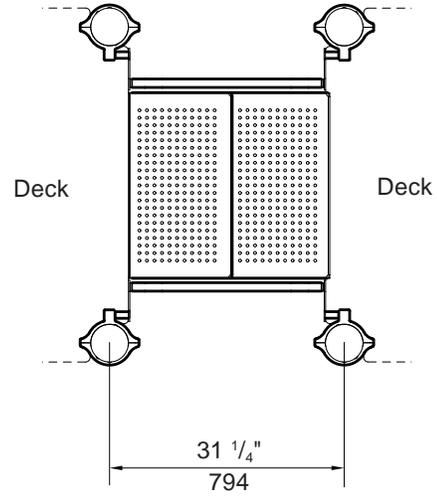
- 1) Attach step section to decks using 3/8" x 1 1/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" standard hex nuts with 3/8" SAE flat washers, as shown. Refer to the Step Section To Deck Attachment Detail.
- 2) Attach upper and lower panels to the face of the deck using 3/8" x 7/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" standard hex nuts with 3/8" SAE flat washers. Refer to the Panel to Deck 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 with 3/8" tee nuts. Refer to the Typical Offset Hanger Clamp Spec Sheet.
- 4) Attach upper and lower panels to offset hanger clamps using 3/8" x 3 1/4" BHCS with 3/8" SAE flat washers, spacer tubes and 3/8" flange nuts w/pin. Refer to the Panel To Clamp Attachment Detail.
- 5) Attach barriers to upper and lower panels using 3/8" x 7/8" BHCS w/pin and 3/8" SAE flat washers, as shown.
- 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.

PLAN VIEW/FOOTING LAYOUTS

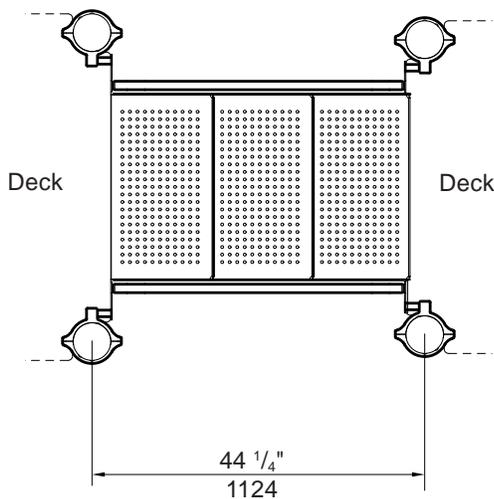
FOOTINGS/ 1-STEP



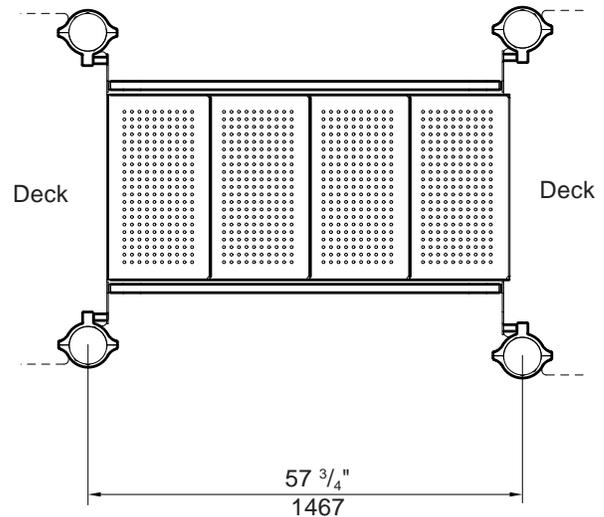
FOOTINGS/ 2-STEP



FOOTINGS/ 3-STEP



FOOTINGS/ 4-STEP



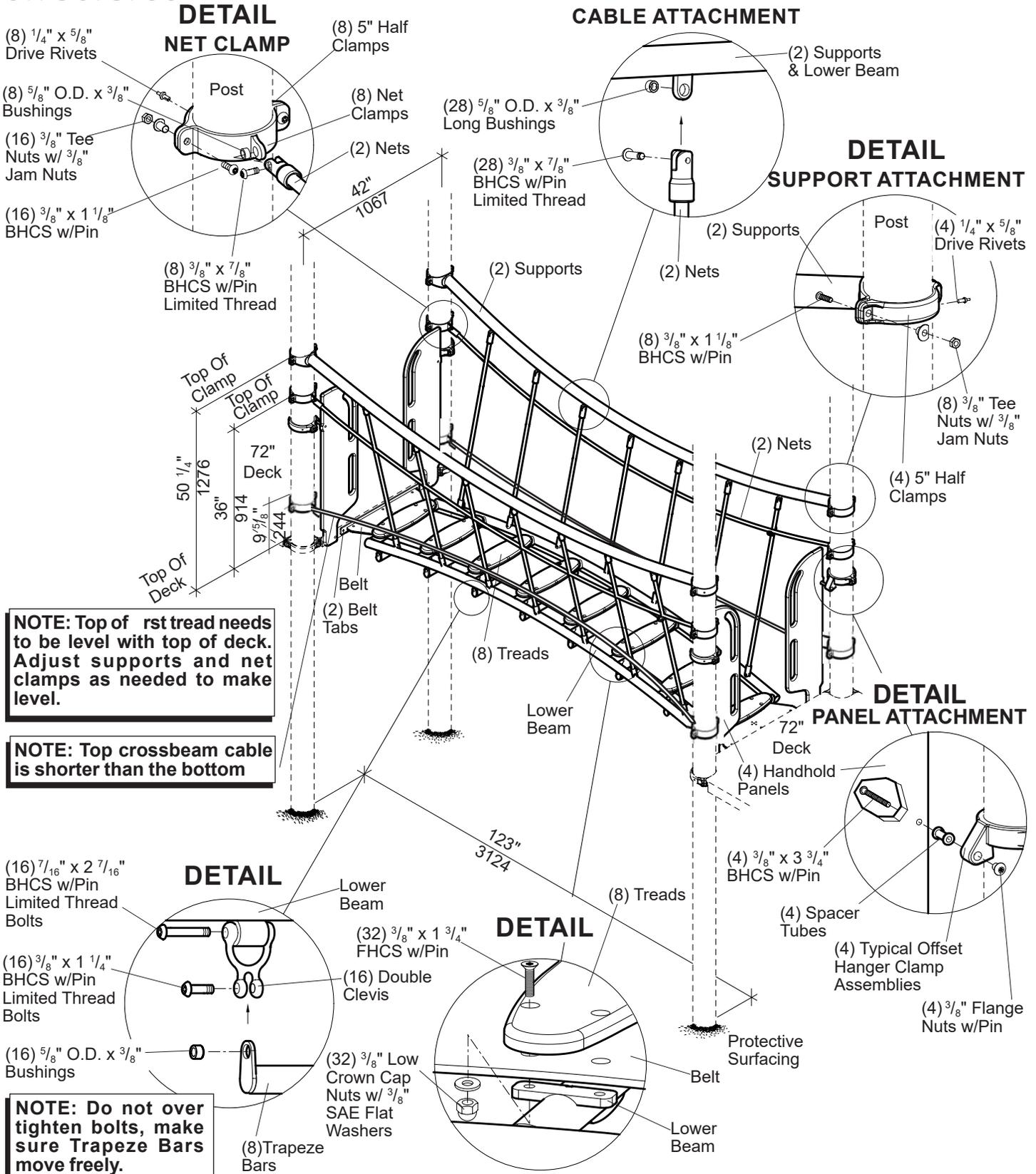


landscape structures®



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.)

21892900

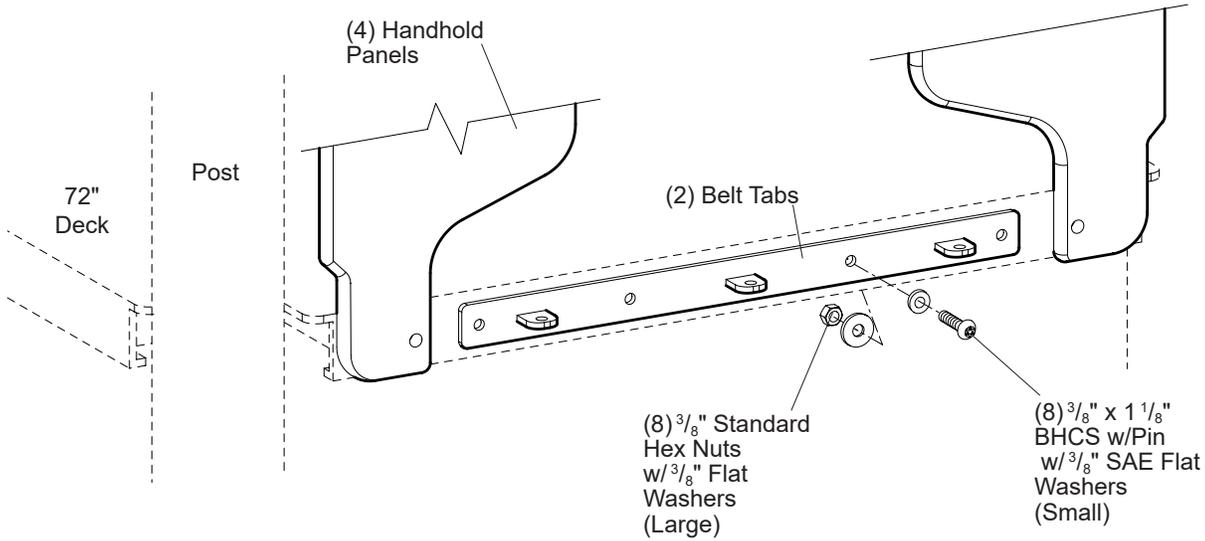


NOTE: Top of first tread needs to be level with top of deck. Adjust supports and net clamps as needed to make level.

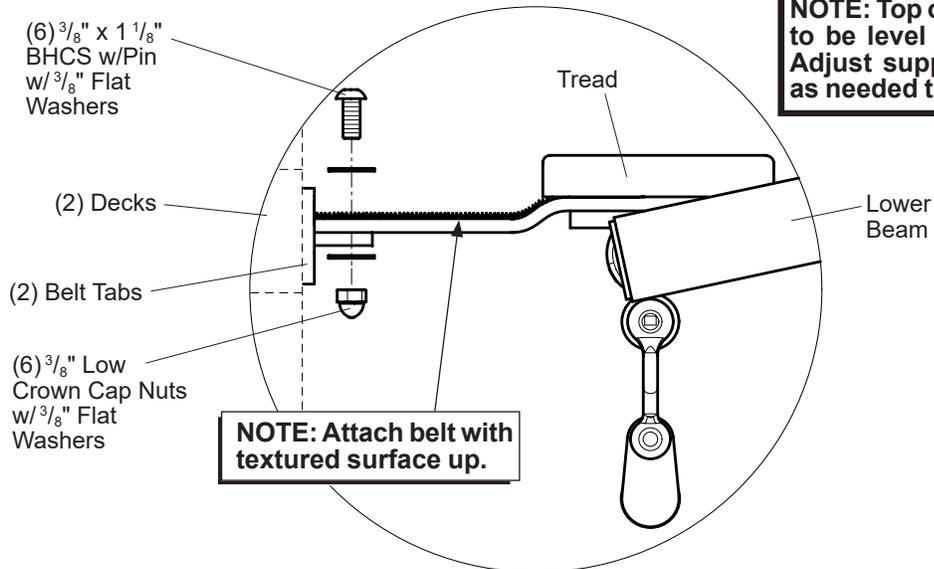
NOTE: Top crossbeam cable is shorter than the bottom

NOTE: Do not over tighten bolts, make sure Trapeze Bars move freely.

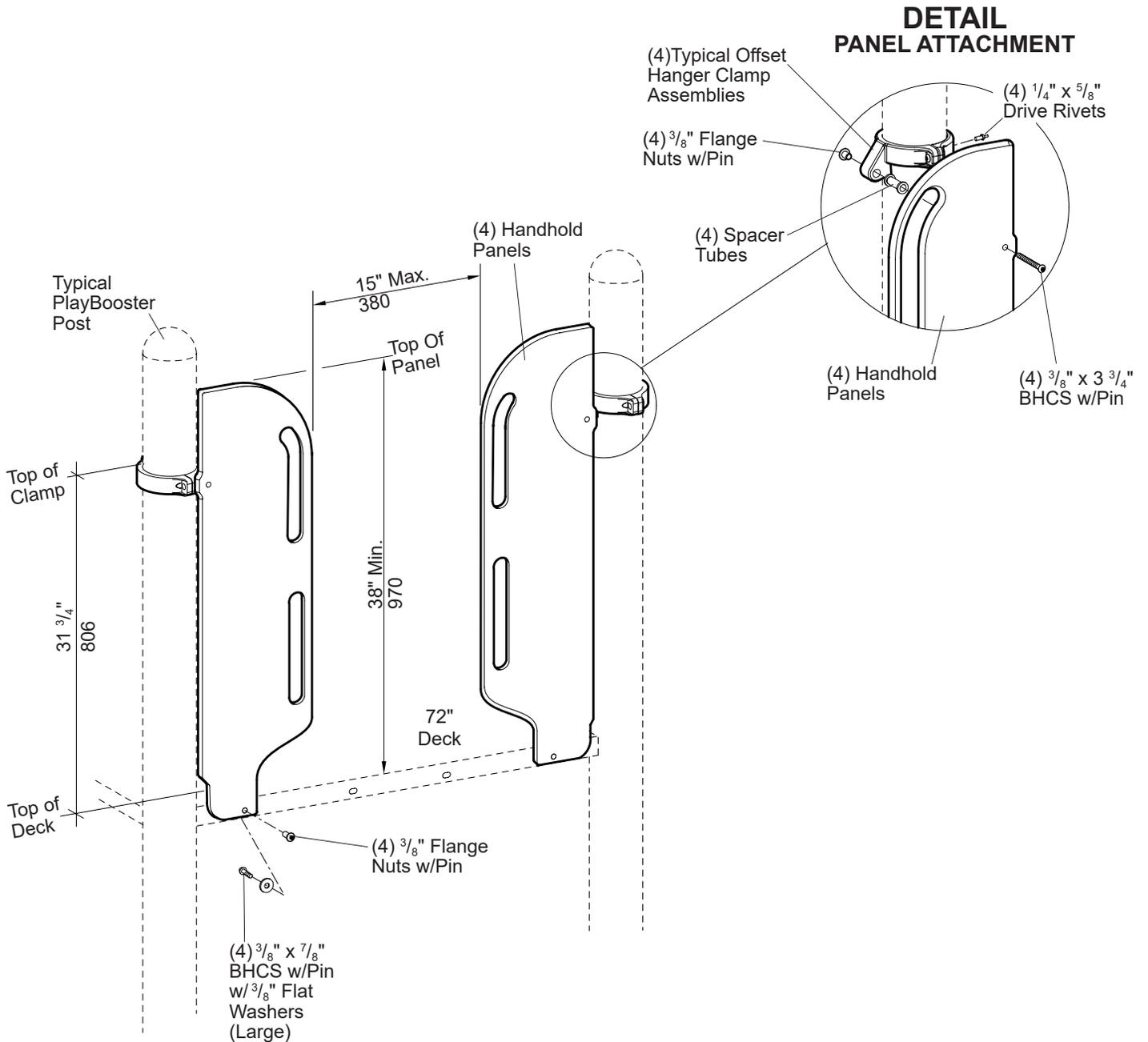
**DETAIL
BELT TAB
ATTACHMENT**



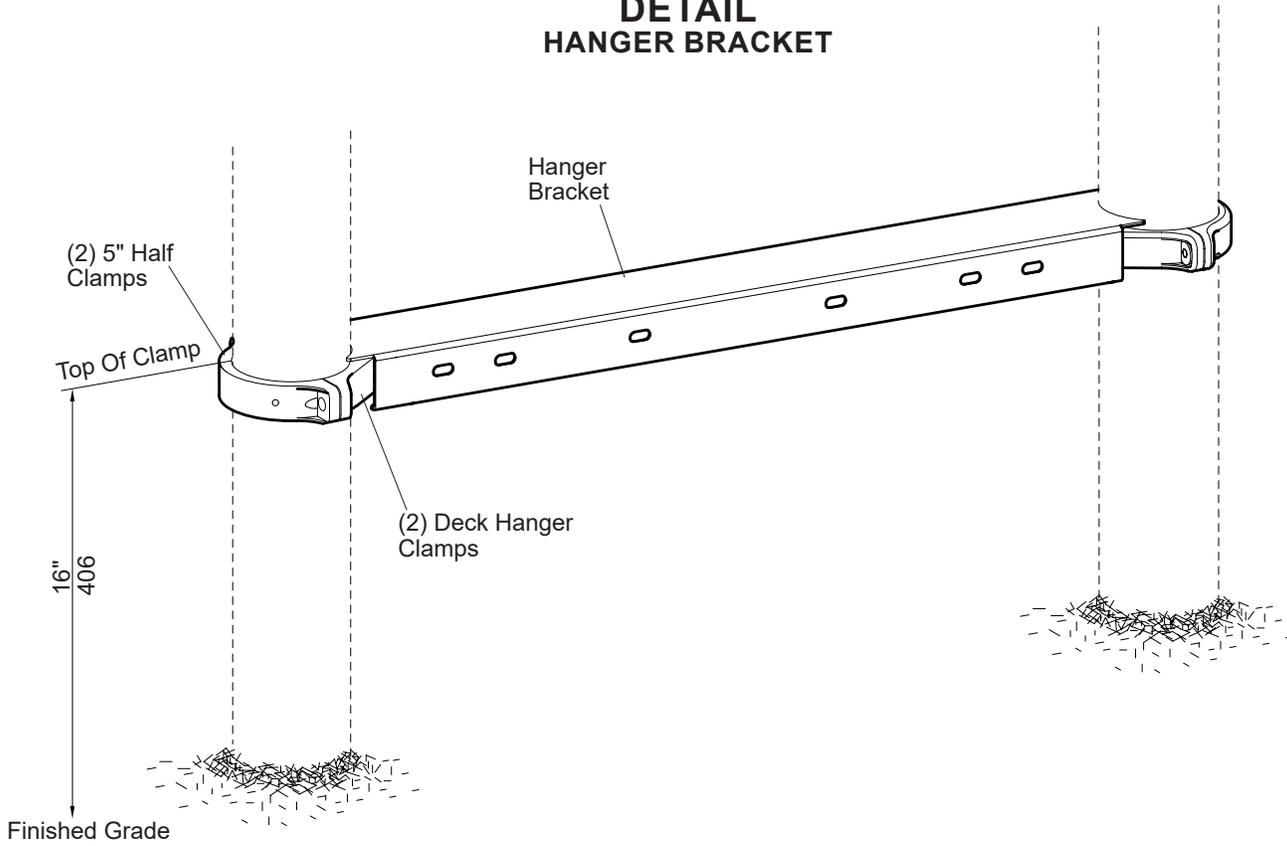
**DETAIL
BELT ATTACHMENT**



NOTE: Top of tread needs to be level with top of deck. Adjust supports and clamps as needed to make level.

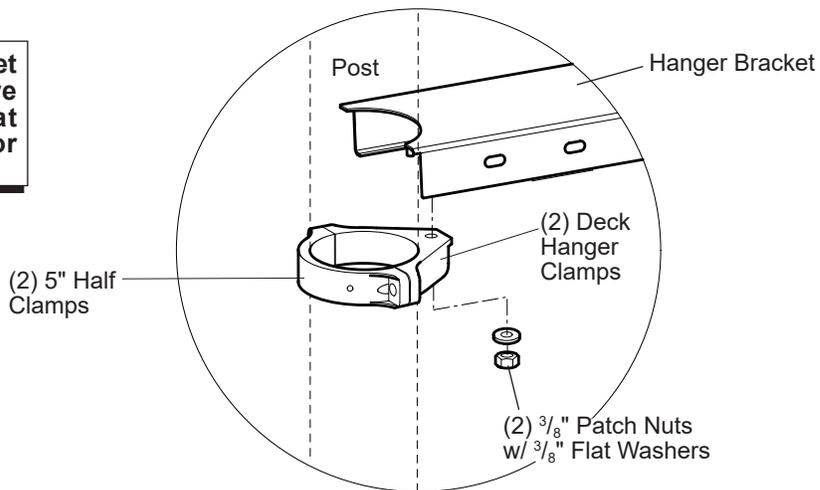


**DETAIL
HANGER BRACKET**



**DETAIL
HANGER BRACKET ATTACHMENT**

NOTE: A hanger bracket is required when there is not a lower deck at the end of the Traveler Climber.



Parts List

Part#	Description	Qty.
100610	1/4" x 5/8" Drive Rivet, AL./SST	16
105327	5" Half Clamp, Specify Color	*
113729	5" Offset Hanger Clamp, Specify Color	4
106022	Deck Hanger Clamp, Specify Color	*
113468	7/8" O.D. x 1 11/16" Tube, AL., Specify Color	4
144476	Handhold Panel, Specify Color	4
161898	Net Clamp, Specify Color	8
190911	Upper Support, Specify Color	2
237898	Net (Cable Assy.), Black, Specify Color	2
218936	Lower Beam, Specify Color	1
195007	Trapeze Bar, Specify Color	8
234001	Traveler Belt, Black	1
201971	Belt Tab, Specify Color	2
202034	GripX Tread, Black	8
184259	Hanger/Transition Bracket, Specify Color	*
242305	Traveler 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	46
100256	3/8" x 1 3/4" FHCS w/Pin, SST	32
100290	3/8" x 7/8" BHCS w/Pin Limited Thread, SST	36
100292	3/8" x 1 1/4" BHCS w/Pin Limited Thread, SST	16
100349	3/8" Low Crown Cap Nut, SST	38
100351	3/8" Tee Nut, SST	32
100353	3/8" Flange Nut w/Pin, SST	8
100327	3/8" Standard Hex Nut, SST	8
100362	3/8" Flat Washer, SST	24
100365	3/8" SAE Flat Washer, SST	40
124460	3/8" x 3 3/4" BHCS w/Pin, SST	4
127068	7/16" x 2.438" BHCS w/Pin Limited Thread, SST	16
127179	5/8" O.D. x 3/8" Long Bushing, SST	52
138917	Double Clevis, SST	16
128296	3/8" Jam Nuts, SST	24
106676	Hanger Bracket Hardware Package	*
100198	3/8" x 1 1/8" BHCS w/Pin, SST	4
100321	3/8" Hex Patch Nut, SST	2
100351	3/8" Tee Nut, SST	4
100362	3/8" Flat Washer, SST	2
100610	1/4" x 5/8" Drive Rivet, AL./SST	2

* = Quantity Determined By Your Order

Lower Beam: Weldment comprised of 1.900 (48,26 mm) O.D. RS20 (.090"-1.00") (2,29 mm-2,54 mm) galvanized steel tubing, 1.315 (33,40 mm) O.D. RS20 (.080"-0.90") (2,03 mm-2,29 mm) galvanized steel tubing, 7 GA. (.179") (4,55 mm) HRPO steel sheet, 1/8" (3,18 mm) HRPO steel sheet and 3/8" (9,53 mm) thick HRPO steel sheet. SAE 841 dry bronze bushings are pressed into housings at factory. Finish: ProShield®, color specified.

Trapeze Bar: Weldment comprised of 1.315" (33,40 mm) O.D. RS20 (.080"-0.90") (2,03 mm-2,29 mm) galvanized steel tubing and 7 GA. (.179") (4,55 mm) HRPO steel sheet. Finish: ProShield, color specified.

Cable Assembly: **(Cable)** Made of tightly woven polyester-wrapped, six-stranded galvanized-steel cable with a polypropylene core. **(Cable Connectors)** 6063-T6 aluminum.

Hanger Bracket: Formed from 11 GA (.120") (3,05 mm) HRPO low carbon sheet steel. Finish: TenderTuff, color specified.

GripX Tread: 3/4" (19,05 mm) Thick Permalene®, black in color.

Handhold Panel: Permalene®, color specified.

Support: Weldment comprised of 2.375" (60,33 mm) O.D. RS40 (.130" - .140") (3,30 mm-3,56 mm) wall galvanized steel tubing, 3/8" (9,53 mm) thick HRPO steel sheet, and 1/4" (6,35 mm) HRPO flat steel. Finish: ProShield, color specified.

Belt: .315" (8,00 mm) Thick mini rough top rubber belting with polyester fabric plys, black in color.

Belt Tab: Weldment comprised of 3/8" (9,53 mm) thick HRPO steel sheet, and 1/4" (6,35 mm) HRPO flat steel. Finish: ProShield, color specified.

Net Clamps: Weldment comprised of 1/4" (6,35 mm) x 1 3/4" (44,45 mm) HRPO flat steel and .375" (9,53 mm) stainless steel sheet. Finish: ProShield, color specified.

Clamp: Cast aluminum. Finish: ProShield, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: Approx. 4 1/2 man hours

Area Req: 6' (1,83 m) minimum use zone

Weight: 309 lbs. No Hanger Brackets

330 lbs. w/1 Hanger Brackets

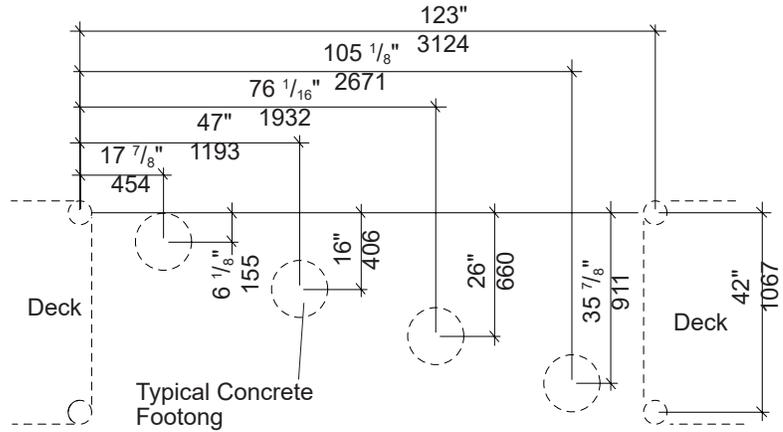
352 lbs. w/2 Hanger Brackets

Max. Fall Height: 79" (2,01 m)

Installation Instructions

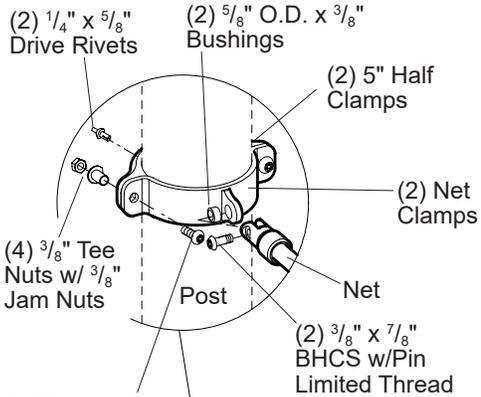
- 1) Attach belt tabs and handhold panels to decks. Refer to the Belt Tab Attachment Detail.
- 2) Attach offset hanger clamps to handhold panels. Refer to the Panel Attachment Detail.
- 3) Attach offset hanger clamps to posts, using 5" half clamps and $\frac{3}{8}$ " x $1\frac{1}{8}$ " BHCS w/pin with $\frac{3}{8}$ " tee nuts. Refer To The Typical Offset Hanger Clamp Spec Sheet.
- 4) Lay beam on ground with bushings facing up. Position double clevis's over bushings and fasten with $\frac{7}{16}$ " x $2\frac{7}{16}$ " BHCS w/pin limited thread bolts. See Detail. **NOTE:** *Do not over tighten bolts.*
- 5) Attach trapeze bars to double clevis's as shown, using bushings and $\frac{3}{8}$ " x $1\frac{1}{4}$ " BHCS w/pin limited thread bolt. **NOTE:** *Do not over tighten bolts, make sure trapeze bars move freely.*
- 6) Turn lower beam over. Attach treads and belt to lower beam. Refer to Detail.
- 7) Attach supports and net clamps to posts at height shown. Refer to the Support and Net Clamp Attachment Details.
- 8) Attach nets to clamps and supports. Refer to the Cable and Net Clamp Attachment Details.
- 9) Attach lower beam to nets. Refer to Details. **NOTE:** *Top of first tread needs to be level with top of deck. Adjust supports as needed to make level.*
- 10) Attach belt to belt tabs and lower beam. Refer to the Belt Tab & Belt Attachment Details.
- 11) (If applicable - Hanger Bracket) Mark posts at 16" above finished grade. Attach deck hanger clamps to hanger bracket. Position hanger bracket with deck hanger clamps between posts level with marks. Attach to posts. Refer to the Hanger Bracket Attachment Detail. **NOTE:** *A hanger bracket is required when there is not a lower deck at the end of the Travelor Climber.*
- 12) Install $\frac{1}{4}$ " x $\frac{5}{8}$ " drive rivets in all 5" half clamps. Drill through hole in 5" half clamps and into 5" post with a $\frac{1}{4}$ " or "F" (only) drill bit, insert drive rivet in hole through clamp and into post. Hammer drive rivet pin in until flush with head. Refer to the Typical Offset Hanger Clamp Spec Sheet.
- 13) Install protective surfacing before users are allowed to play on the structure.

PLAN VIEW/FOOTING LAYOUT



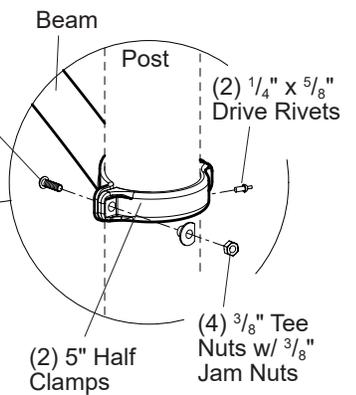
DETAIL

NET CLAMP



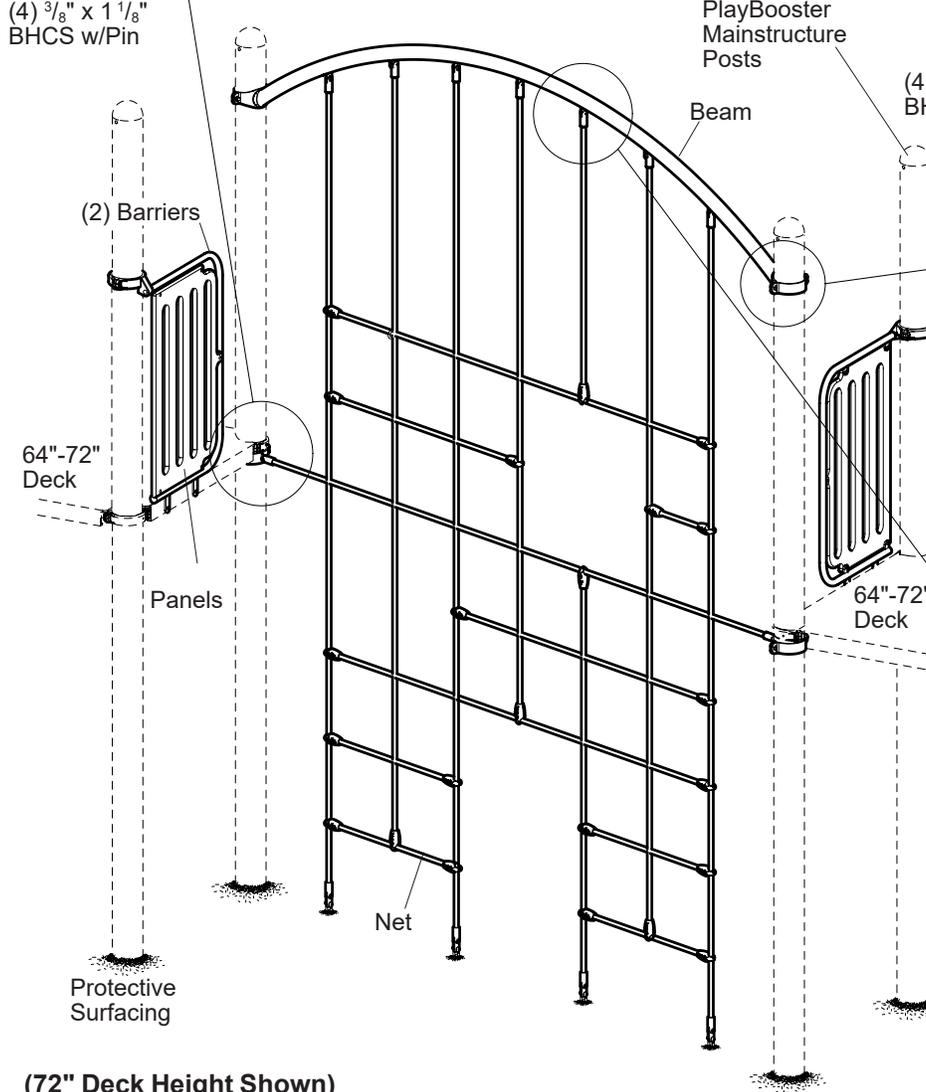
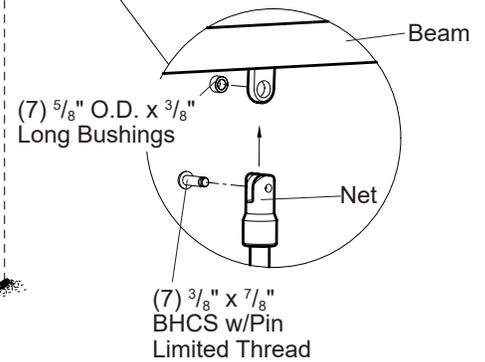
DETAIL

BEAM ATTACHMENT



NOTE: Refer to sheet 2 for clamp height.

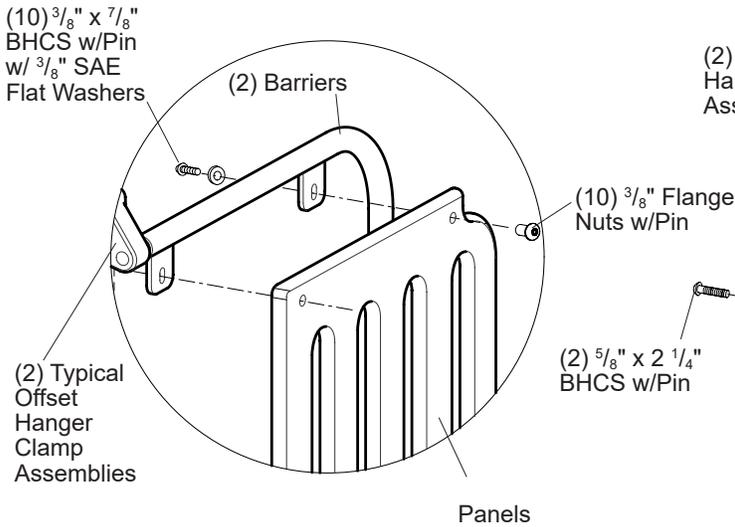
DETAIL
CABLE ATTACHMENT



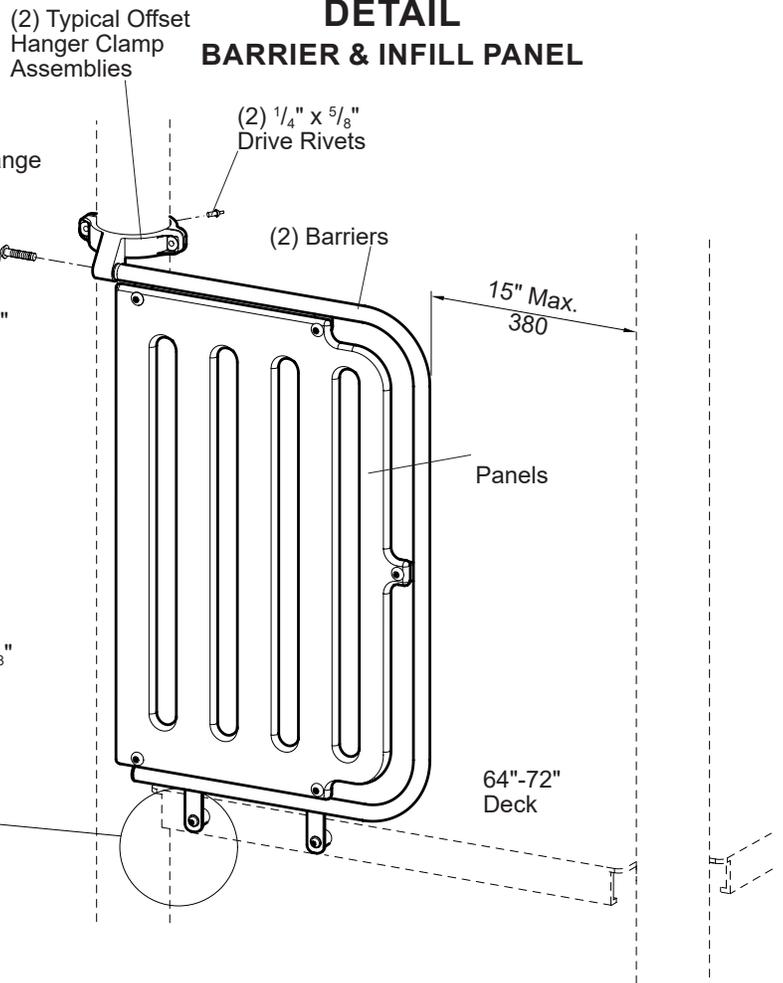
(72" Deck Height Shown)

BARRIER ATTACHMENT DETAILS

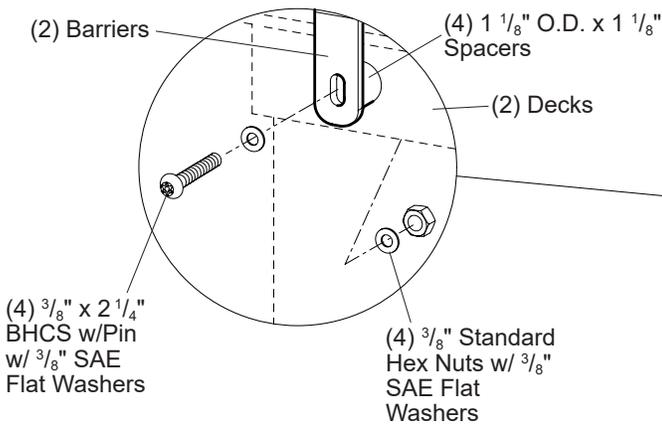
**DETAIL
INFILL PANEL ATTACHMENT**



**DETAIL
BARRIER & INFILL PANEL**

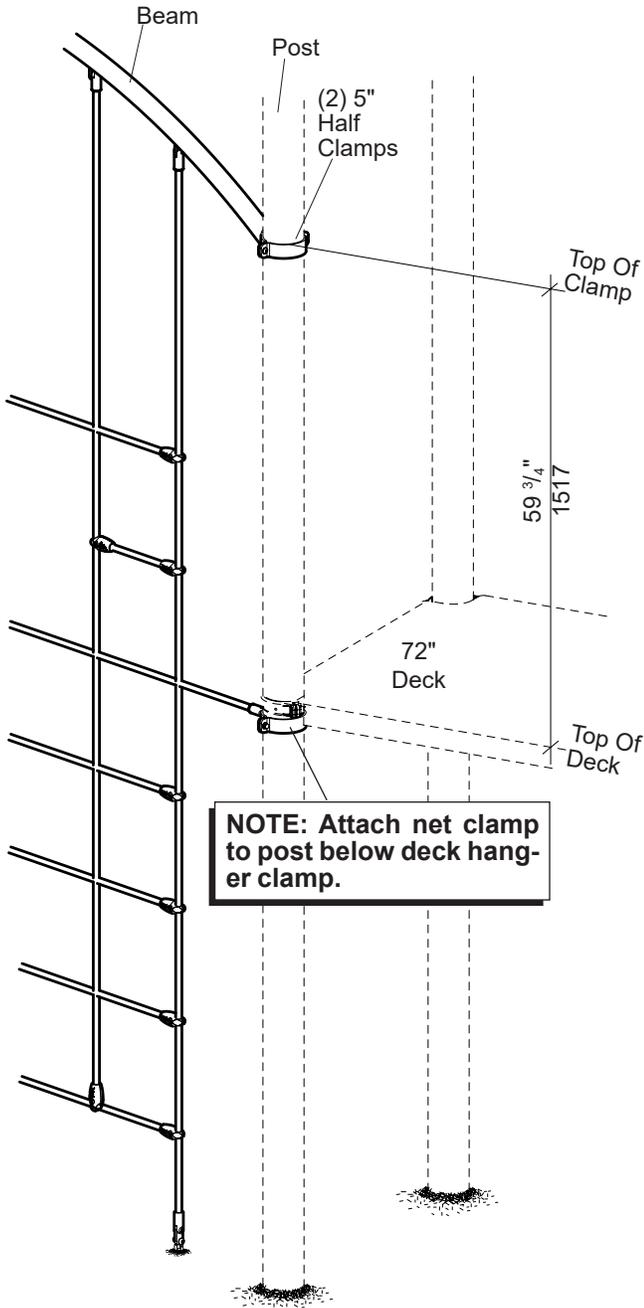


**DETAIL
BARRIER TO DECK ATTACHMENT**

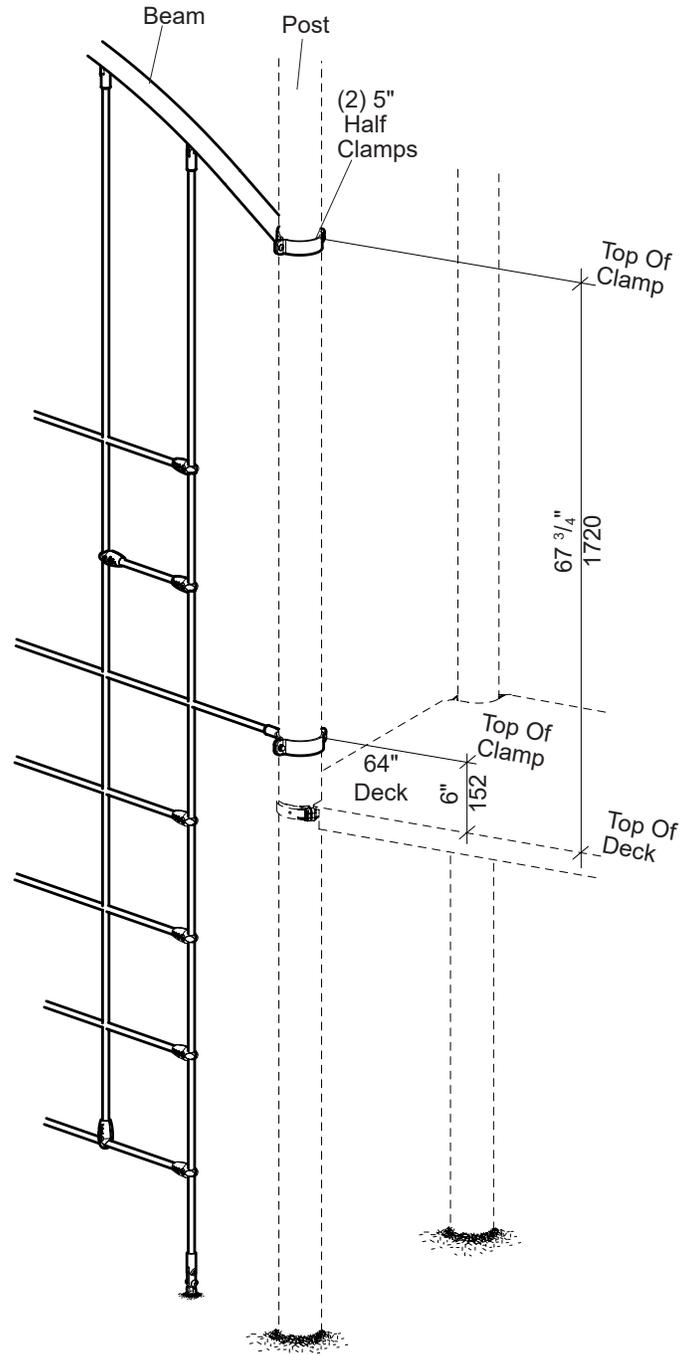


PlayBooster® 202594 Portal Climber, w/Permalene Handholds

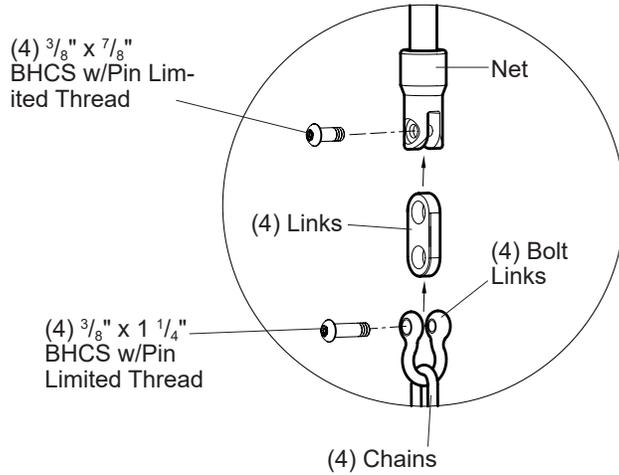
**DETAIL
72" DECK HEIGHT**



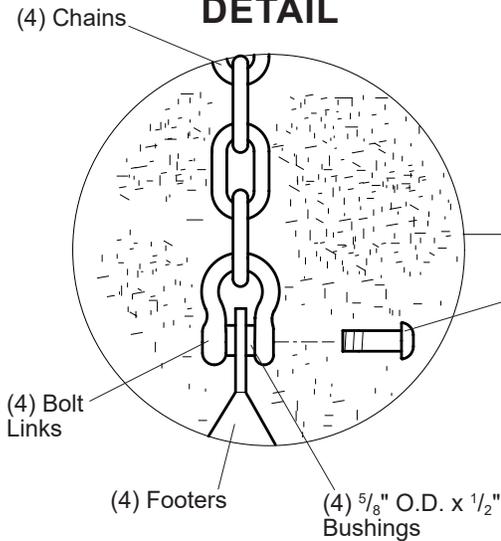
**DETAIL
64" DECK HEIGHT**



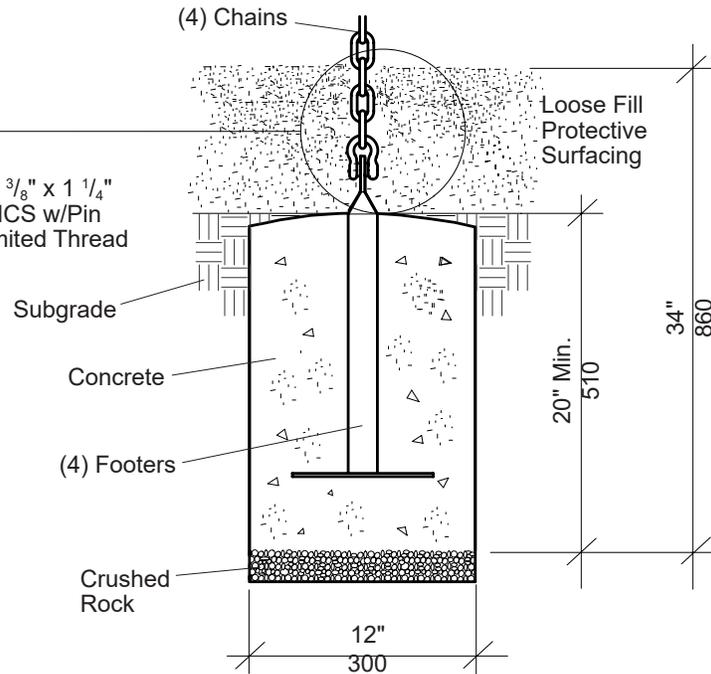
**DETAIL
CHAIN ATTACHMENT**



DETAIL



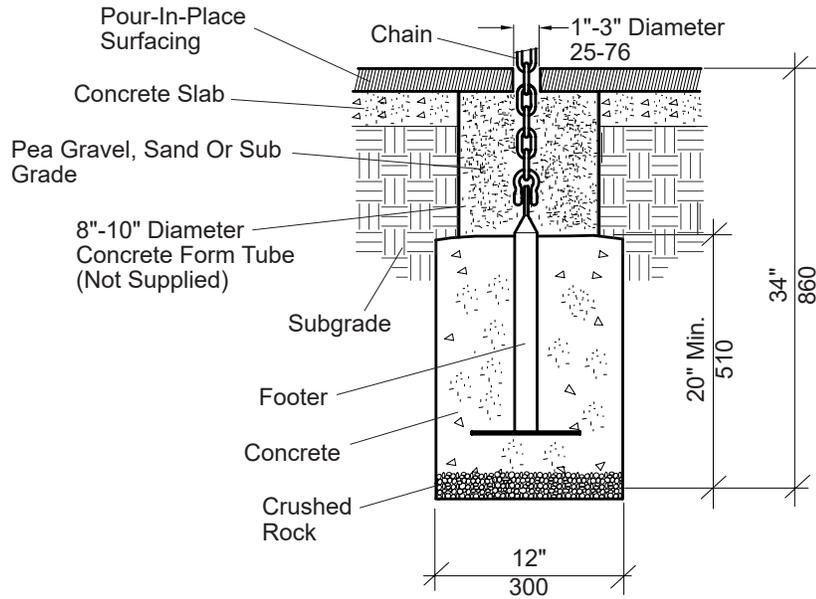
**DETAIL
FOOTER ATTACHMENT**



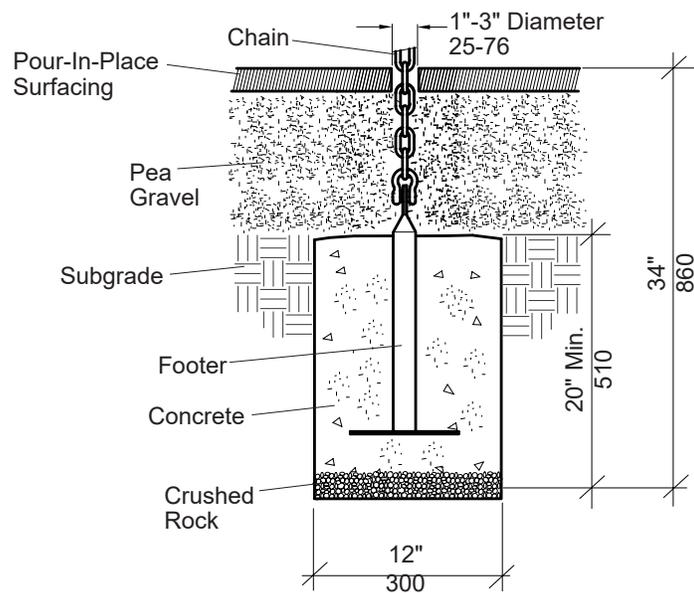
NOTE: The hole depth for the footer needs to be deep enough, so the footer plate doesn't contact the bottom of the hole. The weight of the concrete will force the footer plate down, tightening the cable.

PlayBooster® 202594 Portal Climber, w/Permalene Handholds

DETAIL
DIRECT BURY WITH
POUR-IN-PLACE SURFACING



DETAIL
DIRECT BURY WITH
POUR-IN-PLACE SURFACING
(PEA GRAVEL)



Parts List

Part#	Description	Qty.
100610	1/4" x 5/8" Drive Rivet, AL/SST	6
105327	5" Half Clamp, Specify Color	6
113729	5" Offset Hanger Clamp, Specify Color	2
151072	1 1/8" O.D. x 1 1/8" Spacer, AL., Specify Color	4
164367	Footer, Specify Color	4
170930	Infill Panel, Specify Color	2
170931	Barrier, Specify Color	2
136721	9 1/4" Long P70 Chain	4
190875	Beam, Specify Color	1
161898	Net Clamp, Specify Color	2
202668	Net (Cable Assy.), Black	1
170993	Single Barrier w/Infill Hardware Package	2
100196	3/8" x 7/8" BHCS w/Pin, SST	10
100198	3/8" x 1 1/8" BHCS w/Pin, SST	4
100199	3/8" x 2 1/4" BHCS w/Pin, SST	4
100203	5/8" x 2 1/4" BHCS w/Pin, SST	2
100327	3/8" Standard Hex Nut, SST	4
100351	3/8" Tee Nut, SST	4
100353	3/8" Flange Nut w/Pin, SST	10
100365	3/8" SAE Flat Washer, SST	18
206067	Portal Climber Hardware Package	1
100198	3/8" x 1 1/8" BHCS w/Pin, SST	8
100290	3/8" x 7/8" BHCS w/Pin Limited Thread, SST	13
100292	3/8" x 1 1/4" BHCS w/Pin Limited Thread, SST	8
127179	5/8" O.D. x 3/8" Bushing, SST	9
100351	3/8" Tee Nut, SST	8
128296	3/8" Jam Nuts, SST	8
138915	Bolt Link, SST	8
156962	5/8" O.D. x 1/2" Long Bushing, SST	4
162921	3/8" x 1" x 2 1/2" Link, SST	4

Cable Assembly: (Cable) Made of tightly woven polyester-wrapped, six-stranded galvanized-steel cable with a polypropylene core. (Cable Connectors) 6063-T6 aluminum.

Chain: Steel 1/4" (6,35 mm) straight link chain, 3,150 lbs. (1,428,82 kilograms) working load limit. Finish: ProGuard.

Beam: Weldment comprised of 2.375" (60,33 mm) O.D. RS40 (.130" - .140") (3,30 mm-3,56 mm) wall galvanized steel tubing, 3/8" (9,53 mm) thick SST plate, and 1/4" (6,35 mm) HRPO flat steel. 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. Finish: ProShield, color specified.

Infill Panel: Recycled Permalene®, color specified.

Barrier: Weldment comprised of 1.125" (28,58 mm) O.D. 11 Ga. (.120") (3,05 mm) wall steel tube per ASTM A513 with 203 or 303 stainless steel threaded inserts with 5/8" (15,88 mm) internal threads and 1/4" (6,35 mm) tabs. Finish: TenderTuff®, color specified.

Net Clamp: Weldment comprised of 1/4" (6,35 mm) x 1 3/4" (44,45 mm) HRPO flat steel and .375" (9,53 mm) stainless steel sheet. Finish: ProShield, color specified.

5" 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. 3 1/2 man hours

Concrete Req.: Approx. 5.24 cu. ft.

Weight: 184 lbs.

Fall Height: 101" (2,56 m)

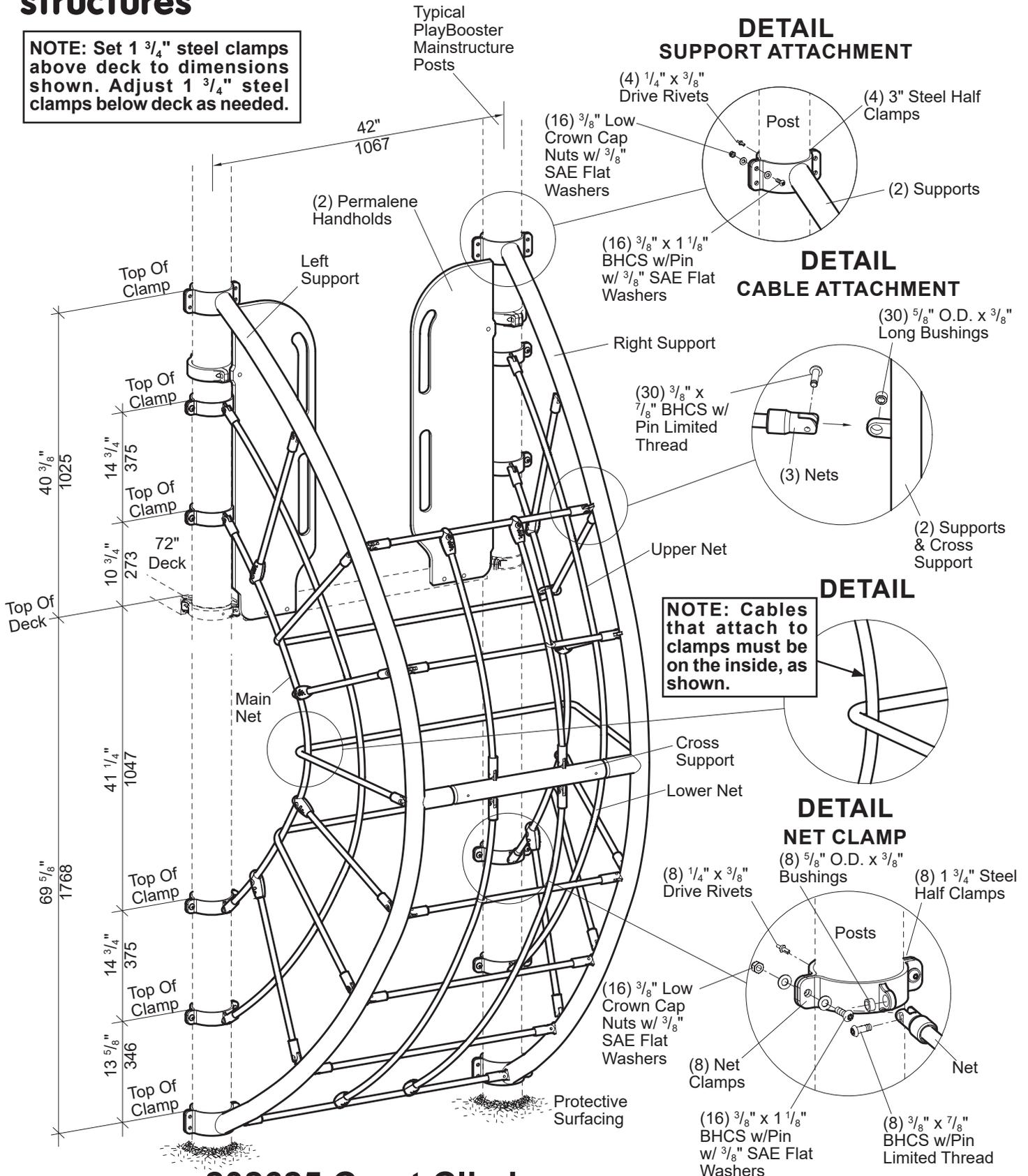
Installation Instructions

- (Direct Bury) Refer to the Plan View/Footing Layout for footing locations.**
- Attach infill panels to barriers. Refer to the Barrier Attachment Details.
- Attach barriers to decks. Refer to the Barrier Attachment Details.
- Attach offset hanger clamps to barriers. Refer to the Barrier Attachment Details
- 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 Assembly Sheet.
- Attach beam to posts at height shown. Refer to the Beam Attachment Detail.
- Attach net clamps to posts at height shown. Refer to the Net Clamp Detail.
- Attach net to beam and net clamps. Refer to the Cable and Net Clamp Details.
- Attach chains to net cables. Refer to the Chain Attachment Detail.
- Attach footers to chains. Refer to the Footer Attachment Detail.
- With footers 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.

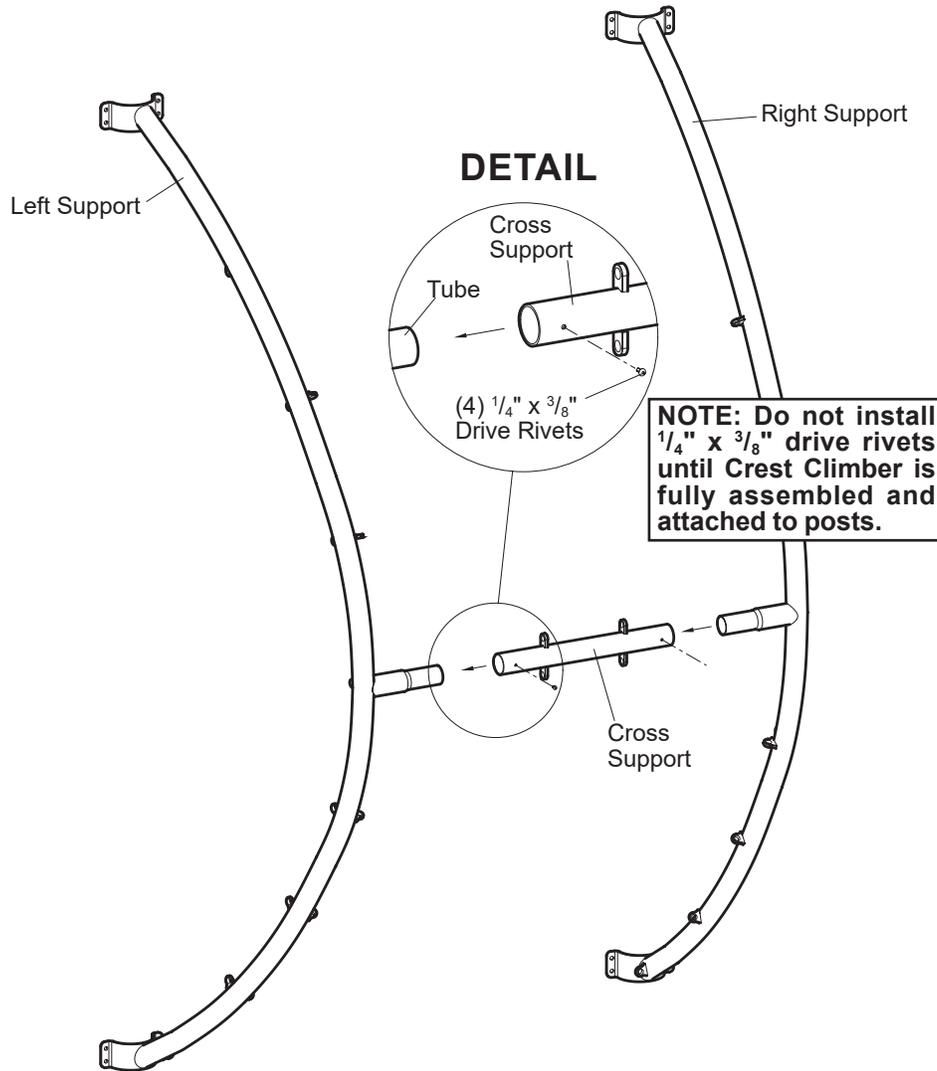
(Direct Bury With Pour-In Place Surfacing) Cut 4 lengths of concrete form tubes (not supplied) long enough to set on top of concrete footings and be level with top of concrete slab. Concrete form tubes should be 8"-10" in diameter. Disconnect bolt links from link plates. Place concrete form tubes over chains and footers. Connect bolt links to link plates. Fill concrete form tubes with pea gravel, sand or subgrade. 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 Direct Bury Pour-In-Place Surfacing Detail.

- Install 1/4" x 5/8" drive rivets in 5" half clamps. Drill through hole in clamps and into 5" post with a 1/4" or "F" (only) drill bit, insert drive rivet in hole through clamp and into post. Hammer drive rivet pin in until flush with head. Refer to the Typical Offset Hanger Clamp Spec Sheet.
- Install protective surfacing before users are allowed to play on the structure.

NOTE: Set 1 3/4" steel clamps above deck to dimensions shown. Adjust 1 3/4" steel clamps below deck as needed.

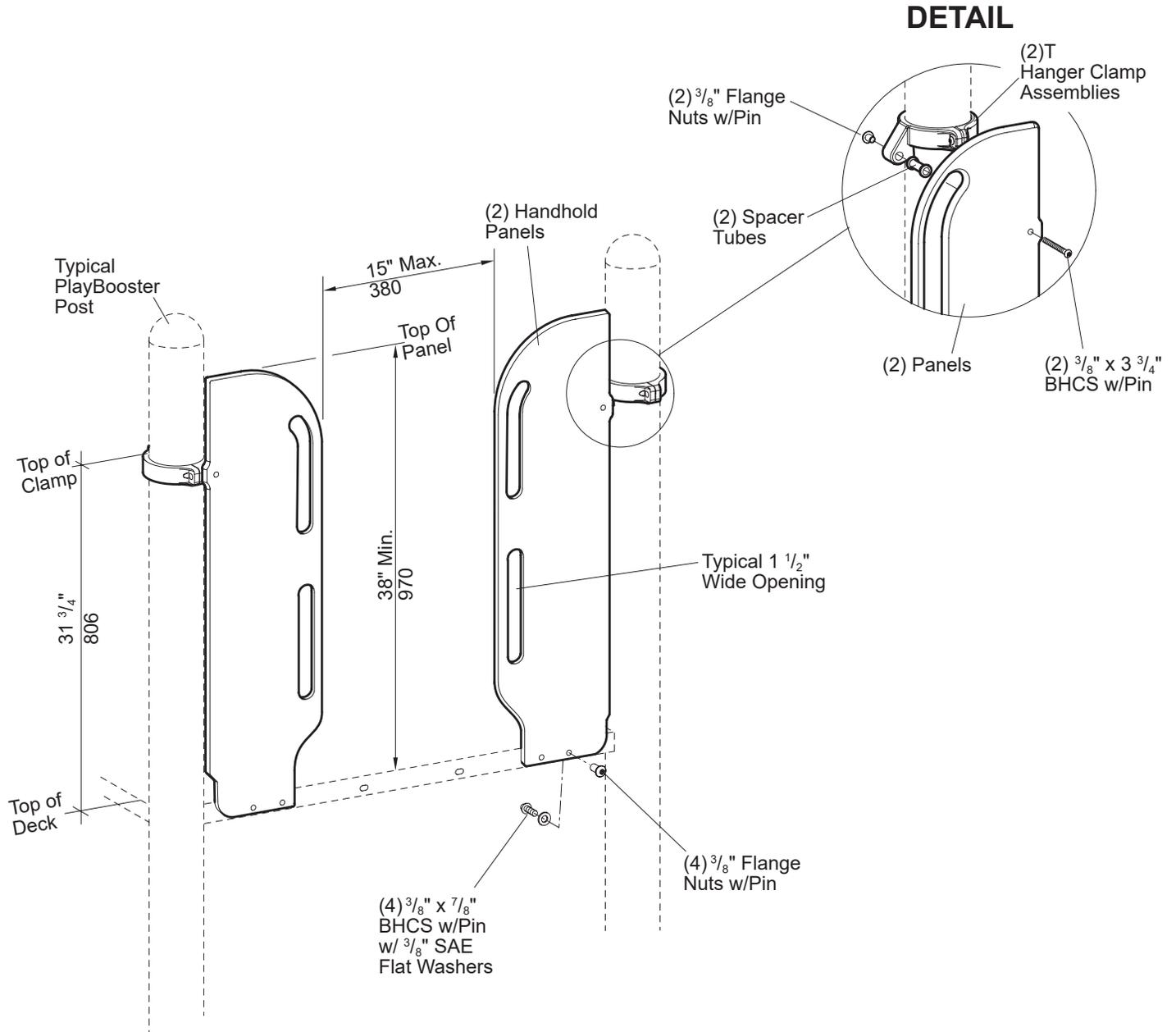


**DETAIL
EXPLODED VIEW**



PlayBooster® 202625 Crest Climber, w/Permalene Handholds

DETAIL
HANDHOLD PANEL ATTACHMENT



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, AL., Specify Color	2
113729	5" Offset Hanger Clamp, Specify Color	2
139563	Handhold Panel, Specify Color	2
190918	Support, (LH), Specify Color	1
191036	Support, (RH), Specify Color	1
191012	Cross Support, Specify Color	1
202720	Lower Net (Cable Assy.), Black	1
202750	Upper Net (Cable Assy.), Black	1
206661	Main Net (Cable Assy.), Black	1
125711	3" Wide Half Clamp, Specify Color	4
104731	1 3/4" Steel Half Clamp, Specify Color	8
161898	Net Clamp, Specify Color	8
139861	Handhold Hardware Package	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
124460	3/8" x 3 3/4" BHCS w/Pin, SST	2
267319	Crest Climber Hardware Package	1
100198	3/8" x 1 1/8" BHCS w/Pin, SST	32
100290	3/8" x 7/8" BHCS w/Pin Limited Thread, SST	38
100349	3/8" Low Crown Cap Nut, SST	32
100365	3/8" SAE Flat Washer, SST	64
100611	1/4" x 3/8" Drive Rivet, AL/SST	16
127179	5/8" O.D. x 3/8" Bushing, SST	38

Support: Weldment comprised of 2.375" (60,33 mm) O.D. RS40 (.130" - .140") (3,30 mm-3,56 mm) wall galvanized steel tubing, 3/8" (9,53 mm) thick SST plate, and 1/4" (6,35 mm) HRPO flat steel. Finish: ProShield®, color specified.

Handhold Panel: Permalene®, color specified.

Cross Support: Weldment comprised of 2.375" (60,33 mm) O.D. RS40 (.130" - .140") (3,30 mm-3,56 mm) wall galvanized steel tubing and 3/8" (9,53 mm) thick SST plate. Finish: ProShield, color specified.

Cable Assembly: (Cable) Made of tightly woven polyester-wrapped, six-stranded galvanized-steel cable with a polypropylene core. (Cable Connectors) 6063-T6 aluminum.

Net Clamp: Weldment comprised of 1/4" (6,35 mm) x 1 3/4" (44,45 mm) HRPO flat steel and .375" (9,53 mm) stainless steel sheet. Finish: ProShield, color specified.

Steel Half Clamps: Fabricated from of 1/4" (6,35 mm) HRPO flat steel. Finish: ProShield, color specified.

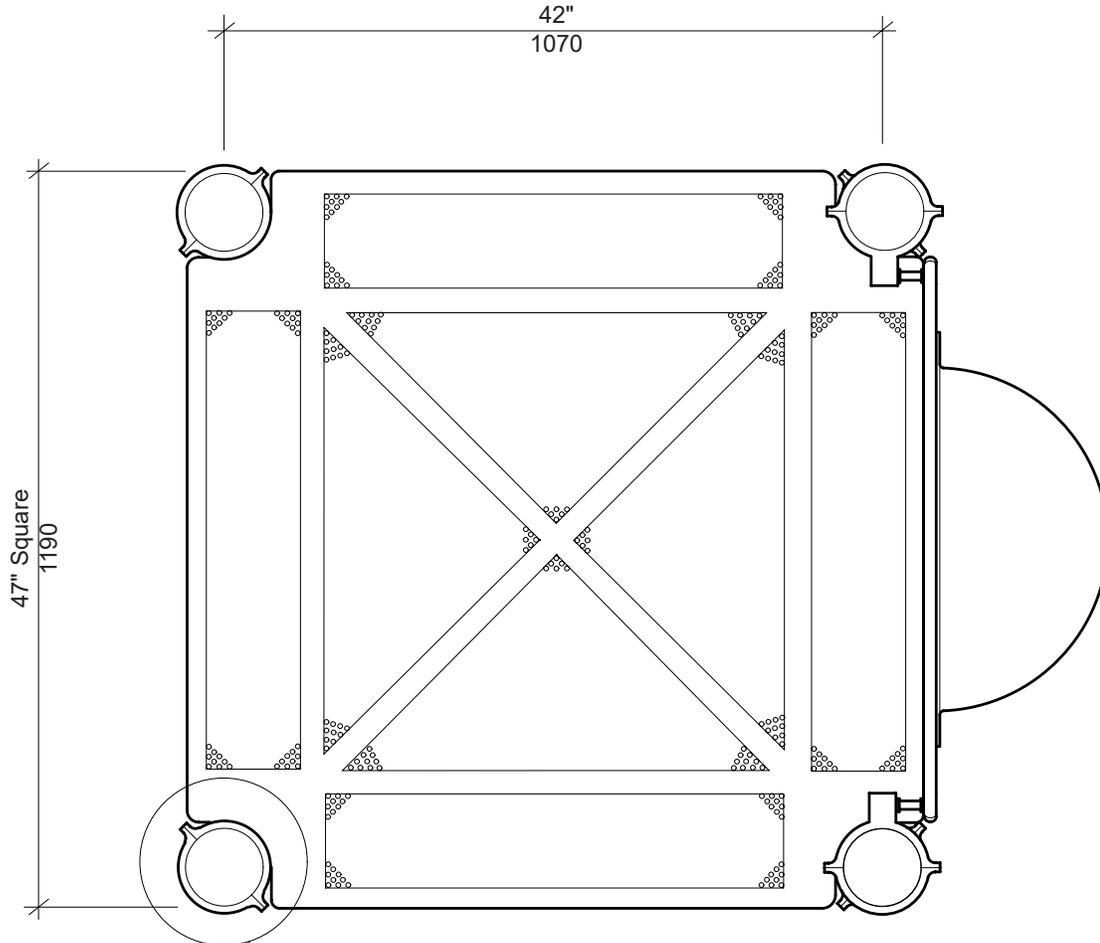
5" Clamps: Cast aluminum. Finish: ProShield, color specified.

Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: 4 man hours
Weight: 205 lbs.
Fall Height: 93" (2,36 m)

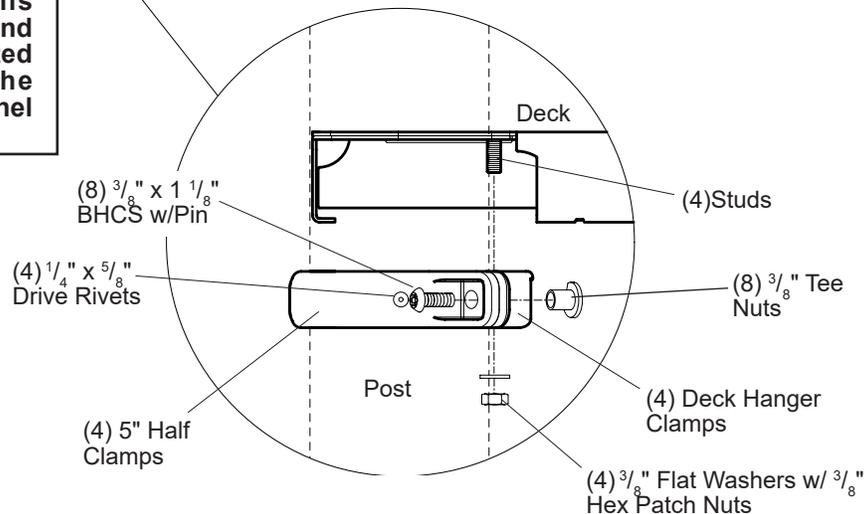
Installation Instructions

- 1) Attach handhold panels to the face of the deck. Refer to the Handhold Panel Attachment Detail.
- 2) Attach offset hanger clamps to post 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 panels to offset hanger clamp assemblies. Refer to the Handhold Panel Attachment Detail.
- 4) Attach left support to post at height shown. Refer to the Support Attachment Detail. Place cross support onto left support. Refer to Exploded View Detail.
- 5) Place right support onto cross support. Attach right support to post at height shown. Refer to the Support Attachment Detail & Exploded View Detail. **NOTE: Make sure cross support is level.**
- 6) Install 1/4" x 3/8" drive rivets in inner cross support and rail support. Drill through holes in inner cross support and supports with a 1/4" or "F" (only) drill bit. Insert drive rivets in inner cross support and supports. Hammer drive rivet pin in until flush with head.
- 7) Attach net clamps to posts at height shown. Refer to the Net Clamp Detail. **NOTE: Set 1 3/4" steel clamps above deck to dimensions shown. Adjust 1 3/4" steel clamps below deck as needed.**
- 8) Attach nets to supports, cross support and net clamps. Refer to the Cable and Net Clamp Attachment Details.
- 9) Install 1/4" x 3/8" drive rivets in 1 3/4" & 3" wide steel clamps. Drill through hole in steel clamps and into 5" post with a 1/4" or "F" (only) drill bit, insert drive rivet in hole through clamp and into post. Hammer drive rivet pin in until flush with head. Refer to the Typical Offset Hanger Clamp Spec Sheet.
- 10) Install 1/4" x 5/8" drive rivets in all 5" half clamps. Drill through hole in 5" half clamps and into 5" post with a 1/4" or "F" (only) drill bit, insert drive rivet in hole through clamp and into post. Hammer drive rivet pin in until flush with head. Refer to the Typical Offset Hanger Clamp Spec Sheet.
- 11) Install protective surfacing before users are allowed to play on the structure.



**DETAIL
DECK HANGER CLAMP**

NOTE: When using this deck, ALL enclosures and components are mounted on the OUTSIDE of the posts like the bubble panel shown above.



Parts List

Part#	Description	Qty.
145656	Tenderdeck, Specify Color	1
105327	5" Half Clamp, Specify Color	4
106022	5" Deck Hanger Clamp, Specify Color	4
119491	Hardware Package	1
100198	$\frac{3}{8}$ " x 1 $\frac{1}{8}$ " BHCS w/Pin, SST	8
100321	$\frac{3}{8}$ " Hex Patch Nut, SST	4
100351	$\frac{3}{8}$ " Tee Nut, SST	8
100362	$\frac{3}{8}$ " Flat Washer, SST	4
100610	$\frac{1}{4}$ " x $\frac{5}{8}$ " Drive Rivet, SST	4

Square Deck: Flange formed from 12 GA (.105") sheet steel conforming to ASTM A1011. Standing surface is perforated with $\frac{5}{16}$ " diameter holes. Deck face has (4) slotted holes for face mounting components. The finished size measures 2 $\frac{5}{8}$ " x 47" x 47". Finish: TenderTuff™, color specified.

Deck Hanger Clamp Assembly: Cast aluminum. Finish: ProShield®, color specified.

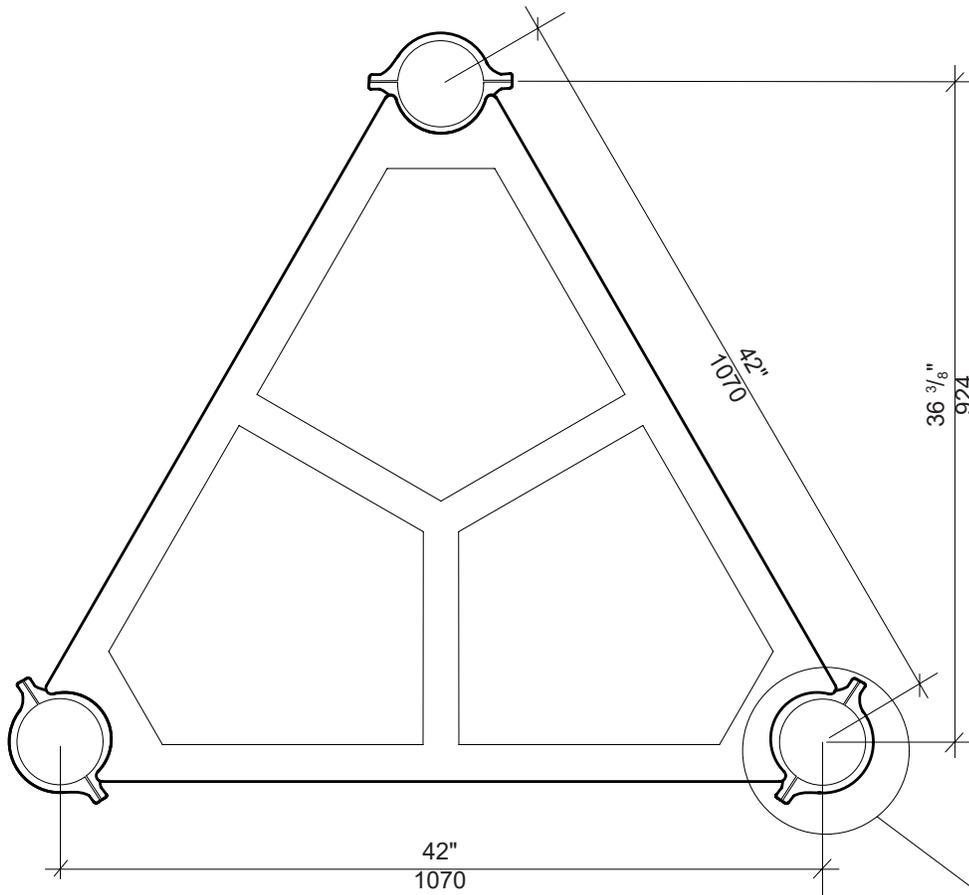
Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: Approx. 1 man hour

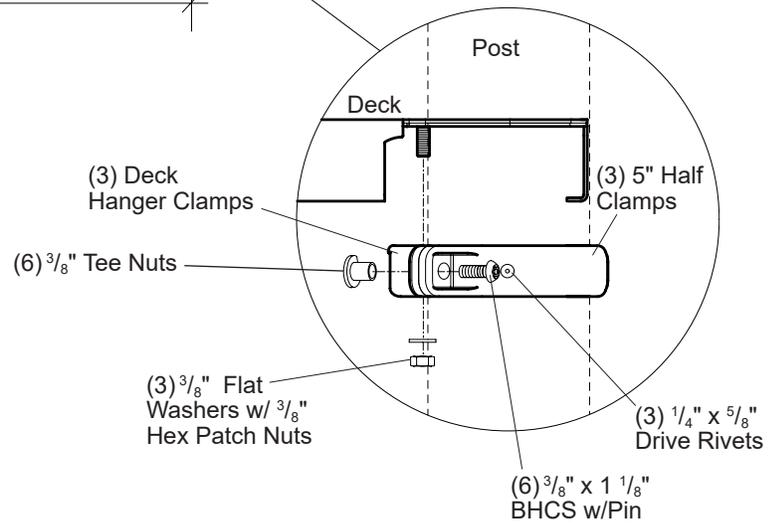
Weight: 119 lbs.

Installation Instructions

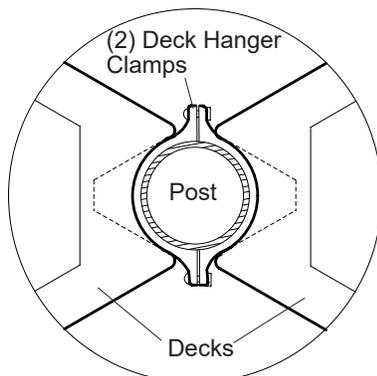
- 1) Mark posts for the appropriate height of the deck you are installing.
- 2) Fasten hanger clamps to marked position on posts. See Detail on front of sheet.
- 3) Lift deck into position, lining up studs underneath deck with deck hanger clamp as shown. Attach with $\frac{3}{8}$ " flat washers and $\frac{3}{8}$ " hex patch nuts.
- 4) Level deck and plumb posts. Install the drive rivets in all 5" half clamps. Refer to the Typical Offset Hanger Clamp Spec Sheet.
- 5) After all enclosures/components are installed, pour concrete footings per the Typical Concrete Footing Detail Sheet.
- 6) Install protective surfacing before users are allowed to play on the structure.



DETAIL DECK HANGER CLAMP



DETAIL



Configuration for Back to Back Decks at Same Height.

Parts List

Part#	Description	Qty.
145657	Tri-Deck, Specify Color	1
105327	5" Half Clamp, Specify Color	3
106022	Deck Hanger Clamp, Specify Color.....	3
120203	Triangular Deck Hardware Package	1
100198	$\frac{3}{8}$ " x $1\frac{1}{8}$ " BHCS w/Pin, SST	6
100321	$\frac{3}{8}$ " Hex Patch Nut, SST.....	3
100351	$\frac{3}{8}$ " Tee Nut, SST.....	6
100362	$\frac{3}{8}$ " Flat Washer, SST	3
100610	$\frac{1}{4}$ " x $\frac{5}{8}$ " Drive Rivet, AL/SST	3

Triangular Deck: Flange formed from 12 GA (.105") sheet steel conforming to ASTM A1011. Standing surface is perforated with $\frac{5}{16}$ " diameter holes. Deck face has (4) slotted holes for face mounting components. The finished size measures $2\frac{5}{8}$ " x $37\frac{3}{4}$ ". 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. $\frac{1}{2}$ man hour

Weight: 61 lbs.

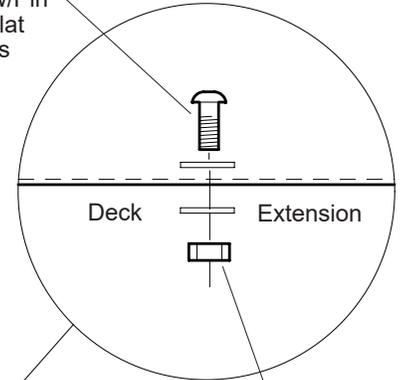
Installation Instructions

- 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 $\frac{3}{8}$ " hex patch nuts with $\frac{3}{8}$ " flat washers. With deck level and posts plumb, final tighten all hardware.
- 4) Install $\frac{1}{4}$ " x $\frac{5}{8}$ " 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.

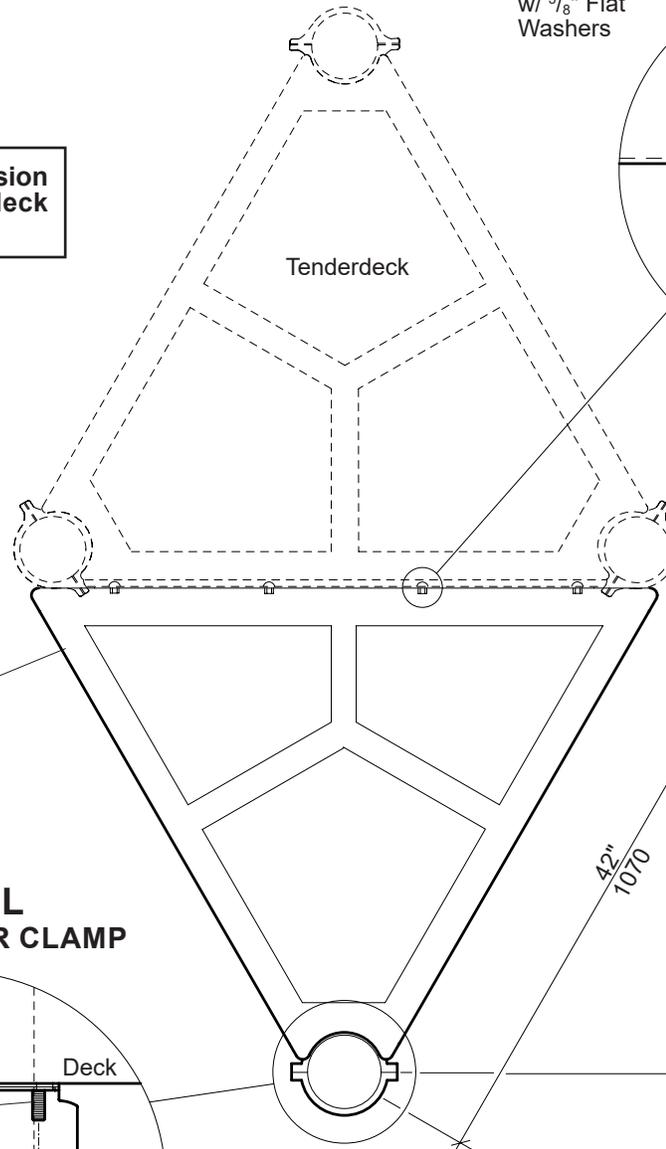
NOTE: The Tri-Deck Extension can attach to all other deck styles.

DETAIL

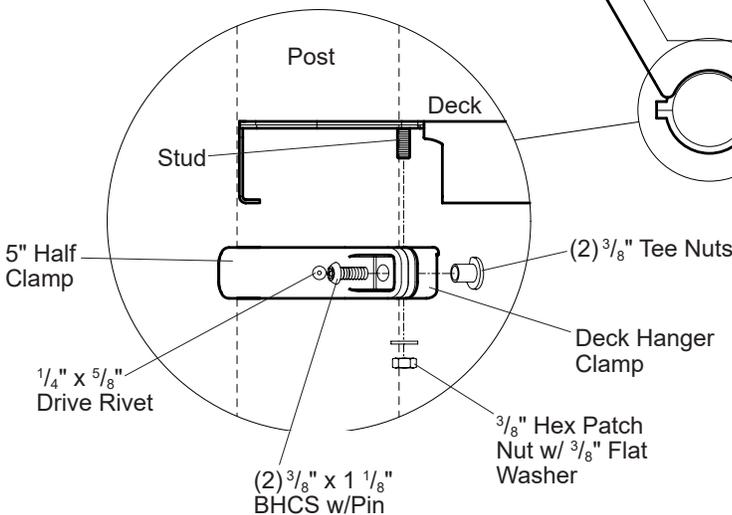
(4) $\frac{3}{8}$ " x $1\frac{1}{8}$ " BHCS w/Pin w/ $\frac{3}{8}$ " Flat Washers



(4) $\frac{3}{8}$ " Standard Hex Nuts w/ $\frac{3}{8}$ " Flat Washers



**DETAIL
DECK HANGER CLAMP**



NOTE: When using this deck, ALL enclosures and components are mounted on the OUTSIDE of the posts.

PlayBooster® 119646 Triangular Tenderdeck Extension



PlayBooster® 119646 Triangular Tenderdeck Extension

Parts List

Part#	Description	Qty.
145663	Tri-Deck Extension, Specify Color	1
105327	5" Half Clamp, Specify Color	1
106022	5" Deck Hanger Clamp, Specify Color	1
119593	Tri-Deck Extension Hardware Package	1
100198	3/8" x 1 1/8" BHCS w/Pin, SST	6
100321	3/8" Hex Patch Nut, SST.....	1
100327	3/8" Standard Hex Nut, SST	4
100351	3/8" Tee Nut, SST.....	2
100362	3/8" Flat Washer, SST	9
100610	1/4" x 5/8" Drive Rivet, AL/SST	1

Tri-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 of two of the three sides measures 2 5/8" x 37 7/8" on the face of the deck and the other side measures 2 5/8" x 43 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).

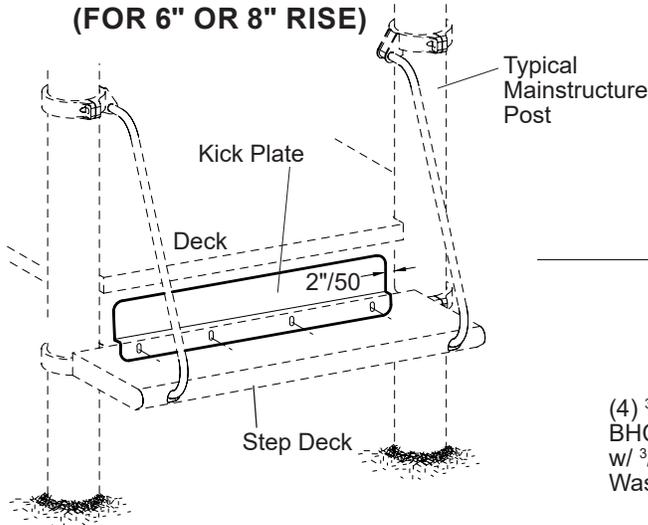
Installation Time: Approx. 3/4 man hour

Weight: 52 lbs.

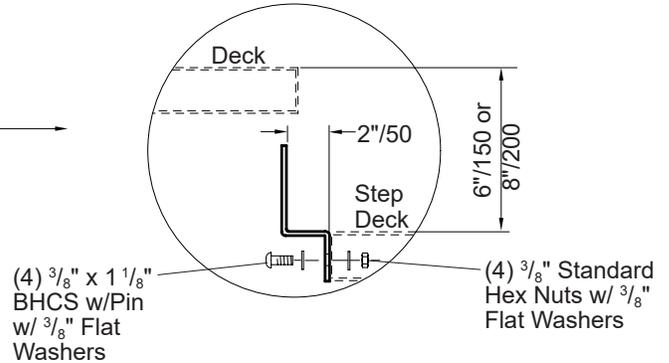
Installation Instructions

- 1) Mark the post for the appropriate height of the deck you are installing.
- 2) Fasten the deck hanger clamp to the marked position on the post. Refer to the Deck Hanger Clamp Detail.
- 3) Lift the deck into position, line up the studs underneath the deck with the deck hanger clamp. Attach using a 3/8" hex patch nut and 3/8" flat washer, as shown.
- 4) Attach the tri-deck extension to the tenderdeck 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.
- 5) With the tri-deck extension level and the post plumb, install the 1/4" x 5/8" drive rivet in the 5" half clamp. Refer to the Typical Offset Hanger Clamp Spec Sheet.
- 6) Install protective surfacing before users are allowed to play on the structure.

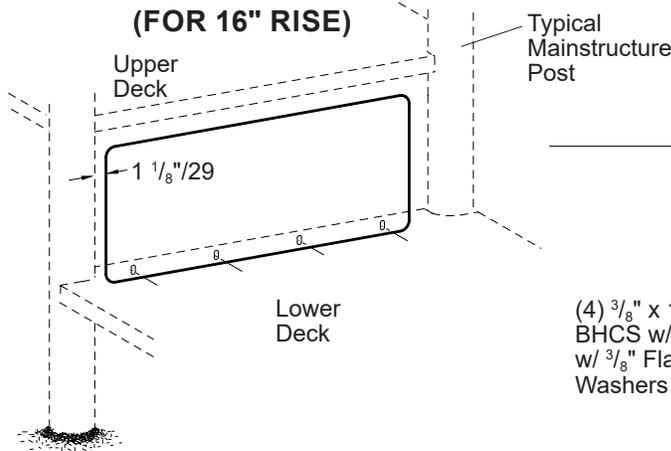
**KICK PLATE
(FOR 6" OR 8" RISE)**



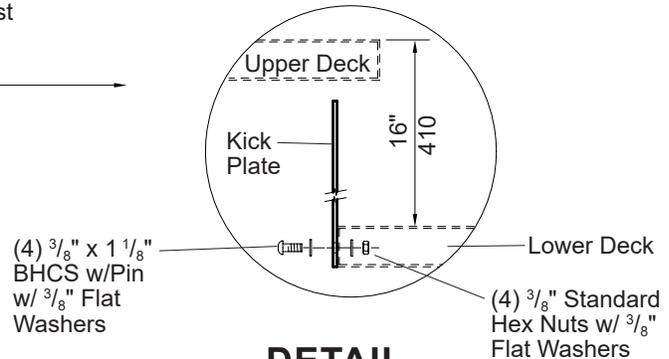
**DETAIL
KICK PLATE ATTACHMENT
(FOR 6" OR 8" RISE)**



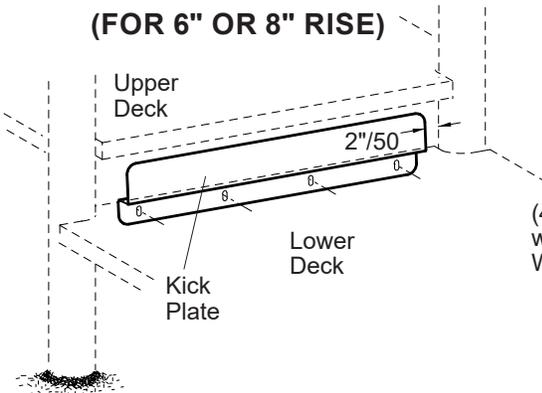
**KICK PLATE
(FOR 16" RISE)**



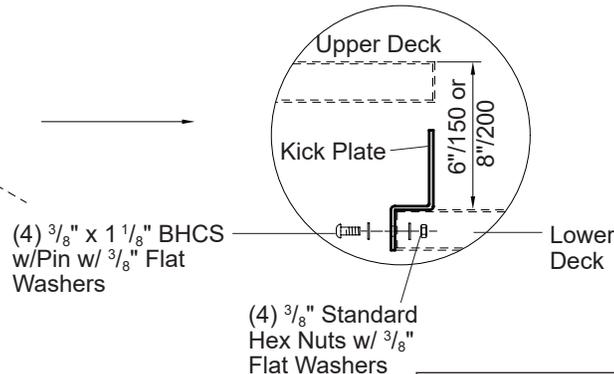
**DETAIL
KICK PLATE ATTACHMENT
(FOR 16" RISE)**



**KICK PLATE
(FOR 6" OR 8" RISE)**



**DETAIL
KICK PLATE ATTACHMENT
(FOR 6" OR 8" RISE)**



NOTE: Kick Plates mount to face of lower deck.

PlayBooster® 121948 Kick Plates, Tenderdecks, 6", 8" & 16"

Parts List

Part#	Description	Qty.
121819	Kick Plate (For 6" or 8" Rise), Specify Color	1
121818	Kick Plate (For 16" Rise), Specify Color	1
156058	Kick Plate Tenderdeck Hardware Package	1
100198	$\frac{3}{8}$ " x $1\frac{1}{8}$ " BHCS w/Pin, SST.....	4
100327	$\frac{3}{8}$ " Standard Hex Nut, SST	4
100362	$\frac{3}{8}$ " Flat Washer, SST	8

Kick Plate: Fabricated from 11 GA (.120") HR flat steel. Finish: TenderTuff™, brown or gray 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).

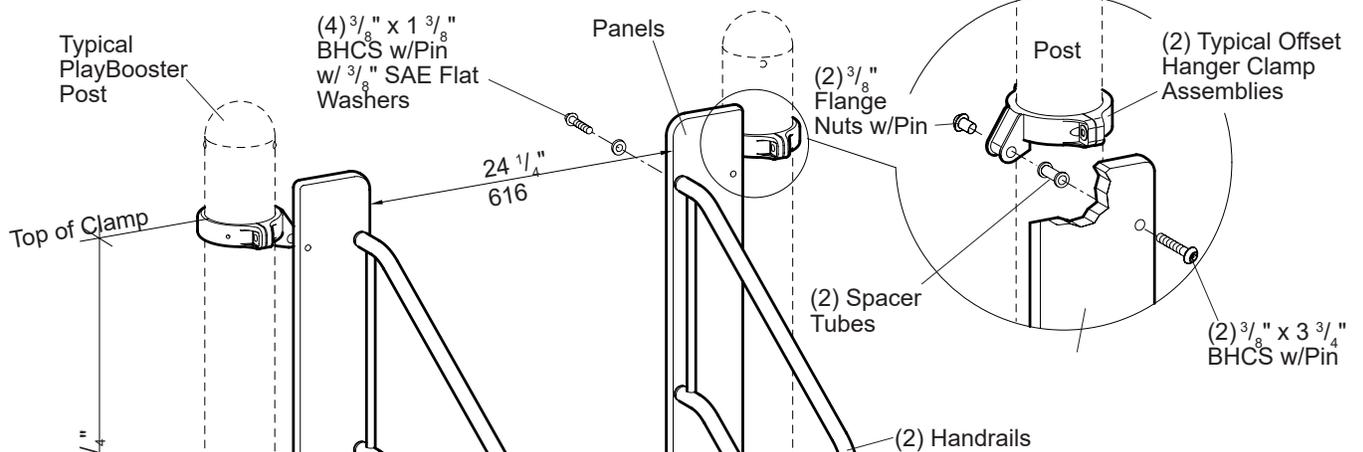
Installation Time: Approx. $\frac{1}{4}$ man hour
Weight: Kick Plate (For 6" or 8" Rise) 13 lbs.
 Kick Plate (For 16" Rise) 23 lbs.

Installation Instructions

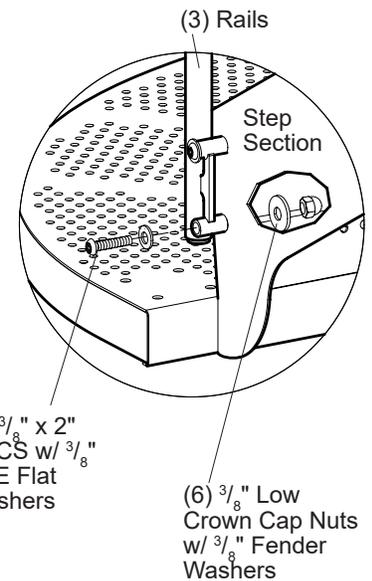
- 1) Locate kick plates as labeled on your plan drawing.
- 2) Attach kick plate using $\frac{3}{8}$ " x $1\frac{1}{8}$ " BHCS w/pin with $\frac{3}{8}$ " flat washers and $\frac{3}{8}$ " standard hex nuts with $\frac{3}{8}$ " flat washers, as shown. **NOTE:** *Kick plates mount to face of lower deck.*
- 3) Install protective surfacing before users are allowed to play on the structure.

NOTE: The illustration shown is a left hand orientation. Refer to the site plan drawing for the orientation

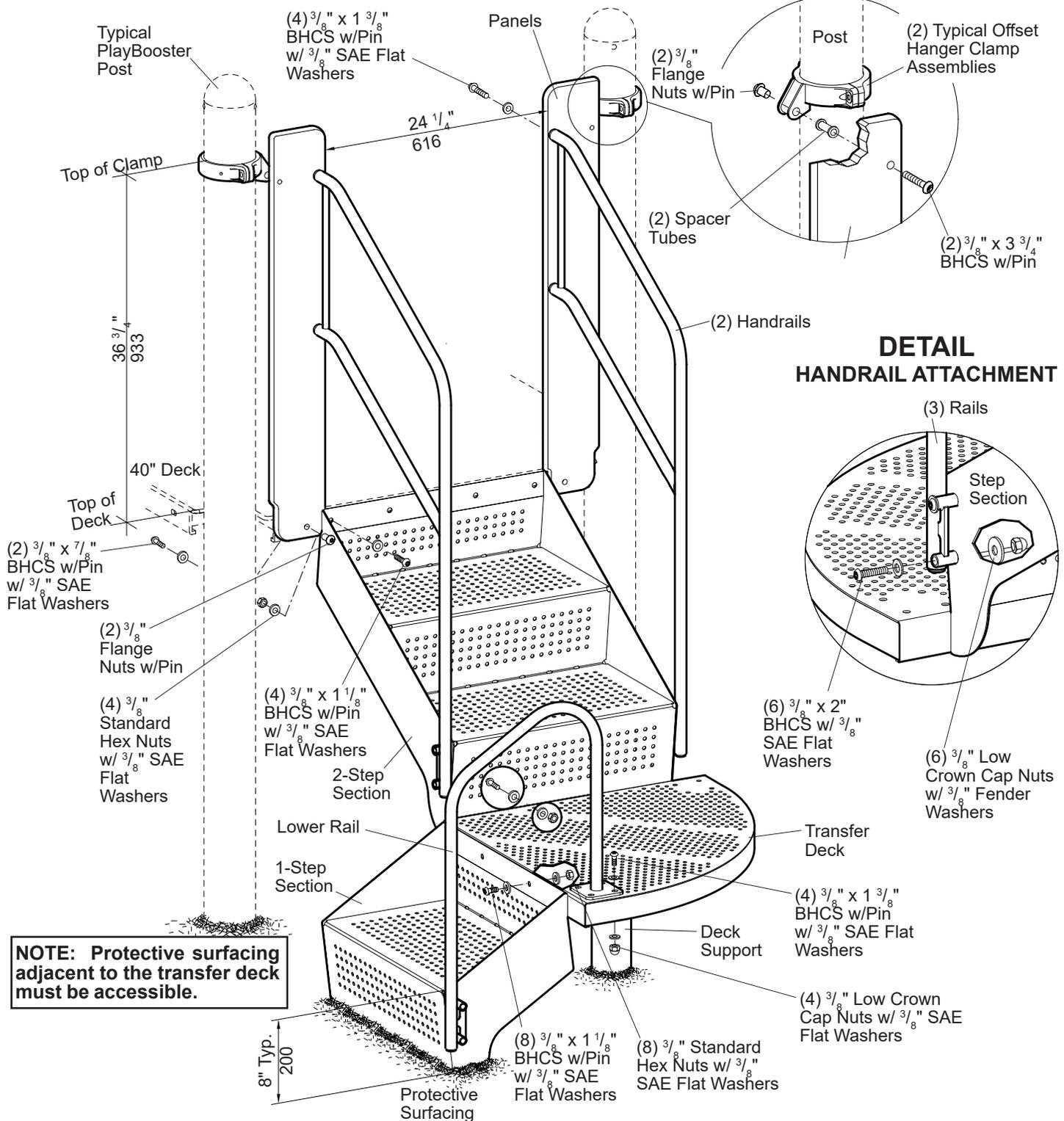
**DETAIL
PANEL ATTACHMENT**



**DETAIL
HANDRAIL ATTACHMENT**



NOTE: Protective surfacing adjacent to the transfer deck must be accessible.



PlayBooster® 152911 Transfer Module, 40\", w/Handrails

Parts List

Part#	Description	Qty.
100610	1/2" 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	Offset Hanger Clamp, Specify Color	2
181371	Deck Support (DB), Specify Color	1
181373	Deck Support (SM), Specify Color	1
181374	Step Support (DB), Specify Color	1
181376	Step Support (SM), Specify Color	1
144696	1-Step Section, Specify Color	1
144698	2-Step Section, Specify Color	1
152639	2-Step Handrail, Specify Color	2
152641	Lower Rail, Specify Color	1
153398	Transfer Deck, Specify Color	1
153399	Infill Panel, Specify Color	2
204034	Transfer Module Hardware Package	1
100173	3/8" x 2" BHCS, SST	6
100196	3/8" x 7/8" BHCS w/Pin, SST	4
100198	3/8" x 1 3/8" BHCS w/Pin, SST	20
100327	Standard Hex Nut, SST	16
100351	Tee Nut, SST	4
100353	Flange Nut w/Pin, SST	4
100365	SAE Flat Washer, SST	54
113027	3/8" x 1 3/8" BHCS w/Pin, SST	8
124460	3/8" x 3 3/8" BHCS w/Pin, SST	2
100378	Fender Washer, SST	6
100349	3/8" Low Crown Cap Nut, SST	12
111393	4-Hole (SM) Hardware Package	1
100263	3/8" x 2 3/8" Expansion Anchors	4
100327	Standard Hex Nut, SST	4
100365	3/8" SAE Flat Washers, SST	4
121256	2-Hole (SM) Hardware Package	1
100263	3/8" x 2 3/8" Expansion Anchors	2
100327	Standard Hex Nut, SST	2
100365	3/8" SAE Flat Washers, SST	2

DB = Direct Bury
SM = Surface Mount

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 7/8" 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 - 225 lbs. DB - 240 lbs.
Fall Height:	Deck Height

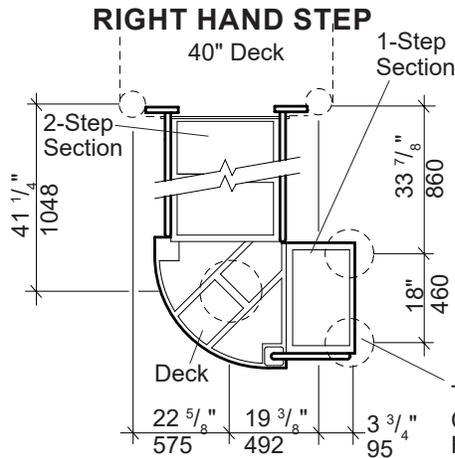
Installation Instructions

- (Direct Bury)** Dig footings as shown. Refer to your Plan View/Footing Layout.
- 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.
- Attach the 2-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.
- Attach the 2-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.
- 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.
- 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.
- 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.
- 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.
- 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.
- Attach the handrails to the 2-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.
- Attach the handrails to the infill panels using 3/8" x 1 3/8" BHCS w/pin and 3/8" SAE flat washers.
- 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.
- 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.
- (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.
- Install 1/4" x 5/8" drive rivets in all 5" half clamps. Refer to the Typical Offset Hanger Clamp Spec Sheet.
- Install protective surfacing before users are allowed to play on the structure.

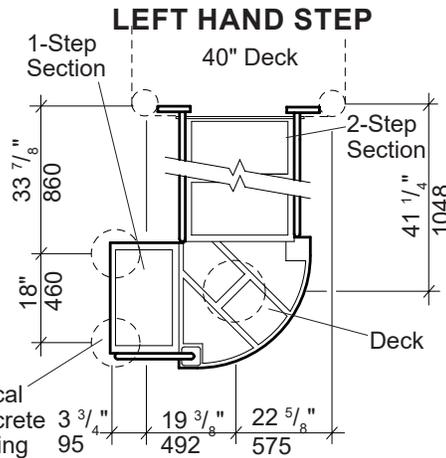
NOTE: Refer to the site plan drawing for proper orientation.

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.)

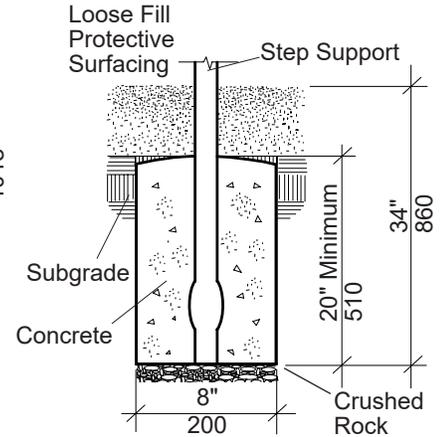
PLAN VIEW FOOTING LAYOUT



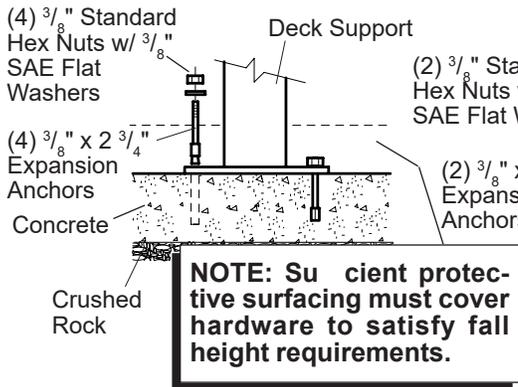
PLAN VIEW FOOTING LAYOUT



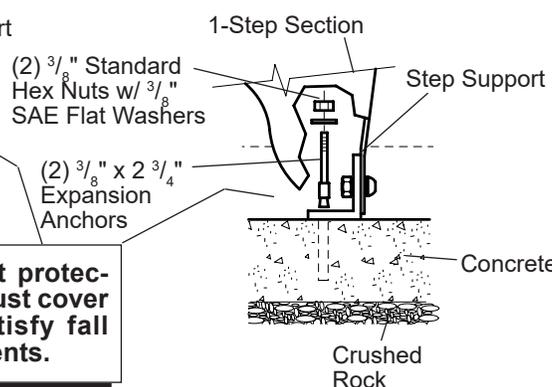
DETAIL STEP SUPPORT BURY



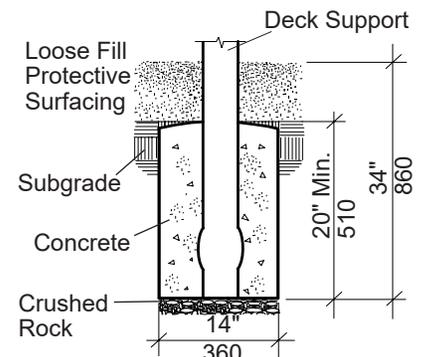
DETAIL SURFACE MOUNT DECK SUPPORT



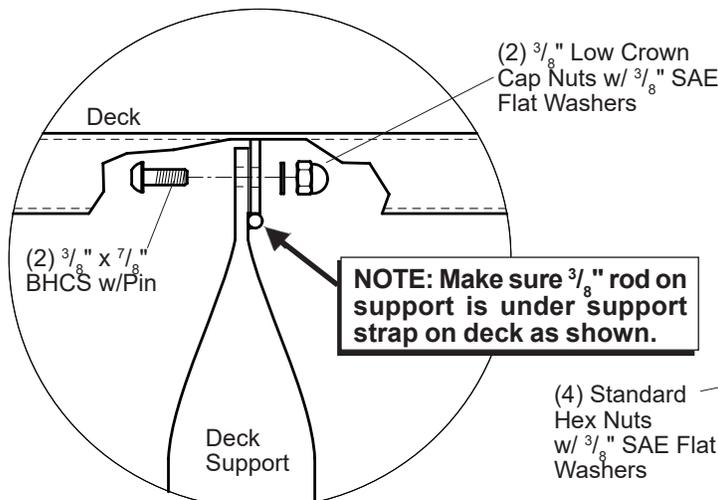
DETAIL SURFACE MOUNT STEP SUPPORT



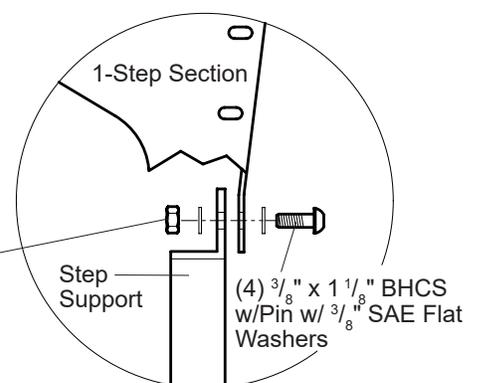
DETAIL DECK SUPPORT BURY



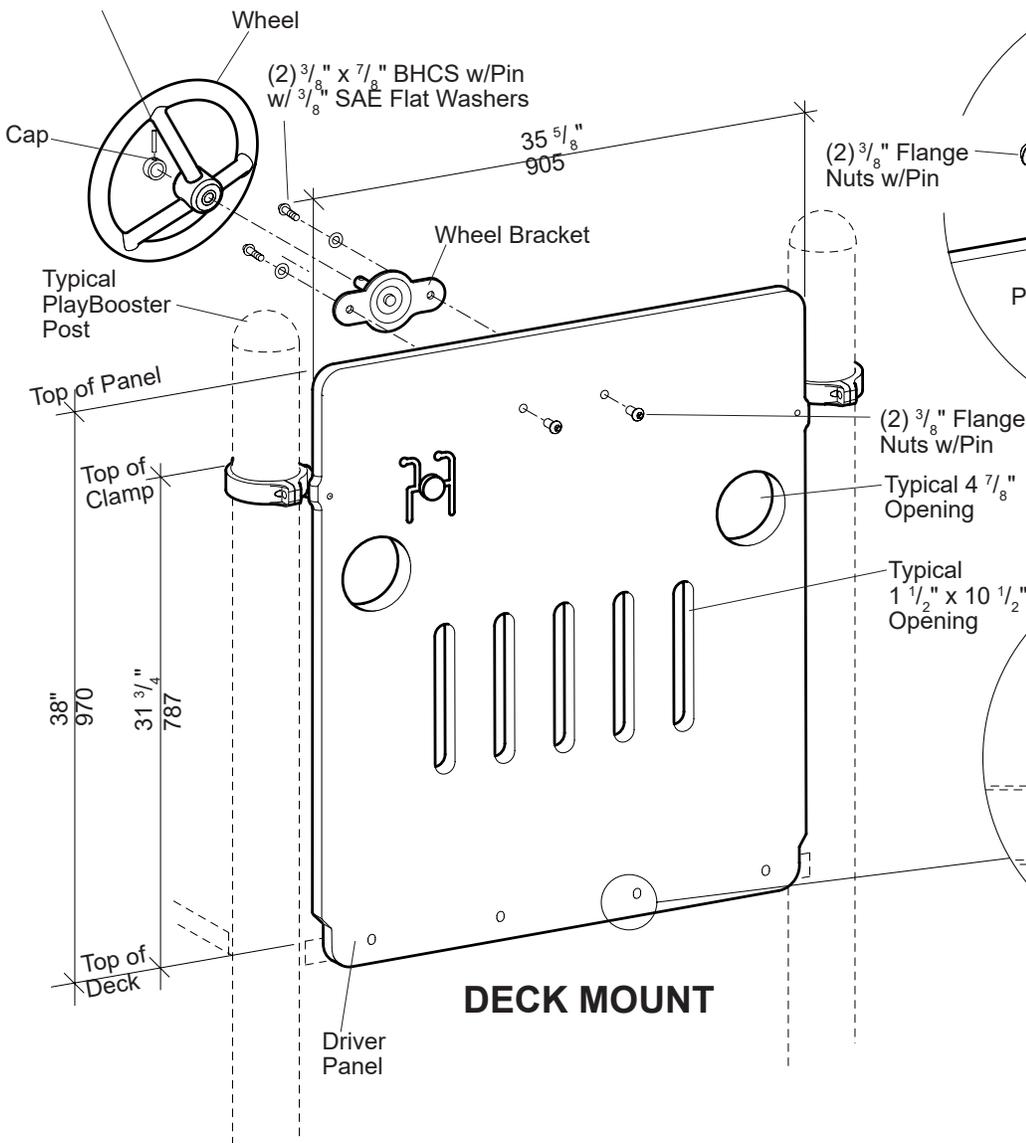
DETAIL DECK SUPPORT ATTACHMENT



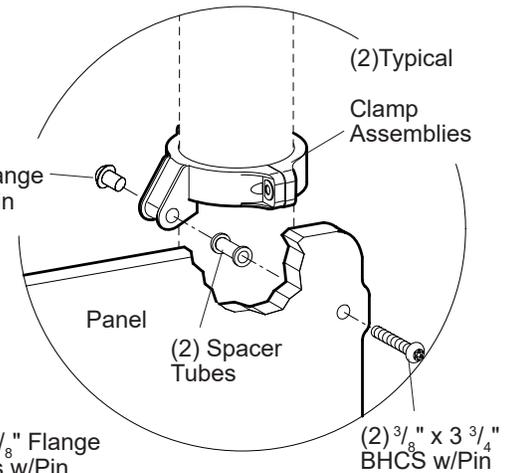
DETAIL STEP SUPPORT ATTACHMENT



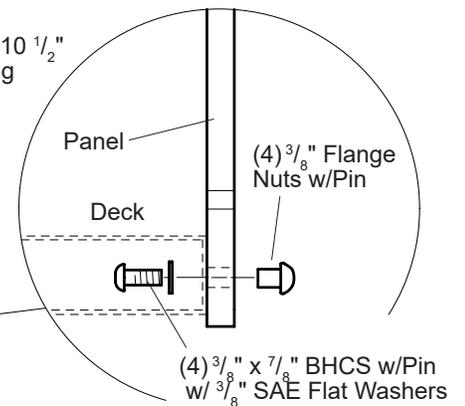
Refer to Wheel Assembly
Details on back of sheet 2.



**DETAIL
PANEL ATTACHMENT**



**DETAIL
TENDERDECKS**



NOTE: Steering Wheel Panel available. Refer to the Wheel Spec Sheet.

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
140234	Driver Panel, Specify Color	1
108432	Wheel, Specify Color	1
127242	Steering Wheel Bracket, Black.....	1
100610	1/4" x 5/8" Drive Rivet, AL/SST.....	2
240451	Driver Panel Hardware Package	1
100196	3/8" x 7/8" BHCS w/Pin, SST	2
100353	3/8" Flange Nut w/Pin, SST.....	2
237528	3/16" x 7/8" Spring Pin, SST	1
234353	Cap, White.....	1
100365	3/8" SAE Flat Washer, 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
140234	Driver Panel, Specify Color	1
108432	Wheel, Specify Color	1
127242	Steering Wheel Bracket, Specify Color.....	1
100610	1/4" x 5/8" Drive Rivet, AL/SST.....	4
240451	Driver Panel Hardware Package	1
100196	3/8" x 7/8" BHCS w/Pin, SST	2
100353	3/8" Flange Nut w/Pin, SST.....	2
237528	3/16" x 7/8" Spring Pin, SST	1
234353	Cap, White.....	1
100365	3/8" SAE Flat Washer, SST.....	2
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

Permalene® Panel: Two color panel measures 35 5/8" wide x 41" high, color specified.

Wheel: 12" diameter cast A356 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.

Wheel Bracket: Weldment comprised of formed 3/16" plate and 5/8" O.D. stainless steel shaft. Finish: ProShield, black in color.

Offset Hanger Clamp Assembly: Cast aluminum. Finish: ProShield, color specified.

Spacer Tube: Made from 6061-T6 aluminum 7/8" O.D. x 1 11/16". 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 42 lbs.
Below Deck 50 lbs.

Installation Instructions

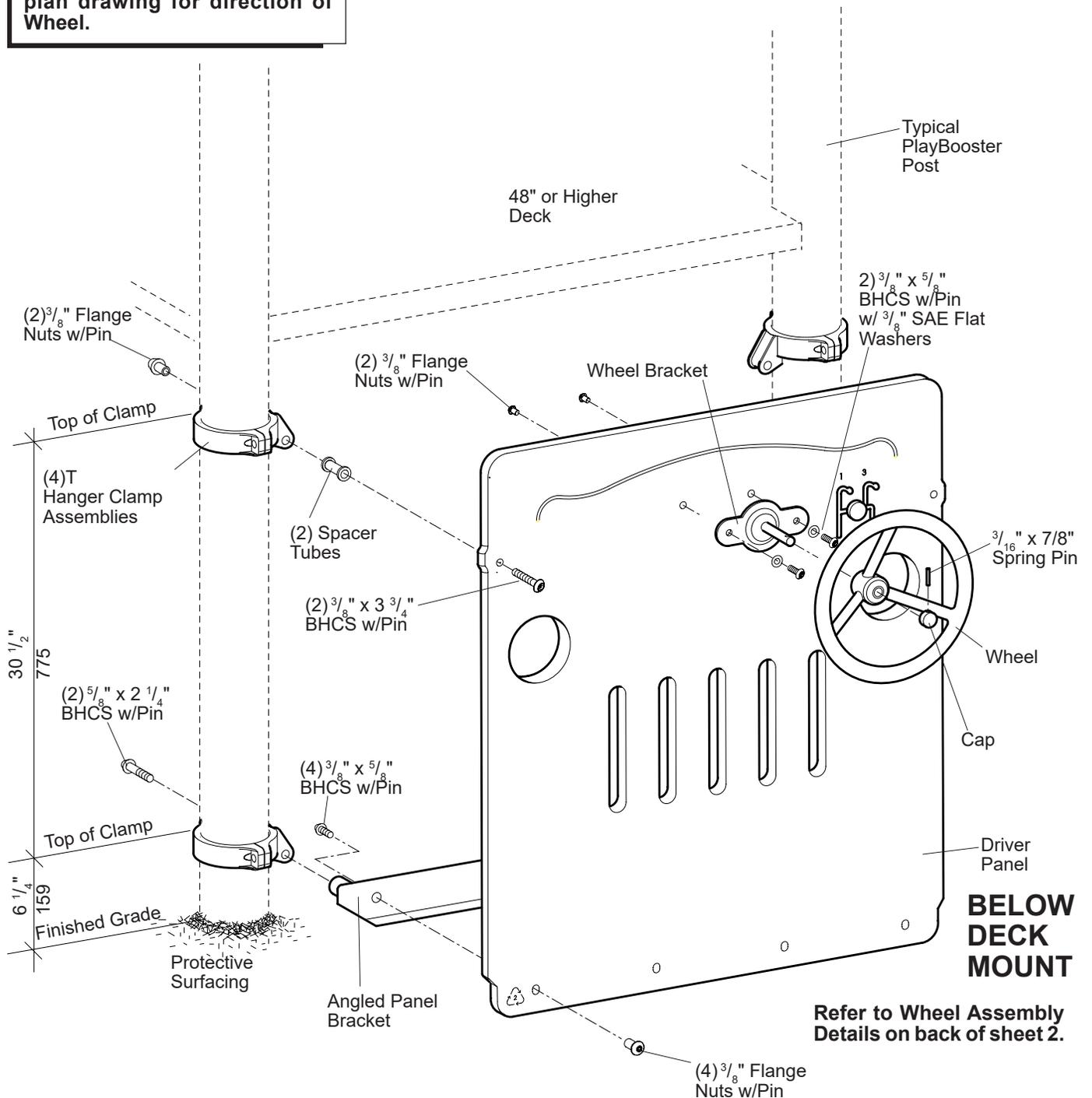
ABOVE DECK (See Sheet 1 of 2)

- 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 wheel as shown on sheet 1 and back of sheet 2.
- 5) Install protective surfacing before users are allowed to play on the structure.

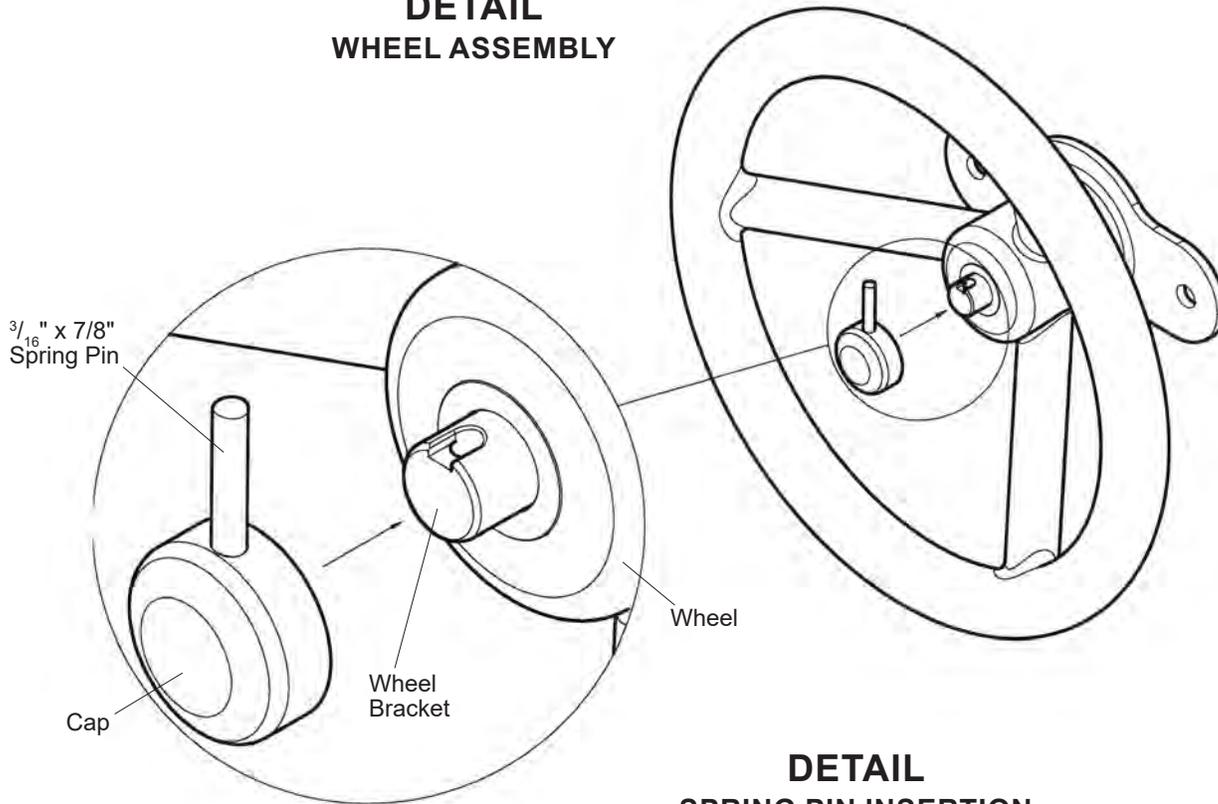
BELOW DECK (See Sheet 2 of 2)

- 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 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 wheel as shown on front and 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.

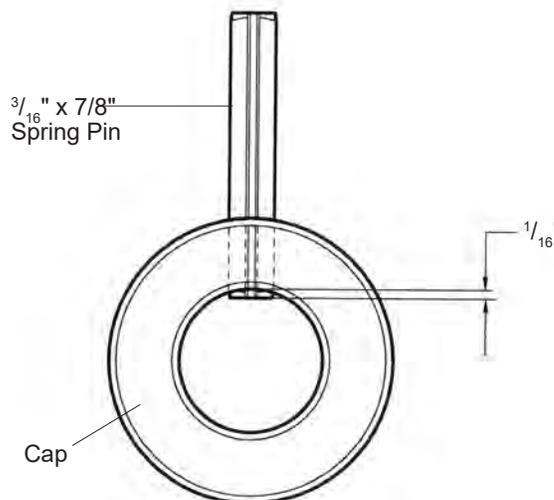
NOTE: Wheel can be installed facing outward. Refer to your plan drawing for direction of Wheel.



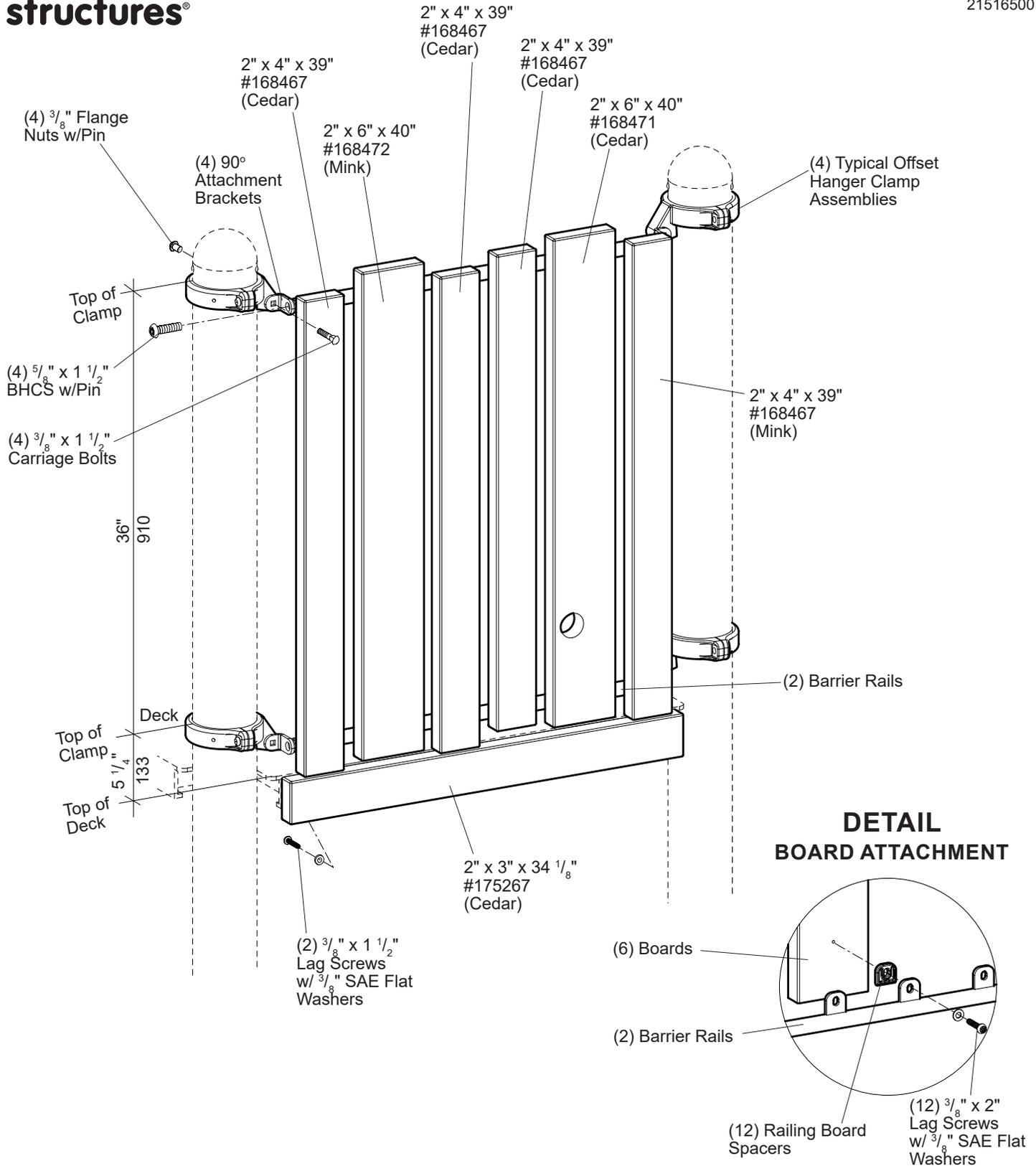
**DETAIL
 WHEEL ASSEMBLY**



**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 $\frac{1}{16}$ ". Orient spring pin to groove on wheel bracket shaft. Slide cap in place and tap spring pin through cap and shaft until



Play Naturally™

PlayBooster®

169319 Recycled Lumber Panel

Parts List

Part#	Description	Qty.
100610	1/4" x 5/8" Drive Rivet, AL/SST	4
105327	5" Half Clamp, Specify Color	4
113729	Offset Hanger Clamp, Specify Color	4
174605	Barrier Rail, Tan	2
168467	2" x 4" x 39" Board, Cedar	3
168467	2" x 4" x 39" Board, Mink	1
168471	2" x 6" x 40" Board, Cedar	1
168472	2" x 6" x 40" Board, Mink	1
175267	2" x 3" x 34 1/8" Deck Face Board, Cedar	1
174606	90° Attachment Bracket, Tan	4
215164	Lumber 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	4
100351	3/8" Tee Nut, SST	8
100365	3/8" SAE Flat Washer, SST	14
139039	3/8" x 2" Lag Screw, SST	12
168198	3/8" x 1 1/2" Lag Screw, SST	2
116017	3/8" x 1 1/2" Carriage Bolt w/Patch, SST	4
100353	3/8" Flange Nuts w/Pin, SST	4
207485	Railing Board Spacer, Tan	12

Installation Instructions

- 1) 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.
- 2) Attach the 90° attachment brackets to barrier rails, using 5/8" x 1 1/2" BHCS w/pin.
- 3) 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.
- 4) Line up pilot holes in barrier boards with spacers and barrier rail tabs, and attach using 3/8" x 2" lag screws with 3/8" SAE flat washers. Refer to the Board Attachment Detail.
- 5) Line up pilot holes in deck face board with slots in deck and attach, using 3/8" x 1 1/2" lag screws with 3/8" SAE flat washers.
- 6) Install protective surfacing before users are allowed to play on the structure.

Poly Board: Recycled high-density polyethylene, cedar or mink in color.

Barrier Rail: Weldment comprised of 1.125" (28,57 mm) O.D. 11 GA. (.120") (3,05 mm) steel tubing with 203 or 303 stainless steel inserts, with 5/8" (15,87 mm) internal threads and 1/4" (6,57 mm) HRPO steel plate. Finish: ProShield®, tan in color.

90° Bracket: Formed from 1/4" (6,57 mm) x 1 1/4" (32,12 mm) HRPO flat steel. Finish: ProShield, tan in color.

Clamps: Cast aluminum. Finish: ProShield, color specified.

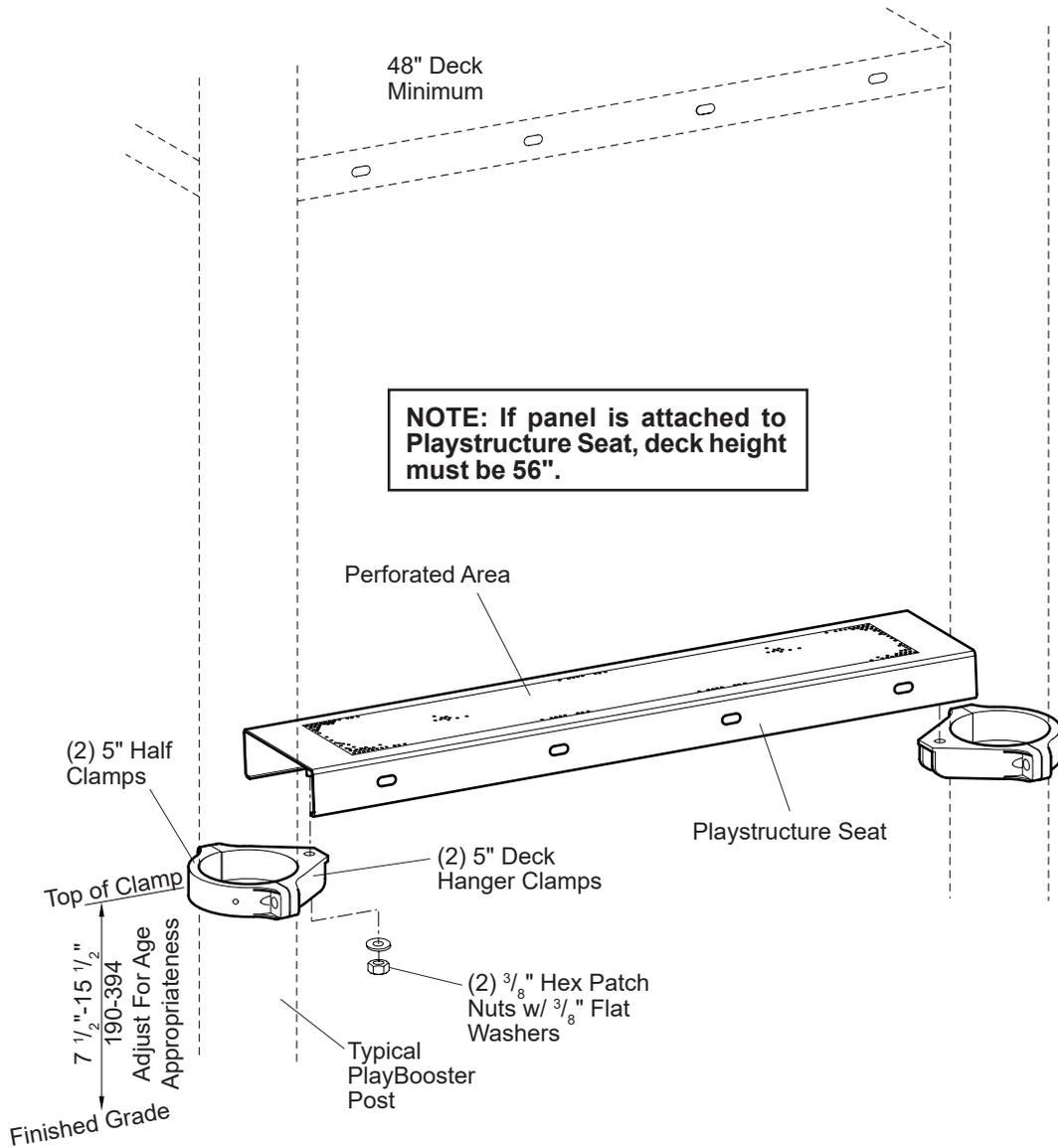
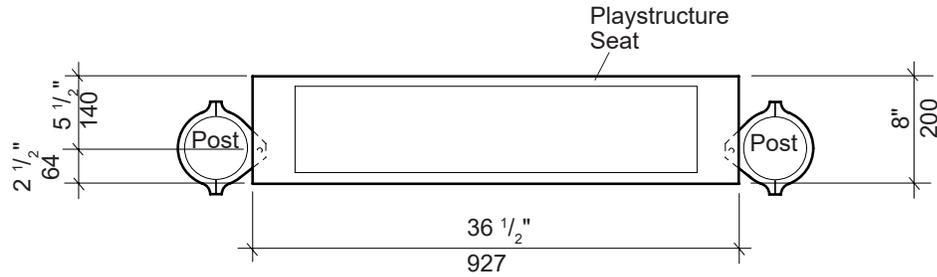
Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated (see specific product installation/specifications).

Installation Time: Approx. 1 1/4 man hours

Weight: 85 lbs.

Fall Height: Deck Height

Top View



PlayBooster®

120818 Playstructure Seat

Parts List

Part#	Description	Qty.
153952	Playstructure Seat, Specify Color.....	1
105327	5" Half Clamp, Specify Color	2
106022	5" Deck Hanger Clamp, Specify Color	2
106676	Seat Hardware Package	1
100198	$\frac{3}{8}$ " x $1\frac{1}{8}$ " BHCS w/Pin, SST	4
100321	$\frac{3}{8}$ " Hex Patch Nut, SST.....	2
100351	$\frac{3}{8}$ " Tee Nut, SST.....	4
100362	$\frac{3}{8}$ " Flat Washer, SST	2
100610	$\frac{1}{4}$ " x $\frac{5}{8}$ " Drive Rivet, AL/SST	2

Seat: Flange formed from 11 GA (.120") sheet steel. Seating surface is perforated with $\frac{5}{16}$ " diameter holes. Finish: TenderTuff™, color specified.

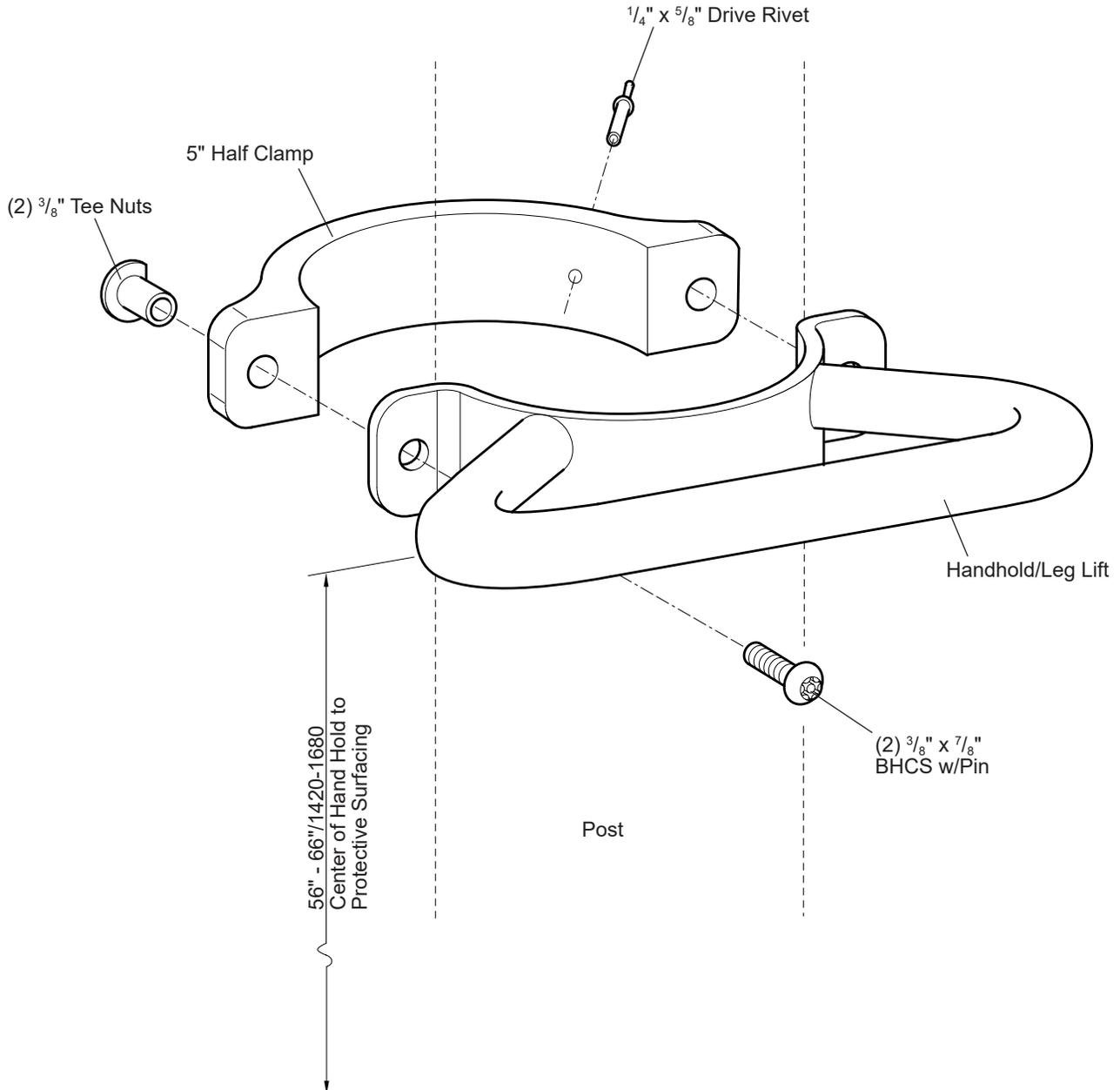
Deck Hanger Clamp Assembly: Cast aluminum. Finish: ProShield®, color specified.

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 $\frac{3}{8}$ " x $1\frac{1}{8}$ " BHCS w/pin with $\frac{3}{8}$ " tee nuts. Refer to the Typical Offset Hanger Clamp Spec Sheet.
- 4) Position seat over 5" deck hanger clamps and attach using $\frac{3}{8}$ " hex patch nuts with $\frac{3}{8}$ " flat washers, as shown.
- 5) Install $\frac{1}{4}$ " x $\frac{5}{8}$ " 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.



Parts List

Part#	Description	Qty.
105327	5" Half Clamp, Specify Color	1
138029	Handhold/Leg Lift, Specify Color.....	1
106518	Hand Hold Hardware Package	1
100196	$\frac{3}{8}$ " x $\frac{7}{8}$ " BHCS w/Pin, SST	2
100351	$\frac{3}{8}$ " Tee Nut, SST.....	2
100610	$\frac{1}{4}$ " x $\frac{5}{8}$ " Drive Rivet, AL/SST	1

Half Clamp: Cast aluminum. Finish: ProShield®, color specified.

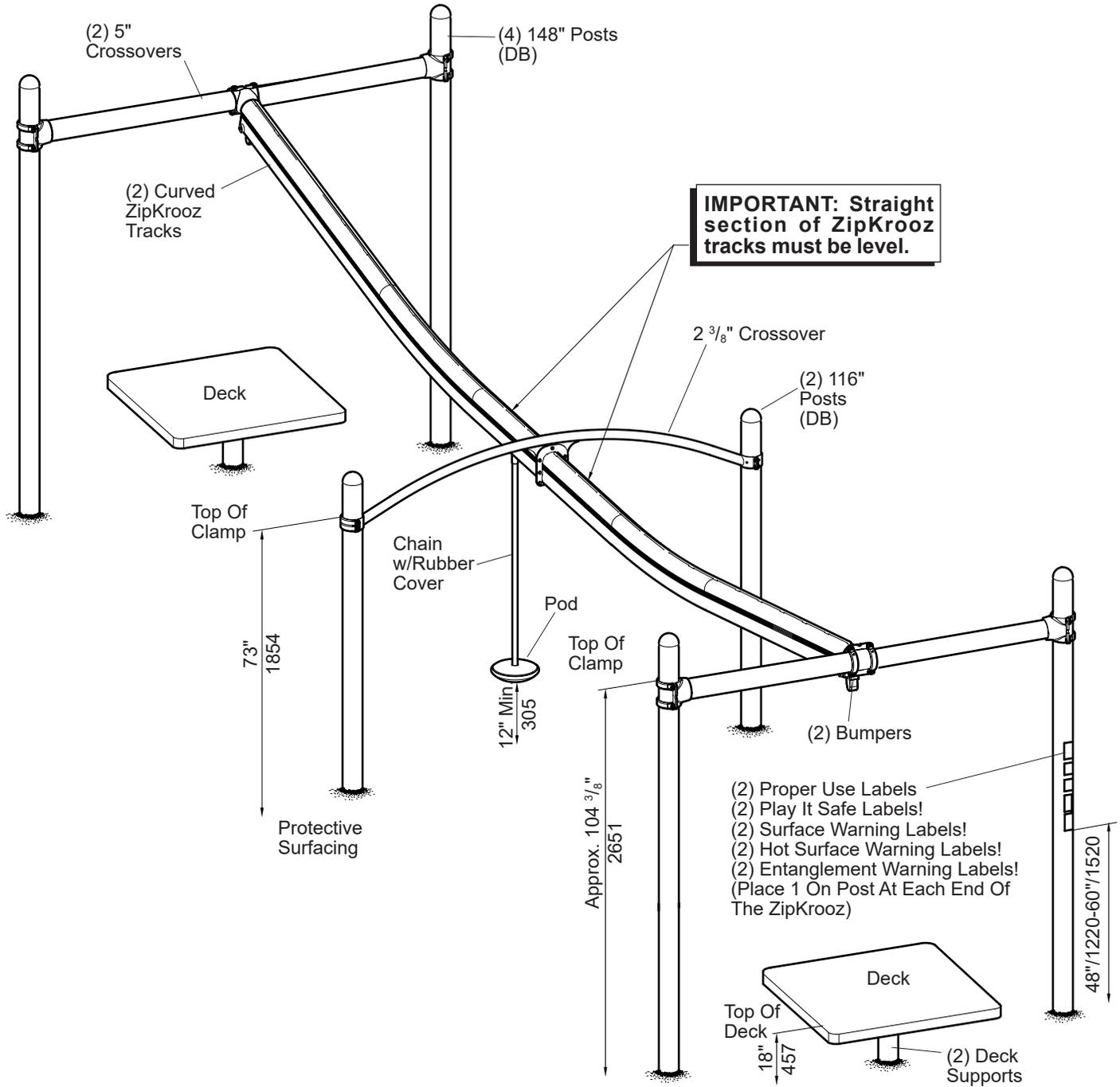
Hand Hold: Weldment comprised of formed $\frac{7}{8}$ " O.D. 11 GA (.120") and $\frac{1}{4}$ " x $1\frac{3}{4}$ " stainless steel half clamps. Finish: TenderTuff™, color specified.

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).

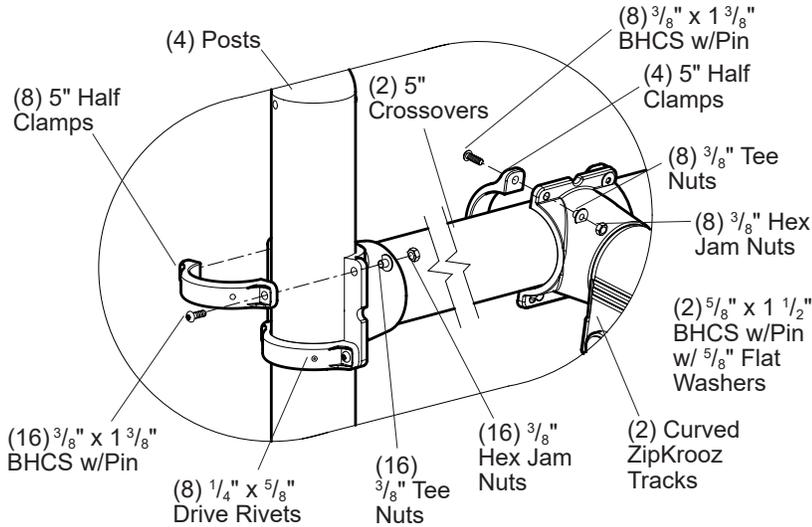
Installation Time: Approx. $\frac{1}{4}$ man hour
Weight: 4 lbs.

Installation Instructions

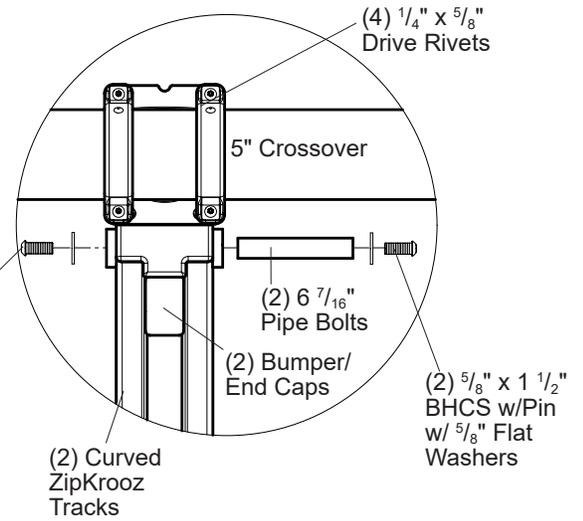
- 1) Attach handhold/leglift to post at height shown, using a 5" half clamp, $\frac{3}{8}$ " x $\frac{7}{8}$ " BHCS w/pin and $\frac{3}{8}$ " tee nuts.
- 2) Install $\frac{1}{4}$ " x $\frac{5}{8}$ " drive rivet in 5" half clamp. Refer to the Offset Hanger Clamp Spec Sheet.
- 3) Install protective surfacing before users are allowed to play on the structure.



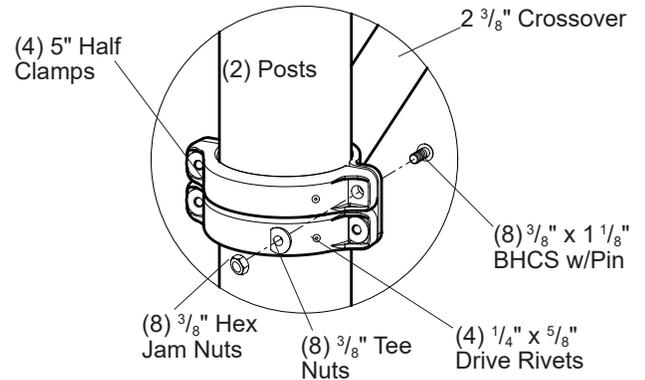
**DETAIL
TRACK ATTACHMENT**



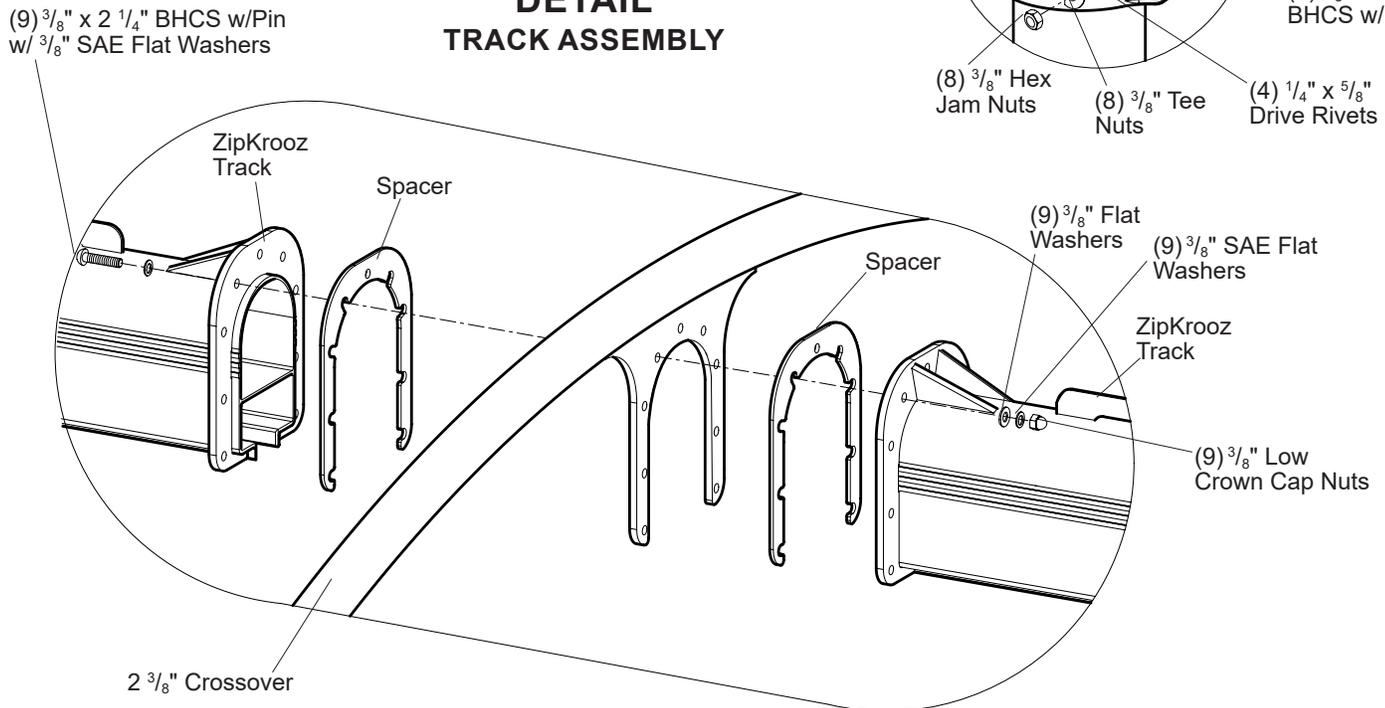
**DETAIL
BUMPER ASSEMBLY**



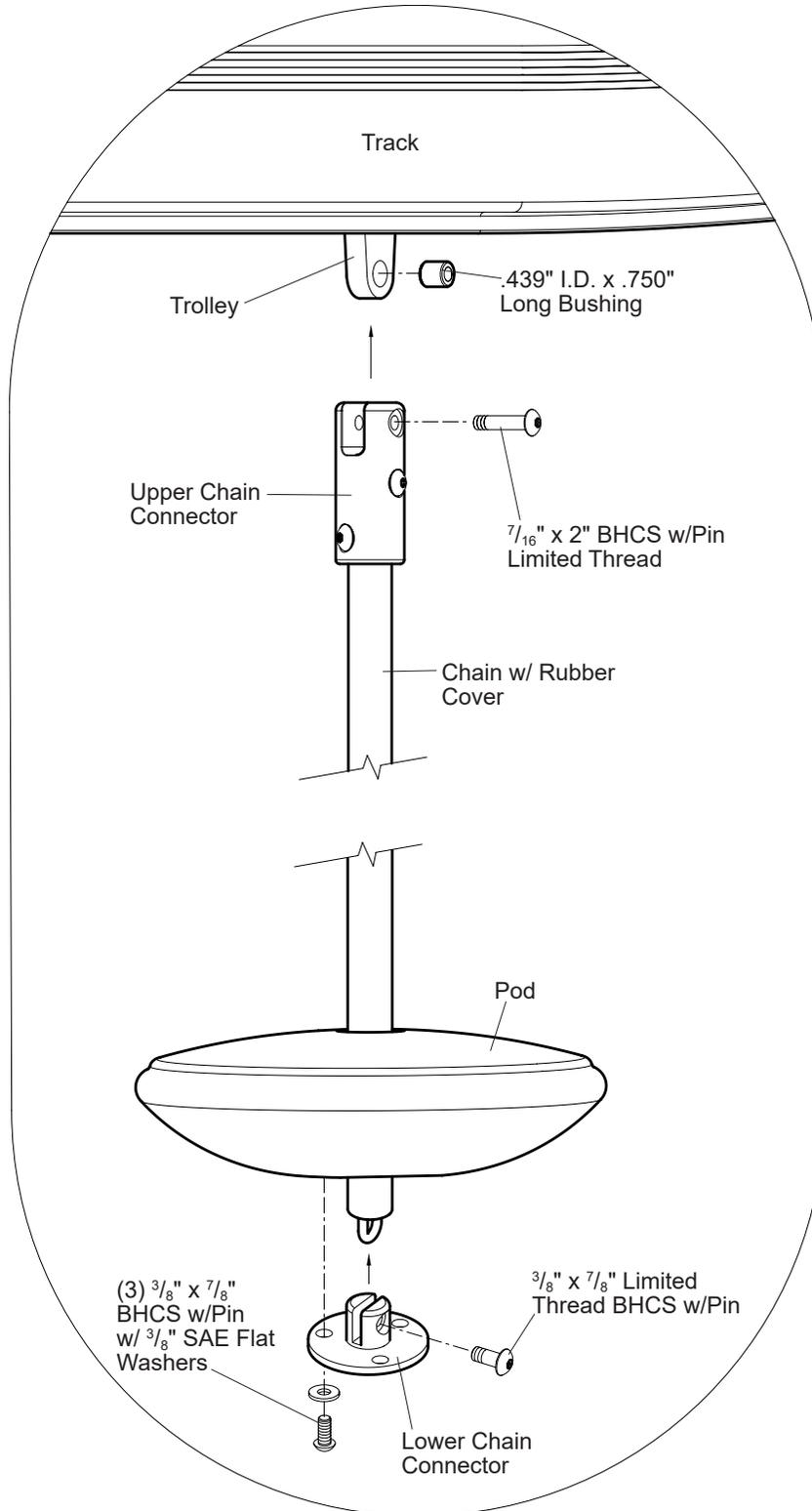
**DETAIL
CROSSOVER ATTACHMENT**



**DETAIL
TRACK ASSEMBLY**



**DETAIL
TROLLEY ASSEMBLY**



Part#	Description	Qty.
100610	1/4" x 5/8" Drive Rivet, AL/SST	16
105327	5" Half Clamp, Specify Color	16
199896	Crossover Beam, Specify Color	2
107470	84" Steel Post w/Cap, SM, Specify Color	2
198216	116" Steel Post w/Cap, SM, Specify Color	4
107520	116" Steel Post w/Cap, DB, Specify Color	2
198214	148" Steel Post w/Cap, DB, Specify Color	4
107623	84" Aluminum Post w/Cap, SM, Specify Color	2
198217	116" Aluminum Post w/Cap, SM, Specify Color	4
107694	116" Aluminum Post w/Cap, DB, Specify Color	2
198215	148" Aluminum Post w/Cap, DB, Specify Color	4
142136	Bumper, Black	2
199792	Deck, Specify Color	2
154460	Evos Climb Across Pod, Specify Color	1
205138	2 3/8" Crossover, Specify Color	1
205042	Curved ZipKrooz Track, Specify Color	2
195731	Lower Chain Connector, Aluminum, Black	1
229287	ZipKrooz Trolley Assembly, Black	1
196442	Chain w/Rubber Cover	1
199899	Deck Support 18" Deck, DB, Specify Color	2
199900	Deck Support 18" Deck, SM, Specify Color	2
205192	Spacer, Aluminum	2
199927	Deck Support Hardware Package	2
100198	3/8" x 1 1/8" BHCS w/Pin, SST	8
100362	3/8" Flat Washer, SST	8
206171	ZipKrooz 34 Ft. Hardware Package	1
100198	3/8" x 1 1/8" BHCS w/Pin, SST	8
113027	3/8" x 1 3/8" BHCS w/Pin, SST	24
100201	5/8" x 1 1/2" BHCS w/Pin, SST	4
100349	3/8" Low Crown Cap Nut, SST	9
100351	3/8" Tee Nut, SST	32
100365	3/8" SAE Flat Washer, SST	18
100362	3/8" Flat Washer, SST	9
100366	5/8" Flat Washer, SST	4
100199	3/8" x 2 1/4" BHCS w/Pin, SST	9
121105	6 7/16" Aluminum Pipe Bolt	2
197123	Proper Use Label	2
115176	ASTM HD Surface Warning Label	2
156847	Play Safe Label, 5-12 YRS	2
182212	Entanglement Warning Label	2
182213	Hot Surface Warning Label	2
128296	3/8" Hex Jam Nut, SST	32
196651	ZipKrooz Pod Seat Hardware Package	1
100196	3/8" x 7/8" BHCS w/Pin, SST	3
100290	3/8" x 7/8" BHCS w/Pin Limited Thread, SST	1
100365	3/8" SAE Flat Washer, SST	3
157704	7/16" x 2" BHCS w/Pin Limited Thread, SST	1
203702	.439" I.D. x .750" Long Bushing, SST	1
121348	4-Hole (SM) Hardware Package	8
100266	1/2" x 2 3/4" Expansion Anchor	32
100322	1/2" Standard Hex Nut, SST	32
100363	1/2" Flat Washer, SST	32

DB = Direct Bury
SM = Surface Mount

Track: Extruded from 6005-T4 aluminum alloy. Finish: ProShield®, color specified.

Posts: See PlayBooster®(PB) General Specifications.

Deck Support: Weldment comprised of 5" (127 mm) O.D. x 7 GA. (.179") (4,54 mm) wall galvanized steel tube, and 1/2" (12,7 mm) HRPO steel plate. Finish: ProShield®, color specified.

Spacer: .190"(4,82 mm) Thick aluminum sheet.

Bumper: Urethane, black in color.

Pod: Rotationally molded from U.V. stabilized linear low density polyethylene, color specified.

Deck: Flange formed from 12 GA (.105") (2,66 mm) sheet steel conforming to ASTM A1011, 1/4" (6,35 mm) HRPO flat steel and 3/8" (9,53 mm) HRPO flat steel. Standing surface is perforated with 5/16" (7,94 mm) diameter holes. The finished size measures 2 1/8" x 38 1/2" x 38 1/2" (53,98 mm x 977 mm x 977 mm). Finish: TenderTuff™, color specified.

Trolley Assy.: Steel body with urethane rollers. Completely assembled. Steel Body Finish: ProShield®, black in color.

ZipKrooz Crossover: Weldment comprised of 2.375" (60,33 mm) O.D. RS40 (.130"-.140") (3,30 mm-3,55 mm) wall galvanized steel tubing, 3/8" (9,52 mm) thick HRPO steel plate and 1/4" (6,35 mm) thick HRPO steel. Finish: ProShield®, color specified.

Crossover: Weldment comprised of tee clamps and a 5" (127 mm) O.D. extruded 6005-T5 aluminum alloy tube with a .125" (3,17 mm) wall. Finish: ProShield, color specified.

Chain w/ Rubber Cover: (Chain) Steel 1/4" (6,35 mm) straight link chain, 3,150 lbs. (1428,82 kilograms) working load limit. Finish: ProGuard. (Cover) High pressure Buna-N Rubber hose, black in color. (Connector) Aluminum.

Clamp: 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: **(DB)** Approx. 12 man hours
(SM) Approx. 11 man hours

Min. Area Req.: 50' 8" x 21' 5" (15,45 m x 6,52 m)

Concrete: **(DB)** Approx. 14.25 cu. ft.

Weight: **(DB)** 1178 lbs. Steel

(DB) 820 lbs. Aluminum

(SM) 1058 lbs. Steel

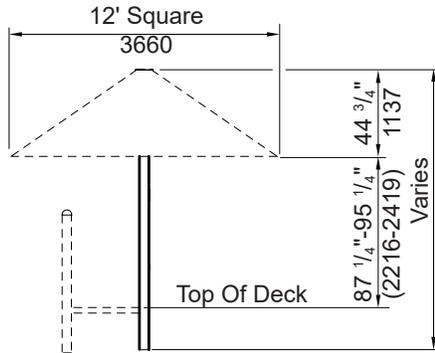
(SM) 790 lbs. Aluminum

Max. Fall Height: 105" (2,67 m)

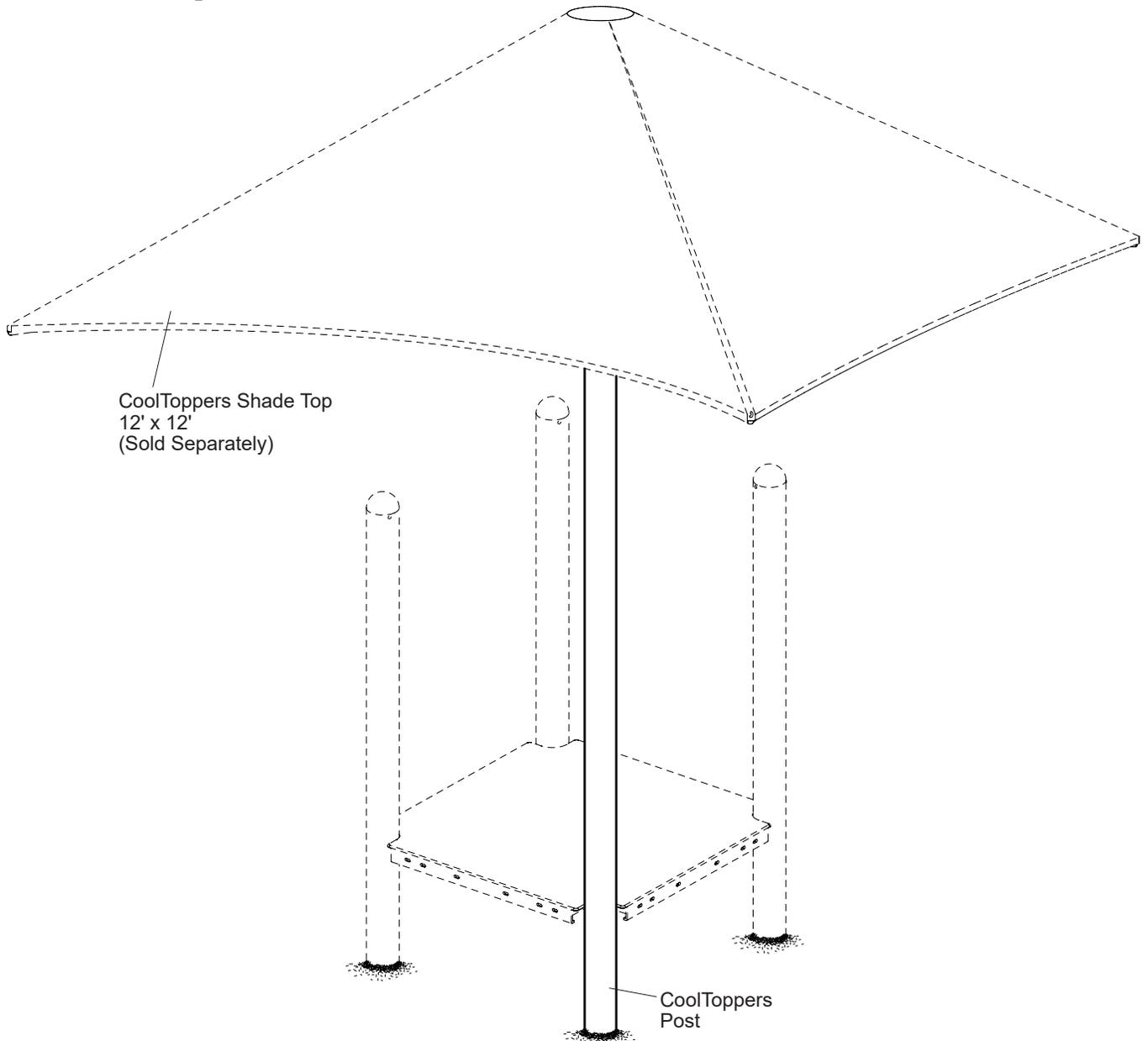
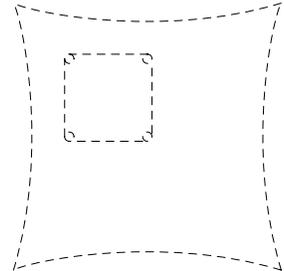
Installation Instructions

- 1) **(Direct Bury)** Dig footings as shown. Refer to the Plan View Footing Layout.
- 2) Attach support posts to decks, using $\frac{3}{8}$ " x $1\frac{1}{8}$ " BHCS w/pin & $\frac{3}{8}$ " flat washers. Refer to the Deck Support Attachment Detail.
- 3) Attach 5" crossover beams to posts at height shown. Refer to the Beam Attachment Detail.
- 4) Attach 2 $\frac{3}{8}$ " crossover beams to posts at height shown. Refer to the Beam Attachment Detail.
- 5) Attach the ZipKrooz tracks to the center of the crossover beams. Refer to the Track Attachment Detail.
- 6) Attach the ZipKrooz tracks to 2 $\frac{3}{8}$ " crossover beam. Refer to the Track Assembly Detail. **IMPORTANT:** *Straight section of ZipKrooz tracks must be level.*
- 7) Insert trolley assembly, then bumpers into track ends. Line up hole in bumper with collars on track and insert pipe bolt. Fasten with $\frac{5}{8}$ " x $1\frac{1}{2}$ " BHCS w/pin and $\frac{5}{8}$ " flat washers. Refer to the Bumper Detail.
- 8) **(Direct Bury)** With posts and decks level, pour concrete footings. Refer to the Direct Bury Detail. **NOTE:** *Allow concrete to cure for 72 hours before attaching cable with pod to trolley.*
(Surface Mount) Drill $\frac{1}{2}$ " x 3" deep holes through post plates and deck support plates using hammer drill and $\frac{1}{2}$ " masonry bit. Tap expansion anchors into drilled holes. Fasten 5" posts and deck support plates to expansion anchors using $\frac{1}{2}$ " standard hex nuts with $\frac{1}{2}$ " flat washers.
- 9) Attach chain w/rubber cover to trolley. Refer to the Trolley Assembly Detail.
- 10) Attach pod to chain w/rubber cover. Refer to the Pod Attachment Detail.
- 11) Install $\frac{1}{4}$ " x $\frac{5}{8}$ " drive rivets in all 5" half clamps. Refer to the Typical Tee Clamp Spec Sheet.
- 12) Apply Labels, as shown.
- 13) Install protective surfacing before users are allowed to play on the component.

**DETAIL
FRONT VIEW**



**DETAIL
TOP VIEW**



PlayBooster® 154883 CoolToppers® Post For Roofs, Single Post



PlayBooster® 154883 CoolToppers® Posts For Roofs, Single Post

Parts List

Part#	Description	Qty.
153697	5" O.D. x 220 1/2" Mast (16"-72"), Specify Color	1
154804	5" O.D. x 200 1/2" Mast (GRD, 8"),Specify Color	1
154046	12" Footer Extension (32"-40"), Specify Color	1
154044	28" Footer Extension (48"-56"), Specify Color	1
154043	44" Footer Extension (64"-96"), Specify Color	1
244382	Middle Post 96" Deck, Specify Color	1
244384	Upper Post Extension 96" Deck, Specify Color.....	1
155083	DB Post Extension (32"-96") Hdw. Package	1
100198	3/8" x 1 1/8" BHCS w/Pin, SST	4
100327	3/8" Standard Hex Nut, SST	4
100362	3/8" Flat Washer, SST	8
246727	Upper Post Extension 96" Deck	1
113027	3/8" x 1 3/8" BHCS w/Pin, SST	6
136931	3/8" - 16 Hex Nut Nylock	6
100365	3/8" Flat SAE Washer, SST.....	12

DB=Direct Bury

CoolToppers Post:	Weldment comprised of 5" O.D. x 7 GA (.179") galvanized steel tubing and 1/4" steel plate. Finish: ProShield, color specified.
Footer Extension:	Weldment comprised of 5" O.D. x 11 GA (.120") galvanized steel tubing and 1/4" steel 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).
Upper Post Ext:	Weldment comprised of 5" OD x 11 GA (.120") galvanized steel tubing with 1/4" steel plate ZP and 3/8" steel plate. Finish: ProShield, color specified.
Middle Post:	Weldment comprised of 5" OD x 7 GA (.179") galvanized steel tubing with 1/4" steel plate ZP and 3/8" steel plate. Finish: ProShield, color specified.
Installation Time:	Post - 2 People Approx. 1 hour
Concrete:	12 cu. ft.
Weight:	172 lbs. (GRD., 8") 188 lbs. (16"-24") 200 lbs. (32"-40") 211 lbs. (48"-56") 222 lbs. (64"-72") 253 lbs. (96")

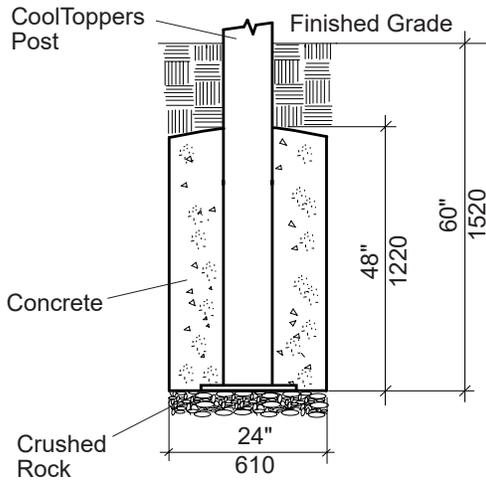
Installation Instructions

- 1) Dig footing hole as shown.
- 2) **(Grd., 8", 16" & 24" Deck Height)** Place post in footing hole. With post braced plumb pour concrete footing. **NOTE: Allow concrete footing to cure for a minimum of 72 hours before attaching CoolToppers shade top.**

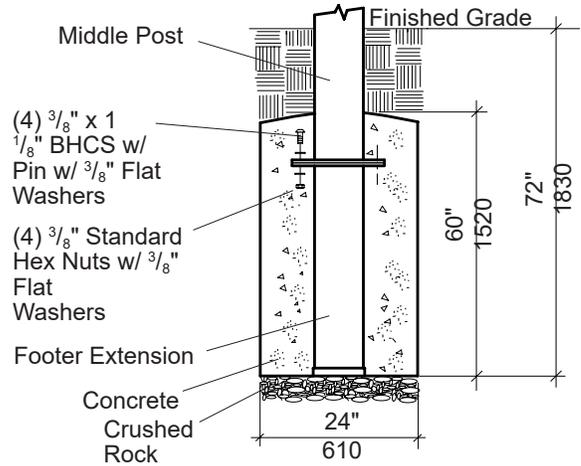
(32"-72" Deck Height) Attach post extension to CoolToppers post using 3/8" x 1 1/8" BHCS w/pin with 3/8" flat washers and 3/8" standard hex nuts with 3/8" flat washers. Place post in footing hole. With post braced plumb pour concrete footing. **NOTE: Allow concrete footing to cure for a minimum of 72 hours before attaching CoolToppers shade top.**

(96" Deck Height) Attach DB post extension to middle post 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. Attach upper post extension to middle post using 3/8" x 1 1/8" BHCS w/pin with 3/8" SAE flat washers and 3/8" low crown cap nuts with 3/8" SAE flat washers. With post braced plumb pour concrete footing. **NOTE: Allow concrete footing to cure for a minimum of 72 hours before attaching CoolTopper Shade top.**

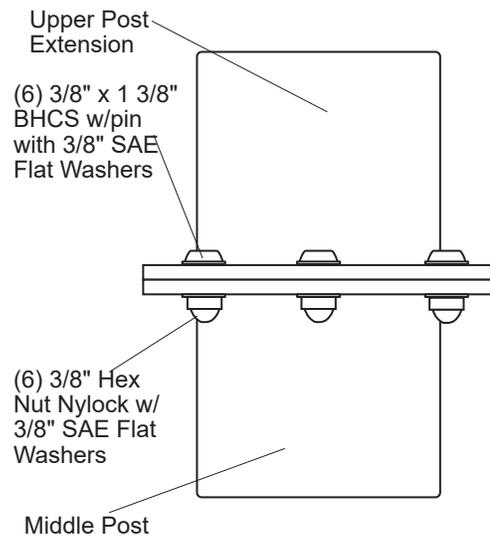
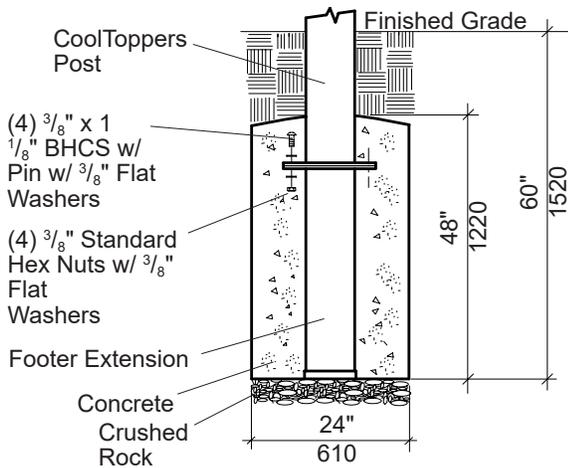
**DETAIL
 DIRECT BURY
 (GRD., 8", 16" & 24" DECK)**



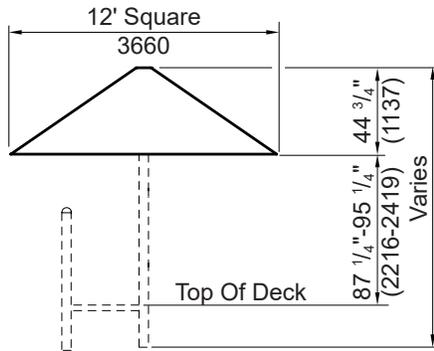
**DETAIL
 DIRECT BURY
 (96" DECKS)**



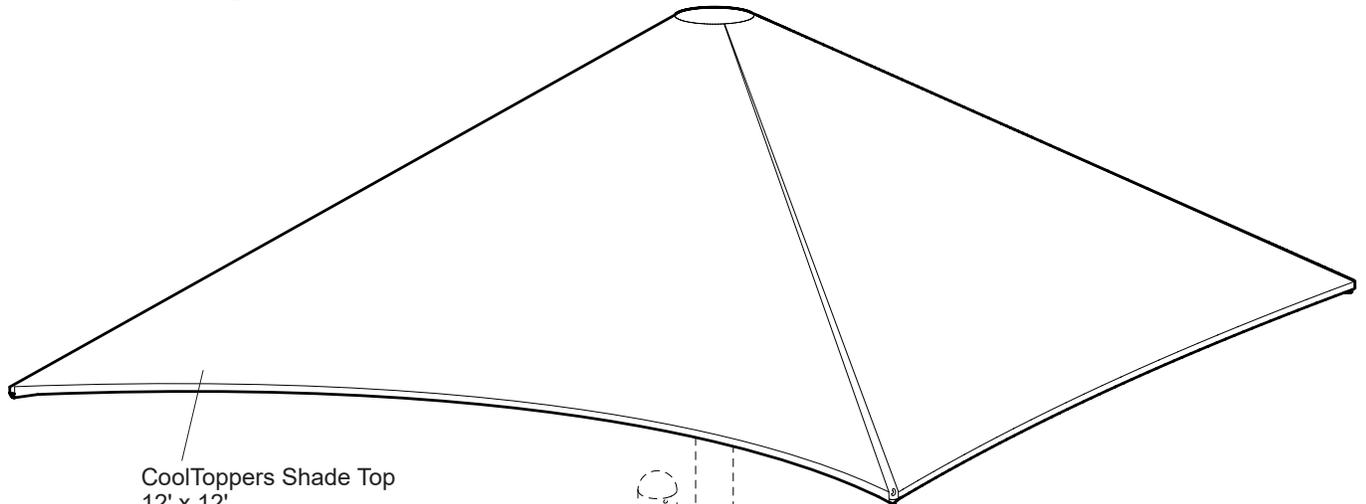
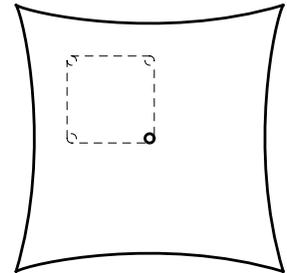
**DETAIL
 DIRECT BURY
 (32"-72" DECKS)**



**DETAIL
FRONT VIEW**



**DETAIL
TOP VIEW**



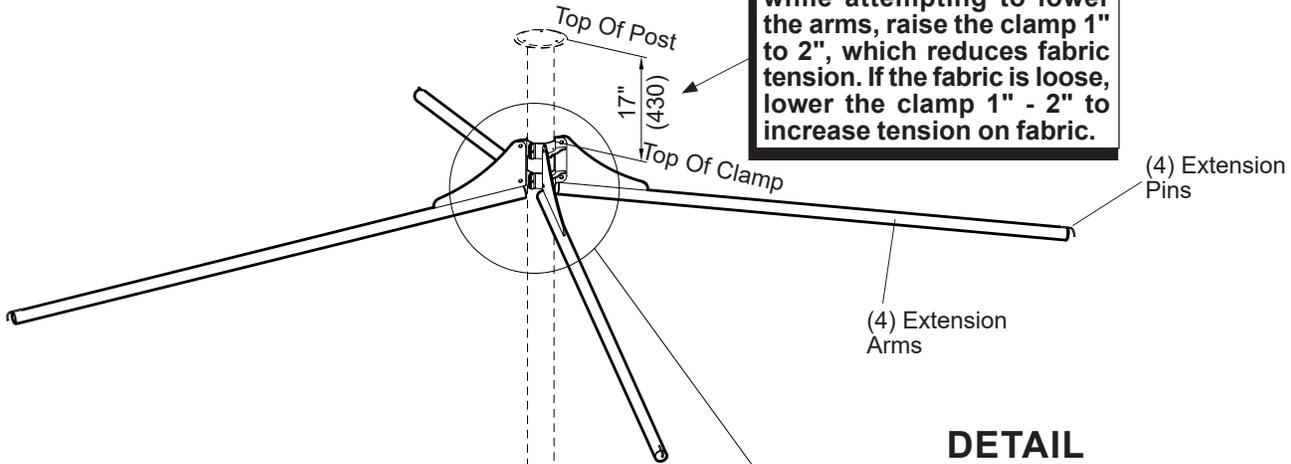
CoolToppers Shade Top
12' x 12'

CoolToppers Post
(Sold Separately)

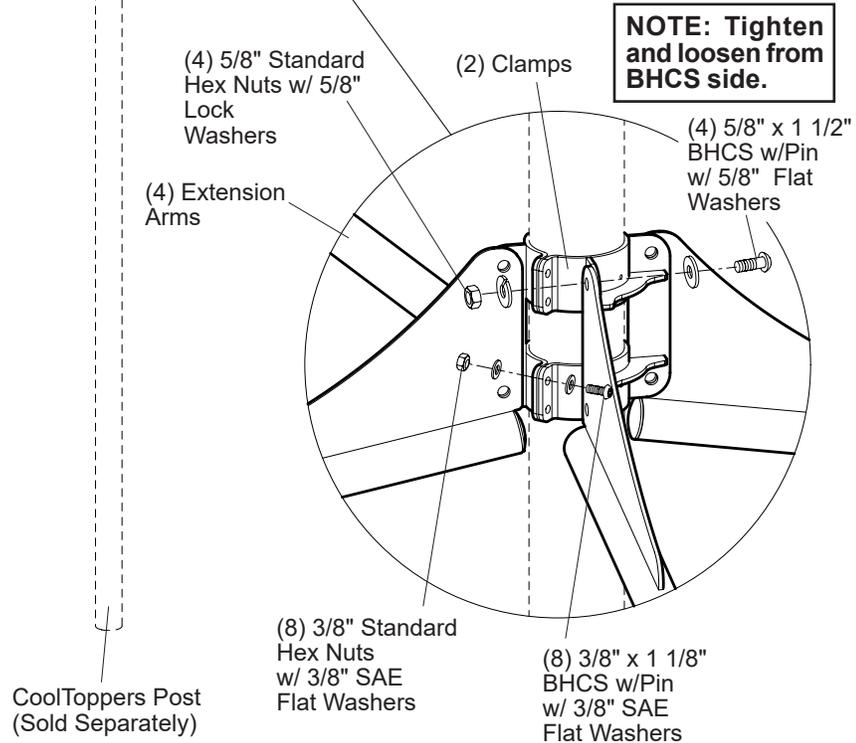
NOTE: Remove fabric when wind speeds are expected to exceed 90 mph and snow loads are expected to exceed 5 psf.

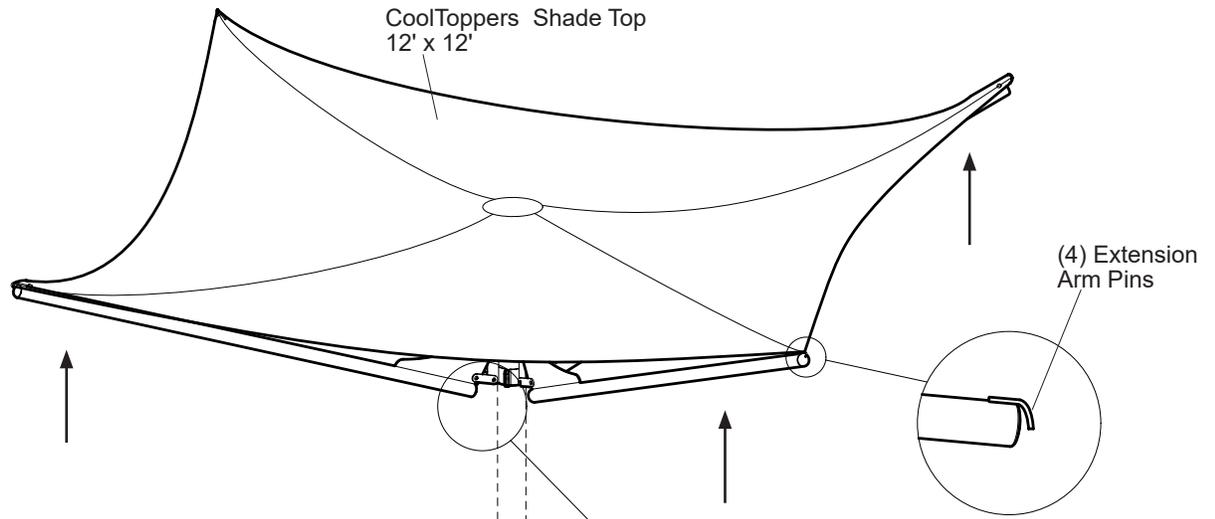
NOTE: Refer to Site Plan for orientation of extension arms.

NOTE: 17" is an approximate measurement from the top of post to top of clamp. Field adjustment of the clamp height may be required to achieve proper fabric tension. If fabric seems extremely tight, while attempting to lower the arms, raise the clamp 1" to 2", which reduces fabric tension. If the fabric is loose, lower the clamp 1" - 2" to increase tension on fabric.



**DETAIL
UPPER ARM ATTACHMENT**

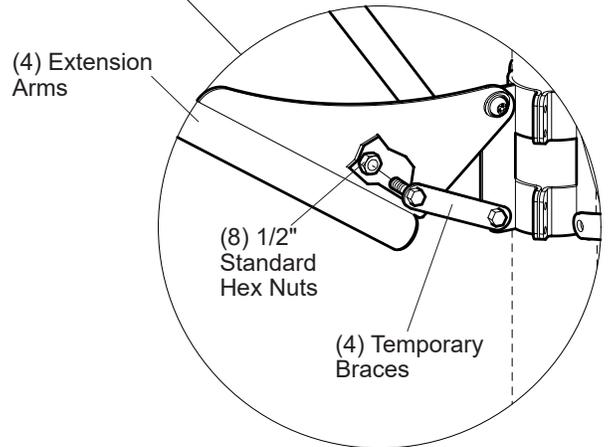




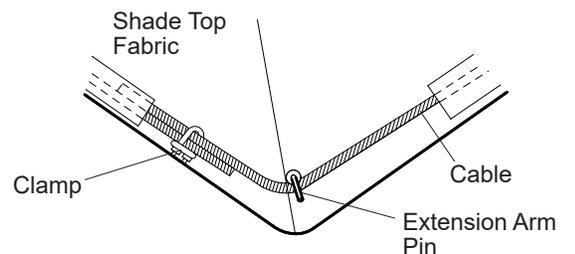
NOTE: For ease of installation a 12'-16' ladder or bucket lift is recommended.

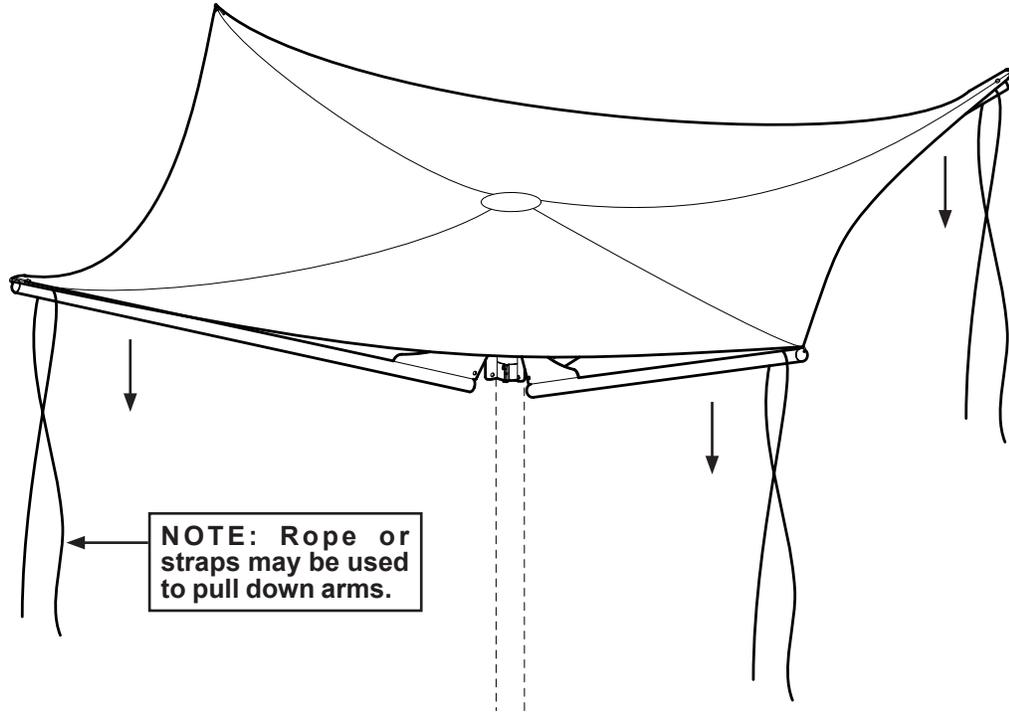
CoolToppers Post
(Sold Separately)

**DETAIL
BRACE ATTACHMENT**

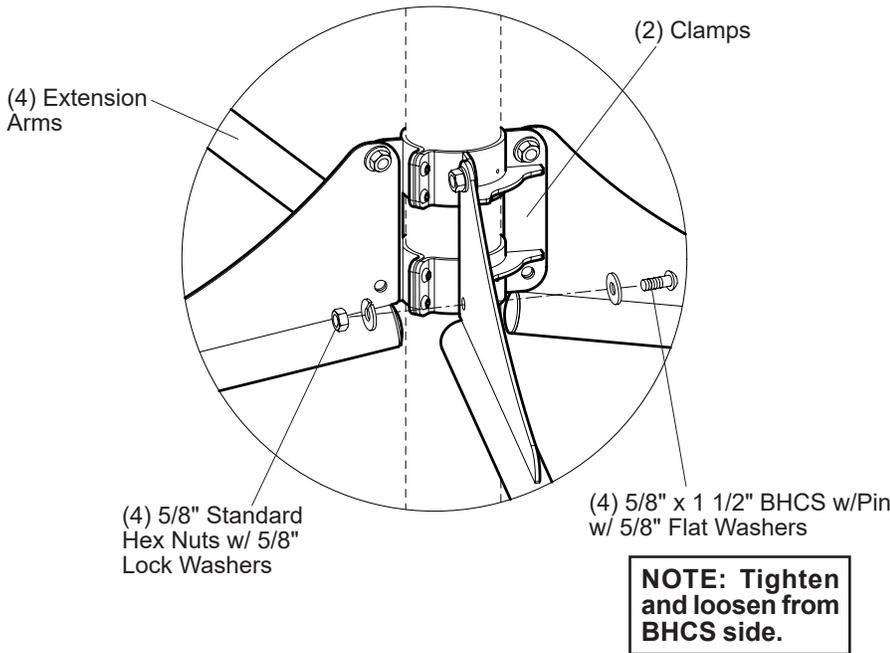


**DETAIL
CABLE CLAMP ATTACHMENT**





**DETAIL
LOWER ARM ATTACHMENT**





PlayBooster® 154884 CoolToppers® Single Post

Parts List

Part#	Description	Qty.
152833	Umbrella Ext. Arm Weldt., Specify Color.....	4
210962	LSI Shade 12x12 Cooltopper	1
153560	Clamp, Specify Color	2
153663	Brace (Installation & Removal), Specify Color	4
175824	Single Post Shade Hardware Package	1
100322	1/2" Standard Hex Nut, SST.....	8
100323	5/8" Standard Hex Nut, SST.....	8
100327	3/8" Standard Hex Nut, SST.....	8
100365	3/8" SAE Flat Washer, SST	16
100366	5/8" Flat Washer, SST.....	8
175652	5/8" Lock Washer, SST.....	8
127547	3/8" x 1 1/8" BHCS w/Pin, SST	8
127551	5/8" x 1 1/2" BHCS w/Pin, SST	8

DB=Direct Bury

CoolToppers Shade Top:

High-density polyethylene with ultra violet additives. All corners to be strengthened with 16 oz. non-tear vinyl material. Protective webbing is sewn into all areas where steel cable enters/exits cloth pockets. Live loads 20 psf. Wind design speed withstands up to 90 mph. Uplift 19 psf. Snow loads 5 psf. Tear strength warp 221 lb. and weft 463 lb.. Burst strength 38 PSIA.

Extension Arms: Weldment comprised of 2.875" O.D. RS-40 (.149" - .182") galvanized steel tubing, 1/4" steel plate and 1/4" diameter carbon steel J-hooks. Finish: ProShield®, color specified.

Clamp: Weldment comprised of 1/4" x 3" HRPO flat steel and 1/4" HRPO steel 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).

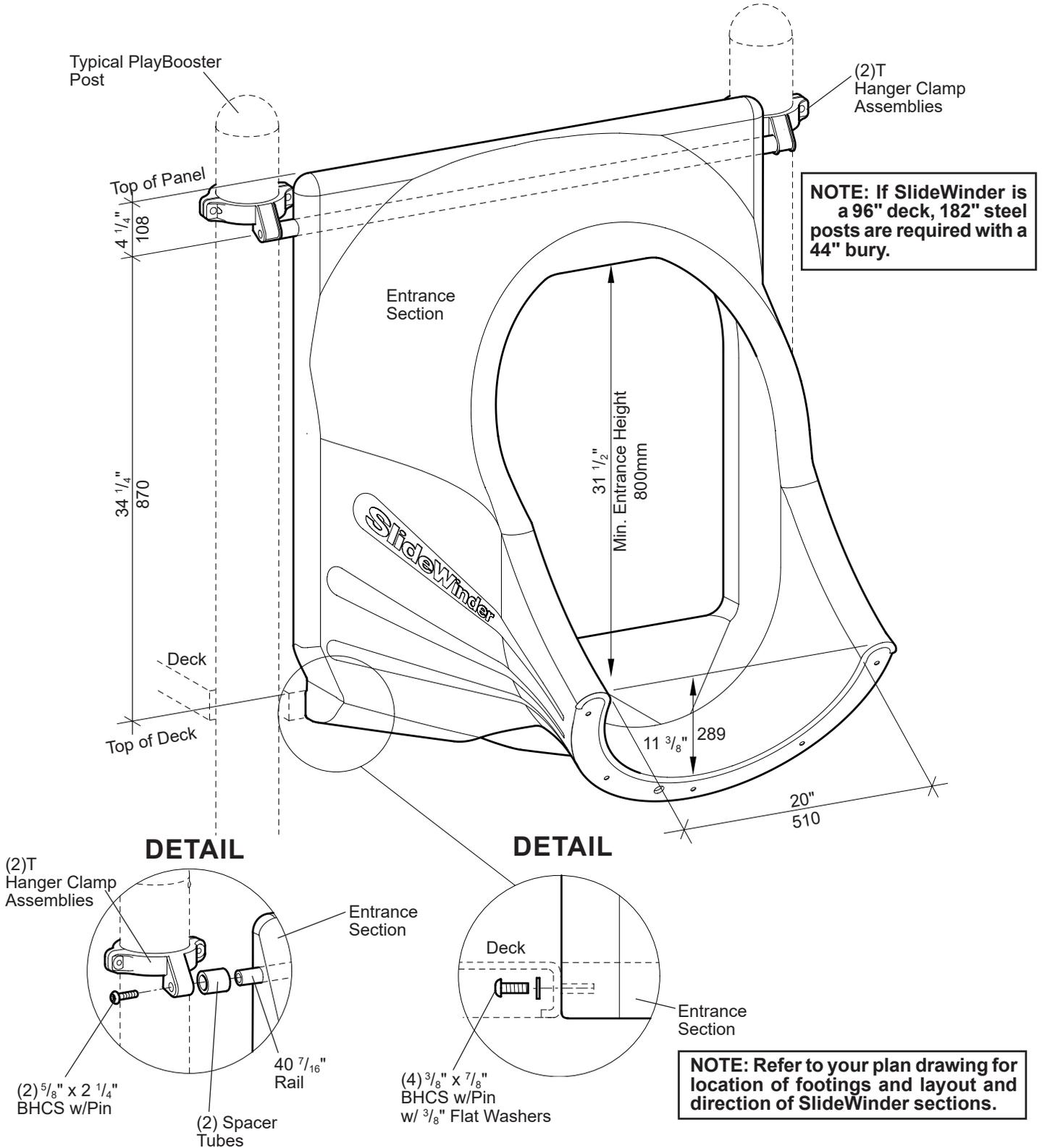
Installation Time: Shade Top Assembly - 4 People Approx. 2 Hours
Actual Size: 12' x 12'
Weight: 145 lbs.

Installation Instructions

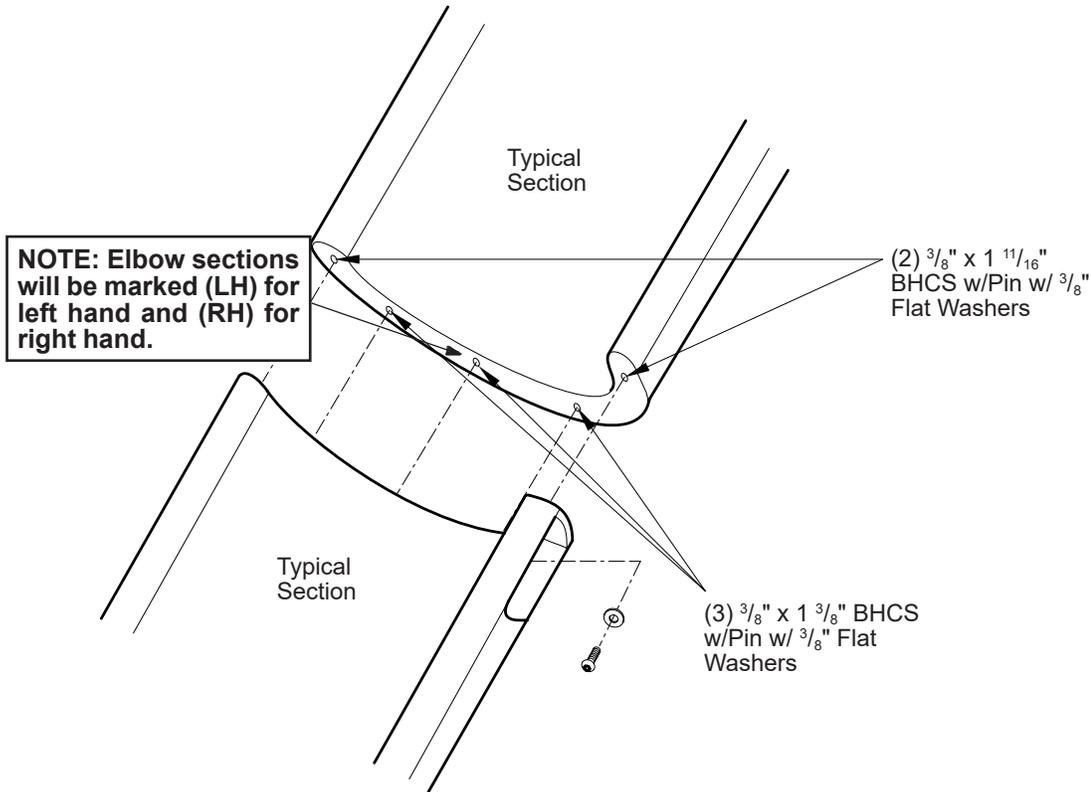
NOTE: Allow concrete footing to cure for a minimum of 72 hours before installing CoolToppers shade top.

- 1) Attach clamps to post at height shown 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 Upper Arm Attachment Detail. **NOTE:** Orientate clamp flanges in the direction you want extension arms to face.
- 2) Lift extension arm into position and attach the top bolt only to clamp flange, using 5/8" x 1 1/2" BHCS w/pin with 5/8" flat washer and 5/8" standard hex nut with 5/8" lock washer. Attach remaining extension arms following the same sequence. Refer to the Upper Arm Attachment Detail. **NOTE:** Lightly tighten bolts, so arms move freely up and down. For ease of installation a 12'-16' ladder or bucket lift is recommended.
- 3) Lift extension arm up and attach temporary brace to clamp flange and extension arm using 1/2" standard hex nuts. Attach temporary braces to remaining extension arms following the same sequence. Refer to the Brace Attachment Detail.
- 4) Thread cable along perimeter of fabric.
- 5) Place the shade over the extension arms and attach each corner to extension arm pin.
- 6) Remove temporary braces from extension arms and clamps. **NOTE:** Retain temporary braces for future use.
- 7) Simultaneously pull the arms down and bolt the remaining hole in the arm to post flange using 5/8" x 1 1/2" BHCS w/pin with 5/8" flat washers and 5/8" standard hex nuts with 5/8" lock washers. Refer to the Lower Arm Attachment Detail. Final tighten hardware. **NOTE:** When CoolToppers shade top is properly tensioned, it should be difficult to insert fingers between fabric and top of post. To increase tension to shade top, loosen clamp fasteners and pull down on extension arms and clamps. Retighten clamp fasteners.
- 8) Cable should lay on top of fabric at the corners. Pull cable tight by hand and attach with cable clamp provided. Refer to the Cable Clamp Attachment Detail.

ENTRANCE SECTION ATTACHMENT

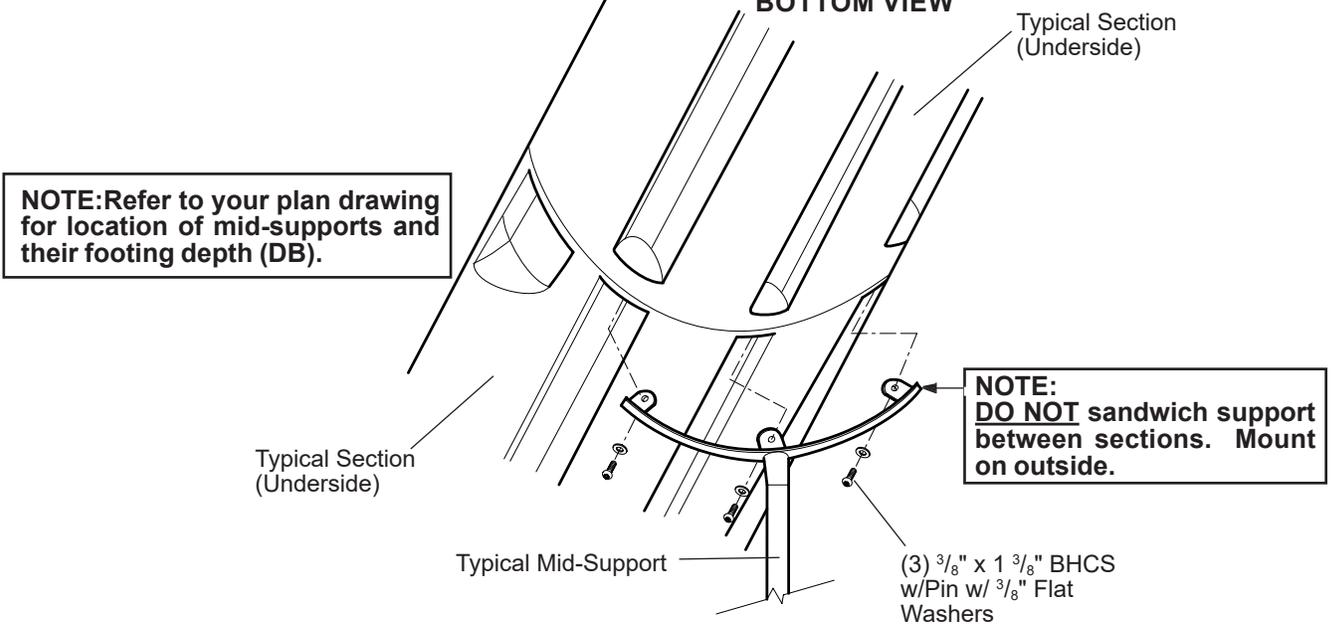


DETAIL
TYPICAL SLIDE SECTION

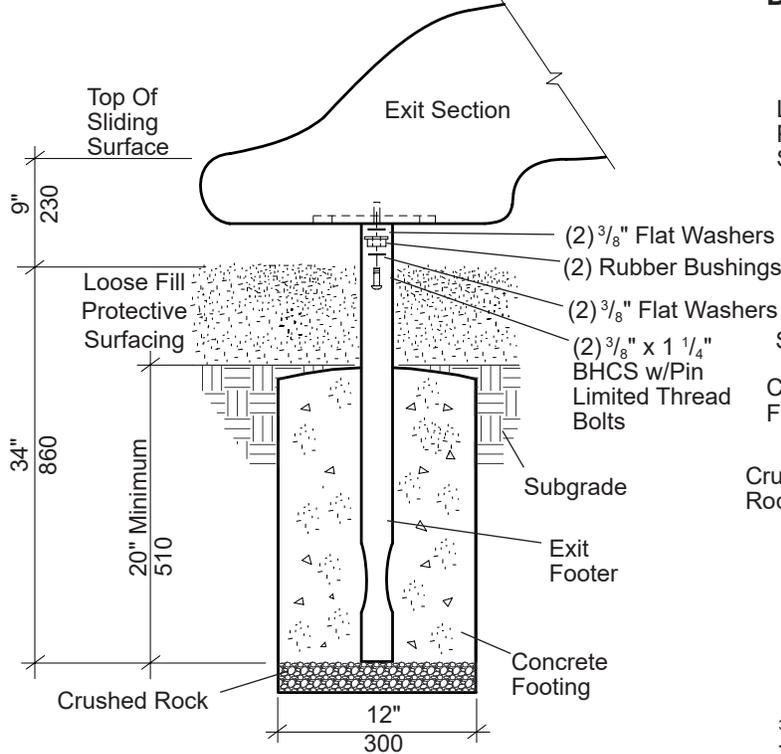


NOTE: Fasten top of slide section with pockets to bottom of slide section without pockets.

DETAIL
TYPICAL MID-SUPPORT
(48" - 96" SLIDES ONLY)
BOTTOM VIEW

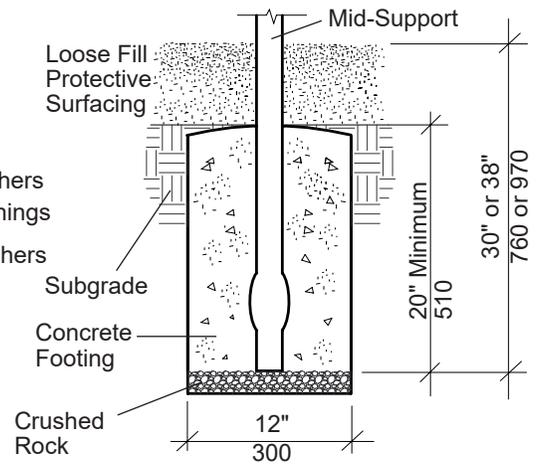


**DETAIL
DIRECT BURY / EXIT SECTION**

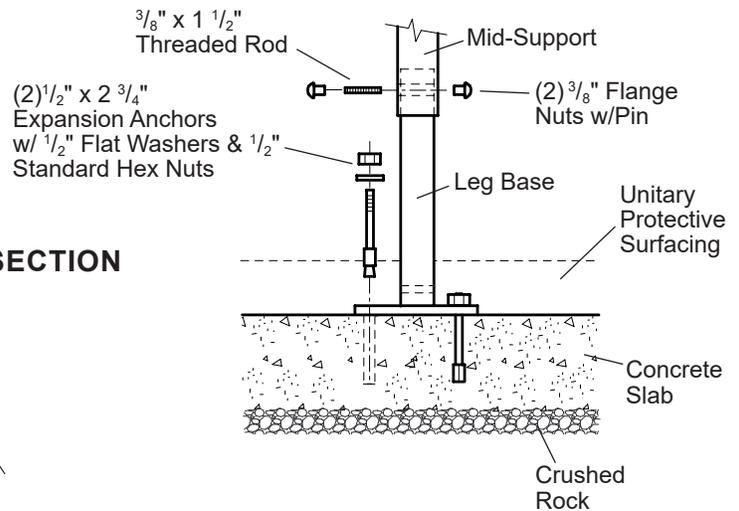


NOTE: Attach bolts in the center of the footer slots to allow for expansion and contraction. Snug bolts down only, do not overtighten!

**DETAIL
DIRECT BURY / MID-SUPPORTS**

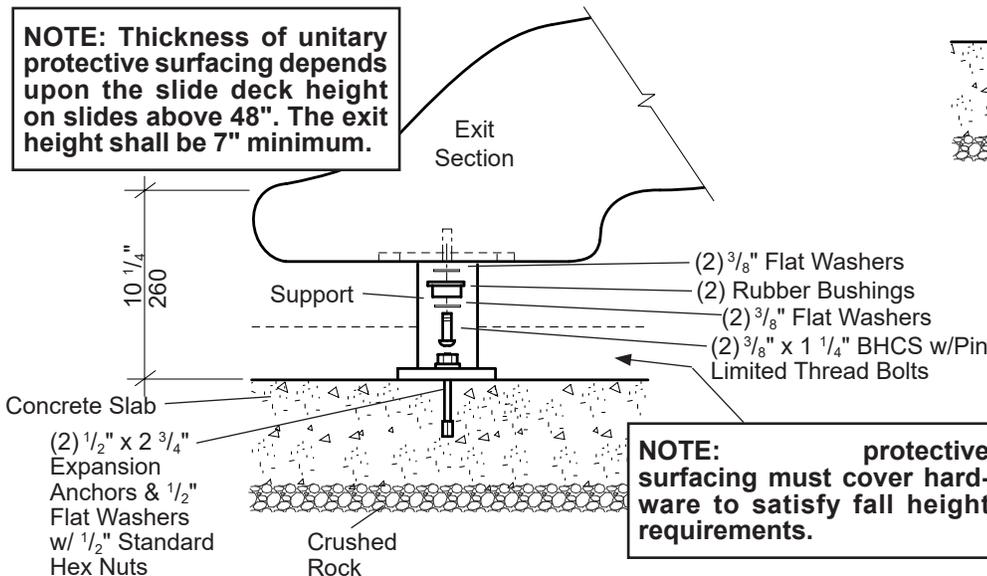


**DETAIL
SURFACE MOUNT / MID-SUPPORTS**



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.

**DETAIL
SURFACE MOUNT / EXIT SECTION**



NOTE: Thickness of unitary protective surfacing depends upon the slide deck height on slides above 48". The exit height shall be 7" minimum.

NOTE: protective surfacing must cover hardware to satisfy fall height requirements.

Parts List

Part#	Description	Qty.
124867	Right Elbow Section, Specify Color	*
124868	Left Elbow Section, Specify Color	*
125655	Straight Section (15 1/4" Long), Specify Color	*
124864	Straight Section (30 1/2" Long), Specify Color	*
100583	40 7/16" Rail, Specify Color	1
105327	5" Half Clamp, Specify Color	2
113729	Offset Hanger Clamp, Specify Color	2
100610	1/4" x 5/8" Drive Rivet, AL/SST	2
125562	Support Base (SM), Specify Color	*
128434	66" Mid-Support (DB), Specify Color	*
128077	82" Mid-Support (DB), Specify Color	*
128078	106" Mid-Support (DB), Specify Color	*
128079	20 3/4" Mid-Support (SM), Specify Color	*
128080	29" Mid-Support (SM), Specify Color	*
128081	37 1/8" Mid-Support (SM), Specify Color	*
128082	45 1/4" Mid-Support (SM), Specify Color	*
128261	Exit Footer (DB), Specify Color	1
128262	Exit Footer (SM), Specify Color	1
124876	Entrance Section, Specify Color	1
124877	Exit Section, Specify Color	1
132443	Spacer Tube, Specify Color	2
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
154942	SlideWinder Section Hardware Package	*
100362	3/8" Flat Washer, SST	*
113027	3/8" x 1 3/8" BHCS w/Pin, SST	*
123224	3/8" x 1 11/16" BHCS w/Pin, SST	*
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
125670	Mid-Support Hardware Package (SM)	*
100266	1/2" x 2 3/4" Expansion Anchor	*
100322	1/2" Standard Hex Nut, SST	*
100353	3/8" Flange Nut w/Pin, SST	*
100363	1/2" Flat Washer, SST	*
115813	3/8" x 1 1/8" Threaded Rod, SST	*
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
128343	Exit Support Hardware Package (SM)	1
100266	1/2" x 2 3/4" Expansion Anchor	2
100292	3/8" x 1 1/4" BHCS w/Pin Limited Thread Bolt, SST	2
100322	1/2" Standard Hex Nut, SST	2
100362	3/8" Flat Washer, SST	4
100363	1/2" Flat Washer, SST	2
111442	Rubber Bushing	2

DB = Direct Bury
 SM = Surface Mount
 * = Quantity Varies Per Deck Height

Slide Sections:	Rotationally molded from U.V. stabilized linear low density polyethylene, color specified.
Rail:	1 1/8" O.D. 6005-T5 aluminum extrusion with 5/16" walls. 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.
Support Base (SM):	Weldment comprised of 1.660" O.D. RS-20 (.085" - .095") galvanized steel tubing and 1/4" x 3" x 8" mounting plate. Finish: ProShield, color specified.
Spacer Tube:	Fabricated from 1.3125 O.D. x 16 Ga. (.065) steel tubing. 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: 32" - 48" Approx. 3 man hours
 56" - 72" Approx. 4 man hours
 96" Approx. 5 man hours

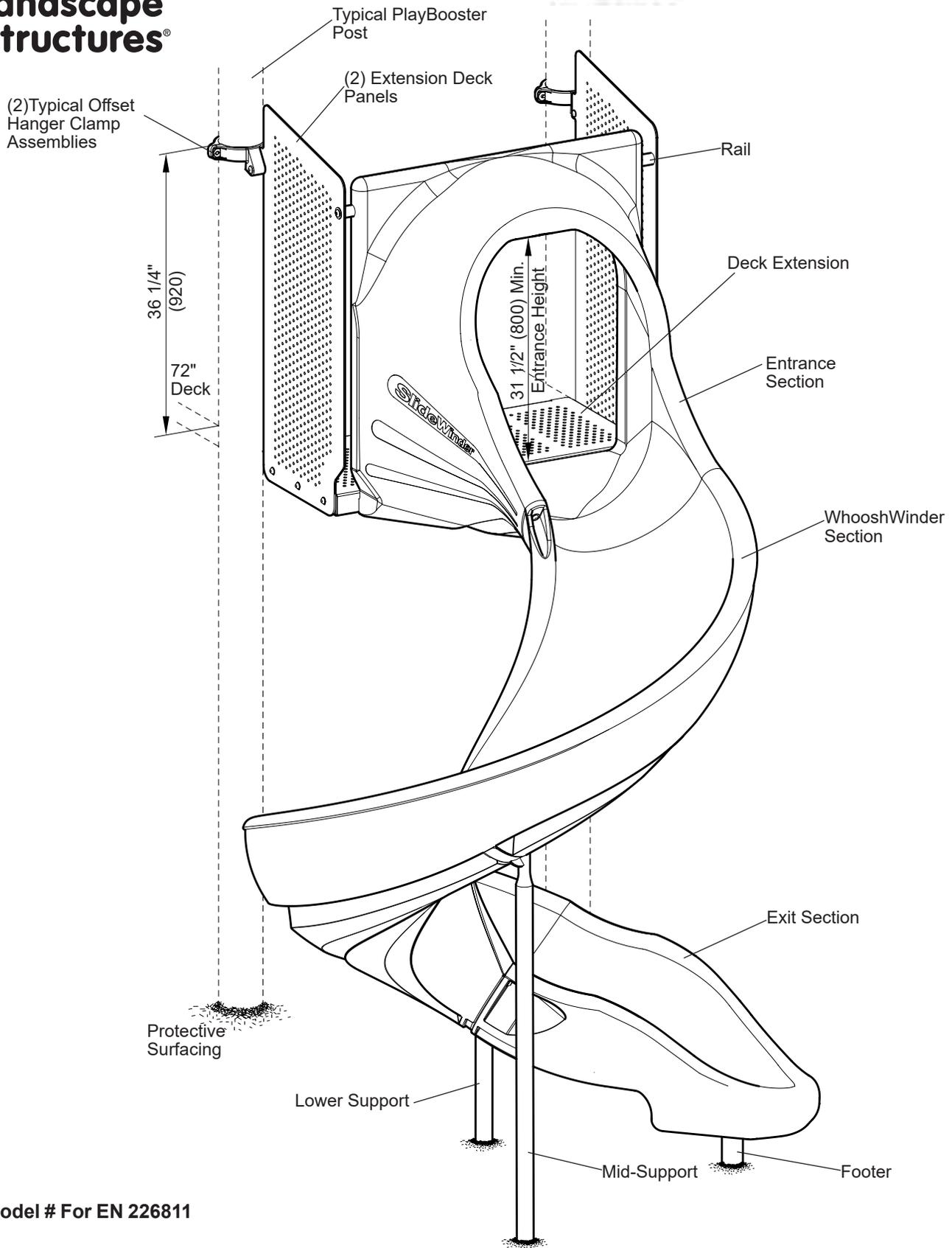
Concrete Req.: 30" Depth - Approx. 1.3 cu. ft.
 34" Depth - Approx. 1.5 cu. ft.
 38" Depth - Approx. 1.8 cu. ft.

Weight: 32" - 134 lbs.
 40" - 146 lbs.
 48" - 172 lbs.
 56" - 184 lbs.
 64" - 197 lbs.
 72" - 247 lbs.
 96" - 265 lbs.

Fall Height: Deck Height

Installation Instructions

- 1) Refer to your plan drawing for location of footings and direction of SlideWinder sections.
- 2) **(Direct Bury)** Dig footing holes spaced as shown, depending upon slide. Refer to the Direct Bury Exit Section and Direct Bury Mid-Support Details.
- 3) Place 40 7/16" rail in 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) Fasten SlideWinder sections together 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. The left elbow section reads (LH) and the right elbow section reads (RH). Attach entrance and exit section last. Refer to the Typical Slide Section Detail.
- 5) **(Direct Bury)** If required attach mid-supports, refer to your plan drawing for locations. Attach mid-supports to slide using 3/8" x 1 3/8" BHCS w/Pin. Refer to the Typical Mid-Support Detail.
(Surface Mount) If required attach mid-supports, refer to your plan drawing for locations. Assemble mid-supports by placing support base inside mid-support and attach using 3/8" x 1 1/2" threaded rod and 3/8" flange nuts w/pin. Refer to the Surface Mount/Mid-Support Detail. Attach mid-supports to slide using 3/8" x 1 3/8" BHCS w/Pin. Refer to the Typical Mid-Support Detail.
- 6) 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.**
- 7) With SlideWinder fully assembled, attach entrance section to the face of the deck using 3/8" x 7/8" BHCS w/Pin and 3/8" flat washers.
- 8) 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.
- 9) **(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 plates. Drill 1/2" x 3" deep holes on marks into concrete using a hammer drill and 1/2" masonry bit. Tap 1/2" x 2 3/4" expansion anchors into drilled holes and fasten using 1/2" standard hex nuts with 1/2" flat washers.
- 10) Install protective surfacing before users are allowed to play on the structure.

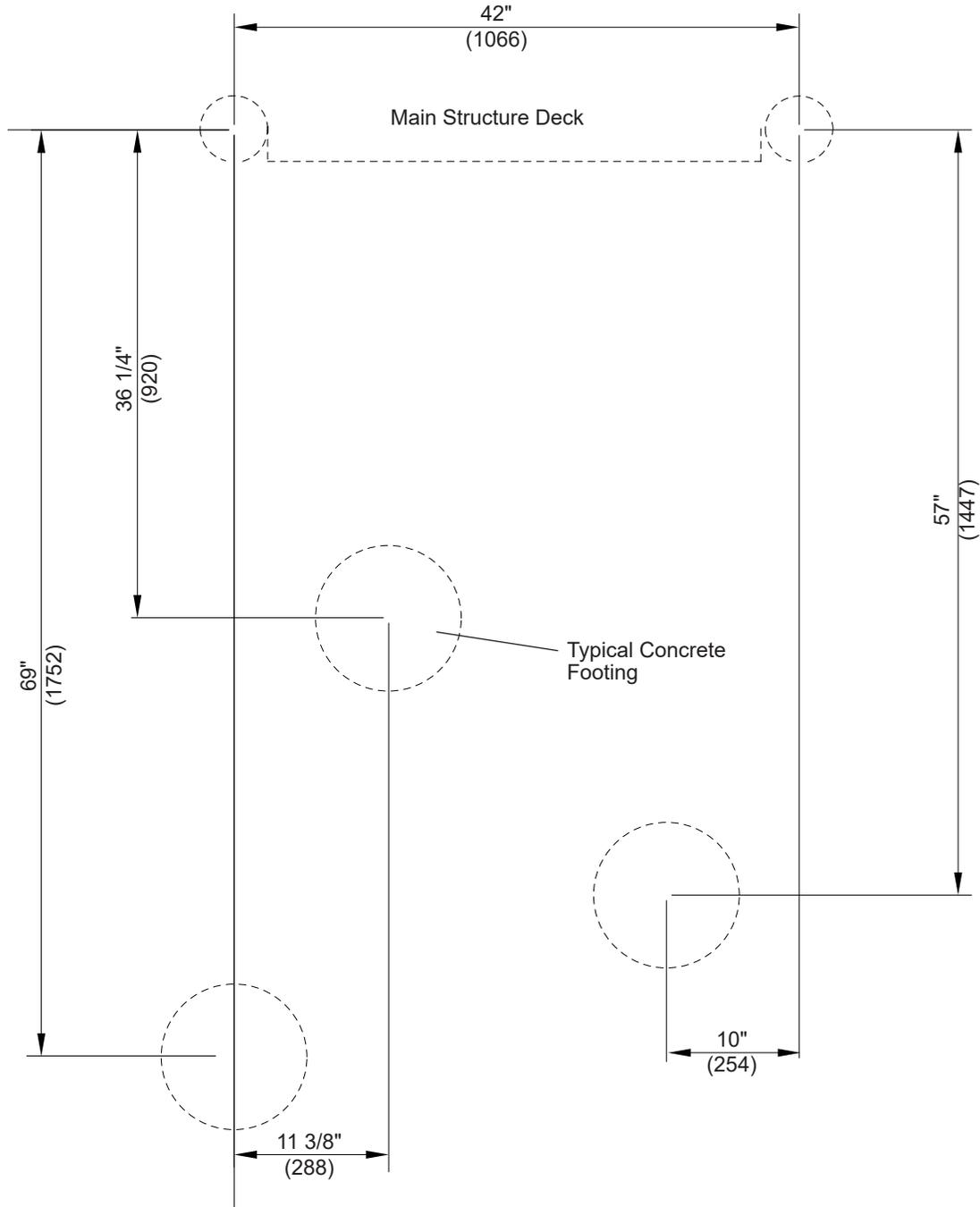


Model # For EN 226811

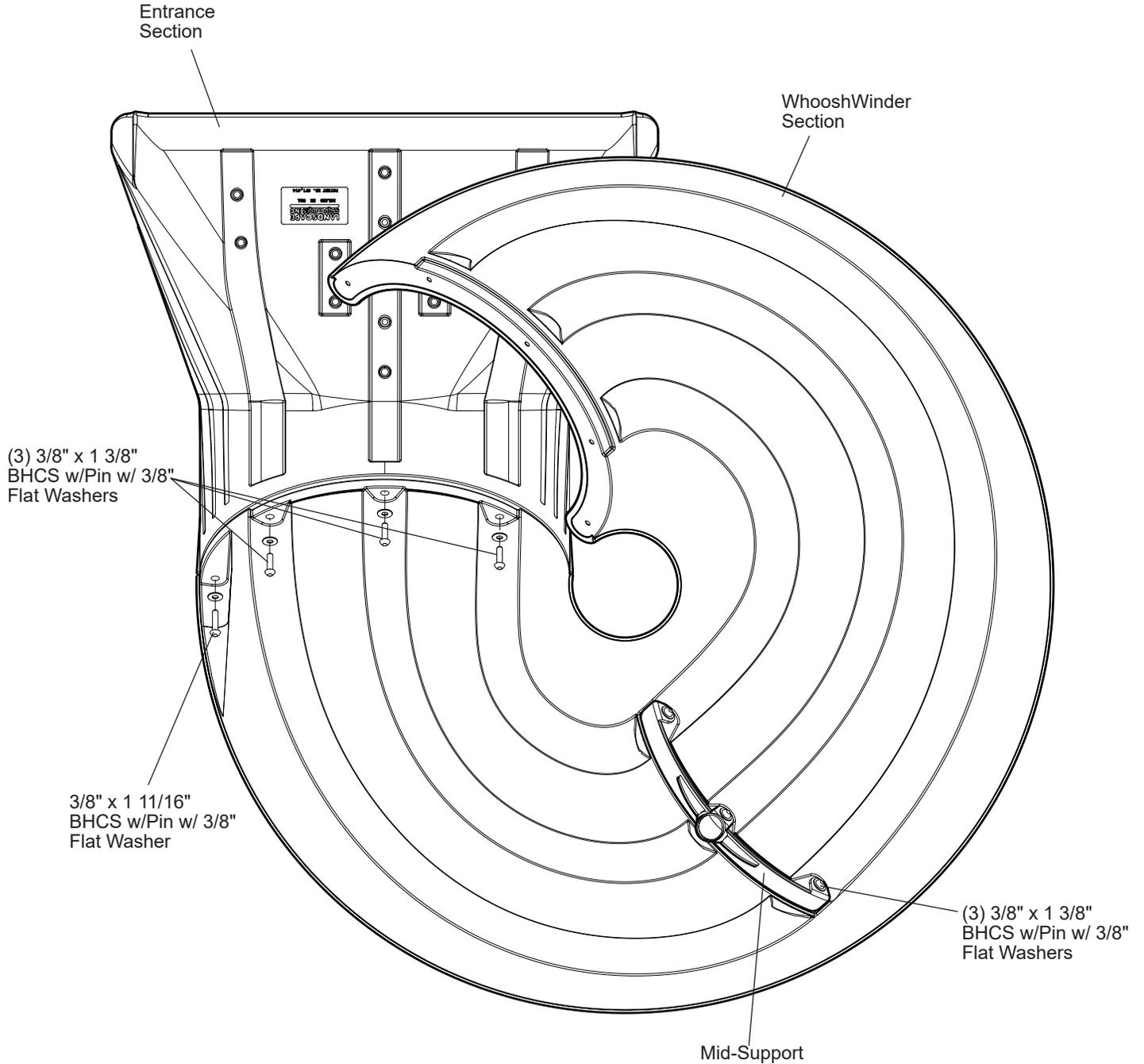
PlayBooster® 222708 WhooshWinder™, 72" Deck

Sheet 1 of 7

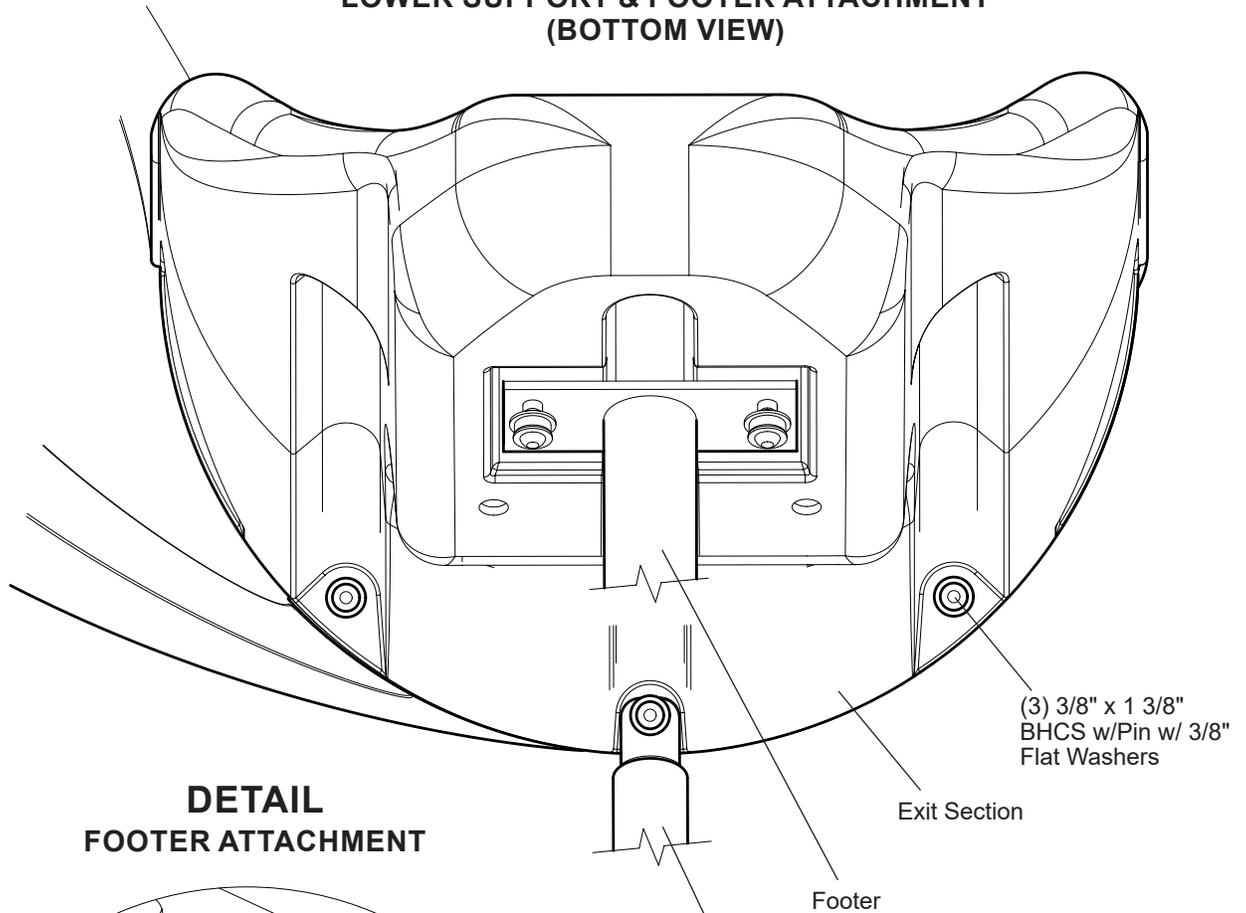
PLAN VIEW/FOOTING LAYOUT



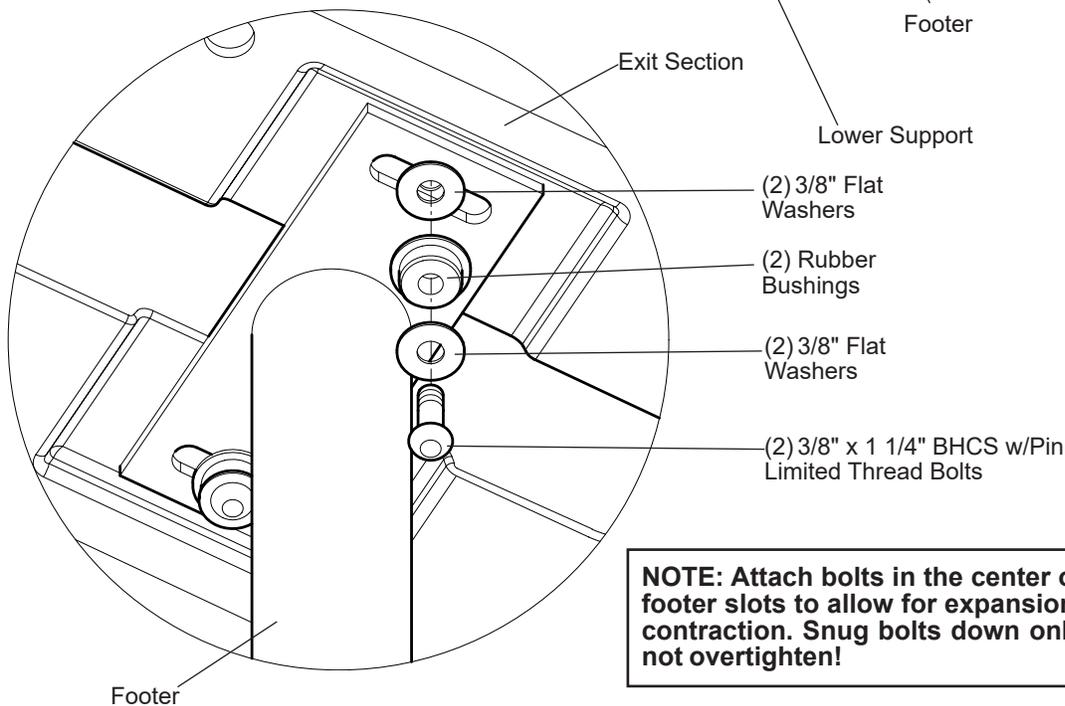
DETAIL
BOTTOM VIEW WITHOUT EXIT SECTION



DETAIL
LOWER SUPPORT & FOOTER ATTACHMENT
(BOTTOM VIEW)

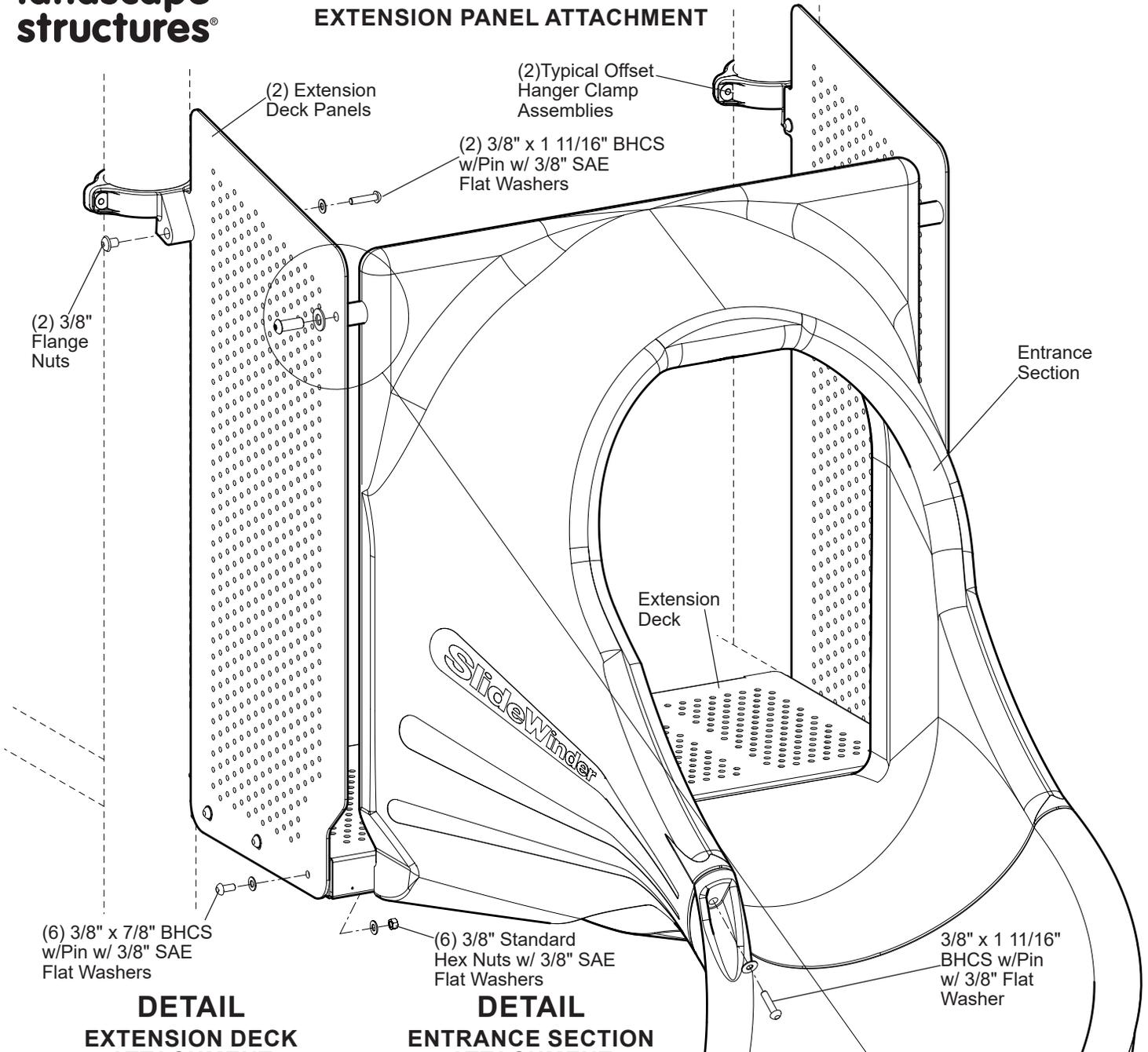


DETAIL
FOOTER ATTACHMENT



NOTE: Attach bolts in the center of the footer slots to allow for expansion and contraction. Snug bolts down only, do not overtighten!

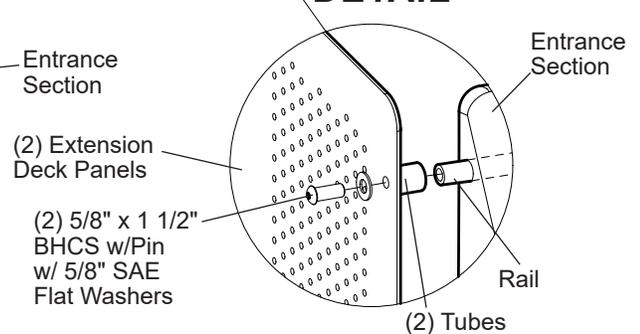
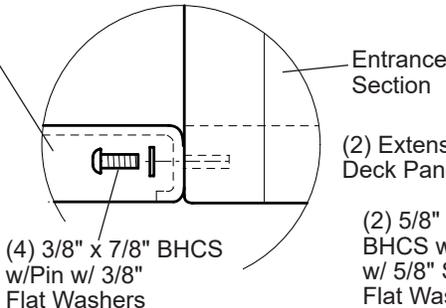
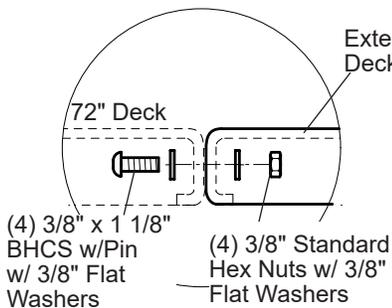
**DETAIL
EXTENSION PANEL ATTACHMENT**



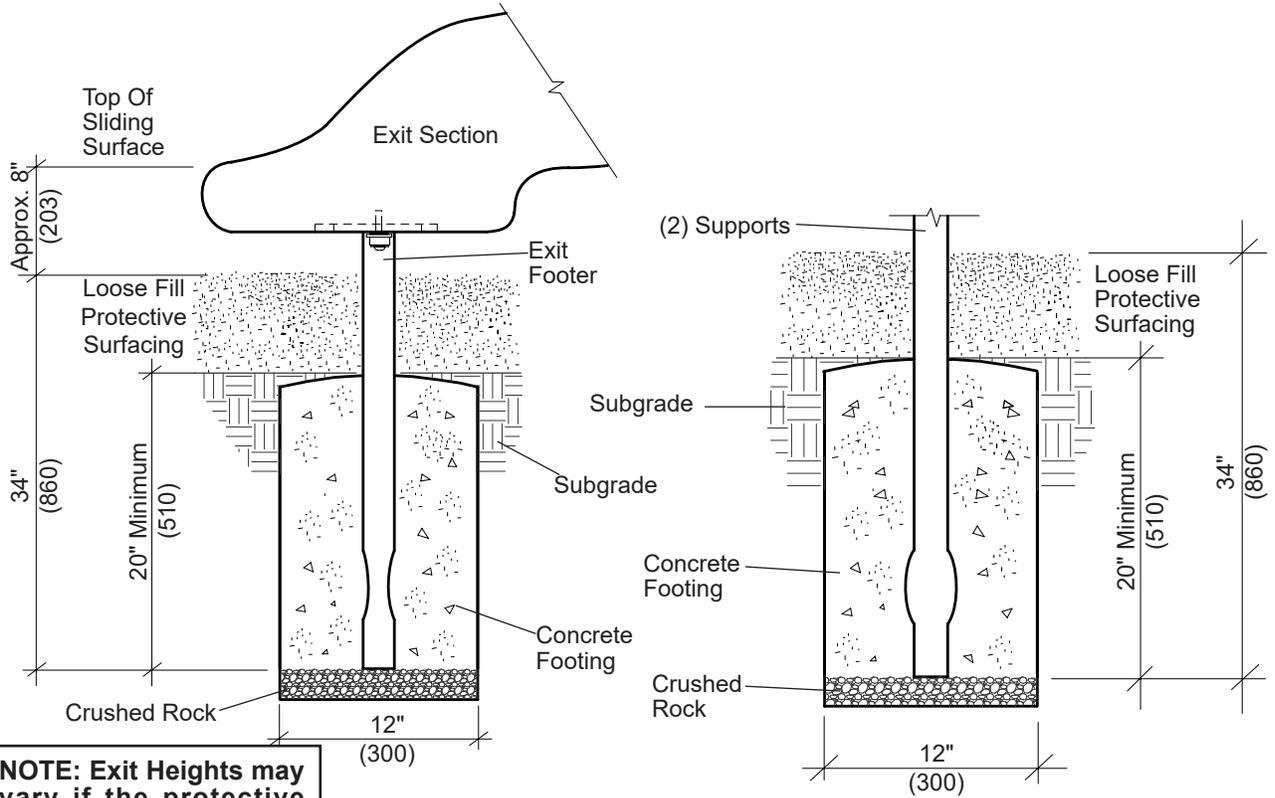
**DETAIL
EXTENSION DECK
ATTACHMENT**

**DETAIL
ENTRANCE SECTION
ATTACHMENT**

DETAIL

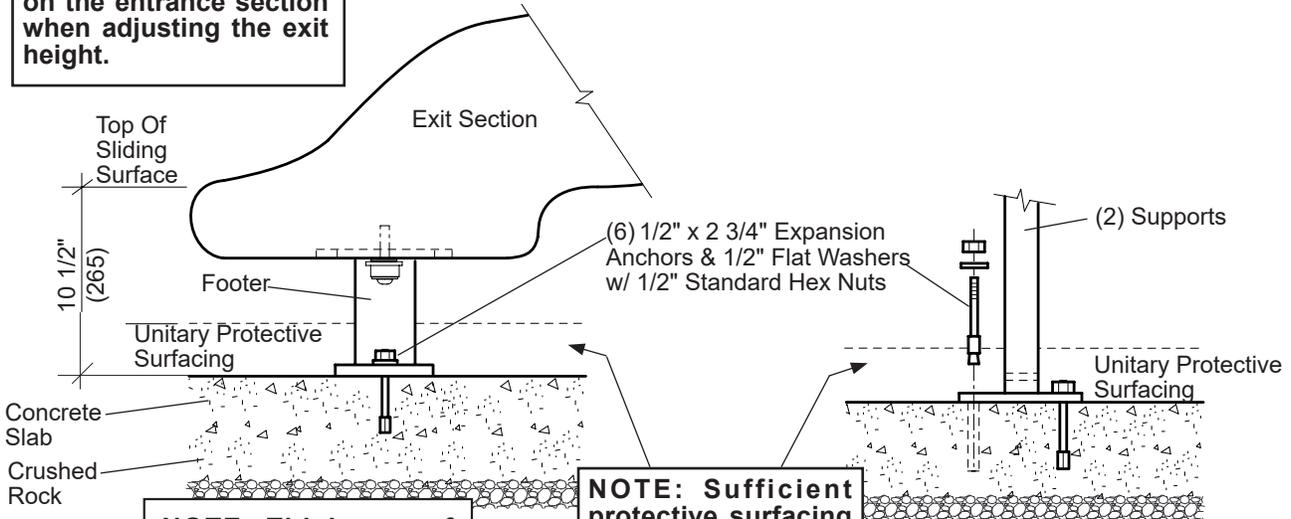


**DETAIL
DIRECT BURY**



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.

**DETAIL
SURFACE MOUNT**



NOTE: Thickness of unitary protective surfacing depends upon the slide deck height. On slides above 48\"/>

NOTE: Sufficient protective surfacing must cover hardware to satisfy fall height requirements.



Parts List

Part#	Description	Qty.
100583	40 7/16" Rail, Specify Color	1
100610	1/4" x 5/8" Drive Rivet, AL/SST	2
105327	5" Half Clamp, Specify Color	2
113729	Offset Hanger Clamp, Specify Color	2
124876	Entrance Section, Specify Color	1
124877	Exit Section, Specify Color	1
128261	Exit Footer (DB), Specify Color	1
128262	Exit Footer (SM), Specify Color	1
132443	Spacer Tube, Specify Color	2
221442	WhooshWinder Section, Specify Color	1
221939	Mid-Support (DB), Specify Color	1
222222	Mid-Support (SM), Specify Color	1
222683	Deck Extension, Specify Color	1
222694	Extension Panel, Specify Color	2
225584	Lower Support (DB), Specify Color	1
221938	Lower Support (SM), Specify Color	1
223506	WhooshWinder 72" Deck Hardware Package	1
100196	3/8" x 7/8" BHCS w/Pin, SST	10
100198	3/8" x 1 1/8" BHCS w/Pin, SST	8
100362	3/8" Flat Washer, SST	29
100365	3/8" SAE Flat Washer, SST	14
100351	3/8" Tee Nut, SST	4
100353	3/8" Flange Nut w/Pin, SST	2
123224	3/8" x 1 11/16" BHCS w/Pin, SST	6
100201	5/8" x 1 1/2" BHCS w/Pin, SST	2
129500	5/8" SAE Flat Washer, SST	2
100327	3/8" Standard Hex Nut, SST	10
113027	3/8" x 1 3/8" BHCS w/Pin, SST	9
111442	#871 Rubber Bushing	2
100292	3/8" x 1 1/4" BHCS w/Pin Limited Thread, SST	2
111392	Exit Support Hardware Package (SM)	3
100266	1/2" x 2 3/4" Expansion Anchor	6
100322	1/2" Standard Hex Nut, SST	6
100363	1/2" Flat Washer, SST	6

DB = Direct Bury
SM = Surface Mount

Slide Sections:	Rotationally molded from U.V. stabilized linear low density polyethylene, color specified.
Deck Extension:	Weldment comprised of 12 GA. (.105") (2.66 mm) HRPO sheet steel. Finish: Tender-Tuff coated, color specified.
Dk. Ext. Panel:	7 GA. (.179") (4,54 mm) HRPO flat steel. Finish: ProShield®, color specified.
Rail:	1 1/8" (28,57 mm) O.D. 6005-T5 aluminum extrusion with 5/16" (7,92 mm) walls. Finish: ProShield®, color specified.
Mid-Support:	Weldment comprised of 1.900" (48,26 mm) O.D. RS20 (.090"-.100") (2,28 mm - 2,54 mm) galvanized steel tubing and 3/16" (4,74 mm) x 1 1/4" (31,75 mm) zinc plated steel strap. Finish: ProShield, color specified.
Lower Support:	Weldment comprised of 1.900" (48,26 mm) O.D. RS20 (.090"-.100") (2,28 mm - 2,54 mm) galvanized steel tubing and 1/4" (6,35 mm) flat steel. Finish: ProShield, color specified.
Spacer Tube:	Fabricated from 1.312" (33,33 mm) O.D. x 16 Ga. (.065") (1,65 mm) steel tubing. Finish: ProShield, color specified.
Exit Footer:	Weldment comprised of 2.375" (60,32 mm) O.D. RS20 (.095"-.105") (2,41 mm-2,66 mm) galvanized steel tubing and 1/4" (6,35 mm) x 3" (76,2 mm) x 7 1/2" (190,5 mm) 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: 72" w/Extension Deck Approx. 5 labor hours
Concrete Req.: DB Approx. 3.93 cu. ft.
Weight: DB 346 lbs.
 SM 335 lbs.
Fall Height: Deck Height
Area Req: 6' (1,82 m) minimum use zone at exit.

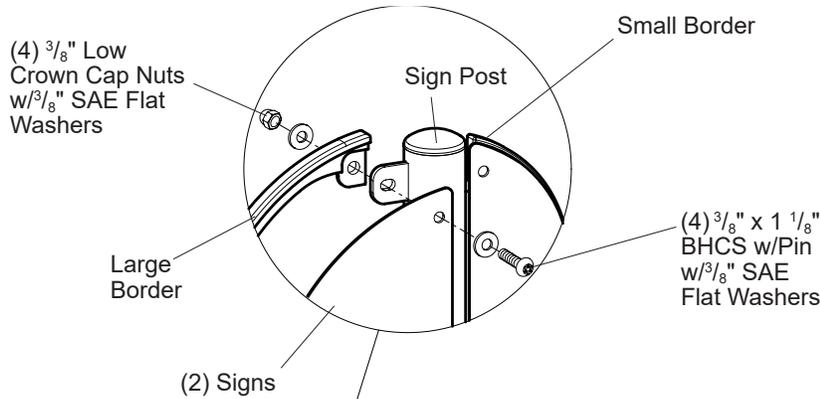
Installation Instructions

- 1) Refer to the Plan View/Footing Location for location of footings.
- 2) **(Direct Bury)** Dig footing holes as shown. Refer to the Direct Bury Detail.
- 3) Attach offset hanger clamp assemblies to posts, at height shown. Refer to the Typical Offset Hanger Clamp Spec Sheet.
- 4) Attach deck extension to main structure deck.
- 5) Attach deck extension panels to extension deck and offset hanger clamp assemblies.
- 6) Place 40 7/16" rail in entrance section, and place spacer tubes over each end of the rail. Refer to Detail.
- 7) Fasten WhooshWinder section to entrance section together loosely starting in the inside and working your way to the outside. When all bolts are started, pull the tops flush with each other and tighten.
- 8) Attach mid-support to WhooshWinder section.
- 9) Attach exit footer to exit section. Attach lower support to exit section and WhooshWinder section. **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 Footer Attachment Detail.
- 10) With SlideWinder fully assembled, attach entrance section to the face of the deck extension. Refer to Entrance Section Attachment Detail.
- 11) Attach rail to deck extension panels.
- 12) **(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.

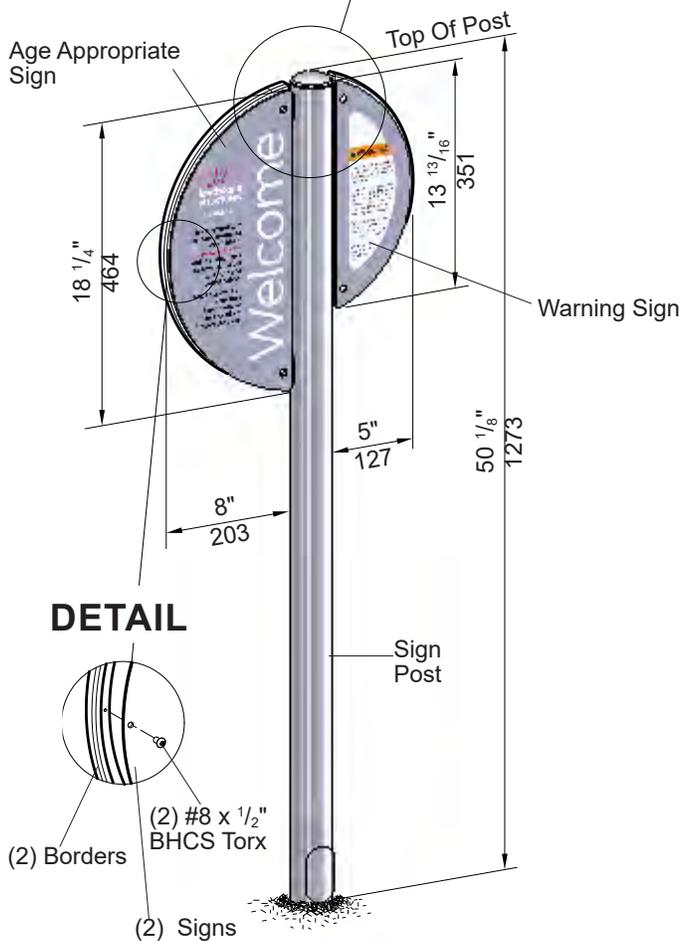
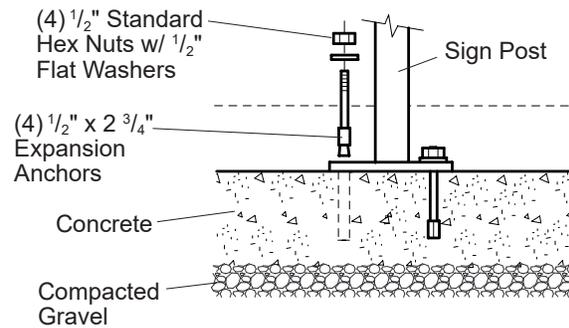
(Surface Mount) Mark anchor bolt locations on concrete slab through holes in anchor plates. Drill 1/2" x 3" deep holes on marks into concrete using a hammer drill and 1/2" masonry bit. Tap 1/2" x 2 3/4" expansion anchors into drilled holes and fasten using 1/2" standard hex nuts with 1/2" flat washers.

- 13) Install 1/4" x 5/8" drive rivets in all 5" half clamps. Refer to the Typical Offset Hanger Clamp Spec Sheet.
- 14) Install protective surfacing before users are allowed to play on the structure.

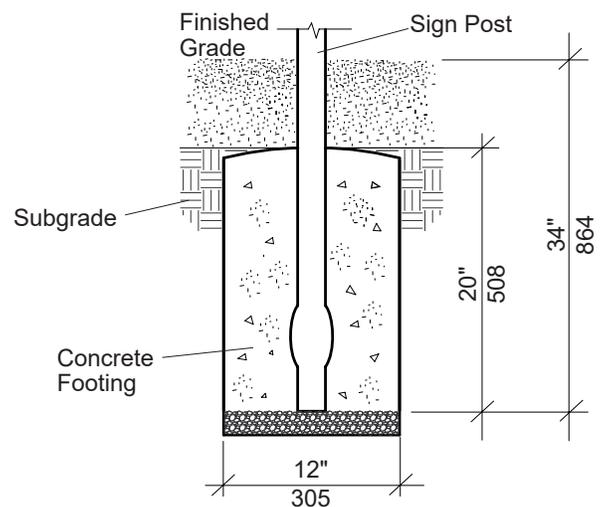
**DETAIL
SIGN ATTACHMENT**



**DETAIL
SURFACE MOUNT**



**DETAIL
DIRECT BURY FOOTING**



Model 182503 - Landscape Structures Provided Welcome Sign
Model 182504 - Welcome Sign

Signs

Welcome Sign

Parts List

Part#	Description	Qty.
219911	Warning Sign, Gray	1
219912	Age Appropriate Sign, 2-12 Years, Gray	*
219913	Age Appropriate Sign, 2-5 Years, Gray	*
219914	Age Appropriate Sign, 5-12 Years, Gray	*
219915	Age Appropriate Sign, 1 1/2-5 Years, Gray	*
219916	Age Appropriate Sign, 1 1/2-12 Years, Gray	*
219918	Age Appropriate Sign, 6-23 Months, Gray	*
180598	Sign Post (DB), Specify Color	*
181119	Sign Post (SM), Specify Color	*
193782	Large Border, Black	1
193783	Small Border, Black	1
213258	Age/Warning Sign Hardware Package	1
100198	3/8" x 1 1/8" BHCS w/Pin, SST	4
100349	3/8" Low Crown Cap Nut, SST	4
100365	3/8" SAE Flat Washer, SST	8
168323	#8 x 1/2" BHCS Torx, SST	2
169413	1/4-6 Lobe T-15 Tamp. Bit	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

DB = Direct Bury

SM = Surface Mount

* = Quantity Determined By Your Order

Installation Instructions

Direct Bury

- 1) Dig footing hole to depth and diameter shown.
- 2) Attach sign panels and borders to post as shown, using 3/8" x 1 1/8" BHCS with 3/8" SAE flat washers and 3/8" low crown cap nuts with 3/8" SAE flat washers. Attach signs to borders using #8 x 1/2" BHCS Torx.
- 3) Set sign assembly in footing hole and temporarily brace in plumb position.
- 4) Pour concrete footing. After concrete has cured, remove bracing.

Surface Mount

- 1) Attach sign panels and borders to post as shown, using 3/8" x 1 1/8" BHCS with 3/8" SAE flat washers and 3/8" low crown cap nuts with 3/8" SAE flat washers. Attach signs to borders using #8 x 1/2" BHCS Torx.
- 2) With sign in proper position, using a 1/2" masonry bit and hammer drill, drill 3" deep holes into concrete slab through holes in post plate. Tap 1/2" x 2 3/4" expansion anchors into holes and secure using 1/2" standard hex nuts with 1/2" flat washers.

Sign Panel: Panel is fabricated from 1/8" (.125")(3,17 mm) aluminum plate. Finish: ProShield®, gray in color. (**Sign**) Digital image is transferred to a 1/8" (.125")(3,17 mm) ProShield coated aluminum plate, then infused into the ProShield.

Border: Permalene, black in color.

Post: Weldment comprised 2.375" (60,33 mm) O.D. RS20 (.095-.105) (2,41 mm-2,67 mm) wall galvanized tube, 1/4" (6,35 mm) HRPO steel sheet and aluminum post cap. 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: (DB) Approx. 1 man hour
(SM) Approx. 1/2 man hour

Concrete Req: Approx. 1.31 cu. ft.

Weight: (DB) - 24 lbs.
(SM) - 27 lbs.

DRAWINGS

PROSPECT HILL PARK IMPROVEMENTS

314 TOTTEN POND ROAD
WALTHAM, MASSACHUSETTS

OWNER:

MAYOR JEANNETTE A. McCARTHY
CITY OF WALTHAM

CITY OF WALTHAM
DEPARTMENT OF RECREATION
510 Moody Street
WALTHAM, MA 02453

CONSULTANTS:

HEDLUND DESIGN GROUP

LLC

Landscape Architecture + Planning

10 Central Street, Arlington MA 02476 USA
t 617-826-9302 w www.hedlunddesign.com

ENGINEERING CONSULTANT:

Horsley Witten Group, Inc.

Sustainable Environmental Solutions

www.horsleywitten.com

90 Route 6A

Sandwich, MA 02563

508-833-6600 voice

508-833-3150 fax

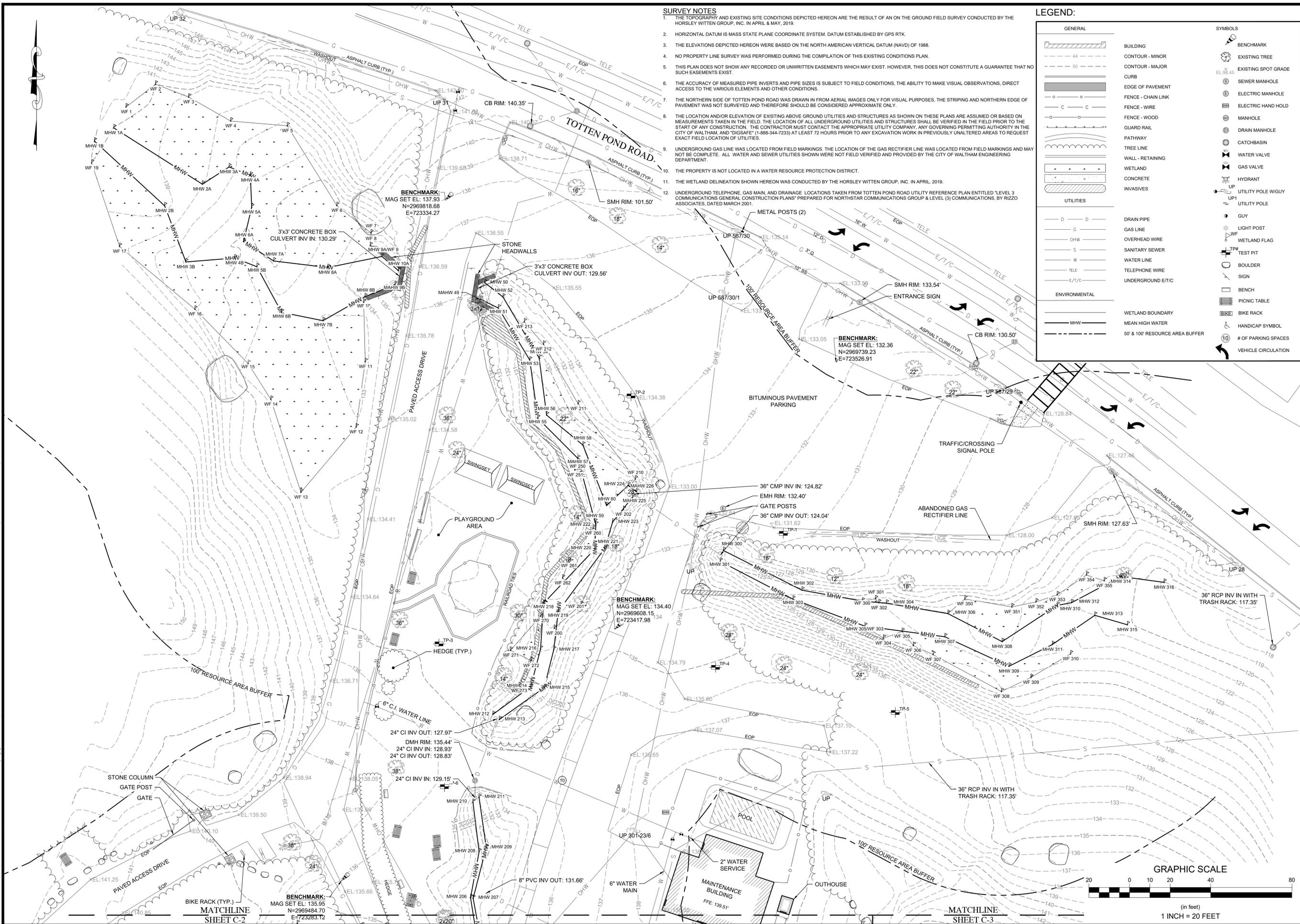


BID DOCUMENTS AUGUST 20, 2020

DRAWING LIST:

C1	EXISTING CONDITIONS PLAN	L6-7	SHADE STRUCTURE DETAILS
C2	EXISTING CONDITIONS PLAN	L7-1	PAVILION DETAILS
C3	EXISTING CONDITIONS PLAN	L7-2	PAVILION DETAILS
L1-1	SITE PREPARATION & DEMOLITION PLAN	L7-3	PAVILION DETAILS
L1-2	SITE PREPARATION & DEMOLITION PLAN	L7-4	PAVILION DETAILS
L2-1	MATERIALS PLAN	L7-5	PAVILION DETAILS
L2-2	MATERIALS PLAN	L8-1	KIOSK DETAILS
L3-1	GRADING AND DRAINAGE PLAN	L8-2	KIOSK DETAILS
L3-2	GRADING AND DRAINAGE PLAN	L8-3	KIOSK DETAILS
L3-3	ROAD PROFILES	L8-4	KIOSK DETAILS
L3-4	UTILITY COORDINATION PLAN	L9-1	SPLASHPAD EQUIPMENT CABINET DETAILS
L3-5	UTILITY COORDINATION PLAN	L9-2	SPLASHPAD RAIN DIVERTER DETAILS
L4-1	LAYOUT PLAN	L9-3	SPLASHPAD DETAILS
L4-2	LAYOUT PLAN	L9-4	SPLASHPAD DETAILS
L5-1	PLANTING PLAN	L9-5	SPLASHPAD DETAILS
L5-2	PLANTING PLAN	L9-6	SPLASHPAD DETAILS
L6-1	PLANTING DETAILS	L9-7	SPLASHPAD DETAILS
L6-2	PLANTING AND GUARDRAIL DETAILS	L9-8	SPLASHPAD DETAILS
L6-3	SITE DETAILS	L9-9	SPLASHPAD PLUMBING AND ELECTRICAL PLANS
L6-4	PLAYGROUND PLAN	L10-1	DRAINAGE DETAILS
L6-5	SPLASHPAD LAYOUT	L10-2	DRAINAGE DETAILS
L6-6	WELDED WIRE FENCE DETAILS	L10-3	EROSION AND SEDIMENT CONTROL DETAILS

last modified: 08/21/20 printed: 08/21/20 by gg H:\Projects\2018\18163 Prospect Hill Park Waltham\Drawings\18163-EX.dwg



- SURVEY NOTES**
1. THE TOPOGRAPHY AND EXISTING SITE CONDITIONS DEPICTED HEREON ARE THE RESULT OF AN ON THE GROUND FIELD SURVEY CONDUCTED BY THE HORSLEY WITTEN GROUP, INC. IN APRIL & MAY, 2019.
 2. HORIZONTAL DATUM IS MASS STATE PLANE COORDINATE SYSTEM. DATUM ESTABLISHED BY GPS RTK.
 3. THE ELEVATIONS DEPICTED HEREON WERE BASED ON THE NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988.
 4. NO PROPERTY LINE SURVEY WAS PERFORMED DURING THE COMPILATION OF THIS EXISTING CONDITIONS PLAN.
 5. THIS PLAN DOES NOT SHOW ANY RECORDED OR UNWRITTEN EASEMENTS WHICH MAY EXIST. HOWEVER, THIS DOES NOT CONSTITUTE A GUARANTEE THAT NO SUCH EASEMENTS EXIST.
 6. THE ACCURACY OF MEASURED PIPE INVERTS AND PIPE SIZES IS SUBJECT TO FIELD CONDITIONS, THE ABILITY TO MAKE VISUAL OBSERVATIONS, DIRECT ACCESS TO THE VARIOUS ELEMENTS AND OTHER CONDITIONS.
 7. THE NORTHERN SIDE OF TOTTON POND ROAD WAS DRAWN IN FROM AERIAL IMAGES ONLY FOR VISUAL PURPOSES, THE STRIPING AND NORTHERN EDGE OF PAVEMENT WAS NOT SURVEYED AND THEREFORE SHOULD BE CONSIDERED APPROXIMATE ONLY.
 8. THE LOCATION AND/OR ELEVATION OF EXISTING ABOVE GROUND UTILITIES AND STRUCTURES AS SHOWN ON THESE PLANS ARE ASSUMED OR BASED ON MEASUREMENTS TAKEN IN THE FIELD. THE LOCATION OF ALL UNDERGROUND UTILITIES AND STRUCTURES SHALL BE VERIFIED IN THE FIELD PRIOR TO THE START OF ANY CONSTRUCTION. THE CONTRACTOR MUST CONTACT THE APPROPRIATE UTILITY COMPANY, ANY GOVERNING PERMITTING AUTHORITY IN THE CITY OF WALTHAM, AND "DIGSAFE" (1-888-344-7233) AT LEAST 72 HOURS PRIOR TO ANY EXCAVATION WORK IN PREVIOUSLY UNALTERED AREAS TO REQUEST EXACT FIELD LOCATION OF UTILITIES.
 9. UNDERGROUND GAS LINE WAS LOCATED FROM FIELD MARKINGS. THE LOCATION OF THE GAS RECTIFIER LINE WAS LOCATED FROM FIELD MARKINGS AND MAY NOT BE COMPLETE. ALL WATER AND SEWER UTILITIES SHOWN WERE NOT FIELD VERIFIED AND PROVIDED BY THE CITY OF WALTHAM ENGINEERING DEPARTMENT.
 10. THE PROPERTY IS NOT LOCATED IN A WATER RESOURCE PROTECTION DISTRICT.
 11. THE WETLAND DELINEATION SHOWN HEREON WAS CONDUCTED BY THE HORSLEY WITTEN GROUP, INC. IN APRIL, 2019.
 12. UNDERGROUND TELEPHONE, GAS MAIN, AND DRAINAGE LOCATIONS TAKEN FROM TOTTON POND ROAD UTILITY REFERENCE PLAN ENTITLED "LEVEL 3 COMMUNICATIONS GENERAL CONSTRUCTION PLANS" PREPARED FOR NORTHSTAR COMMUNICATIONS GROUP & LEVEL (3) COMMUNICATIONS, BY RIZZO ASSOCIATES, DATED MARCH 2001.

LEGEND:

GENERAL	SYMBOLS
[Symbol]	BUILDING
[Symbol]	CONTOUR - MINOR
[Symbol]	CONTOUR - MAJOR
[Symbol]	CURB
[Symbol]	EDGE OF PAVEMENT
[Symbol]	FENCE - CHAIN LINK
[Symbol]	FENCE - WIRE
[Symbol]	FENCE - WOOD
[Symbol]	GUARD RAIL
[Symbol]	PATHWAY
[Symbol]	TREE LINE
[Symbol]	WALL - RETAINING
[Symbol]	WETLAND
[Symbol]	CONCRETE
[Symbol]	INVASIVES
[Symbol]	UTILITIES
[Symbol]	DRAIN PIPE
[Symbol]	GAS LINE
[Symbol]	OVERHEAD WIRE
[Symbol]	SANITARY SEWER
[Symbol]	WATER LINE
[Symbol]	TELEPHONE WIRE
[Symbol]	UNDERGROUND E/T/C
[Symbol]	ENVIRONMENTAL
[Symbol]	WETLAND BOUNDARY
[Symbol]	MEAN HIGH WATER
[Symbol]	50' & 100' RESOURCE AREA BUFFER
[Symbol]	BENCHMARK
[Symbol]	EXISTING TREE
[Symbol]	EXISTING SPOT GRADE
[Symbol]	SEWER MANHOLE
[Symbol]	ELECTRIC MANHOLE
[Symbol]	ELECTRIC HAND HOLD
[Symbol]	MANHOLE
[Symbol]	DRAIN MANHOLE
[Symbol]	CATCHBASIN
[Symbol]	WATER VALVE
[Symbol]	GAS VALVE
[Symbol]	HYDRANT
[Symbol]	UTILITY POLE W/GUY
[Symbol]	UTILITY POLE
[Symbol]	GUY
[Symbol]	LIGHT POST
[Symbol]	WETLAND FLAG
[Symbol]	TEST PIT
[Symbol]	BOULDER
[Symbol]	SIGN
[Symbol]	BENCH
[Symbol]	PICNIC TABLE
[Symbol]	BIKE
[Symbol]	HANDICAP SYMBOL
[Symbol]	# OF PARKING SPACES
[Symbol]	VEHICLE CIRCULATION

Revisions

Date	By	Description
04-2020	SSG/DMM	FIRST FLOOR ELEVATION

Horsley Witten Group, Inc.
Sustainable Environmental Solutions
80 Route 6A
Sandwich, MA 02563
508-833-6600 voice
508-833-3150 fax

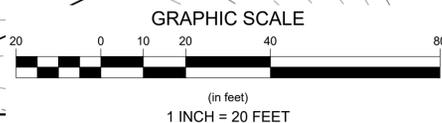
Prepared For:
City of Waltham
Recreation Department
610 Main Street
Waltham, MA
Phone: (781) 314-3475

Survey Provided By:
Horsley Witten Group, Inc.
90 Route 6A
Sandwich, MA 02563
Phone: (508) 833-6600
Fax: (508) 833-3150
Dated: APRIL & MAY 2019

Registration:

Project Number: 18163
Sheet: 1 of 3
Sheet Number: C-1

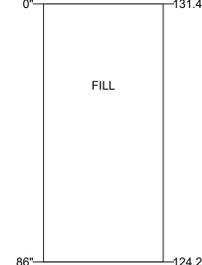
Plan Title: **EXISTING CONDITIONS PLAN (1)**



MATCHLINE
SHEET C-2

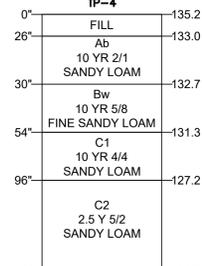
MATCHLINE
SHEET C-3

SOIL TEST PIT DATA
PERFORMED BY: E. HOFFMAN
HORSLEY WITTEN GROUP, INC
DATE: MARCH 10, 2020.



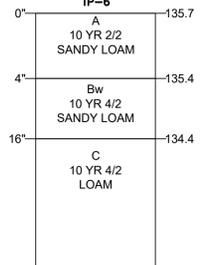
LEDGE AT 84"
NO GROUNDWATER OR REDOX OBSERVED

SOIL TEST PIT DATA
PERFORMED BY: E. HOFFMAN
HORSLEY WITTEN GROUP, INC
DATE: MARCH 10, 2020.



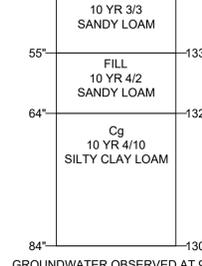
GROUNDWATER AND REDOX OBSERVED AT 96"

SOIL TEST PIT DATA
PERFORMED BY: E. HOFFMAN
HORSLEY WITTEN GROUP, INC
DATE: MARCH 10, 2020.



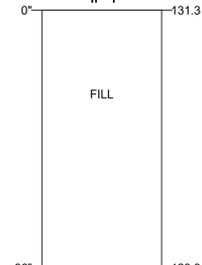
GROUNDWATER OBSERVED AT 66"

SOIL TEST PIT DATA
PERFORMED BY: E. HOFFMAN
HORSLEY WITTEN GROUP, INC
DATE: MARCH 10, 2020.



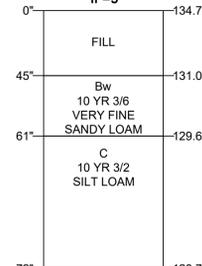
GROUNDWATER OBSERVED AT 96"

SOIL TEST PIT DATA
PERFORMED BY: E. HOFFMAN
HORSLEY WITTEN GROUP, INC
DATE: MARCH 10, 2020.



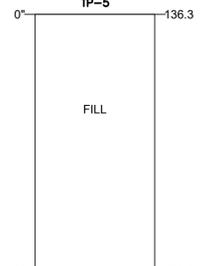
GROUNDWATER OBSERVED AT 96"

SOIL TEST PIT DATA
PERFORMED BY: E. HOFFMAN
HORSLEY WITTEN GROUP, INC
DATE: MARCH 10, 2020.



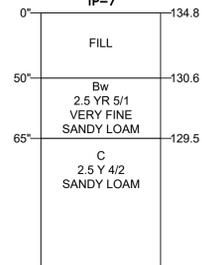
REDOX OBSERVED AT 45"

SOIL TEST PIT DATA
PERFORMED BY: E. HOFFMAN
HORSLEY WITTEN GROUP, INC
DATE: MARCH 10, 2020.



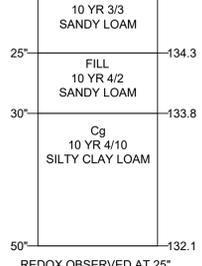
NO GROUNDWATER OR REDOX OBSERVED

SOIL TEST PIT DATA
PERFORMED BY: E. HOFFMAN
HORSLEY WITTEN GROUP, INC
DATE: MARCH 10, 2020.

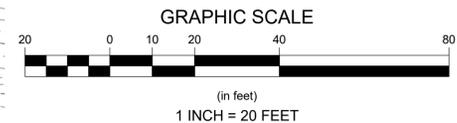
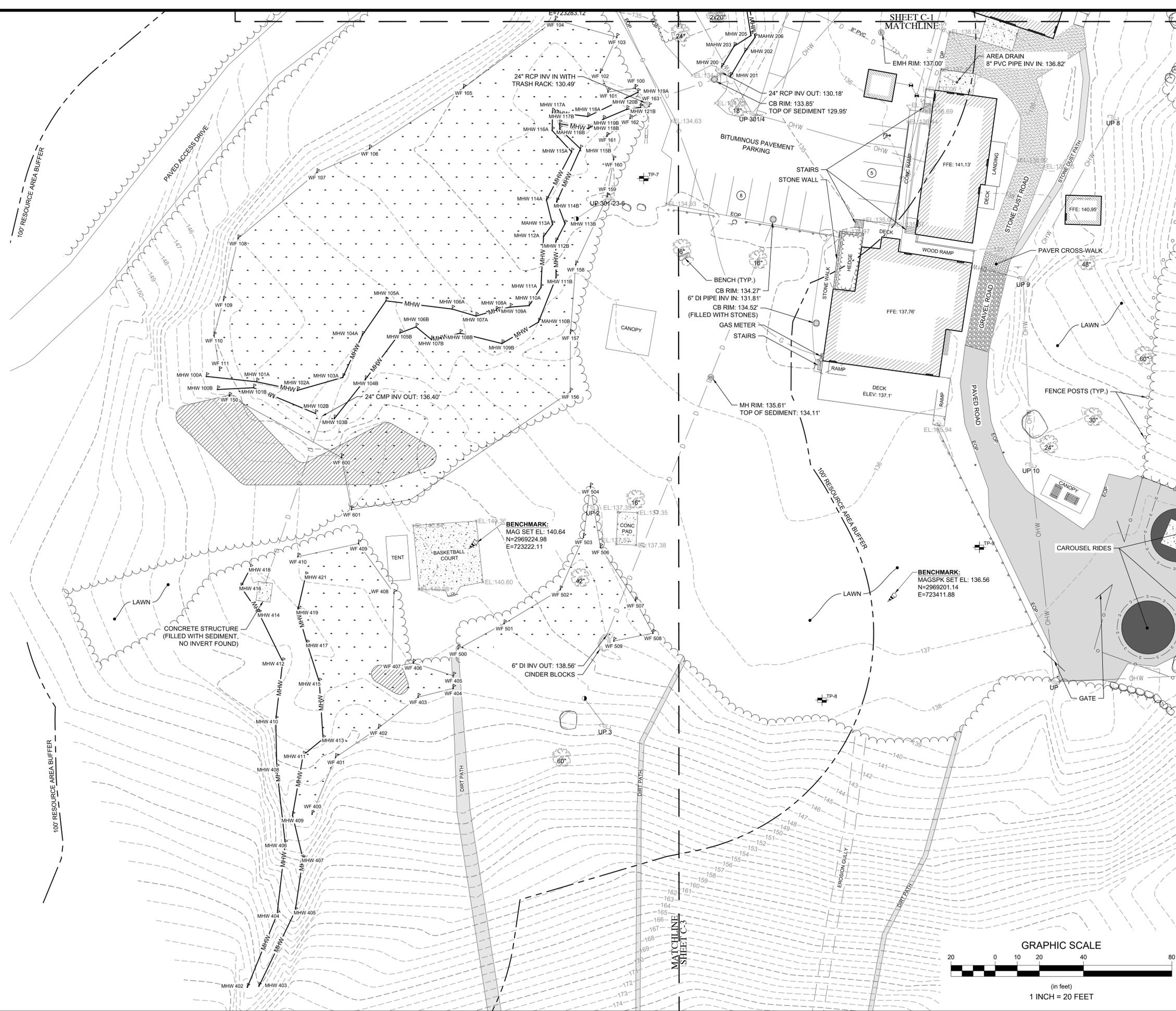


GROUNDWATER OBSERVED AT 18"

SOIL TEST PIT DATA
PERFORMED BY: E. HOFFMAN
HORSLEY WITTEN GROUP, INC
DATE: MARCH 10, 2020.



REDOX OBSERVED AT 25"



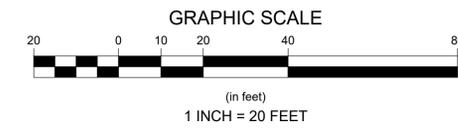
Revisions table with columns for Date, Description, and initials.

Horsley Witten Group, Inc. logo and contact information: 80 Route 6A, Waltham, MA 02563. Phone: 508-833-6600. Fax: 508-833-3150.

City of Waltham Recreation Department
610 Main Street
Waltham, MA
Phone: (781) 314-3475

Professional Engineer seal for Daniel W. MacKinnon, No. 6787, State of Massachusetts. Registration No. 02-12-08.

last modified: 08/21/20 printed: 08/21/20 by gg H:\Projects\2018\18163 Prospect Hill Park Waltham\Drawings\18163-EX.dwg



Revisions

Rev	Date	By	Appr	Description
1	04-2020	SSG	DM	SSG/DWM FIRST FLOOR ELEVATION

Horsley Witten Group, Inc.
 Sustainable Environmental Solutions
 90 Route 6A
 Sandwich, MA 02563
 508-833-6600 voice
 508-833-3150 fax

Checked By: DM
 Drawn By: SSG
 Designated By: ***
 Date: AUGUST 2020

PROSPECT HILL PARK
 314 TOTTEN POND ROAD
 WALTHAM, MASSACHUSETTS

Plan Title: EXISTING CONDITIONS PLAN (3)

Prepared For:
City of Waltham
 Recreation Department
 610 Main Street
 Waltham, MA
 Phone: (781) 314-3475

Survey Provided By:
Horsley Witten Group, Inc.
 90 Route 6A
 Sandwich, MA 02563
 Phone: (508) 833-6600
 Fax: (508) 833-3150
 Dated: APRIL & MAY 2019



Project Number: 18163 Sheet: 3 of 3
 Sheet Number: C-3



No.	Description	Date
1	ISSUED FOR BID	8-20-2020

DWG ISSUE & REVISION HISTORY

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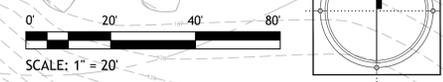
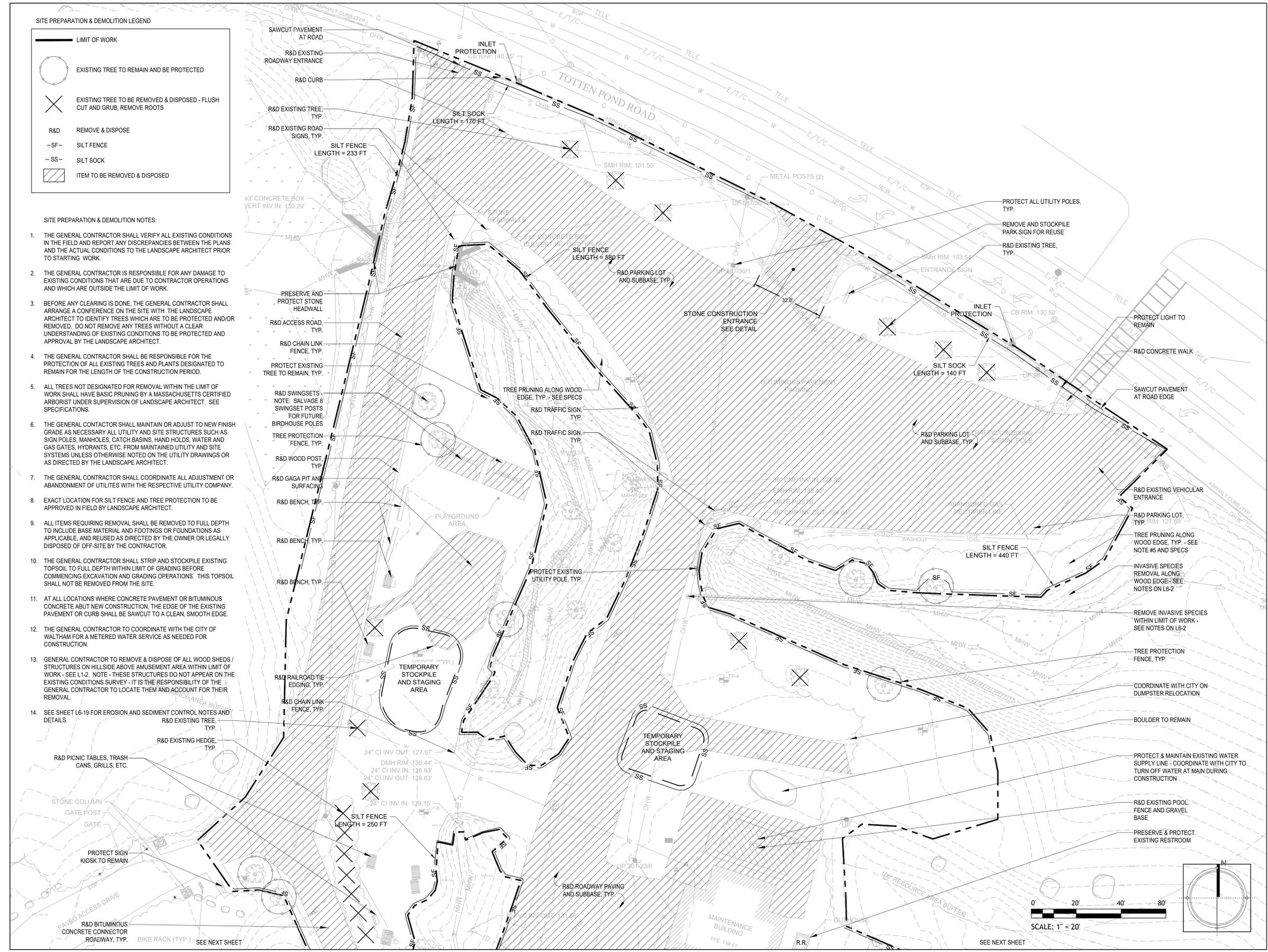
ISSUED FOR BID

Project Title:
**PROSPECT HILL PARK
 WALTHAM, MA**

Drawing Title:
**SITE PREPARATION &
 DEMOLITION PLAN**

Project No. 180619
 Drawn By: PWH
 Checked By: PWH
 Scale: AS NOTED
 Date: August 20, 2020

Drawing No. **L1-1**



8/28/20 1:36:01 PM H:\18-0619 Prospect Hill Park\CAD\Plots\L1 SITE PREP AND DEMO PLAN.dwg

No.	Description	Date
1	ISSUED FOR BID	8-20-2020

DWG ISSUE & REVISION HISTORY

Stamp

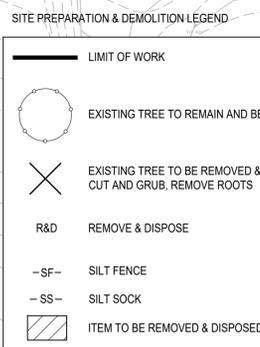
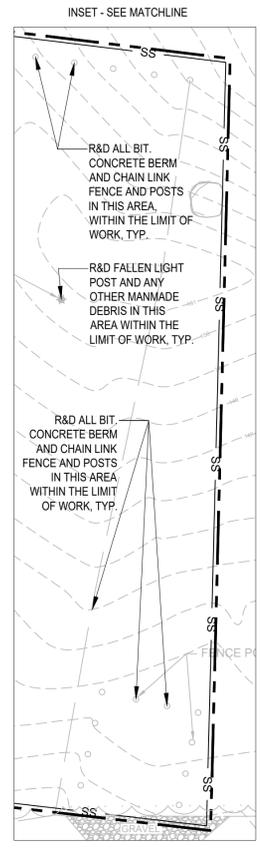
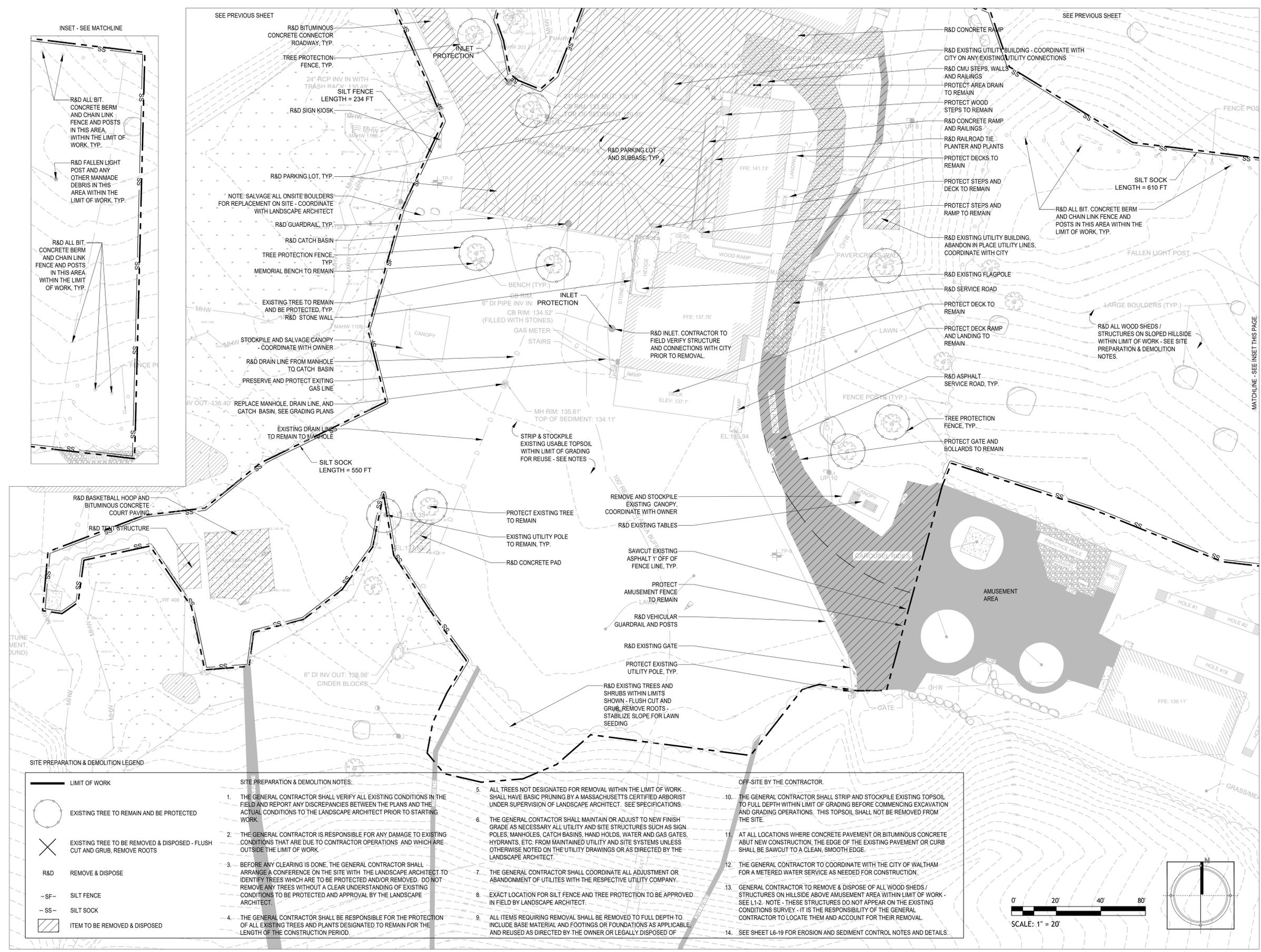
ISSUED FOR BID

Project Title:
**PROSPECT HILL PARK
 WALTHAM, MA**

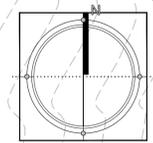
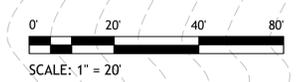
Drawing Title:
**SITE PREPARATION &
 DEMOLITION PLAN**

Project No. 180619
 Drawn By: PWH
 Checked By: PWH
 Scale: AS NOTED
 Date: August 20, 2020

Drawing No. **L1-2**



- SITE PREPARATION & DEMOLITION NOTES:**
- THE GENERAL CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS IN THE FIELD AND REPORT ANY DISCREPANCIES BETWEEN THE PLANS AND THE ACTUAL CONDITIONS TO THE LANDSCAPE ARCHITECT PRIOR TO STARTING WORK.
 - THE GENERAL CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE TO EXISTING CONDITIONS THAT ARE DUE TO CONTRACTOR OPERATIONS AND WHICH ARE OUTSIDE THE LIMIT OF WORK.
 - BEFORE ANY CLEARING IS DONE, THE GENERAL CONTRACTOR SHALL ARRANGE A CONFERENCE ON THE SITE WITH THE LANDSCAPE ARCHITECT TO IDENTIFY TREES WHICH ARE TO BE PROTECTED AND/OR REMOVED. DO NOT REMOVE ANY TREES WITHOUT A CLEAR UNDERSTANDING OF EXISTING CONDITIONS TO BE PROTECTED AND APPROVAL BY THE LANDSCAPE ARCHITECT.
 - THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING TREES AND PLANTS DESIGNATED TO REMAIN FOR THE LENGTH OF THE CONSTRUCTION PERIOD.
 - ALL TREES NOT DESIGNATED FOR REMOVAL WITHIN THE LIMIT OF WORK SHALL HAVE BASIC PRUNING BY A MASSACHUSETTS CERTIFIED ARBORIST UNDER SUPERVISION OF LANDSCAPE ARCHITECT. SEE SPECIFICATIONS.
 - THE GENERAL CONTRACTOR SHALL MAINTAIN OR ADJUST TO NEW FINISH GRADE AS NECESSARY ALL UTILITY AND SITE STRUCTURES SUCH AS SIGN POLES, MANHOLES, CATCH BASINS, HAND HOLDS, WATER AND GAS GATES, HYDRANTS, ETC. FROM MAINTAINED UTILITY AND SITE SYSTEMS UNLESS OTHERWISE NOTED ON THE UTILITY DRAWINGS OR AS DIRECTED BY THE LANDSCAPE ARCHITECT.
 - THE GENERAL CONTRACTOR SHALL COORDINATE ALL ADJUSTMENT OR ABANDONMENT OF UTILITIES WITH THE RESPECTIVE UTILITY COMPANY.
 - EXACT LOCATION FOR SILT FENCE AND TREE PROTECTION TO BE APPROVED IN FIELD BY LANDSCAPE ARCHITECT.
 - ALL ITEMS REQUIRING REMOVAL SHALL BE REMOVED TO FULL DEPTH TO INCLUDE BASE MATERIAL AND FOOTINGS OR FOUNDATIONS AS APPLICABLE, AND REUSED AS DIRECTED BY THE OWNER OR LEGALLY DISPOSED OF OFF-SITE BY THE CONTRACTOR.
 - THE GENERAL CONTRACTOR SHALL STRIP AND STOCKPILE EXISTING TOPSOIL TO FULL DEPTH WITHIN LIMIT OF GRADING BEFORE COMMENCING EXCAVATION AND GRADING OPERATIONS. THIS TOPSOIL SHALL NOT BE REMOVED FROM THE SITE.
 - AT ALL LOCATIONS WHERE CONCRETE PAVEMENT OR BITUMINOUS CONCRETE ABOUT NEW CONSTRUCTION, THE EDGE OF THE EXISTING PAVEMENT OR CURB SHALL BE SAWCUT TO A CLEAN, SMOOTH EDGE.
 - THE GENERAL CONTRACTOR TO COORDINATE WITH THE CITY OF WALTHAM FOR A METERED WATER SERVICE AS NEEDED FOR CONSTRUCTION.
 - GENERAL CONTRACTOR TO REMOVE & DISPOSE OF ALL WOOD SHEDS / STRUCTURES ON HILLSIDE ABOVE AMUSEMENT AREA WITHIN LIMIT OF WORK - SEE L1-2. NOTE - THESE STRUCTURES DO NOT APPEAR ON THE EXISTING CONDITIONS SURVEY - IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO LOCATE THEM AND ACCOUNT FOR THEIR REMOVAL.
 - SEE SHEET L6-19 FOR EROSION AND SEDIMENT CONTROL NOTES AND DETAILS.



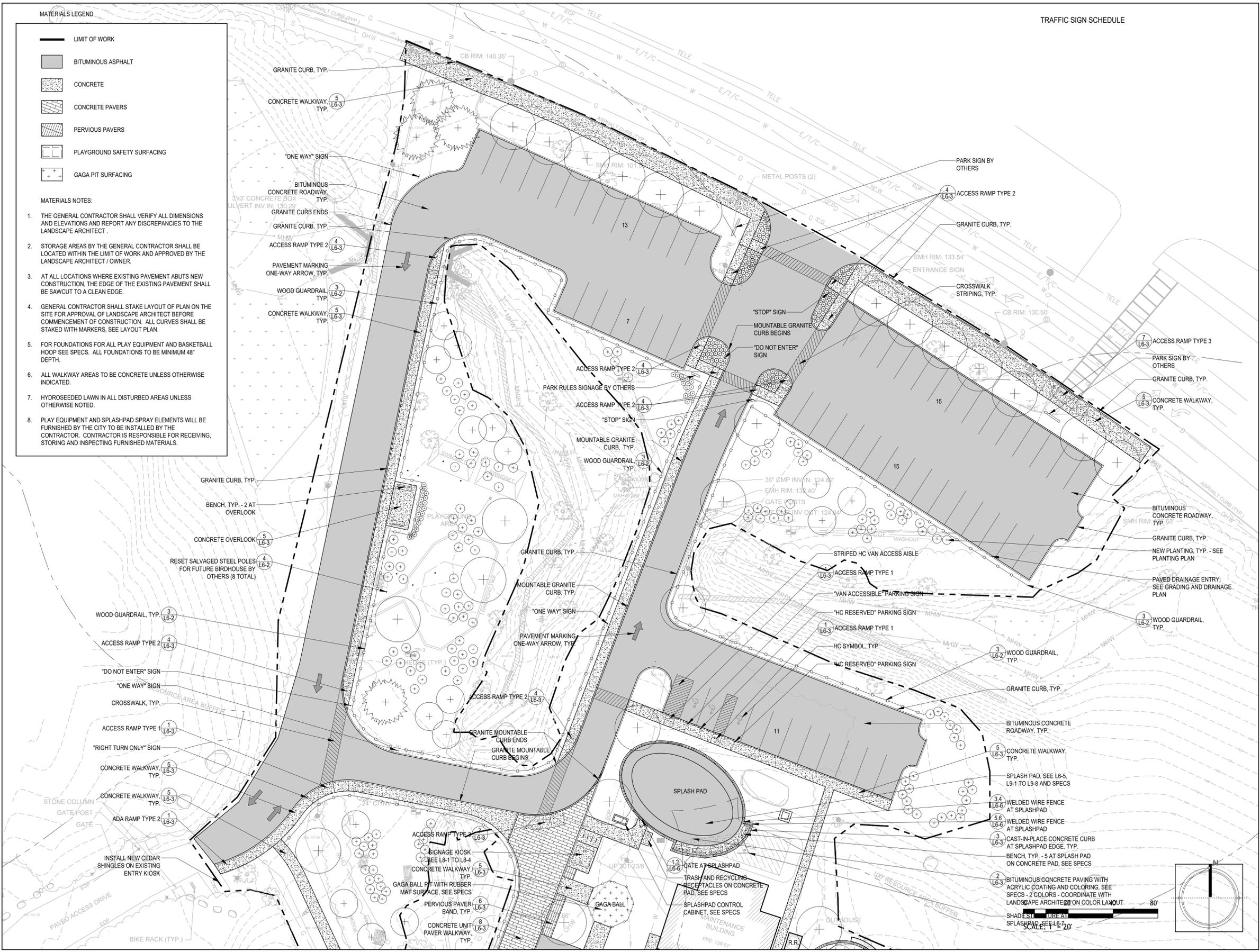
MATERIALS LEGEND

- LIMIT OF WORK
- BITUMINOUS ASPHALT
- CONCRETE
- CONCRETE PAVERS
- PERVIOUS PAVERS
- PLAYGROUND SAFETY SURFACING
- GAGA PIT SURFACING

MATERIALS NOTES:

1. THE GENERAL CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND ELEVATIONS AND REPORT ANY DISCREPANCIES TO THE LANDSCAPE ARCHITECT.
2. STORAGE AREAS BY THE GENERAL CONTRACTOR SHALL BE LOCATED WITHIN THE LIMIT OF WORK AND APPROVED BY THE LANDSCAPE ARCHITECT / OWNER.
3. AT ALL LOCATIONS WHERE EXISTING PAVEMENT ABUTS NEW CONSTRUCTION, THE EDGE OF THE EXISTING PAVEMENT SHALL BE SAWCUT TO A CLEAN EDGE.
4. GENERAL CONTRACTOR SHALL STAKE LAYOUT OF PLAN ON THE SITE FOR APPROVAL OF LANDSCAPE ARCHITECT BEFORE COMMENCEMENT OF CONSTRUCTION. ALL CURVES SHALL BE STAKED WITH MARKERS, SEE LAYOUT PLAN.
5. FOR FOUNDATIONS FOR ALL PLAY EQUIPMENT AND BASKETBALL HOOP SEE SPECS. ALL FOUNDATIONS TO BE MINIMUM 48" DEPTH.
6. ALL WALKWAY AREAS TO BE CONCRETE UNLESS OTHERWISE INDICATED.
7. HYDROSEEDING LAWN IN ALL DISTURBED AREAS UNLESS OTHERWISE NOTED.
8. PLAY EQUIPMENT AND SPLASHPAD SPRAY ELEMENTS WILL BE FURNISHED BY THE CITY TO BE INSTALLED BY THE CONTRACTOR. CONTRACTOR IS RESPONSIBLE FOR RECEIVING, STORING AND INSPECTING FURNISHED MATERIALS.

TRAFFIC SIGN SCHEDULE



HEDLUND DESIGN GROUP LLC

Landscape Architecture + Planning
 10 Central Street, Arlington MA 02476 USA
 † 617-826-9302 www.hedlunddesign.com

Horsley Witten Group, Inc.
 Sustainable Environmental Solutions
 www.horsleywitten.com
 90 Route 6A
 Sandwich, MA 02563
 508-833-6600 voice
 508-833-3150 fax



1	ISSUED FOR BID	8-20-2020
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No.	Description	Date
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DWG ISSUE & REVISION HISTORY

Stamp



ISSUED FOR BID

Project Title:
**PROSPECT HILL PARK
 WALTHAM, MA**

Drawing Title:
MATERIALS PLAN

Project No. 180619
 Drawn By: PWH
 Checked By: PWH
 Scale: AS NOTED
 Date: August 20, 2020

Drawing No. **L2-1**



No.	Description	Date
1	ISSUED FOR BID	8-20-2020

DWG ISSUE & REVISION HISTORY

Stamp



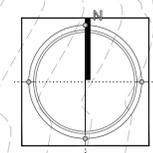
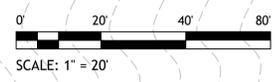
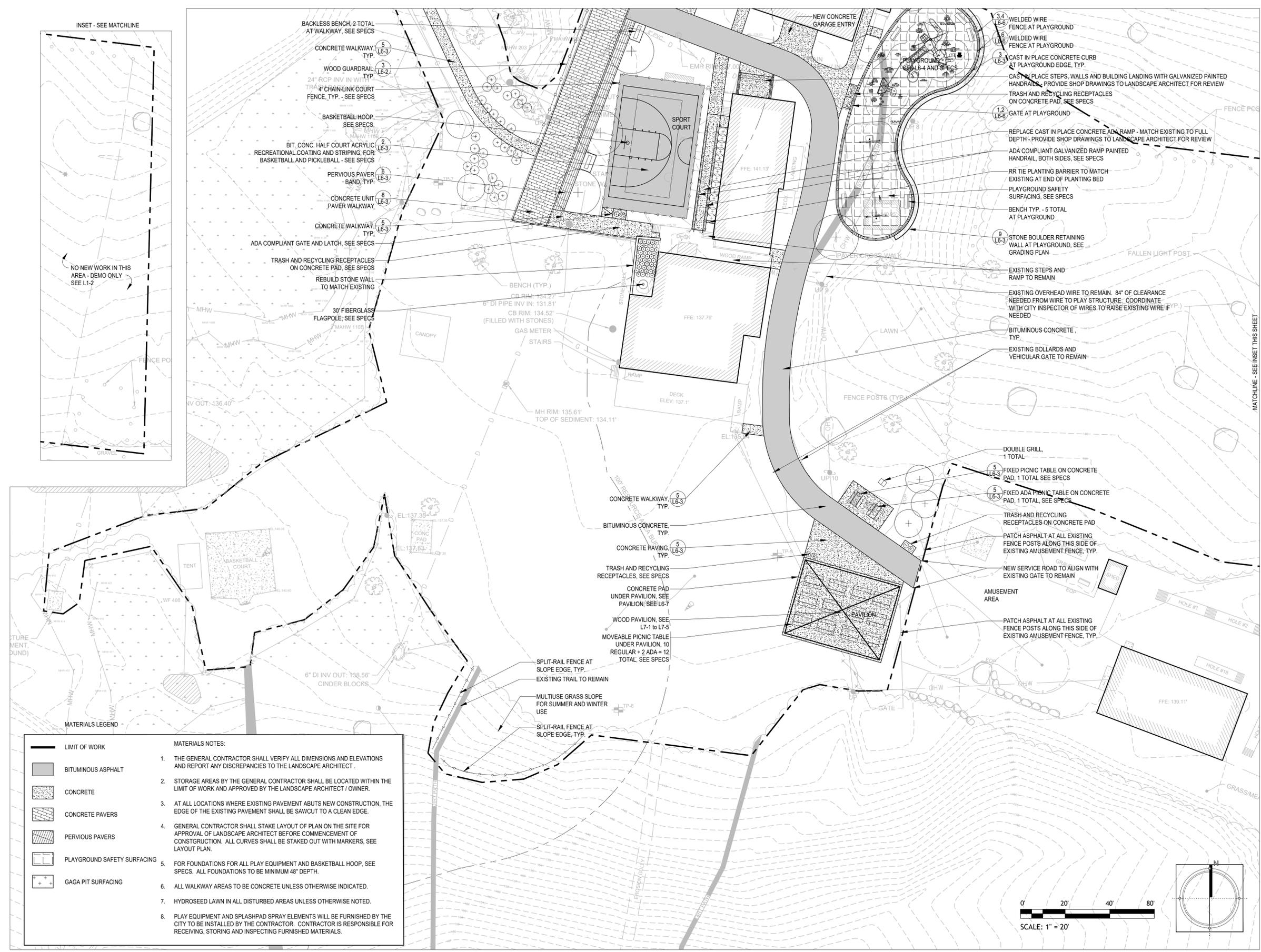
ISSUED FOR BID

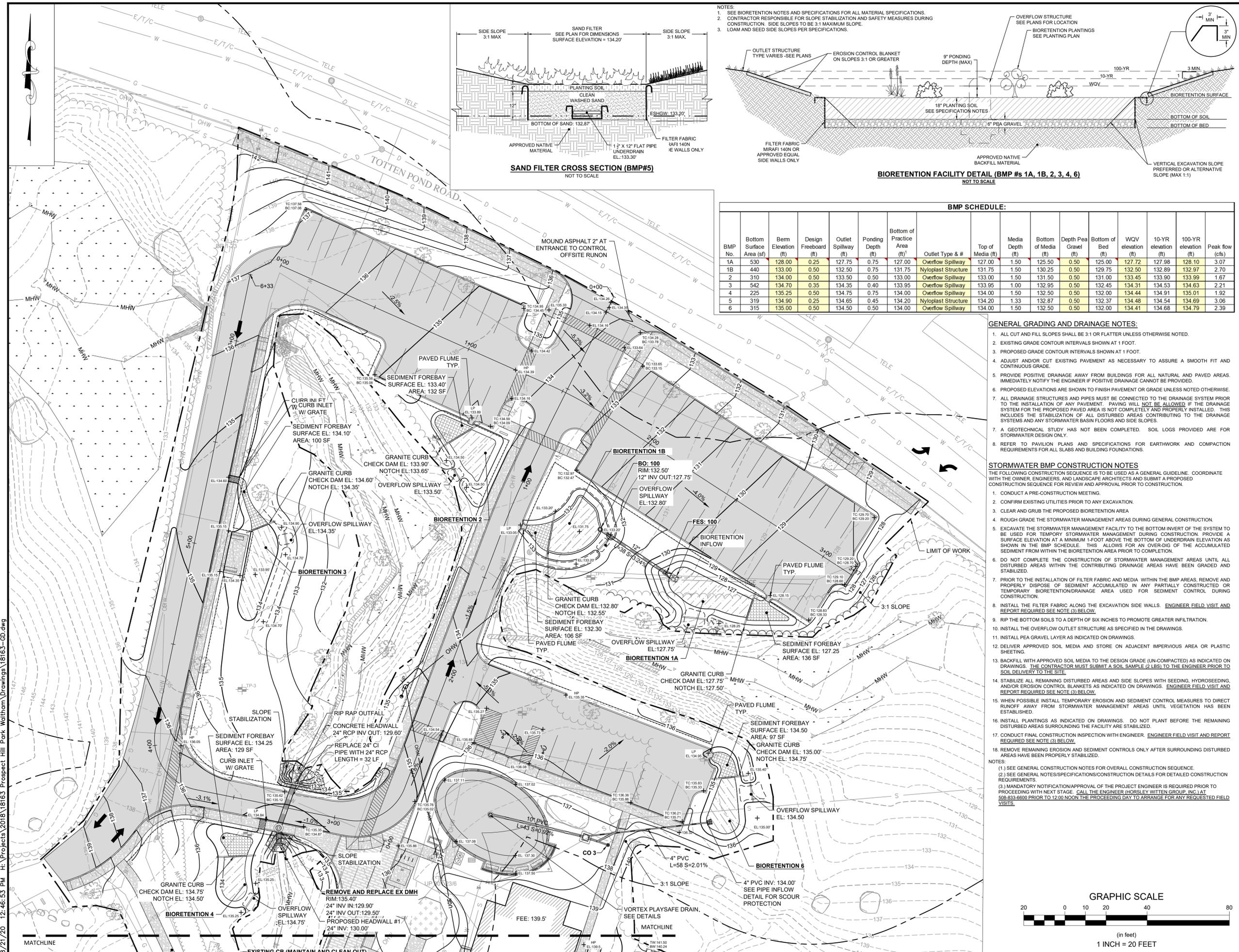
Project Title:
**PROSPECT HILL PARK
WALTHAM, MA**

Drawing Title:
MATERIALS PLAN

Project No. 180619
Drawn By: PWH
Checked By: PWH
Scale: AS NOTED
Date: August 20, 2020

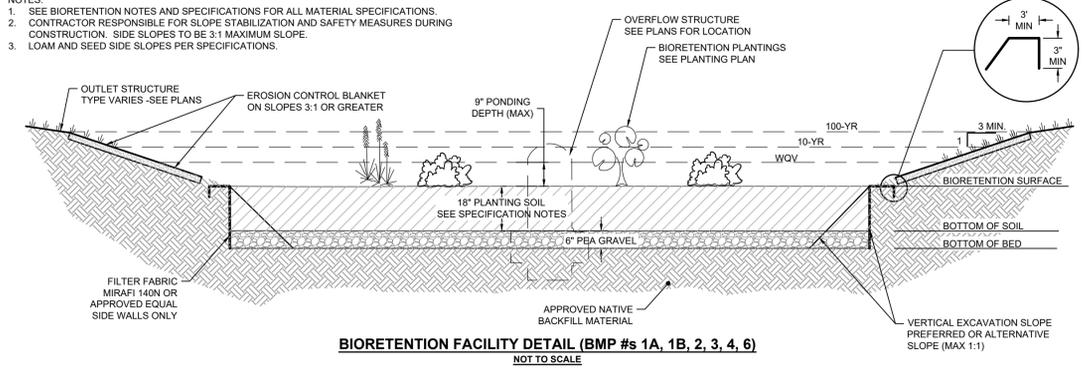
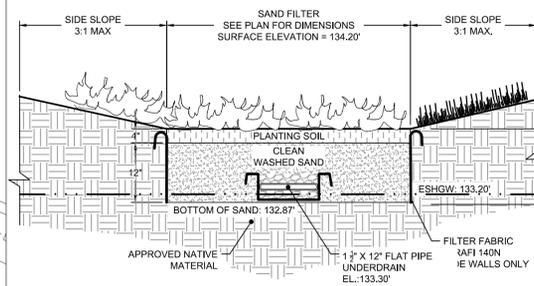
Drawing No. **L2-2**





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- NOTES:**
- SEE BIORETENTION NOTES AND SPECIFICATIONS FOR ALL MATERIAL SPECIFICATIONS.
 - CONTRACTOR RESPONSIBLE FOR SLOPE STABILIZATION AND SAFETY MEASURES DURING CONSTRUCTION. SIDE SLOPES TO BE 3:1 MAXIMUM SLOPE.
 - LOAM AND SEED SIDE SLOPES PER SPECIFICATIONS.



BMP SCHEDULE:

BMP No.	Bottom Surface Area (sf)	Berm Elevation (ft)	Design Freeboard (ft)	Outlet Spillway (ft)	Ponding Depth (ft)	Bottom of Practice Area (ft)	Outlet Type & #	Top of Media (ft)	Media Depth (ft)	Bottom of Media (ft)	Depth Pea Gravel (ft)	Bottom of Bed (ft)	WQV elevation (ft)	10-YR elevation (ft)	100-YR elevation (ft)	Peak flow (cfs)
1A	530	128.00	0.25	127.75	0.75	127.00	Overflow Spillway	127.00	1.50	125.50	0.50	125.00	127.72	127.98	128.10	3.07
1B	440	133.00	0.50	132.50	0.75	131.75	Nyloplast Structure	131.75	1.50	130.25	0.50	129.75	132.50	132.89	132.97	2.70
2	310	134.00	0.50	133.50	0.50	133.00	Overflow Spillway	133.00	1.50	131.50	0.50	131.00	133.45	133.90	133.99	1.67
3	542	134.70	0.35	134.35	0.40	133.95	Overflow Spillway	133.95	1.00	132.95	0.50	132.45	134.31	134.53	134.63	2.21
4	225	135.25	0.50	134.75	0.75	134.00	Overflow Spillway	134.00	1.50	132.50	0.50	132.00	134.44	134.91	135.01	1.92
5	319	134.90	0.25	134.65	0.45	134.20	Nyloplast Structure	134.20	1.33	132.87	0.50	132.37	134.48	134.54	134.69	3.06
6	315	135.00	0.50	134.50	0.50	134.00	Overflow Spillway	134.00	1.50	132.50	0.50	132.00	134.41	134.68	134.79	2.39

- GENERAL GRADING AND DRAINAGE NOTES:**
- ALL CUT AND FILL SLOPES SHALL BE 3:1 OR FLATTER UNLESS OTHERWISE NOTED.
 - EXISTING GRADE CONTOUR INTERVALS SHOWN AT 1 FOOT.
 - PROPOSED GRADE CONTOUR INTERVALS SHOWN AT 1 FOOT.
 - ADJUST AND/OR CUT EXISTING PAVEMENT AS NECESSARY TO ASSURE A SMOOTH FIT AND CONTINUOUS GRADE.
 - PROVIDE POSITIVE DRAINAGE AWAY FROM BUILDINGS FOR ALL NATURAL AND PAVED AREAS. IMMEDIATELY NOTIFY THE ENGINEER IF POSITIVE DRAINAGE CANNOT BE PROVIDED.
 - PROPOSED ELEVATIONS ARE SHOWN TO FINISH PAVEMENT OR GRADE UNLESS NOTED OTHERWISE.
 - ALL DRAINAGE STRUCTURES AND PIPES MUST BE CONNECTED TO THE DRAINAGE SYSTEM PRIOR TO THE INSTALLATION OF ANY PAVEMENT. PAVING WILL NOT BE ALLOWED IF THE DRAINAGE SYSTEM FOR THE PROPOSED PAVED AREA IS NOT COMPLETELY AND PROPERLY INSTALLED. THIS INCLUDES THE STABILIZATION OF ALL DISTURBED AREAS CONTRIBUTING TO THE DRAINAGE SYSTEMS AND ANY STORMWATER BASIN FLOORS AND SIDE SLOPES.
 - A GEOTECHNICAL STUDY HAS NOT BEEN COMPLETED. SOIL LOGS PROVIDED ARE FOR STORMWATER DESIGN ONLY.
 - REFER TO PAVILION PLANS AND SPECIFICATIONS FOR EARTHWORK AND COMPACTION REQUIREMENTS FOR ALL SLABS AND BUILDING FOUNDATIONS.

- STORMWATER BMP CONSTRUCTION NOTES**
- THE FOLLOWING CONSTRUCTION SEQUENCE IS TO BE USED AS A GENERAL GUIDELINE. COORDINATE WITH THE OWNER, ENGINEERS, AND LANDSCAPE ARCHITECTS AND SUBMIT A PROPOSED CONSTRUCTION SEQUENCE FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.
- CONDUCT A PRE-CONSTRUCTION MEETING.
 - CONFIRM EXISTING UTILITIES PRIOR TO ANY EXCAVATION.
 - CLEAR AND GRUB THE PROPOSED BIORETENTION AREA.
 - ROUGH GRADE THE STORMWATER MANAGEMENT AREAS DURING GENERAL CONSTRUCTION.
 - EXCAVATE THE STORMWATER MANAGEMENT FACILITY TO THE BOTTOM INVERT OF THE SYSTEM TO BE USED FOR TEMPORARY STORMWATER MANAGEMENT DURING CONSTRUCTION. PROVIDE A SURFACE ELEVATION AT A MINIMUM 1-FOOT ABOVE THE BOTTOM OF UNDERDRAIN ELEVATION AS SHOWN IN THE BMP SCHEDULE. THIS ALLOWS FOR AN OVER-DIG OF THE ACCUMULATED SEDIMENT FROM WITHIN THE BIORETENTION AREA PRIOR TO COMPLETION.
 - DO NOT COMPLETE THE CONSTRUCTION OF STORMWATER MANAGEMENT AREAS UNTIL ALL DISTURBED AREAS WITHIN THE CONTRIBUTING DRAINAGE AREAS HAVE BEEN GRADED AND STABILIZED.
 - PRIOR TO THE INSTALLATION OF FILTER FABRIC AND MEDIA, WITHIN THE BMP AREAS, REMOVE AND PROPERLY DISPOSE OF SEDIMENT ACCUMULATED IN ANY PARTIALLY CONSTRUCTED OR TEMPORARY BIORETENTION/DRAINAGE AREA USED FOR SEDIMENT CONTROL DURING CONSTRUCTION.
 - INSTALL THE FILTER FABRIC ALONG THE EXCAVATION SIDE WALLS. ENGINEER FIELD VISIT AND REPORT REQUIRED SEE NOTE (3) BELOW.
 - RIP THE BOTTOM SOILS TO A DEPTH OF SIX INCHES TO PROMOTE GREATER INFILTRATION.
 - INSTALL THE OVERFLOW OUTLET STRUCTURE AS SPECIFIED IN THE DRAWINGS.
 - INSTALL PEA GRAVEL LAYER AS INDICATED ON DRAWINGS.
 - DELIVER APPROVED SOIL MEDIA AND STORE ON ADJACENT IMPERVIOUS AREA OR PLASTIC SHEETING.
 - BACKFILL WITH APPROVED SOIL MEDIA TO THE DESIGN GRADE (UN-COMPACTED) AS INDICATED ON DRAWINGS. THE CONTRACTOR MUST SUBMIT A SOIL SAMPLE (2 LBS) TO THE ENGINEER PRIOR TO SOIL DELIVERY TO THE SITE.
 - STABILIZE ALL REMAINING DISTURBED AREAS AND SIDE SLOPES WITH SEEDING, HYDROSEEDING, AND/OR EROSION CONTROL BLANKETS AS INDICATED ON DRAWINGS. ENGINEER FIELD VISIT AND REPORT REQUIRED SEE NOTE (3) BELOW.
 - WHEN POSSIBLE INSTALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES TO DIRECT RUNOFF AWAY FROM STORMWATER MANAGEMENT AREAS UNTIL VEGETATION HAS BEEN ESTABLISHED.
 - INSTALL PLANTINGS AS INDICATED ON DRAWINGS. DO NOT PLANT BEFORE THE REMAINING DISTURBED AREAS SURROUNDING THE FACILITY ARE STABILIZED.
 - CONDUCT FINAL CONSTRUCTION INSPECTION WITH ENGINEER. ENGINEER FIELD VISIT AND REPORT REQUIRED SEE NOTE (3) BELOW.
 - REMOVE REMAINING EROSION AND SEDIMENT CONTROLS ONLY AFTER SURROUNDING DISTURBED AREAS HAVE BEEN PROPERLY STABILIZED.

- NOTES:**
- SEE GENERAL CONSTRUCTION NOTES FOR OVERALL CONSTRUCTION SEQUENCE.
 - SEE GENERAL NOTES/SPECIFICATIONS/CONSTRUCTION DETAILS FOR DETAILED CONSTRUCTION REQUIREMENTS.
 - MANDATORY NOTIFICATION/APPROVAL OF THE PROJECT ENGINEER IS REQUIRED PRIOR TO PROCEEDING WITH NEXT STAGE. CALL THE ENGINEER (HORSLEY WITTEN GROUP, INC.) AT 508-833-8600 PRIOR TO 12:00 NOON THE PRECEDING DAY TO ARRANGE FOR ANY REQUESTED FIELD VISITS.

HEDLUND DESIGN GROUP
LLC
Landscape Architecture + Planning

10 Central Street, Arlington MA 02476 USA
t 617-826-9302 w www.hedlunddesign.com

Horsley Witten Group, Inc.
Sustainable Environmental Solutions
www.horsleywitten.com
90 Route 6A
Sandwich, MA 02563
508-833-8600 voice
508-833-3150 fax

No.	Description	Date
1	ISSUED FOR BID	8-20-2020

DWG ISSUE & REVISION HISTORY

Stamp

ISSUED FOR BID

Project Title:

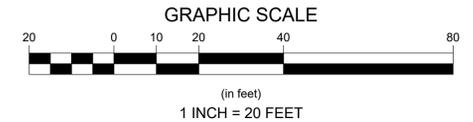
**PROSPECT HILL PARK
WALTHAM, MA**

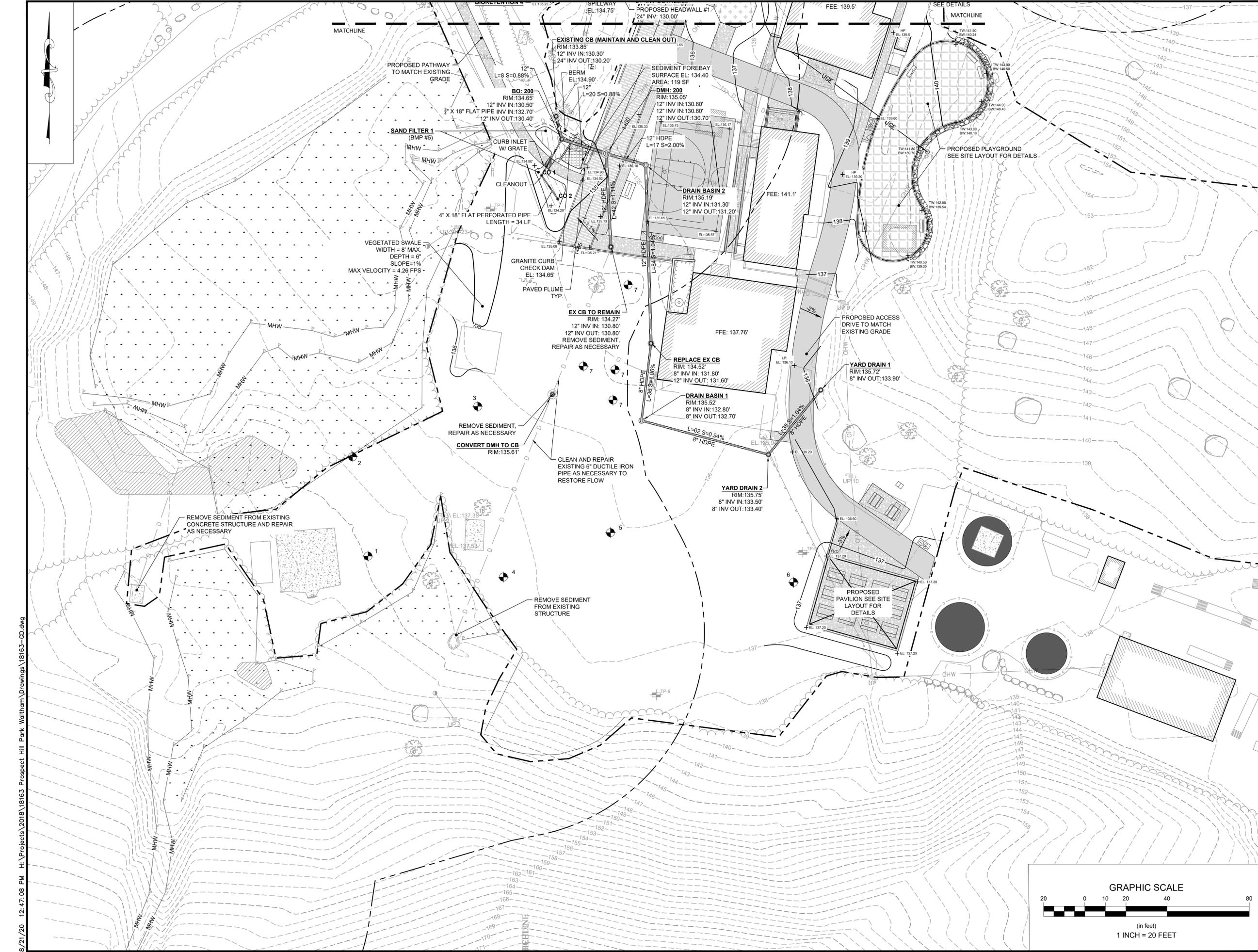
Drawing Title:

**GRADING &
DRAINAGE
PLAN (1)**

Project No. 18163
Drawn By: GSG
Checked By: BRK
Scale: 1"=20'
Date: AUGUST 2020

Drawing No. L3 - 1





HEDLUND DESIGN GROUP
LLC
Landscape Architecture + Planning

10 Central Street, Arlington MA 02476 USA
t 617-826-9302 w www.hedlunddesign.com

Horsley Witten Group, Inc.
Sustainable Environmental Solutions
www.horsleywitten.com
90 Route 6A
Sandwich, MA 02563
508-833-6600 voice
508-833-3150 fax

No.	Description	Date
1	ISSUED FOR BID	8-20-2020

DWG ISSUE & REVISION HISTORY

Stamp

8-20-2020
Richard A. Clayton

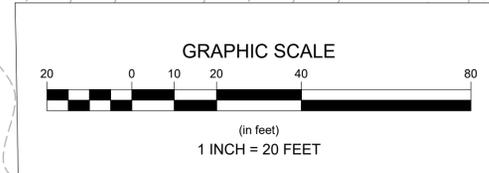
ISSUED FOR BID

Project Title:
**PROSPECT HILL PARK
WALTHAM, MA**

Drawing Title:
**GRADING &
DRAINAGE
PLAN (2)**

Project No. 18163
Drawn By: GSG
Checked By: BRK
Scale: 1"=20'
Date: AUGUST 2020

Drawing No. L3 - 2



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1	ISSUED FOR BID	8-20-2020
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No.	Description	Date
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DWG ISSUE & REVISION HISTORY

Stamp



8-20-2020
 Reardon

ISSUED FOR BID

Project Title:

PROSPECT HILL PARK
 WALTHAM, MA

Drawing Title:

ROAD
 PROFILE

Project No. 18163

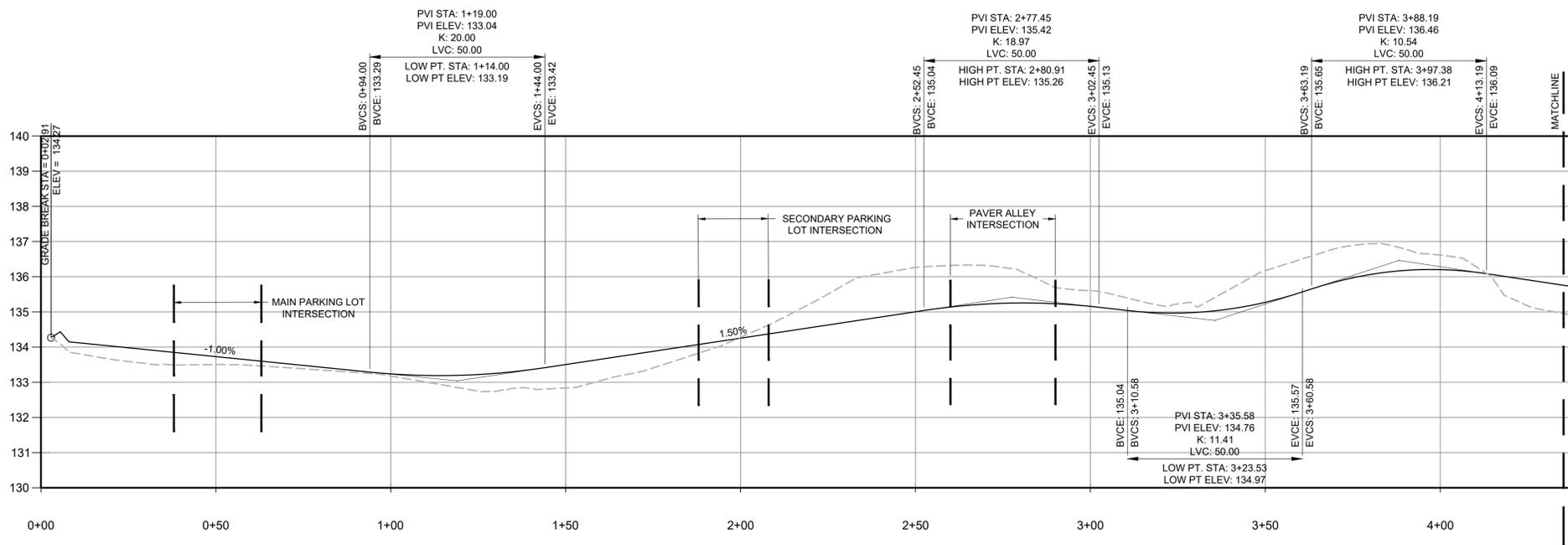
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Checked By: BRK

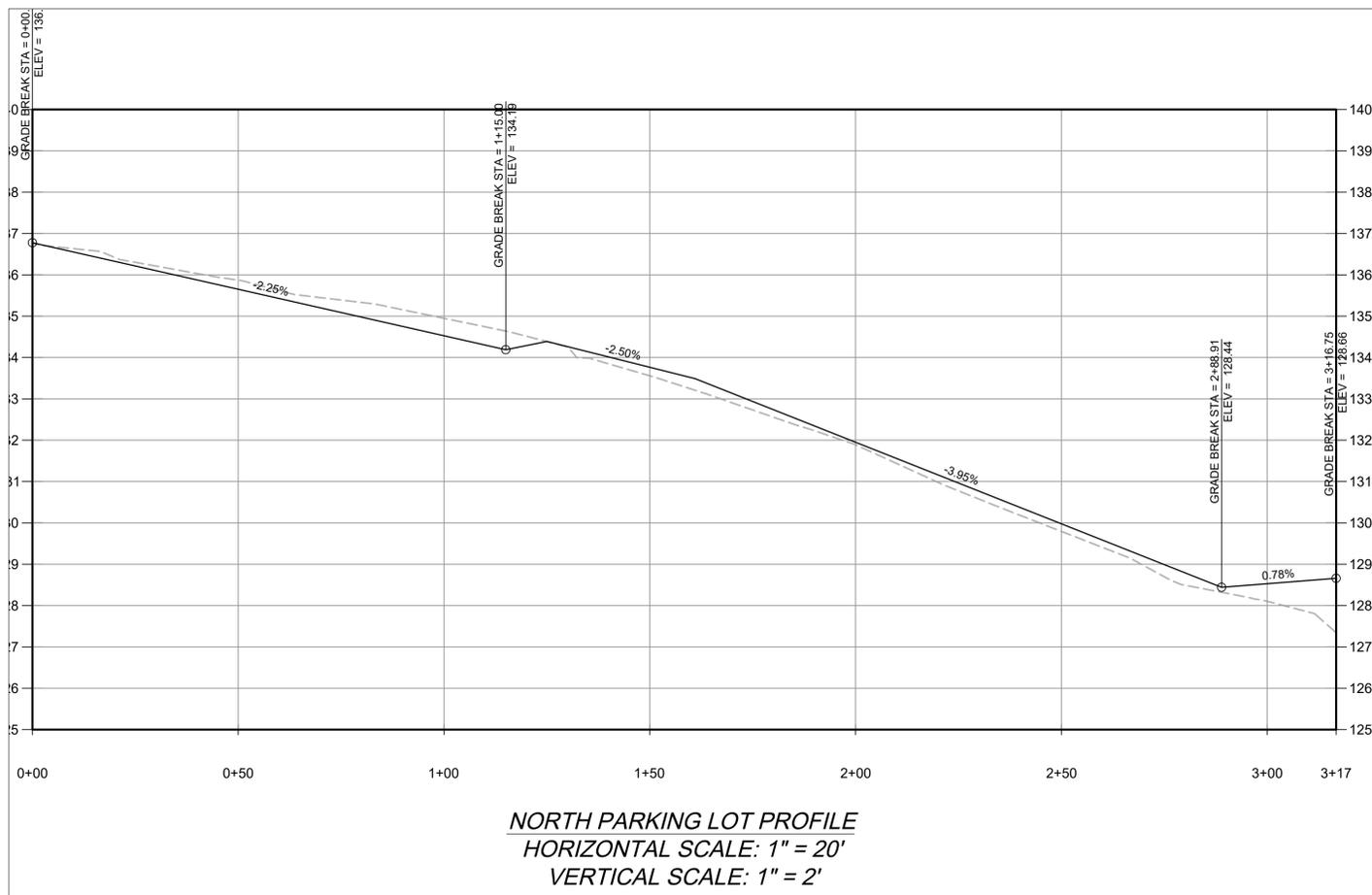
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Date: AUGUST 2020

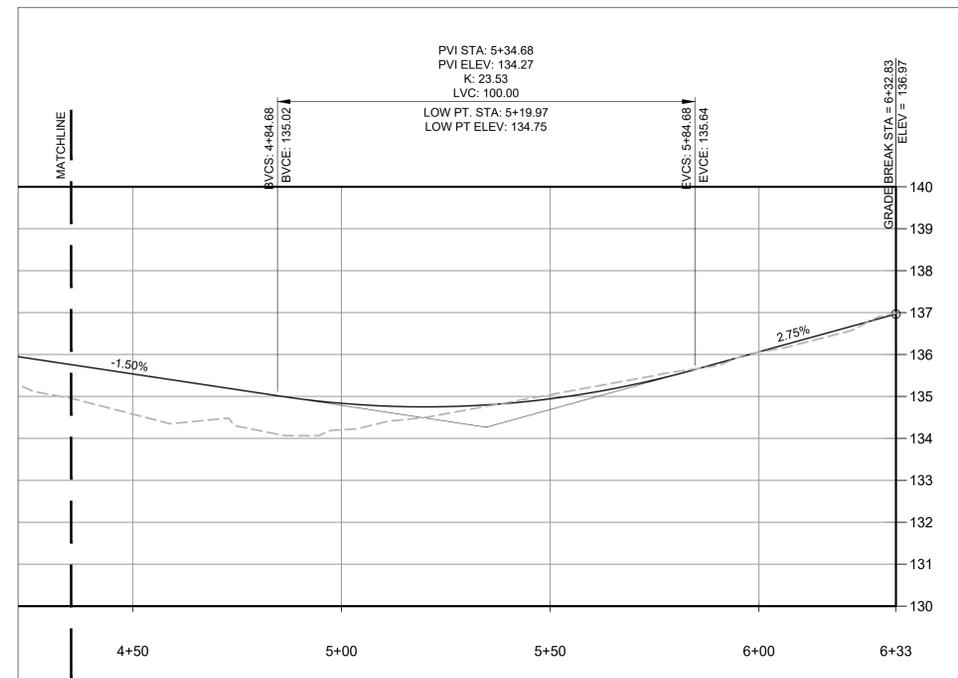
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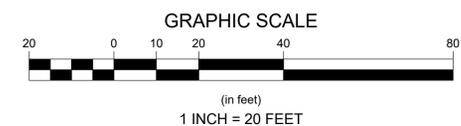
LOOP ROADWAY PROFILE
 HORIZONTAL SCALE : 1" = 20'
 VERTICAL SCALE: 1" = 2'

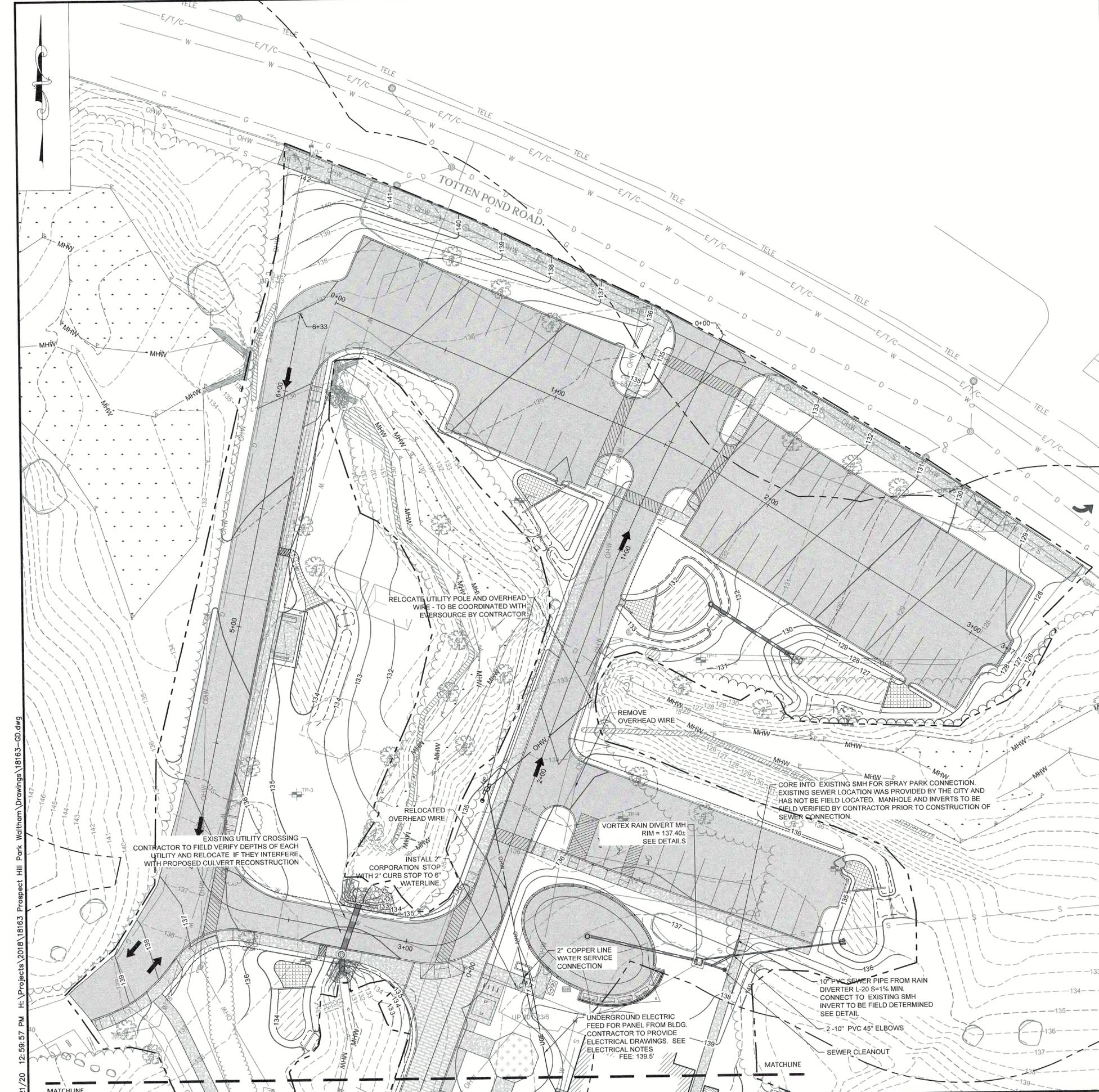


NORTH PARKING LOT PROFILE
 HORIZONTAL SCALE: 1" = 20'
 VERTICAL SCALE: 1" = 2'



LOOP ROADWAY PROFILE (CON'T)
 HORIZONTAL SCALE : 1" = 20'
 VERTICAL SCALE: 1" = 2'





EXISTING UTILITIES NOTES:

1. THE LOCATION AND/OR ELEVATION OF EXISTING ABOVE GROUND UTILITIES AND STRUCTURES AS SHOWN ON THESE PLANS ARE ASSUMED OR BASED ON MEASUREMENTS TAKEN IN THE FIELD OR AS PROVIDED BY THE CITY OF WALTHAM ENGINEERING DEPARTMENT AND RECORDS OF VARIOUS UTILITY COMPANIES, AND WHEREVER POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THIS INFORMATION IS NOT TO BE RELIED UPON AS BEING EXACT OR COMPLETE. VERIFY THE LOCATION OF ALL UNDERGROUND UTILITIES AND STRUCTURES IN THE FIELD PRIOR TO THE START OF CONSTRUCTION.
2. UNDERGROUND GAS LINE WAS LOCATED FROM FIELD MARKINGS. THE LOCATION OF THE GAS RECTIFIER LINE WAS LOCATED FROM FIELD MARKINGS AND MAY NOT BE COMPLETE.
3. ALL WATER AND SEWER UTILITIES SHOWN WERE NOT FIELD LOCATED AND THE LOCATIONS SHOWN WERE PROVIDED BY THE CITY OF WALTHAM ENGINEERING DEPARTMENT.
4. CONTACT THE APPROPRIATE UTILITY COMPANY, ANY GOVERNING PERMITTING AUTHORITY IN THE CITY OF WALTHAM, AND "DIGSAFE" (1-888-344-7233) AT LEAST THREE BUSINESS DAYS PRIOR TO ANY EXCAVATION WORK IN PREVIOUSLY UNALTERED AREAS TO REQUEST EXACT FIELD LOCATION OF UTILITIES. THE CONTRACTOR MUST RESOLVE CONFLICTS BETWEEN THE PROPOSED UTILITIES AND FIELD-LOCATED UTILITIES AND REPORT ANY DISCREPANCIES TO THE ENGINEER IMMEDIATELY.
5. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES OMITTED, INCOMPLETELY OR INACCURATELY SHOWN.
6. COORDINATE AND MAKE ALL CONNECTION ARRANGEMENTS WITH UTILITY COMPANIES, AS REQUIRED.
7. THE CONTRACTOR MUST MAINTAIN ALL EXISTING UTILITIES IN WORKING ORDER AND FREE FROM DAMAGE DURING THE ENTIRE DURATION OF THE PROJECT. REPAIR ANY DAMAGE TO EXISTING UTILITY LINES OR STRUCTURES INCURRED DURING CONSTRUCTION OPERATIONS AT NO COST TO THE OWNER. THE CONTRACTOR IS RESPONSIBLE FOR ALL COST RELATED TO THE REPAIR OF UTILITIES. EXCAVATION REQUIRED WITHIN THE PROXIMITY OF EXISTING UTILITY LINES MUST BE DONE BY HAND.
8. THE CONTRACTOR MUST MAINTAIN ACCURATE RECORDS OF THE LOCATION AND ELEVATION OF ALL WORK INSTALLED AND EXISTING UTILITIES FOUND DURING CONSTRUCTION FOR THE PREPARATION OF THE AS-BUILT PLAN.

WATER & SEWER INSTALLATION NOTES:

1. INSTALL SEWER AND WATER MAINS ACCORDING TO THE FOLLOWING GUIDELINES TO PREVENT FREEZING OF THE MAIN OR SEWER:

UTILITY TYPE	MIN. COVER OVER TOP OF PIPE	MIN. HORIZONTAL TO DRAIN STRUCTURE
SANITARY FORCEMAIN	5'	3'
GRAVITY FORCEMAIN	4'	2'
WATER MAIN	5'	2'
2. INSULATE SANITARY FORCE MAINS, WATER MAINS, HYDRANT PIPING AND DEAD END WATER LINES S WHERE SOIL COVER OR HORIZONTAL SEPARATION TO PRECAST STRUCTURES IS LESS THAN THE DISTANCE SPECIFIED ABOVE AND/OR WHERE SHOWN ON PLANS.
3. INSULATION: 2" THICK POLYURETHANE INSULATION WITH PVC JACKET PLACED AROUND PIPE OR DESIGNER APPROVED EQUAL.
4. WATER AND SEWER SEPARATION IS TYPICALLY 10-FOOT MINIMUM HORIZONTAL AND 18-INCHES VERTICAL WITH SEWER MAINS BELOW THE WATER MAINS (SEE DETAIL). IF SITE CONDITIONS REQUIRE LESS, THEN INSTALL UTILITIES AS INDICATED ON DETAILS.

WATER SYSTEM INSTALLATION NOTES:

1. INSTALL WATER LINE IN ACCORDANCE WITH THE LOCAL WATER DEPARTMENT'S STANDARDS AND SPECIFICATIONS AND PAY FOR ALL ASSOCIATED FEES AS REQUIRED BY THE WATER DEPARTMENT.
2. SUPPLY TWO COPIES OF SWORN CERTIFICATES TO PROVE THAT ALL PIPES AND FITTINGS ARE INSPECTED AND TESTED AS REQUIRED BY THE STANDARD SPECIFICATIONS TO WHICH THE MATERIAL IS MANUFACTURED.
3. GATE VALVES: MUELLER (A 2360 SERIES), CLOW (AWWA STANDARD C509 SERIES), AMERICAN DARLING (RESILIENT WEDGE) OR APPROVED EQUAL.
4. THE GATE VALVE TO TURN TO THE RIGHT TO OPEN (CLOCKWISE). ALL BOLTS AND NUTS MUST BE RUST PROOF STEEL.
5. CLEAR ALL NEWLY INSTALLED WATER SYSTEM COMPONENTS OF ALL FOREIGN MATERIALS SUCH AS DIRT AND MISCELLANEOUS DEBRIS PRIOR TO SYSTEM TESTING. NO TESTING IS ALLOWED WITHOUT REMOVAL OF ALL FOREIGN MATERIALS.
6. CONTRACTOR IS RESPONSIBLE FOR CONDUCTING A PRESSURE TEST AND DISINFECTION TEST OF ALL WATER MAINS. THE TESTS MUST BE WITNESSED BY THE APPROVED INSPECTOR OR THE ENGINEER. THE CONTRACTOR MUST PROVIDE A MINIMUM OF 48-HOUR ADVANCE NOTICE TO THE LOCAL WATER DEPARTMENT PRIOR TO THE PRESSURE AND DISINFECTION TESTS. THE CONTRACTOR MUST PROVIDE ALL NECESSARY EQUIPMENT AND CHEMICALS TO PROPERLY CONDUCT THE TESTS.
7. INSTALL AND REMOVE ALL NECESSARY BLOWOFFS REQUIRED FOR THIS PROJECT AT NO EXTRA COST TO THE OWNER.
8. COLLECT ALL BACTERIOLOGICAL SAMPLES AND PAY FOR ALL RELATED LABORATORY FEES.
9. MAINTAIN UP-TO-DATE AS-BUILT DRAWINGS AND NOTES INDICATING THE HORIZONTAL AND VERTICAL LOCATION WITH TWO TIES OF ALL SYSTEM COMPONENTS INSTALLED. AS-BUILT DRAWINGS AND NOTES WILL BE UTILIZED BY THE ENGINEER FOR THE PREPARATION OF RECORD PLANS.

SEWER SYSTEM OPERATION & MAINTENANCE:

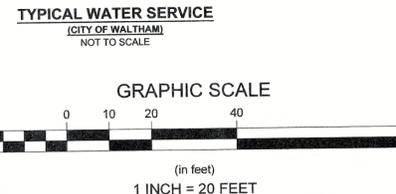
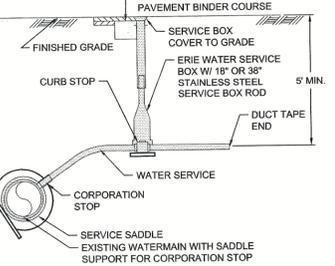
1. CLEAN ALL NEWLY INSTALLED SEWER COLLECTION SYSTEM OF ALL FOREIGN MATERIALS SUCH AS DIRT AND MISCELLANEOUS DEBRIS PRIOR TO SYSTEM TESTING. TESTING MUST BE WITNESSED AND INSPECTED BY THE ENGINEER. NO TESTING IS ALLOWED WITHOUT REMOVAL OF ALL FOREIGN MATERIALS.
2. TEST SEWER PIPES FOR LEAKAGE WITH THE FOLLOWING PROCEDURE:
 INTRODUCE LOW PRESSURE AIR INTO THE SEAL LINE (WITH PNEUMATIC PLUGS) UNTIL THE INTERNAL AIR PRESSURE REACHES 4 PSI GREATER THAN THE AVERAGE BACK PRESSURE OF ANY GROUNDWATER THAT MAY BE OVER THE PIPE.
 ALLOW AT LEAST 2 MINUTES FOR AIR PRESSURE TO STABILIZE.
 AFTER THE STABILIZATION PERIOD (3.5 PSI MINIMUM PRESSURE IN THE PIPE), THE PORTION OF PIPE TESTED IS ACCEPTABLE IF THE TIME REQUIRED IN MINUTES FOR THE PRESSURE TO DECREASE FROM 3.5 TO 3 PSI IS NOT LESS THAN 1.90 TIMES THE LENGTH OF PIPE BEING TESTED.

ELECTRICAL NOTES:

1. ELECTRICAL CONNECTIONS SHOWN ARE SCHEMATIC ONLY.
2. CONTRACTOR TO PROVIDE A STAMPED SITE ELECTRICAL PLAN PER LOCAL BUILDING CODE REQUIREMENTS INCLUDING THE LOCATION, SIZE AND DETAILS FOR ALL CONDUIT, HANDHOLES, AND SITE WIRING REQUIREMENTS.
3. CONTRACTOR TO COORDINATE WITH LOCAL UTILITY PROVIDER FOR ALL ELECTRICAL WORK.
4. COORDINATE ALL ELECTRICAL WORK WITH THE CITY OF WALTHAM INSPECTOR OF WIRES.

NOTES:

1. ALL WATER SERVICES SHALL BE 1" DIA. TYPE K COPPER TUBING UNLESS OTHERWISE NOTE. SERVICE SHALL BE ONE CONTINUOUS LENGTH FROM MAIN TO CURB STOP.
2. ALL WATER SERVICES SHALL BE REPLACED UP TO THE RIGHT OF WAY. WHERE THE SIZE OF THE CONNECTION EXCEEDS THAT FIVE IN THE TABLE, THE CONNECTION SHALL BE MADE MEANS OF A TAPPED SADDLE OR THE CONNECTION.
3. WHERE GATE COX IS NEAR OBSTRUCTION SUCH AS FENCE OR WALL, PLACE TO ALLOW SUFFICIENT ROOM TO OPERATE VALVE WITH WRENCH.
4. NEW TAPPED CONNECTION SHALL NOT BE ALLOWED CLOSER THAN 2' FROM A BELL JOINT ON THE EXISTING WATER MAIN.
5. INSULATION TO BE USED AS REQUIRED BY THE WATER & SEWER SUPERINTENDENT.



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Jonathan G. GSG
 8/20/20

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Project Title:

**PROSPECT HILL PARK
 WALTHAM, MA**

Drawing Title:
**UTILITY
 COORDINATION
 PLAN (1)**

Project No. 18163
 Drawn By: GSG
 Checked By: BRK
 Scale: 1"=20'
 Date: AUGUST 2020

Drawing No. L3 - 4

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Justin Lee
8/20/20

ISSUED FOR BID

Project Title:

**PROSPECT HILL PARK
WALTHAM, MA**

Drawing Title:

**UTILITY
COORDINATION
PLAN (2)**

Project No. 18163
Drawn By: GSG
Checked By: BRK
Scale: 1"=20'
Date: AUGUST 2020

Drawing No. L3-5

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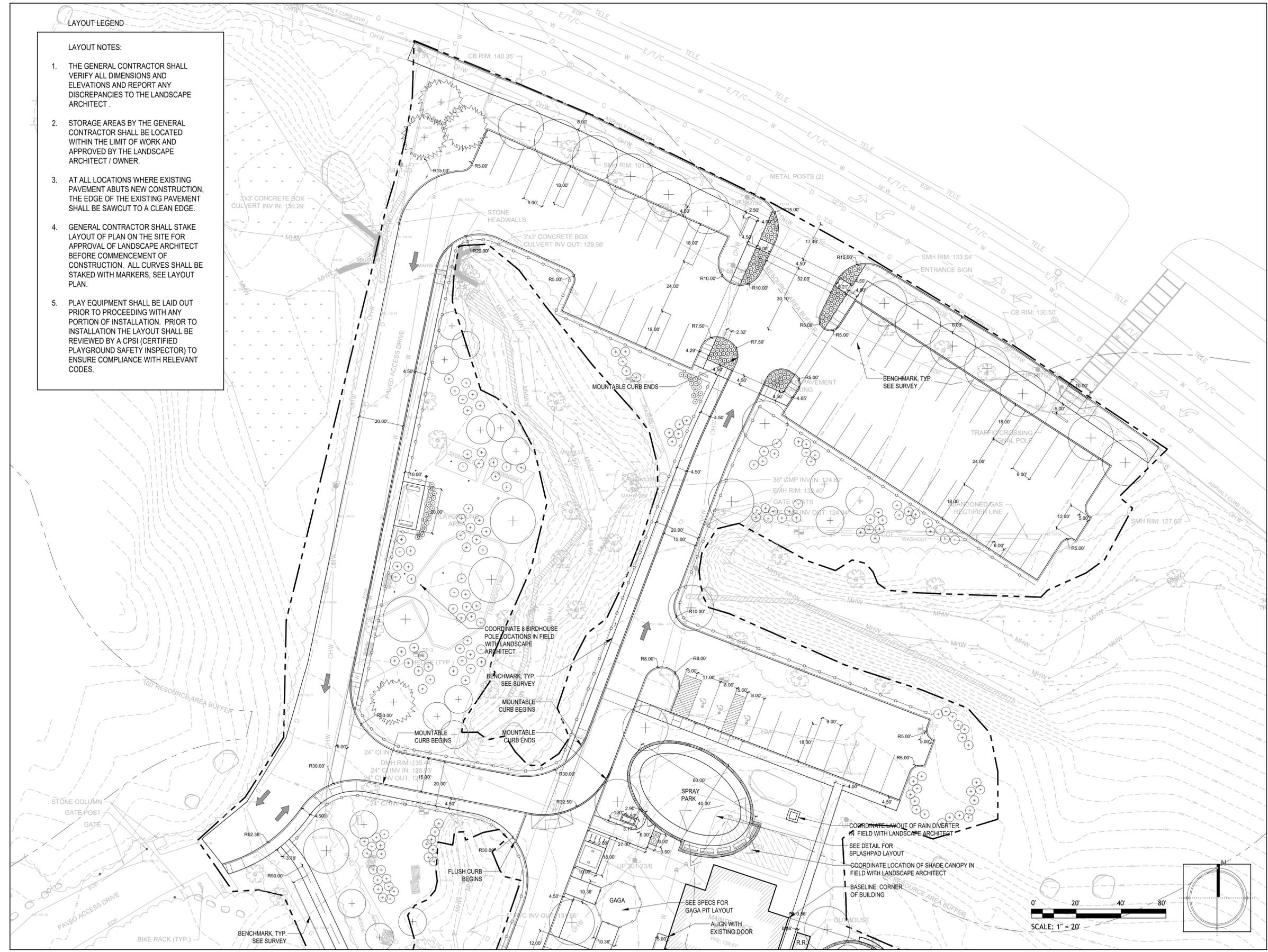
ISSUED FOR BID

Project Title:
**PROSPECT HILL PARK
 WALTHAM, MA**

Drawing Title:
LAYOUT PLAN

Project No. 180619
 Drawn By: PWH
 Checked By: PWH
 Scale: AS NOTED
 Date: August 20, 2020

Drawing No. **L4-1**



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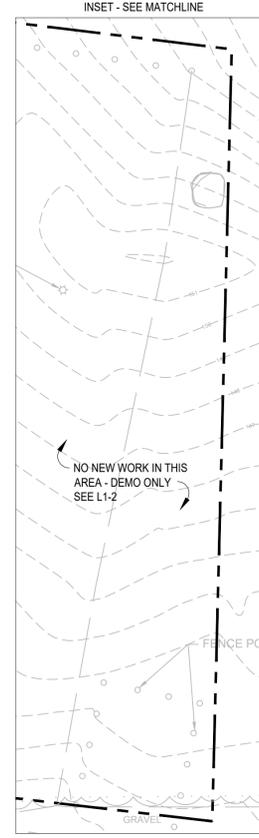
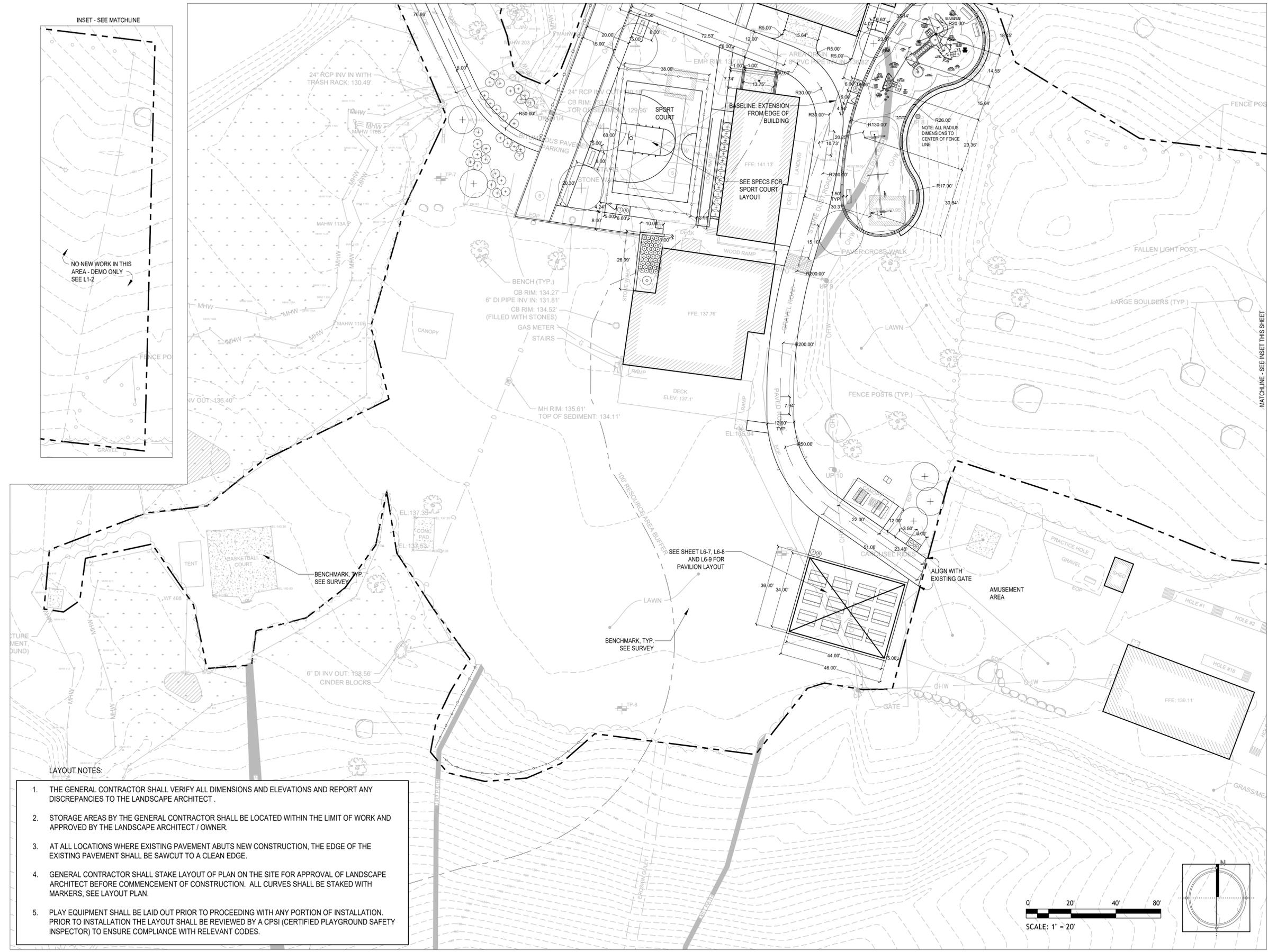
**PROSPECT HILL PARK
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Drawing Title:

LAYOUT PLAN

Project No. 180619
 Drawn By: PWH
 Checked By: PWH
 Scale: AS NOTED
 Date: August 20, 2020

Drawing No. **L4-2**



- LAYOUT NOTES:
1. THE GENERAL CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND ELEVATIONS AND REPORT ANY DISCREPANCIES TO THE LANDSCAPE ARCHITECT .
 2. STORAGE AREAS BY THE GENERAL CONTRACTOR SHALL BE LOCATED WITHIN THE LIMIT OF WORK AND APPROVED BY THE LANDSCAPE ARCHITECT / OWNER.
 3. AT ALL LOCATIONS WHERE EXISTING PAVEMENT ABUTS NEW CONSTRUCTION, THE EDGE OF THE EXISTING PAVEMENT SHALL BE SAWCUT TO A CLEAN EDGE.
 4. GENERAL CONTRACTOR SHALL STAKE LAYOUT OF PLAN ON THE SITE FOR APPROVAL OF LANDSCAPE ARCHITECT BEFORE COMMENCEMENT OF CONSTRUCTION. ALL CURVES SHALL BE STAKED WITH MARKERS. SEE LAYOUT PLAN.
 5. PLAY EQUIPMENT SHALL BE LAID OUT PRIOR TO PROCEEDING WITH ANY PORTION OF INSTALLATION. PRIOR TO INSTALLATION THE LAYOUT SHALL BE REVIEWED BY A CPSI (CERTIFIED PLAYGROUND SAFETY INSPECTOR) TO ENSURE COMPLIANCE WITH RELEVANT CODES.



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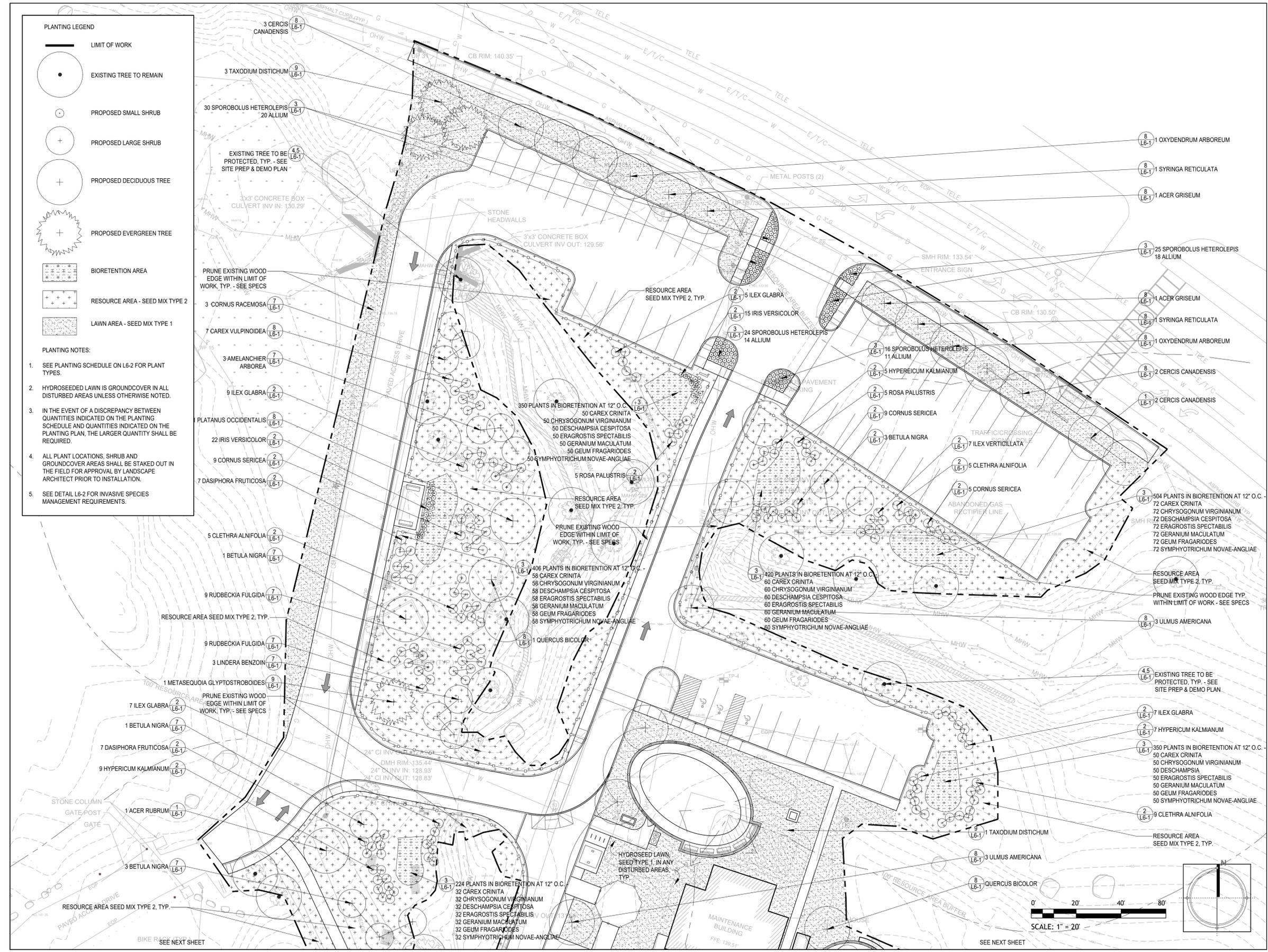
**PROSPECT HILL PARK
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Drawing Title:

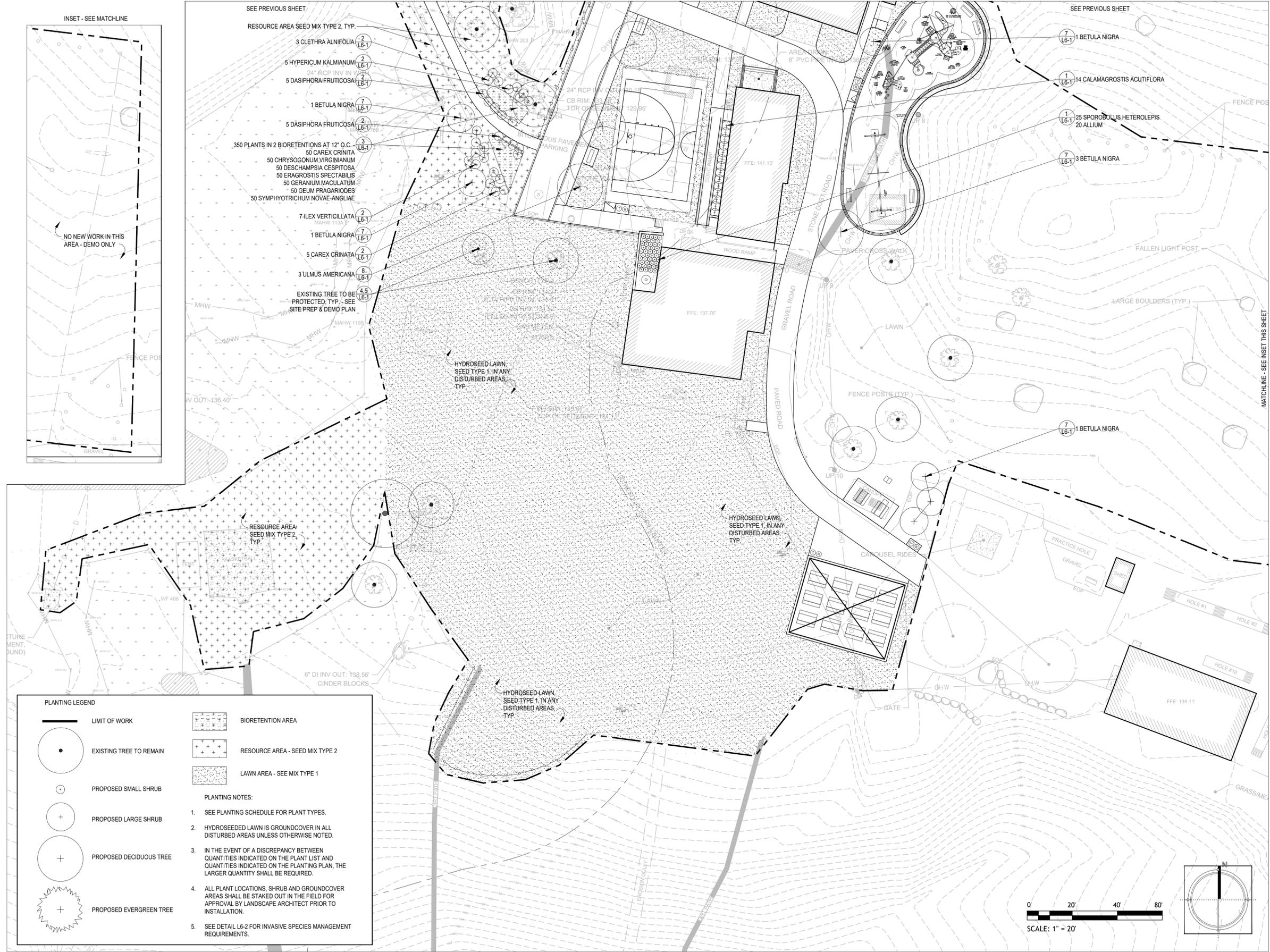
PLANTING PLAN

Project No. 180619
 Drawn By: PWH
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 Date: August 20, 2020

Drawing No. **L5-1**



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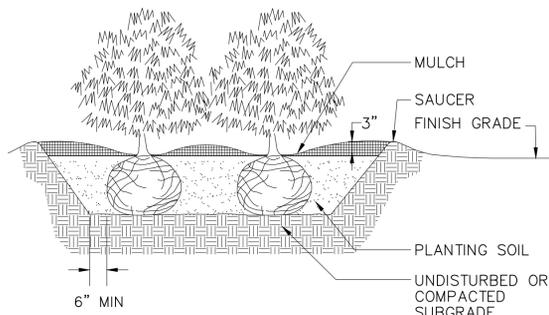
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**PROSPECT HILL PARK
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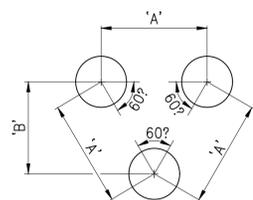
Drawing Title:
PLANTING PLAN

Project No. 180619
Drawn By: PWH
Checked By: PWH
Scale: AS NOTED
Date: August 20, 2020

Drawing No. **L5-2**

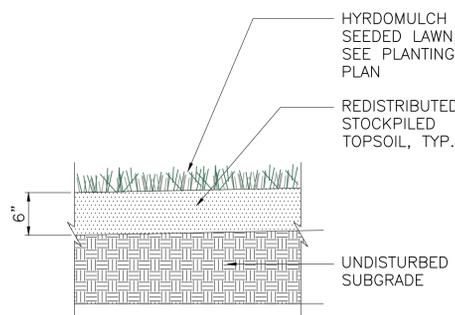


1 SHRUB PLANTING
N.T.S.

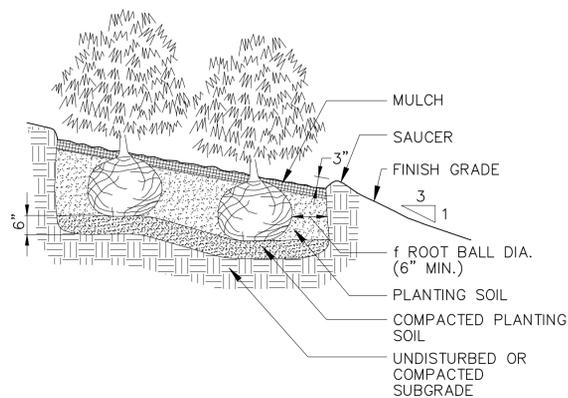


PLANT SPACING ('A')	ROW SPACING ('B')
6 IN. O.C.	5 IN. O.C.
8 IN. O.C.	7 IN. O.C.
10 IN. O.C.	8-1/2 IN. O.C.
12 IN. O.C.	10-1/2 IN. O.C.
15 IN. O.C.	13 IN. O.C.
18 IN. O.C.	16 IN. O.C.
24 IN. O.C.	21 IN. O.C.
30 IN. O.C.	26 IN. O.C.
36 IN. O.C.	30 IN. O.C.
48 IN. O.C.	42 IN. O.C.
54 IN. O.C.	48 IN. O.C.
60 IN. O.C.	54 IN. O.C.

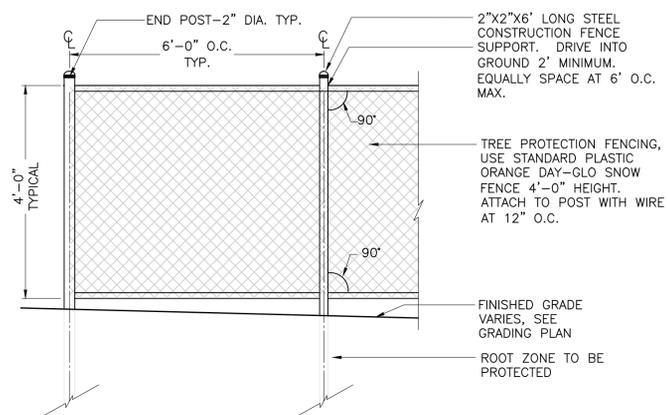
3 GROUND COVER AND SHRUB SPACING CHART
N.T.S.



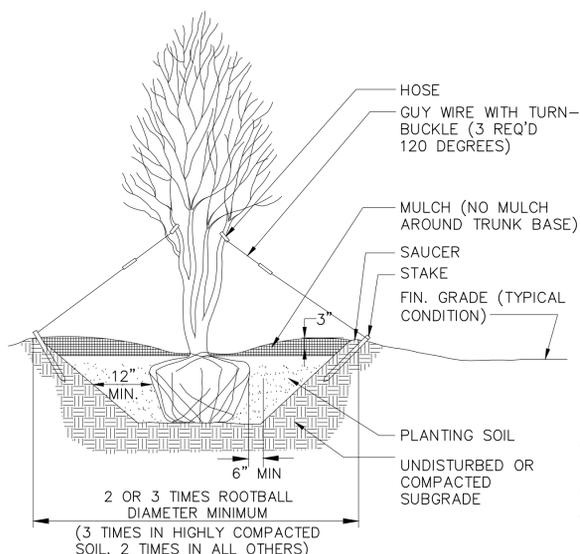
6 LOAM & SEED
SCALE 1"=1'-0"



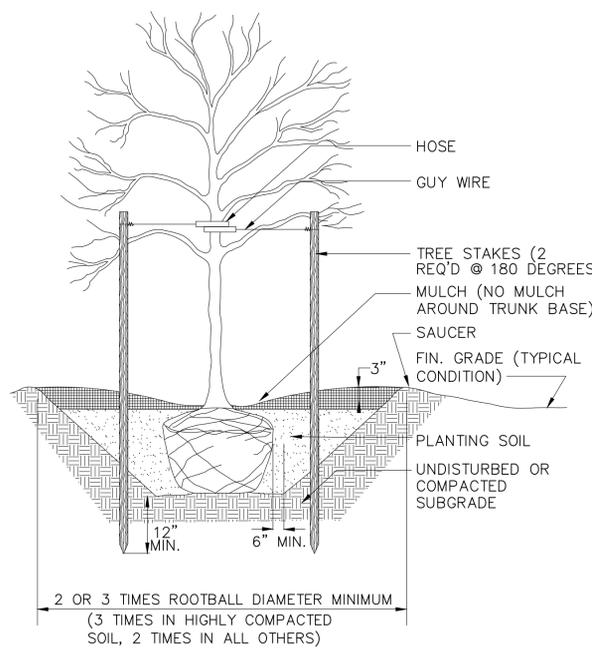
2 SHRUB PLANTING AT SLOPE
N.T.S.



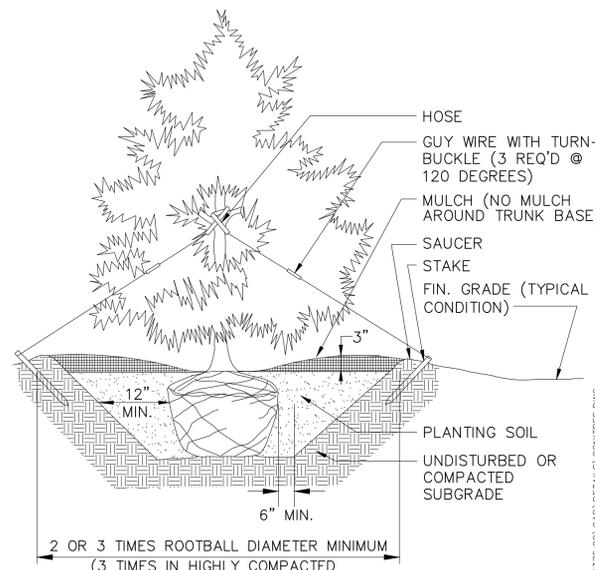
4 TREE PROTECTION FENCE
1/2"=1'-0"



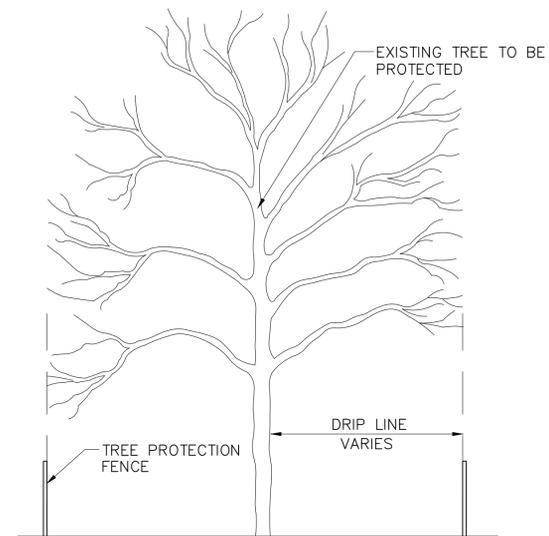
7 MULTISTEMMED TREE PLANTING
SCALE: NTS



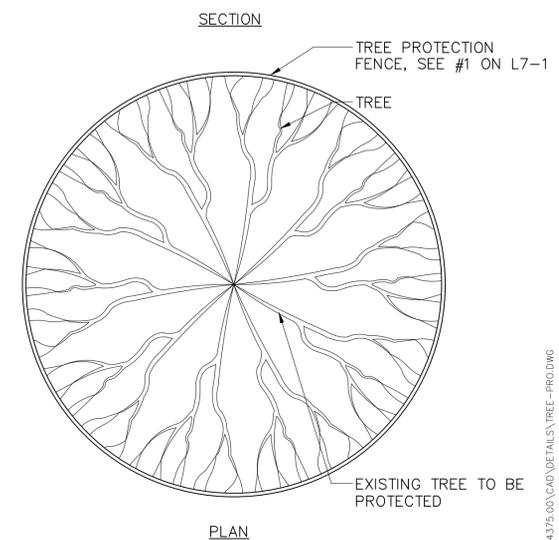
8 DECIDUOUS TREE PLANTING - STAKED (> 4" CALIPER)
N.T.S.



9 CONIFEROUS TREE PLANTING
SCALE: NTS



5 TREE PROTECTION FENCING DETAIL
SCALE: 1/4"=1'-0"



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Project Title:

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PLANTING DETAILS

Project No. 180619

Drawn By: PWH

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Scale: AS NOTED

Date: August 20, 2020

Drawing No. L6-1

INVASIVE SPECIES MANAGEMENT

INVASIVE SPECIES MANAGEMENT SHOULD BE CUSTOMIZED TO THE INDIVIDUAL SPECIES FOLLOWING THE SPECIFIC MEASURES OUTLINED BELOW. MANAGERS SHOULD READ AND UNDERSTAND THE ENCLOSED INVASIVE SPECIES CONTROL SPECIFICATION FOR THIS SITE PRIOR TO COMMENCING ANY INVASIVE SPECIES MANAGEMENT ACTIVITIES. THE USE OF HERBICIDES MUST BE APPROVED BY THE CONSERVATION COMMISSION. ALL PESTICIDE APPLICATIONS MUST BE CONDUCTED BY A MASSACHUSETTS LICENSED PESTICIDE APPLICATOR.

TREE-OF-HEAVEN (AILANTHUS ALTISSIMA)

- MATURE TREES**
- CUT MATURE TREES (AS IDENTIFIED) AT THE BASE. EMERGENCE OF ROOT SUCKERS SHOULD BE ANTICIPATED AND TREATED AS DESCRIBED BELOW AS SOON AS NEW GROWTH IS DETECTED.
 - CUTTING SHOULD BE CONDUCTED IN JUNE AND EARLY JULY (ALTERNATIVELY CUTTING CAN OCCUR IN LATE MAY OR LATE JULY/AUGUST). NOTE THAT CUTTING IN THE EARLY SPRING, FALL, OR WINTER, ESPECIALLY FOR THE FIRST TIME A TREE IS CUT, IS NOT EFFECTIVE FOR CONTROL OF THIS SPECIES.
 - WITHIN 5 MINUTES OF CUTTING, THE STUMP SHOULD BE PAINTED WITH A CONCENTRATED HERBICIDE SOLUTION TO PREVENT SPROUTS AND DISCOURAGE ROOT SUCKERS FROM EMERGING.
- SEEDLINGS/ROOT SUCKERS**
- PULL OR DIG OUT SEEDLINGS, REMOVING THE ENTIRE ROOT STRUCTURE AND ANY RESIDUAL ROOT FRAGMENTS AS MUCH AS POSSIBLE.
 - ROOT SUCKERS THAT EMERGE FROM CUT STUMPS SHOULD BE CUT FREQUENTLY (AT LEAST MONTHLY, IDEALLY WEEKLY) DURING THE GROWING SEASON TO DISCOURAGE NEW GROWTH OVER THE LONG-TERM. NEW GROWTH OF TREE-OF-HEAVEN SHOULD BE REMOVED AS SOON AS IT IS DETECTED.
 - ROOT SUCKERS MAY BE CONTROLLED BY SHADING FROM NEW PLANTINGS. INTRODUCING DENSE PLANTINGS OF NATIVE VEGETATION NEAR CUT STUMPS WILL HELP TO SHADE OUT RECURRING GROWTH OF TREE-OF-HEAVEN.
 - IF ROOT SUCKERING IS EXTENSIVE AND DETERMINED TO NOT BE CONTROLLED BY MECHANICAL MEASURES, MANAGER SHOULD CONSIDER THE USE OF HERBICIDES. ROOT SUCKERS MAY BE FOLIAR SPRAYED WITH A CONCENTRATED HERBICIDE APPLIED TO THE LEAVES AND GREEN SHOOTS OF THE NEW SPROUTS, THOROUGHLY WETTING ALL SURFACES. SPECIAL CARE SHOULD BE TAKEN TO AVOID OVER-SPRAYING AND THE POTENTIAL FOR RUNOFF AS WELL AS AVOIDING CONTACT WITH NEARBY DESIRABLE TREE SPECIES. FOLIAR SPRAYING WITH HERBICIDES MUST BE APPROVED BY THE CONSERVATION COMMISSION.

NORWAY MAPLE (ACER PLATANOIDES)

- MECHANICAL CONTROL METHODS INCLUDE HAND PULLING, MOWING OR CUTTING, OR GIRDLING, DEPENDING ON THE SIZE OF THE INDIVIDUAL.
- HAND PULLING - SEEDLINGS CAN EASILY BE HAND-PULLED IN THEIR FIRST YEAR OF GROWTH. BEYOND THAT, THE ROOT SYSTEM BECOMES TOO ELABORATE TO MAKE PULLING FEASIBLE.
 - MOWING/CUTTING - LARGE AREAS DOMINATED BY YOUNG SEEDLINGS CAN BE EASILY CONTROLLED BY MOWING. LARGER TREES AND SAPLINGS MAY BE CUT AT GROUND LEVEL WITH POWER OR MANUAL SAWS. CUT STUMPS MAY RE-SPROUT, AND THEREFORE FOLLOW UP MAINTENANCE MAY ALSO BE REQUIRED FOR SEVERAL YEARS. MATURE INDIVIDUALS IN THE VICINITY OF NATURAL AREAS SHOULD ALSO BE REMOVED TO REMOVE POTENTIAL SEED SOURCES.
 - GIRDLING - GIRDLING HAS PROVEN EFFECTIVE FOR LARGER TREES WHERE REMOVAL OF LARGE TREES IS NOT PRACTICAL. SIMILAR TO THE METHODS DESCRIBED FOR TREE-OF-HEAVEN, GIRDLING SHOULD BE CONDUCTED USING A HAND-AXE TO MAKE A CUT THROUGH THE BARK APPROXIMATELY 15 CM (6 IN) ABOVE THE GROUND, AND CUT COMPLETELY AROUND THE TRUNK. BE SURE THAT THE CUT GOES WELL INTO OR BELOW THE CAMBIAL LAYER.

CHEMICAL CONTROL ALTERNATIVES FOR NORWAY MAPLE

MATURE TREES SHOULD BE CUT AT THE BASE IN SPRING/EARLY SUMMER, AND CUT STUMPS SHOULD BE HAND-PAINTED WITH A CONCENTRATED HERBICIDE SOLUTION (GLYPHOSATE) TO PREVENT SPROUTS FROM EMERGING. SEEDLINGS AND SPROUTS SHOULD BE REMOVED VIA DIGGING OR PULLING BY HAND WHEN POSSIBLE, TAKING CARE TO REMOVE AS MUCH OF THE ROOT STRUCTURE AS POSSIBLE ALONG WITH ANY ROOT FRAGMENTS. ANY REGROWTH SHOULD BE CUT AND THEN WIPED WITH HERBICIDE IN LATE SUMMER/EARLY FALL.

JAPANESE KNOTWEED (FALLOPIA JAPONICA)

MANUAL AND MECHANICAL MANAGEMENT TECHNIQUES ARE MOST APPROPRIATE FOR SMALLER STANDS OF KNOTWEED AND YOUNG PLANTS AND FOR MANAGEMENT IN ENVIRONMENTALLY SENSITIVE AREAS. HOWEVER, DENSER, MORE TENACIOUS STANDS OF THIS SPECIES REQUIRE HERBICIDE APPLICATION. AS WITH ALL HERBICIDE APPLICATIONS, MANAGERS SHOULD FIRST CONTACT THE CONSERVATION COMMISSION PRIOR TO APPLYING HERBICIDES AT THIS SITE.

- FOLIAR SPRAYING IS AN EFFECTIVE CONTROL STRATEGY FOR LARGE POPULATIONS OF JAPANESE KNOTWEED. GLYPHOSATE (2% SOLUTION) AND TRICLOPYR (3-4% SOLUTION) ARE MOST COMMONLY USED IN FOLIAR SPRAYING. FOLIAGE SHOULD BE SPRAYED GENEROUSLY UNTIL WET WITHOUT DRIPPING. A LOW PRESSURE SPRAYER AND COARSE SPRAY PATTERN SHOULD BE USED WHEN FOLIAR SPRAYING. A "WEED GLOVE" IS RECOMMENDED AS AN OPTION FOR APPLYING THE HERBICIDE SOLUTION IN AREAS WHERE NEIGHBORING VEGETATION IS SUSCEPTIBLE TO INJURY TO AVOID HERBICIDE APPLICATION TO NON-TARGET PLANTS. FOLIAR SPRAYING SHOULD BE CONDUCTED WHEN KNOTWEED SHOOTS ARE THREE TO SIX FEET TALL DURING NON-WINDY CONDITIONS WHEN THE 2-3 DAY WEATHER FORECAST DOES NOT CALL FOR PRECIPITATION. IF LARGER PLANTS EXIST, THEY MUST BE CUT TO A HEIGHT OF APPROXIMATELY FIVE FEET PRIOR TO SPRAYING. ALL CUT PLANT PARTS MUST BE BAGGED AND SEALED AND DISPOSED OF PROPERLY TO PREVENT SPREAD AND TO REDUCE THE POTENTIAL FOR RESPROUTING FROM CUT FRAGMENTS.

ORIENTAL BITTERSWEET

MANUAL OR MECHANICAL CONTROL

- FLUSH CUT MATURE VINES USING LOPPERS, CHAINSAW OR BRUSH SAW AND GRIND STUMPS. CUTTING CAN OCCUR AT ANY TIME OF YEAR AND SHOULD BE REPEATED FREQUENTLY. ON STEMS LESS THAN 2 INCHES IN DIAMETER, USE A WEED WRENCH TO REMOVE REMAINING STEMS AND ROOTS. CHIP WOODY PLANT MATERIAL, AND BAG AND REMOVE CUT PLANT MATERIALS. DISCARD BAGGED PLANT MATERIALS AT AN ENGINEER-APPROVED FACILITY.
- SMALLER VINES SHOULD BE PULLED OR GRUBBED INCLUDING ALL ROOTS AND RUNNERS USING A "PULASKI" OR SIMILAR DIGGING TOOL. SOME REGROWTH SHOULD BE ANTICIPATED IF NOT ALL OF THE ROOT MATERIAL IS REMOVED. REGROWTH MAY ALSO OCCUR FROM GERMINATION OF SEEDS PRESENT IN THE SEED BANK. ALL PLANT PARTS, INCLUDING FRUITS, SHOULD BE BAGGED AND DISPOSED OF IN A LANDFILL TO PREVENT REESTABLISHMENT ON A GIVEN SITE.
- PULL OR DIG SEEDLINGS BY HAND, CAREFULLY REMOVING ENTIRE ROOT STRUCTURE AND ANY RESIDUAL ROOT FRAGMENTS. BAG AND REMOVE CUT PLANT MATERIALS. DISCARD BAGGED PLANT MATERIALS AT AN ENGINEER-APPROVED FACILITY.
- EMERGENCE OF ROOT SUCKERS SHOULD BE ANTICIPATED AND HAND PULLED AS SOON AS NEW GROWTH IS DETECTED. BAG AND REMOVE CUT PLANT MATERIALS. DISCARD PLANT MATERIALS AT AN ENGINEER-APPROVED FACILITY.
- MECHANICAL REMOVAL OF INVASIVE VINES WILL REQUIRE ADDITIONAL REMOVAL FOR MULTIPLE GROWING SEASONS.

CHEMICAL CONTROL ALTERNATIVES

- APPLICATION OF HERBICIDES IS NOT PERMITTED FOR MANAGEMENT OF INVASIVE PLANTS WITHOUT PRIOR CONSULTATION AND APPROVAL GRANTED BY THE CONSERVATION COMMISSION.
- IF CONSERVATION COMMISSION PERMISSION GRANTED, THE FOLLOWING METHODS OF CHEMICAL APPLICATION ARE INDICATED FOR MANAGEMENT OF PERSISTENT INVASIVE TREES PROVIDED THEY TAKE PLACE DURING THE APPROPRIATE TIMES OF YEAR AND/OR DURING APPROPRIATE WEATHER CONDITIONS.
 - "WEED GLOVE": FOR AREAS WITHIN 5 FEET OF OPEN WATER (RIVER) OR WHERE NON-TARGET SPECIES ARE IN CLOSE PROXIMITY. IN JULY/EARLY AUGUST, USING A 25% TRICLOPYR SOLUTION, SPRAY HERBICIDE DIRECTLY ONTO A HEAVY COTTON GLOVE WORN OVER A THICK RUBBER/LATEX (OR NITRILE) GLOVE UNTIL SATURATED (OR DIP GLOVES DIRECTLY INTO SOLUTION UNTIL SATURATED), AND WIPE GLOVES ALONG STEMS.
 - FOLIAR SPRAYING: EFFECTIVE CONTROL STRATEGY FOR LARGE POPULATIONS OF ORIENTAL BITTERSWEET THAT GROW AS GROUND COVER (LOW GROWING). USE TRICLOPYR (2% SOLUTION) FOR FOLIAR SPRAYING. SPRAY FOLIAGE GENEROUSLY UNTIL WET WITHOUT DRIPPING. USE A LOW PRESSURE SPRAYER AND COARSE SPRAY PATTERN WHEN FOLIAR SPRAYING AND ONLY CONDUCT SPRAYING DURING NON-WINDY CONDITIONS WHEN THE TWO-TO THREE-DAY EXTENDED WEATHER FORECAST DOES NOT CALL FOR PRECIPITATION.
 - CUT STEM: THIS APPLICATION IS PREFERRED IN ENVIRONMENTALLY SENSITIVE AREAS AND FOR TALL VINES THAT GROW UP TO THE TREE CANOPY. CUT THE STEM APPROXIMATELY 2-12 INCHES ABOVE THE GROUND (LEAVING ACCESS TO THE STEM) AND IMMEDIATELY APPLY TRICLOPYR (8 TO 25%). RESEARCH HAS DEMONSTRATED EFFECTIVE CONTROL WITH THIS METHOD WHEN AT THE TIME OF THE FIRST KILLING FROST. BAG AND REMOVE CUT PLANT MATERIALS. DISCARD BAGGED PLANT MATERIALS AT AN ENGINEER-APPROVED FACILITY.

INVASIVE SHRUB SPECIES

MULTIFLORA ROSE (ROSA MULTIFLORA); EUROPEAN BUCKTHORN (FRANGULA ALNUS); HONEYSUCKLE (IONICERA SPP.)

MANUAL OR MECHANICAL CONTROL

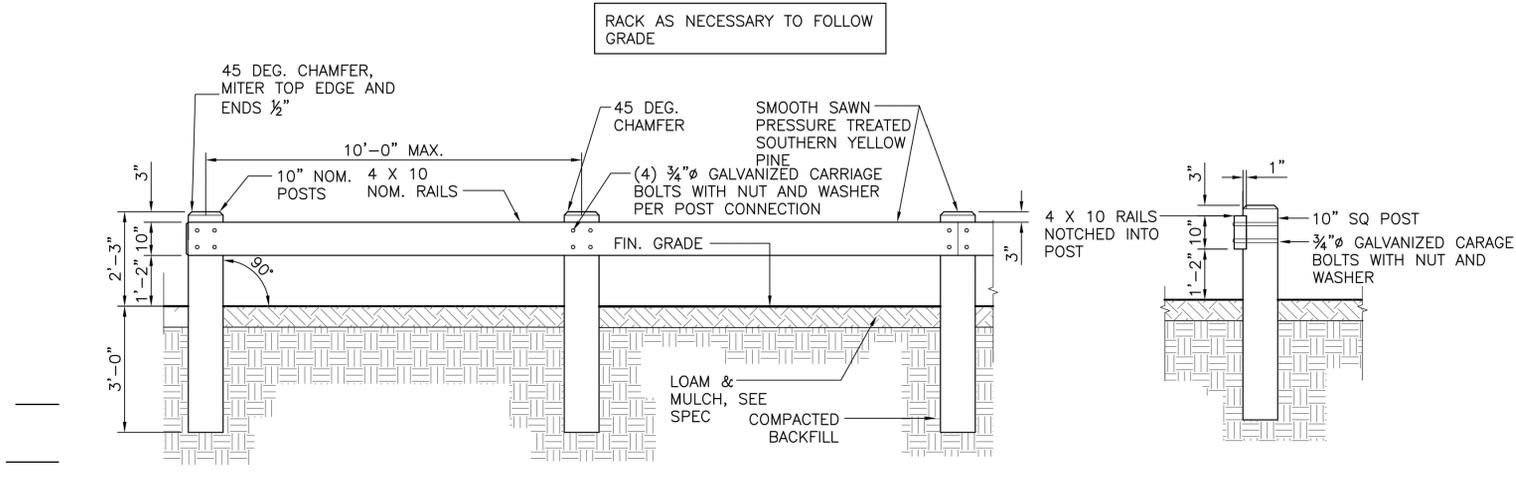
- YOUNG PLANTS MAY BE REMOVED BY HAND, BUT CAUTION MUST BE TAKEN TO ENSURE THE ENTIRE ROOT SYSTEM HAS BEEN REMOVED.
- CUT OR MOW MATURE PLANTS REPEATEDLY DURING THE CONSTRUCTION PERIOD / GROWING SEASON (3 TO 6 TIMES). STEMS MUST BE AS CLOSE TO THE GROUND LEVEL AS POSSIBLE.

INVASIVE SPECIES REMOVAL AND MONITORING SEQUENCE

THE FOLLOWING CONSTRUCTION SEQUENCE IS TO BE USED AS A GENERAL GUIDELINE. THE CONTRACTOR SHALL COORDINATE WITH THE OWNER, ENGINEERS, AND LANDSCAPE ARCHITECTS AND SUBMIT A PROPOSED CONSTRUCTION SEQUENCE FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.

- INSTALL ALL EROSION AND SEDIMENTATION CONTROL MEASURES (E.G., SILT SOCK, STRAWBALE, SILT FENCE) AS INDICATED ON THE PLANS.
- IDENTIFY AND MARK INVASIVE SPECIES TO BE REMOVED. PLANT IDENTIFICATION SHALL BE PERFORMED BY QUALIFIED PERSONNEL ONLY, AS INDICATED IN THE SPECIFICATIONS.
- REMOVE LARGE TREES AS SPECIFIED ON THE INVASIVE SPECIES REMOVAL PLAN AND GRIND ALL STUMPS.
- REMOVE AND TREAT REMAINING INVASIVE TREES, SHRUBS, AND VEGETATION AS INDICATED ON THE PLANS.
- IN 2-4 WEEKS AFTER INITIAL CUTTING AND/OR CHEMICAL TREATMENT, FOLLOW-UP REMOVAL OF OTHER INVASIVE SPECIES (E.G., REGROWTH OF TREE SPROUTS, SHRUBS, AND VEGETATION) AS INDICATED.
- PLANT THE DISTURBED SLOPE ONLY IN THE AREAS IDENTIFIED ON THE PLANTING PLAN.
- ALL PLANTINGS ARE TO BE WATERED AT LEAST TWICE WEEKLY (DEPENDENT ON RAINFALL) FOR THE FIRST GROWING SEASON. REPLACE DEAD OR DYING PLANTS AS NECESSARY.
- MONITOR AT LEAST ONCE A MONTH FOR EMERGENCE OF SEEDLING INVASIVE SPECIES, INCLUDING. REMOVE AS NECESSARY AND DISPOSE OF REMOVED MATERIALS AS INDICATED IN INVASIVE SPECIES REMOVAL NOTES.

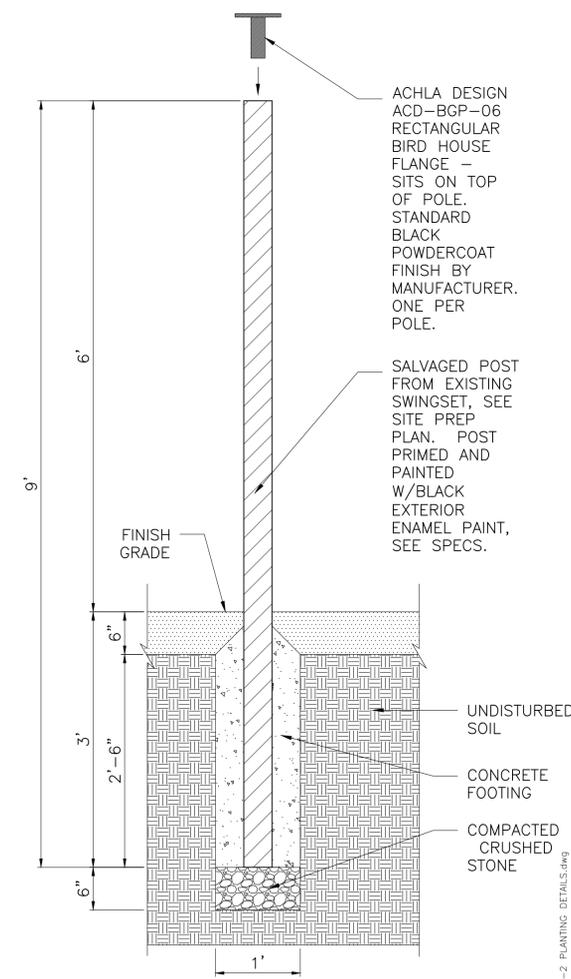
1 INVASIVE SPECIES NOTES



3 WOOD GUARDRAIL
1/2" = 1'0"

GENERAL LANDSCAPE AREAS						
Quantity	Botanical Name	Common Name	Size	Condition	Comments	
Trees						
2	<i>Acer griseum</i>	Paperbark Maple	2 - 2.5" caliper	B&B		
1	<i>Acer rubrum "October Glory"</i>	"October Glory" Red Maple	2.5 - 3" caliper	B&B		
3	<i>Amelanchier arborea</i>	Downy Serviceberry	6 - 8' tall	B&B		
15	<i>Betula nigra "Heritage"</i>	"Heritage" River Birch	6 - 8' tall	B&B	7 single leader, 8 multi-stem	
7	<i>Cercis canadensis</i>	Eastern Redbud	5 - 7' tall	B&B		
1	<i>Metasequoia glyptostroboides</i>	Dawn Redwood	6 - 8' tall	B&B		
1	<i>Platanus occidentalis</i>	American Sycamore	2.5 - 3" caliper	B&B		
2	<i>Oxydendrum arboreum</i>	Sourwood	2.5 - 3" caliper	B&B		
2	<i>Quercus bicolor</i>	Swamp White Oak	2.5 - 3" caliper	B&B		
2	<i>Syringa reticulata</i>	Japanese tree lilac	2.5 - 3" caliper	B&B		
4	<i>Taxodium distichum</i>	Common Baldcypress	3 - 3.5" caliper	B&B		
9	<i>Ulmus Americana "Princeton"</i>	Princeton' American Elm	3 - 3.5" caliper	B&B		
Shrub and Grasses						
93	<i>Allium "Summer Beauty"</i>	"Summer Beauty" Ornamental Onion	1 gallon	container		
14	<i>Calamagrostis acutiflora "Karl Foerster"</i>	"Karl Foerster" Feather Reed Grass	3 gallon	container		
3	<i>Cornus racemosa</i>	Gray Dogwood	5 gallon	container		
3	<i>Lindera benzoin</i>	Spicebush	5 gallon	container		
120	<i>Sporobolus heterolepis</i>	Prairie Dropseed	1 gallon	container		
Quantity	Botanical Name	Common Name	Size	Condition	Comments	
Shrubs						
12	<i>Carex vulpinodea</i>	Fox Sedge	1 gallon	container		
22	<i>Clethra alnifolia</i>	Sweet Pepperbush	1 gallon	container		
23	<i>Cornus sericea "Flaviramea"</i>	"Flaviramea" Yellow Twig Dogwood	1 gallon	container		
24	<i>Dasiphora fruticosa</i>	Shrubby Cinquefoil	1 gallon	container		
28	<i>Hypericum kalmianum "Blues Festival"</i>	"Blues Festival" Kalm St. John's Wort	1 gallon	container		
16	<i>Ilex verticillata "Red Sprite"</i>	"Red Sprite" Winterberry Holly	1 gallon	container	3 male, 13 female	
30	<i>Ilex glabra "Shamrock"</i>	Shamrock' Inkberry Holly	1 gallon	container		
10	<i>Rosa palustris</i>	Swamp Rose	1 gallon	container		
18	<i>Rudbeckia fulgida "Goldsturm"</i>	"Goldsturm" Black Eyed Susan	1 gallon	container		
Perennials, Grasses and Ground Covers						
372	<i>Carex crinita</i>	Fringed Sedge	plugs	plugs	12" o.c. - disperse in bio area	
372	<i>Chrysogonum virginianum</i>	Green and Gold	plugs	plugs	12" o.c. - disperse in bio area	
372	<i>Deschampsia cespitosa</i>	Hairgrass	plugs	plugs	12" o.c. - disperse in bio area	
372	<i>Eragrostis spectabilis</i>	Purple Lovegrass	plugs	plugs	12" o.c. - disperse in bio area	
372	<i>Geranium maculatum</i>	Wild Geranium	plugs	plugs	12" o.c. - disperse in bio area	
372	<i>Geum fragarioides</i>	Appalachian Barren Strawberry	plugs	plugs	12" o.c. - disperse in bio area	
37	<i>Iris versicolor</i>	Blue Flag	1 gallon	#1 container	#1 pot	
372	<i>Symphotrichum novae-angliae</i>	New England Aster	plugs	plugs	12" o.c. - disperse in bio area	
Quantity	Botanical Name	Common Name	Size	Condition	Comments	
see plans	see specs	Lawn Seed Mix 1			hydroseed	
see plans	see specs	Resource Area Seed Mix 2			hydroseed	

2 PLANT SCHEDULE



4 BIRDHOUSE POLE
SCALE: N.T.S.

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No.	Description	Date
1	ISSUED FOR BID	8-20-2020

DWG ISSUE & REVISION HISTORY

Stamp

ISSUED FOR BID

Project Title:

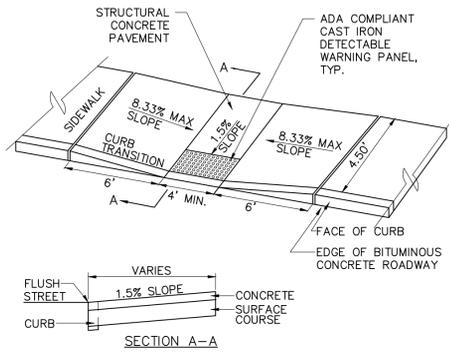
**PROSPECT HILL PARK
WALTHAM, MA**

Drawing Title:

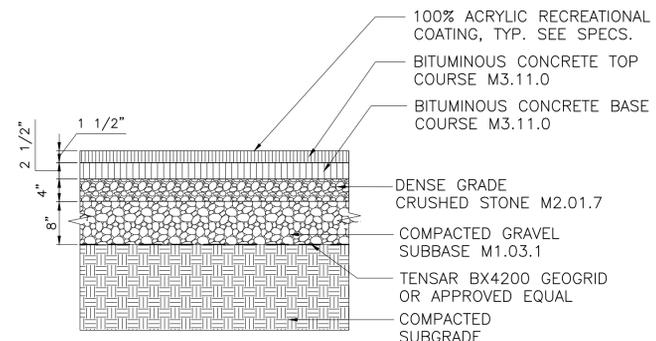
**PLANTING AND GUARDRAIL
DETAILS**

Project No. 180619
Drawn By: PWH
Checked By: PWH
Scale: AS NOTED
Date: August 20, 2020

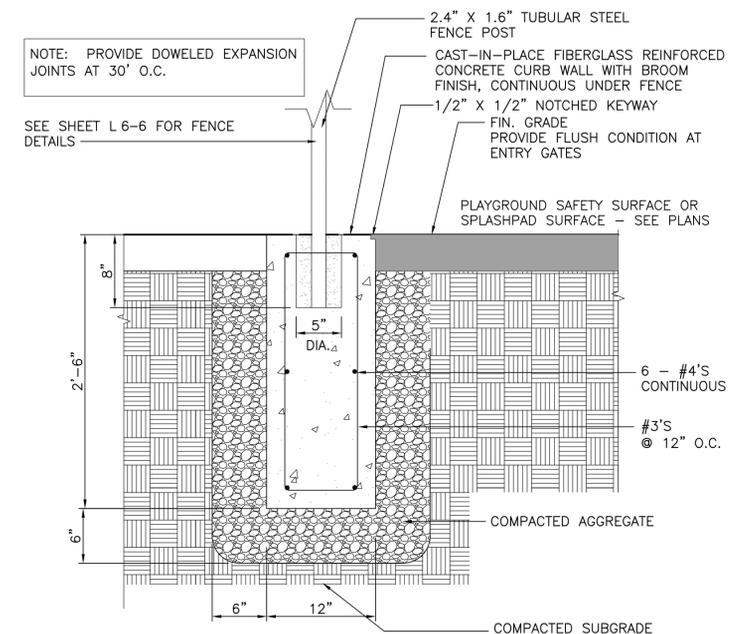
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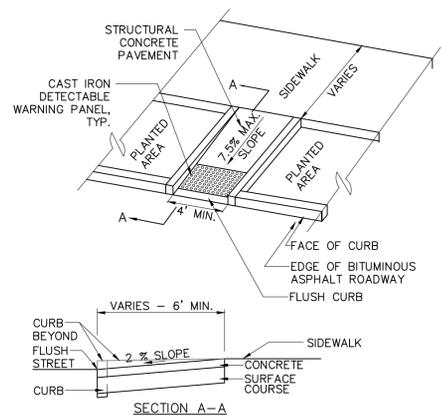
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SCALE: N.T.S.



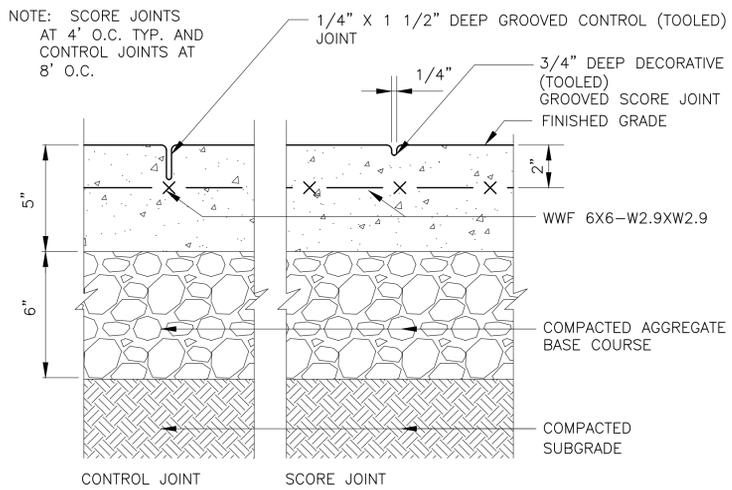
2 BITUMINOUS CONCRETE COURT PAVING
SCALE: NTS



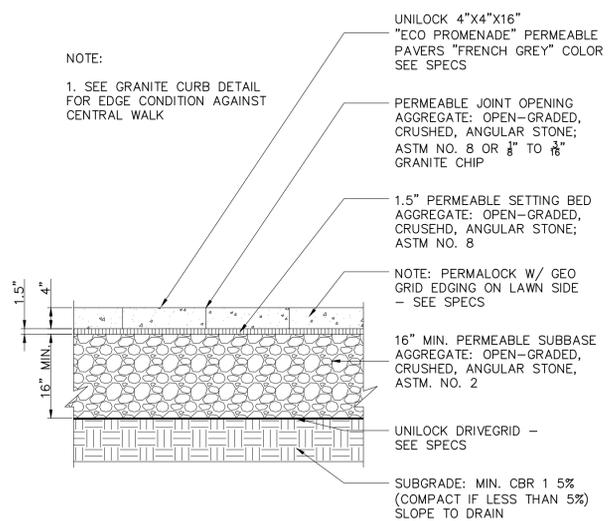
3 CAST IN PLACE CURB AT WELDED WIRE FENCE DETAIL
SCALE: N.T.S.



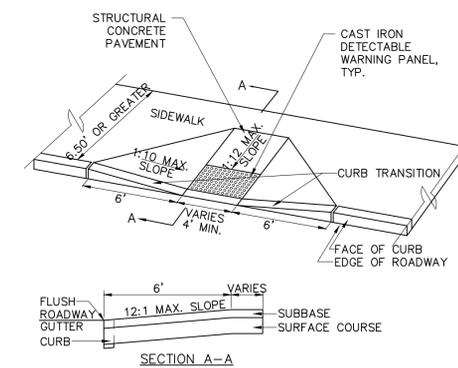
4 ACCESS RAMP TYPE 2
SCALE: N.T.S.



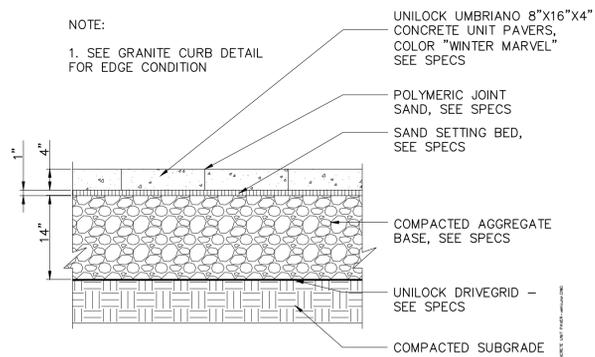
5 CAST IN PLACE CONCRETE PAVING
SCALE: 3"=1'-0"



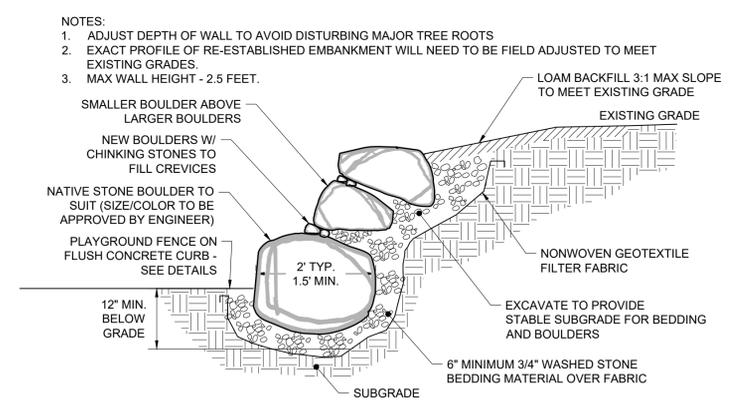
6 PERMEABLE CONCRETE UNIT PAVING
NTS



7 ACCESS RAMP TYPE 3
SCALE: N.T.S.



8 CONCRETE UNIT PAVING - VEHICULAR AREA
NTS



9 STONE BOULDER RETAINING WALL AT PLAYGROUND
SCALE: N.T.S.

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DWG ISSUE & REVISION HISTORY

Stamp

ISSUED FOR BID

Project Title:
**PROSPECT HILL PARK
WALTHAM, MA**

Drawing Title:
SITE DETAILS

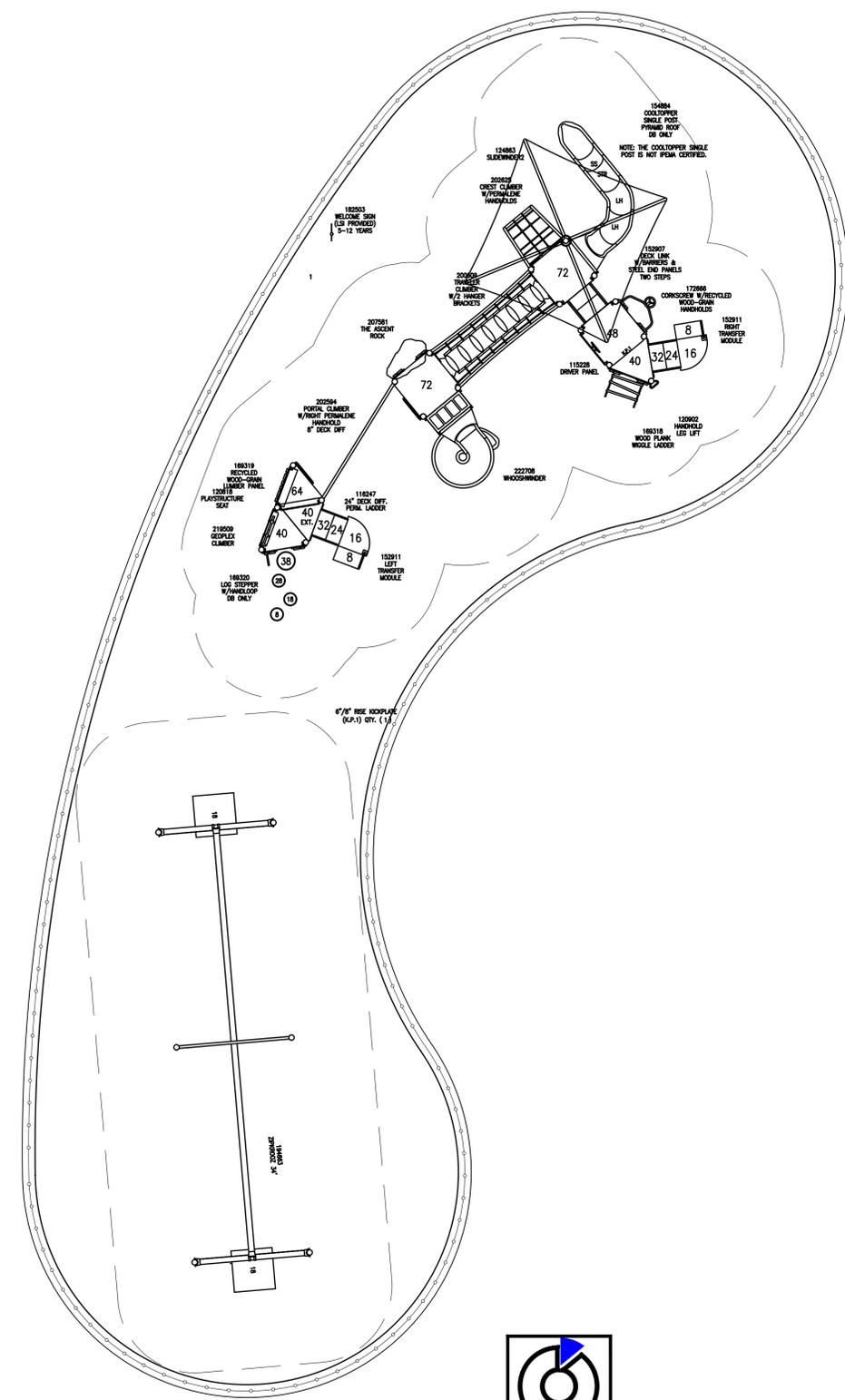
Project No. 180619
Drawn By: PWH
Checked By: PWH
Scale: AS NOTED
Date: August 20, 2020

Drawing No. **L6-3**

NOTE:

SEE SPECIFICATIONS FOR SPECIFIC INSTALLATION DETAILS. OWNER TO PURCHASE AND SUPPLY PLAYGROUND EQUIPMENT. CONTRACTOR TO INSTALL PLAYGROUND EQUIPMENT.

TOTAL ELEVATED PLAY COMPONENTS	REQUIRED
TOTAL ELEVATED COMPONENTS ACCESSIBLE BY RAMP	REQUIRED
TOTAL ELEVATED COMPONENTS ACCESSIBLE BY TRANSFER	REQUIRED
TOTAL ACCESSIBLE GROUND LEVEL COMPONENTS SHOWN	REQUIRED
TOTAL DIFFERENT TYPES OF GROUND LEVEL COMPONENTS	REQUIRED



The play components identified on this plan are IPEMA certified. (Unless model number is preceded with *) The use and layout of these components conform to the requirements of ASTM F1487. To verify product certification, visit www.ipema.org

THIS PLAY AREA & PLAY EQUIPMENT IS DESIGNED FOR AGES UNLESS OTHERWISE NOTED ON PLAN.

IT IS THE MANUFACTURERS OPINION THAT THIS PLAY AREA DOES CONFORM TO THE A.D.A. ACCESSIBILITY STANDARDS, ASSUMING AN ACCESSIBLE PROTECTIVE SURFACING IS PROVIDED, AS INDICATED, OR WITHIN THE ENTIRE USE ZONE.

THIS CONCEPTUAL PLAN WAS BASED ON INFORMATION AVAILABLE TO US. PRIOR TO CONSTRUCTION, DETAILED SITE INFORMATION INCLUDING SITE DIMENSIONS, TOPOGRAPHY, EXISTING UTILITIES, SOIL CONDITIONS, AND DRAINAGE SOLUTIONS SHOULD BE OBTAINED, EVALUATED, & UTILIZED IN THE FINAL DESIGN. PLEASE VERIFY ALL DIMENSIONS OF PLAY AREA, SIZE, ORIENTATION, AND LOCATION OF ALL EXISTING UTILITIES, EQUIPMENT, AND SITE FURNISHINGS PRIOR TO ORDERING. SLIDES SHOULD NOT FACE THE HOT AFTERNOON SUN.

CHOOSE A PROTECTIVE SURFACING MATERIAL THAT HAS A CRITICAL HEIGHT VALUE TO MEET THE MAXIMUM FALL HEIGHT FOR THE EQUIPMENT (REF. ASTM F1487 STANDARD CONSUMER SAFETY PERFORMANCE SPECIFICATION FOR PLAYGROUND EQUIPMENT FOR PUBLIC USE, SECTION 8 CURRENT REVISION). THE SUBSURFACE MUST BE WELL DRAINED. IF THE SOIL DOES NOT DRAIN NATURALLY IT MUST BE TILED OR SLOPED 1/8" TO 1/4" PER FOOT TO A STORM SEWER OR A "FRENCH DRAIN".

IT IS THE MANUFACTURER'S OPINION AND INTENT THAT THE LAYOUT OF THESE COMPONENTS CONFORM WITH THE U.S. CONSUMER PRODUCT SAFETY COMMISSION'S (CPSC) "HANDBOOK FOR PUBLIC PLAYGROUND SAFETY".

DESIGNED BY:

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LANDSCAPE STRUCTURES, INC.
601 7th STREET SOUTH - P.O. BOX 198
DELANO, MINNESOTA 55328
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Date	Previous Drawing #	Initials

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No.	Description	Date
1	ISSUED FOR BID	8-20-2020

DWG ISSUE & REVISION HISTORY

Stamp

ISSUED FOR BID

Project Title:
**PROSPECT HILL PARK
WALTHAM, MA**

Drawing Title:
PLAYGROUND PLAN

Project No. 180619
Drawn By: PWH
Checked By: PWH
Scale: AS NOTED
Date: August 20, 2020

Drawing No. **L6-4**



1	ISSUED FOR BID	8-20-2020
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No.	Description	Date
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DWG ISSUE & REVISION HISTORY

Stamp



ISSUED FOR BID

Project Title:

PROSPECT HILL PARK
WALTHAM, MA

Drawing Title:

SPLASH PAD LAYOUT

Project No. 180619

Drawn By: PWH

Checked By: PWH

Scale: AS NOTED

Date: August 20, 2020

Drawing No. L6-5

SPLASHPAD DIMENSION

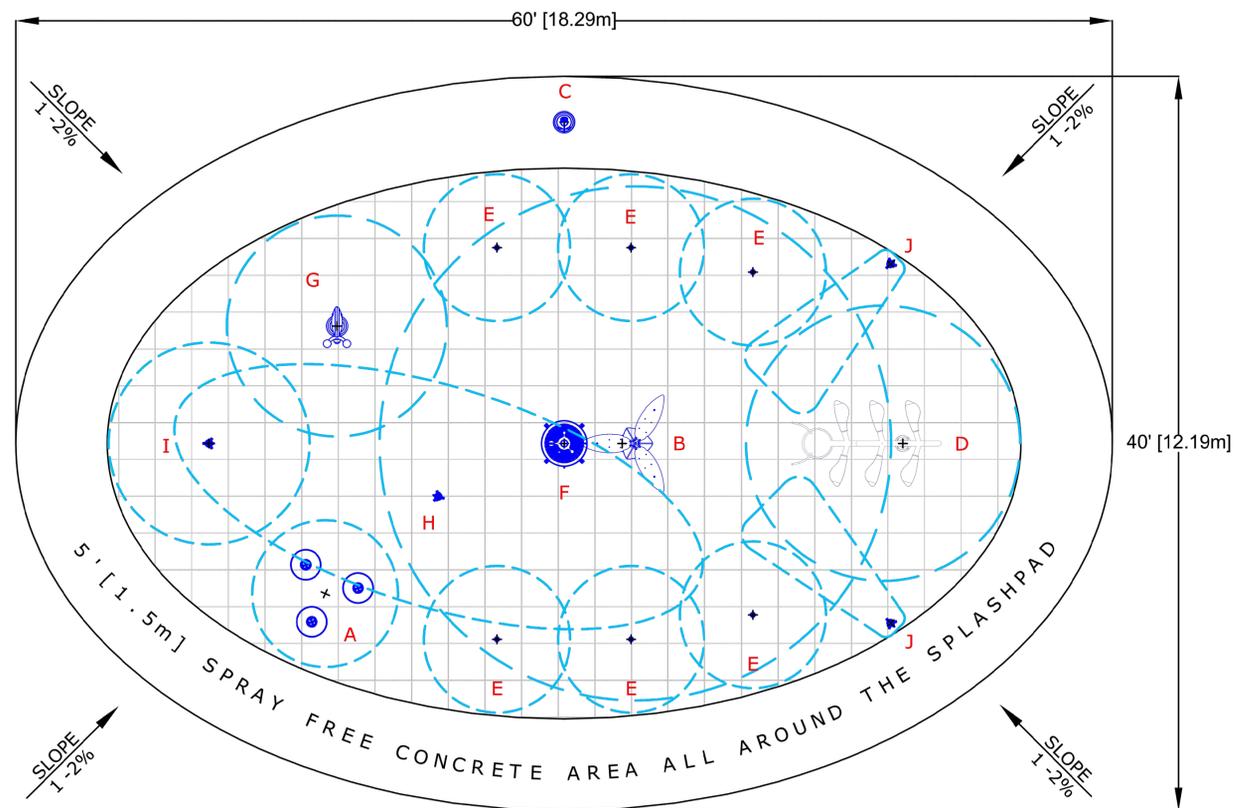
TOTAL AREA : 1884 ft² 175m²
 SPRAY AREA : 1177 ft² 109m²
 GRID SIZE : 2 x 2ft 0.6 x 0.6m

PRODUCT LEGEND

REF	PRODUCT	QTY	GPM	LPM
A	Aqualien Rain Forest N°7 VOR 7000	1	6	22.7
B	Bloom N°1 VOR 7486	1	8.5	32.2
C	Bollard Activator N°3 VOR 0611	1	0	0
D	Gardenbug VOR 7785	1	9	34.1
E	Geyser* VOR 0301	6	27	102.2
F	Playsafe Drain N°1 VOR-1001.4000	1	0	0
G	Snail N°4 VOR 7217	1	6.5	24.6
H	Sparkle N°1* VOR 0324	1	2.5	9.5
I	Spidey Spray N°2 VOR 7674	1	8.5	32.2
J	Split Stream VOR 7516	2	15	56.8
TOTAL		QTY	GPM	LPM
		16	83	314.3

NOTE:

SEE DETAILS FOR SPECIFIC INSTALLATION INSTRUCTIONS. OWNER TO PURCHASE AND SUPPLY SPLASHPAD EQUIPMENT. CONTRACTOR TO INSTALL SPLASHPAD EQUIPMENT.



Prospect Hill Park Splashpad, MA

34674 - Version B - *Low Flow

April 14, 2020



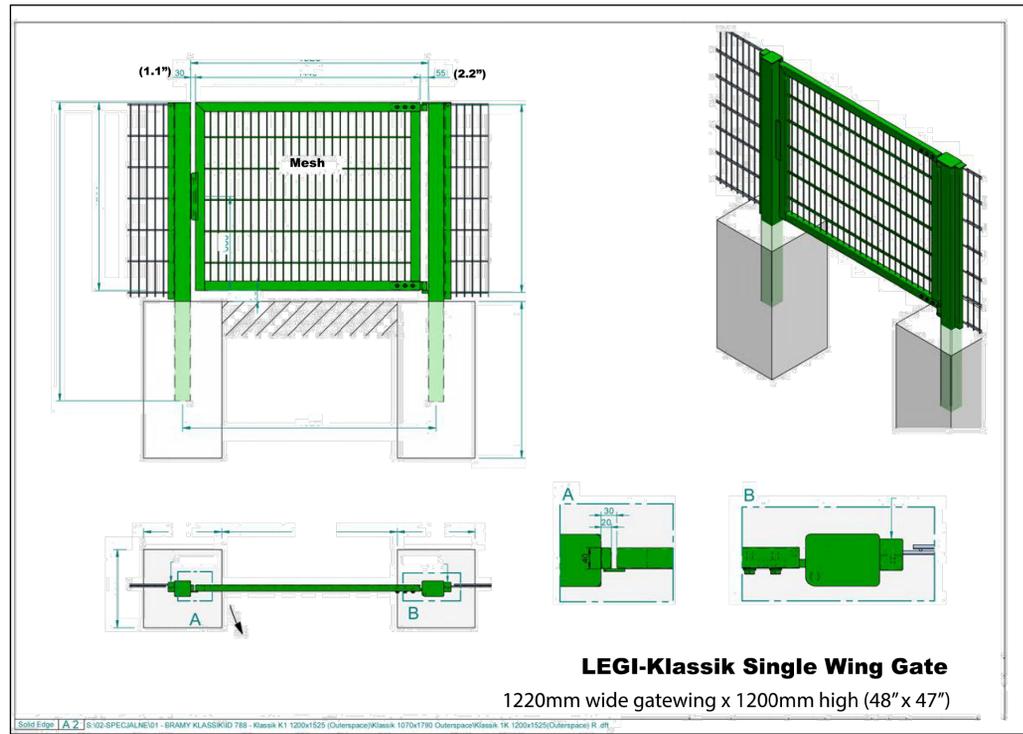
SPLASHPAD LAYOUT DRAWING

SCALE :1/8":1'

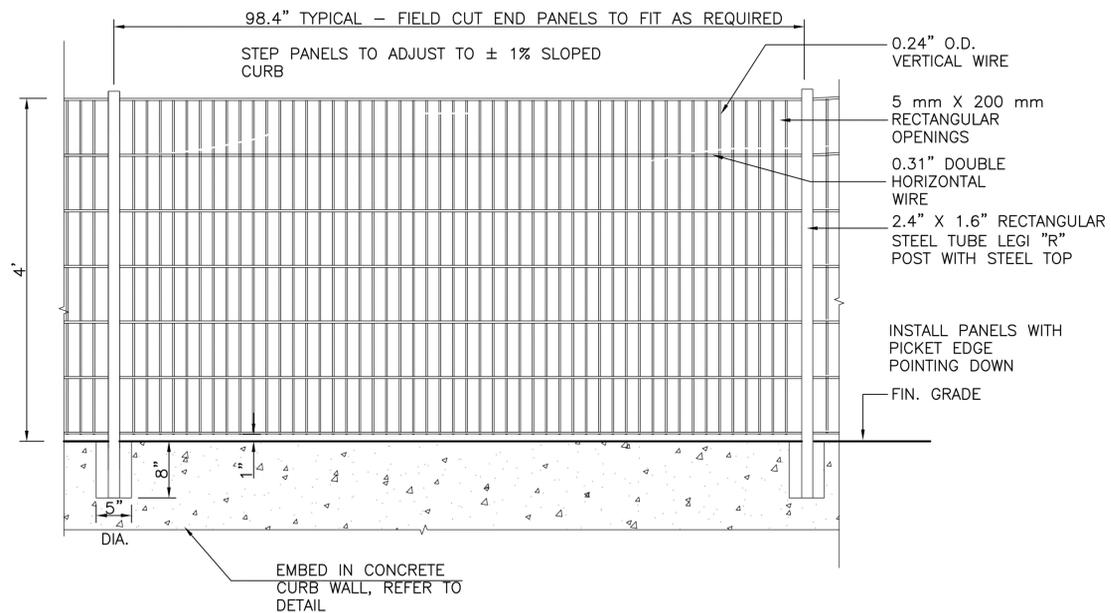


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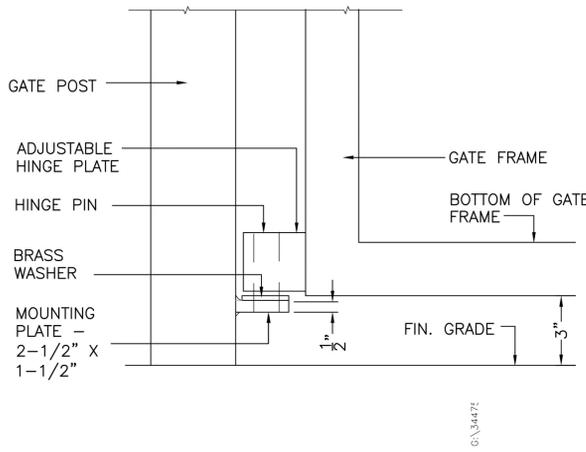
11" X 17" sheet size



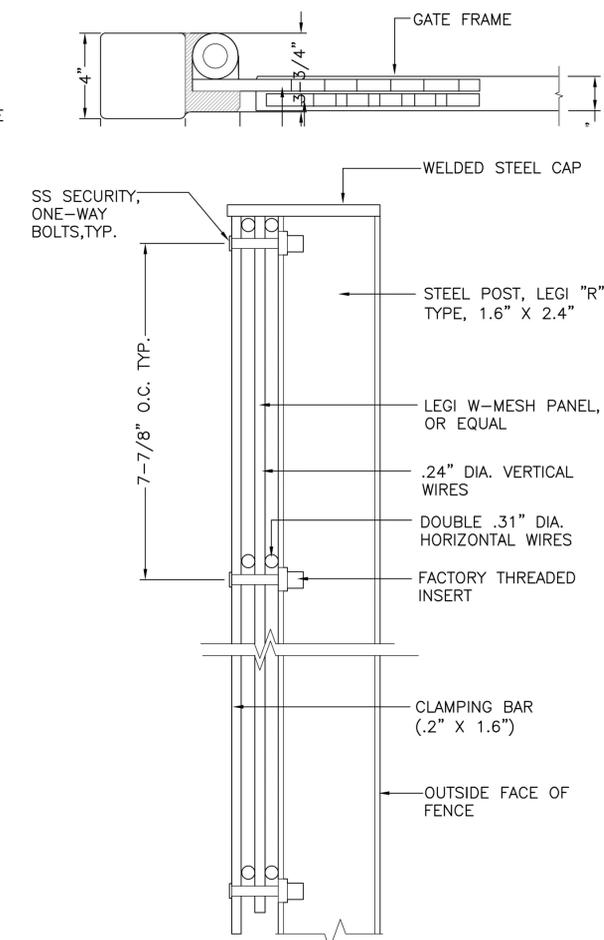
1 WELDED WIRE FENCE - 4' SINGLE SWING KLASSEK GATE DETAIL
SCALE 1"=1'-0"



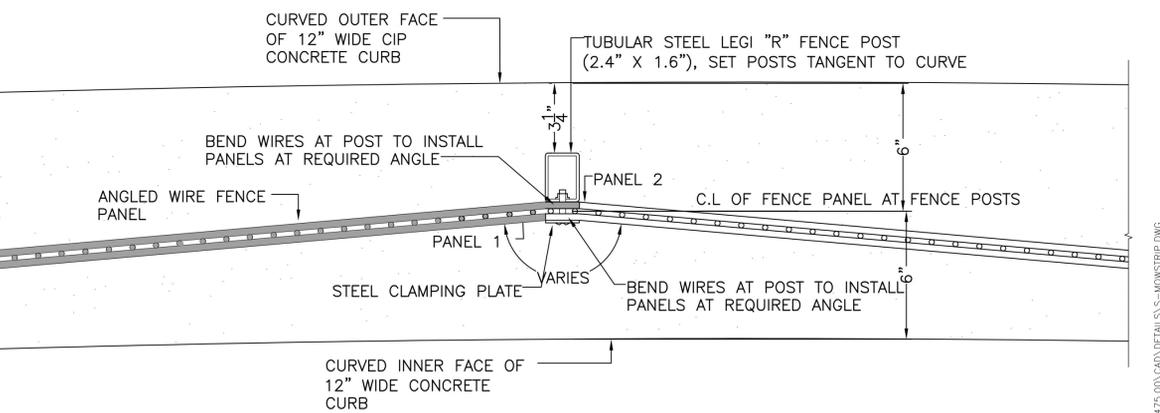
2 WELDED WIRE FENCE - GATE FRAME
SCALE N.T.S.



3 WELDED WIRE FENCE - CORNER POST
SCALE 1"=1'-0"



4 WELDED WIRE FENCE - POST DETAIL
SCALE 1"=1'-0"



5 WELDED WIRE FENCE - PANEL DETAIL
SCALE 1"=1'-0"

6 WELDED WIRE FENCE - ATTACHMENT
SCALE 1"=1'-0"

NOTE: ALL WELDED WIRE FENCE TO BE "LEGI" BRAND OR APPROVED EQUAL - SEE SPECIFICATIONS.

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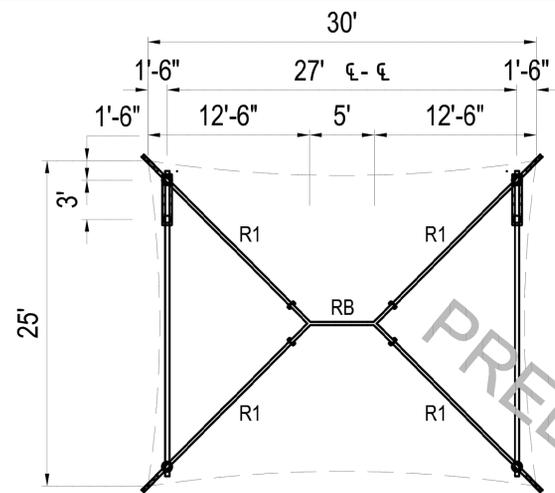
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Project Title:
**PROSPECT HILL PARK
WALTHAM, MA**

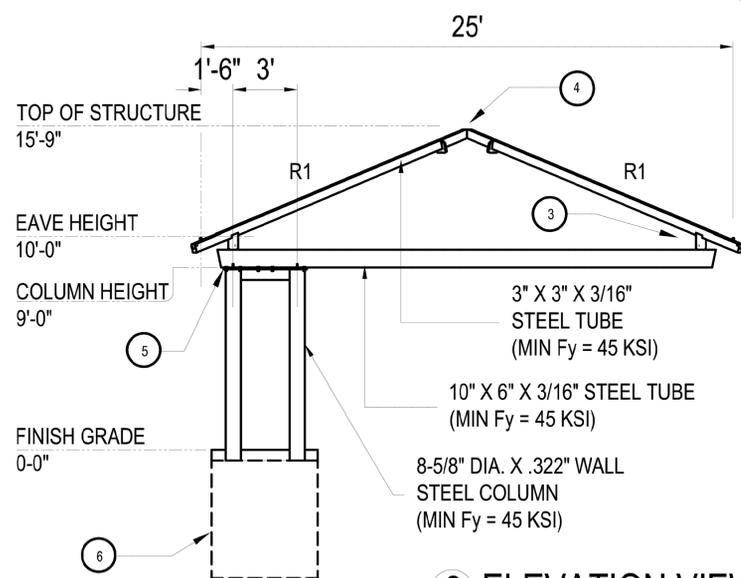
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**WELDED WIRE FENCE
DETAILS**

Project No. 180619
Drawn By: PWH
Checked By: PWH
Scale: AS NOTED
Date: August 20, 2020

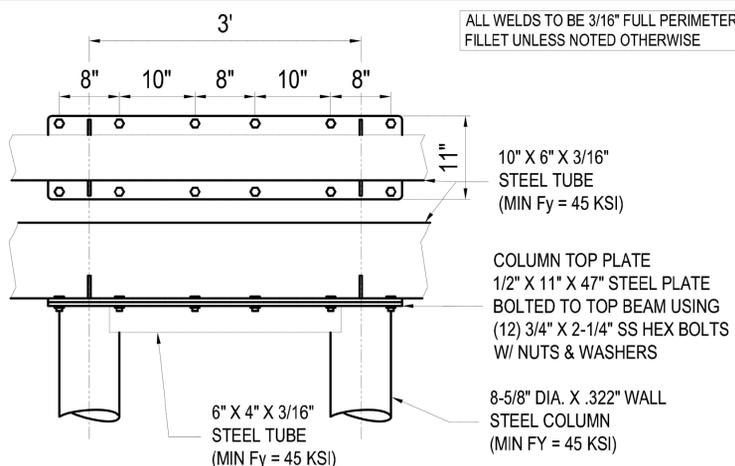
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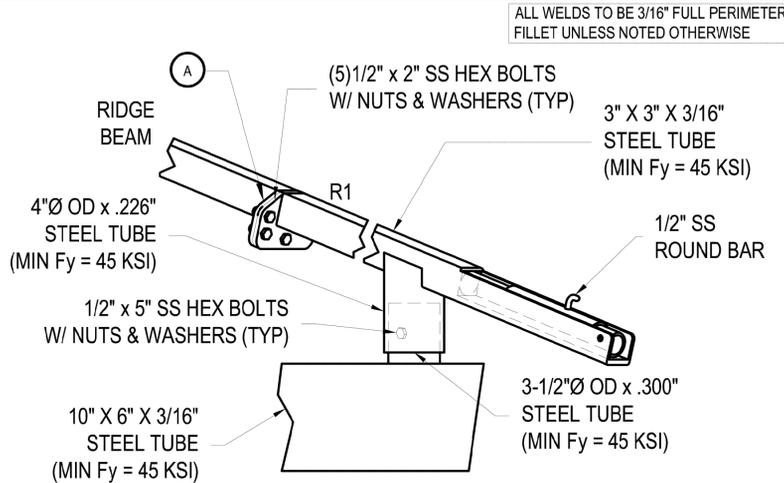
1 PLAN VIEW
1/4" STAINLESS STEEL CABLE AROUND PERIMETER OF STRUCTURE



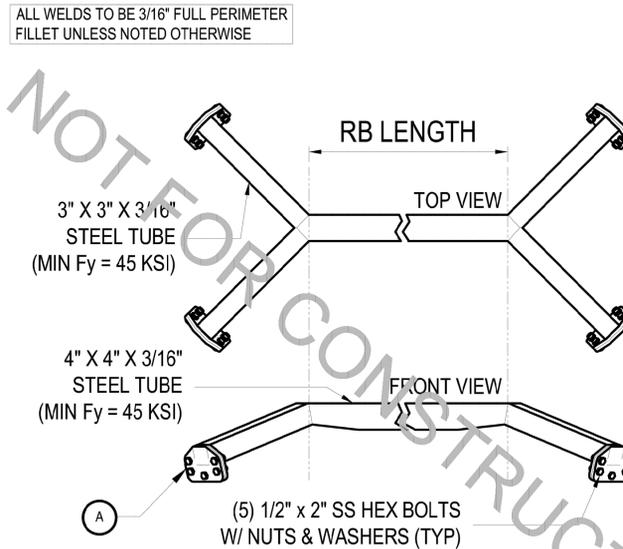
2 ELEVATION VIEW



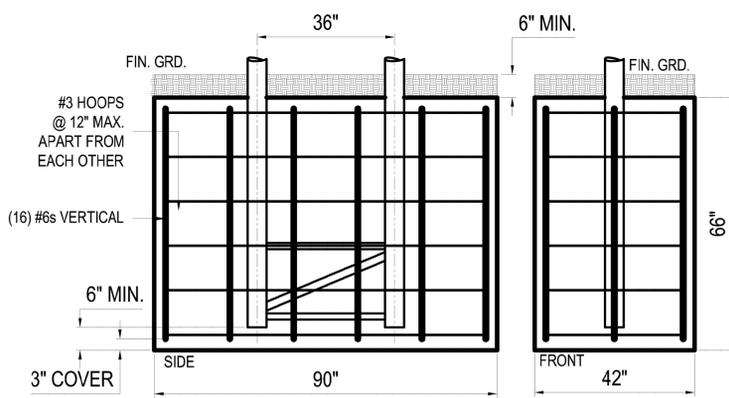
5 BEAM-COLUMN CONNECTION DETAIL



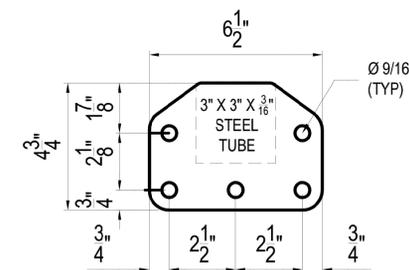
3 RAFTER-BEAM DETAIL
ALL CONNECTION COMPONENTS ARE FACTORY WELDED



4 RIDGE BEAM DETAIL



6 FOOTING DETAIL
NOTE: GROUT, HOOPS, REBARS & ANCHOR BOLTS NOT SUPPLIED BY FACTORY



A CONNECTION PLATE

ALL WELDS TO BE 3/16" FULL PERIMETER FILLET UNLESS NOTED OTHERWISE

GENERAL NOTES

1- THE SHADE SYSTEMS, INC.™ STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH THE 2015 IBC CODES ALONG WITH ANY ADOPTED STATE BUILDING CODES AND ASCE 7 TO THE FOLLOWING DESIGN CRITERIA:

CATEGORY	STRUCTURE WITH FABRIC CANOPY REMOVED
EXPOSURE	C
BASIC WIND SPEED	165 MPH

2- THE FOUNDATION ASSUMES A MINIMUM SOIL BEARING CAPACITY OF 1700 PSF.

3- ALL FASTENERS SHALL BE STAINLESS STEEL.

4- THE FABRIC SYSTEM IS DESIGNED TO WITHSTAND WINDS UP TO 105 MPH WITH THE FABRIC ATTACHED. HOWEVER THE FABRIC MAY NOT WITHSTAND WINDS IN EXCESS OF 90 MPH AND THEREFORE RELEASE.

STEEL:

1- STEEL PIPES SHALL HAVE A MINIMUM YIELD STRENGTH OF 45 KSI. STEEL PLATES SHALL CONFORM TO ASTM A583.

2- ALL PARTS SHALL BE FACTORY-WELDED TO AMERICAN WELDING SOCIETY (AWS) SPECIFICATIONS AND SHALL UTILIZE E70-S6 AND HAVE THE HIGHEST STANDARDS OF QUALITY WORKMANSHIP.

3- ALL WELDS SHALL BE FILLET WELDS WITH MAXIMUM PERMISSIBLE THROAT THICKNESS OR FULL PENETRATION GROOVE WELDS.

CONCRETE:

1- ALL CONCRETE SHALL BE MIXED AND PLACED IN ACCORDANCE WITH THE LATEST EDITION OF ACI 301 AND 318.

2- CONCRETE SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH (f_c) OF 3000 PSI. A CONCRETE MIX HAVING A LISTED STRENGTH OF AT LEAST 3000 PSI THAT IS MIXED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS IS ACCEPTABLE FOR USE.

3- REINFORCING STEEL SHALL BE ASTM A-615 GRADE 60 WITH A MINIMUM YIELD STRENGTH (f_y) OF 60 KSI.

4- UNLESS OTHERWISE SHOWN, CONCRETE COVER SHALL BE 3" (MIN).

FABRIC:

1- KNITTED HDPE FABRIC HAS A SIEVE FACTOR OF 64%.

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NOTE TO OWNER:
OWNER ACCEPTS FULL RESPONSIBILITY FOR REMOVING THE FABRIC SHADE MATERIAL FROM THE STEEL FRAME WHEN SEVERE WEATHER CONDITIONS ARE PREDICTED. SUCH CONDITIONS INCLUDE PREDICTED WIND SPEEDS IN EXCESS OF 90 MPH. ALSO, AS STRUCTURE IS NOT DESIGNED FOR ANY SNOW LOAD, IT IS RECOMMENDED THAT CANOPY BE REMOVED WHEN SNOWFALL IS EXPECTED.

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NOTE: DRAWING IS PRELIMINARY ONLY FOR FOOTING DESIGN. CONTRACTOR TO COORDINATE WITH MANUFACTURER AND SUBMIT FINAL SHOP DRAWINGS FOR REVIEW AND APPROVAL BY LANDSCAPE ARCHITECT - SEE SPECS.

1	ISSUED FOR BID	8-20-2020
No.	Description	Date

DWG ISSUE & REVISION HISTORY

Stamp



ISSUED FOR BID

Approved:

Model Name:
SINGLE CANTILEVER
SHADE SYSTEM STRUCTURE
Model No.:
SC253010

Revisions	
REP:	

REP QTE. NO.
00000000

Approved: JRB	Job:
Checked: MG	
Drawn: NB	
Date: 07/08/2019	Sheets: 1 OF 1
NOT TO SCALE	

Project Title:

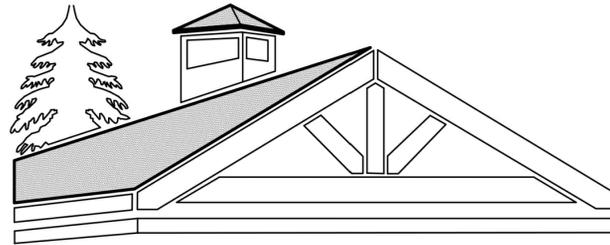
PROSPECT HILL PARK
WALTHAM, MA

Drawing Title:

SHADE STRUCTURE
DETAILS

Project No. 180619
Drawn By: PWH
Checked By: PWH
Scale: AS NOTED
Date: August 20, 2020

Drawing No. L6-7



CFP

CEDAR FOREST PRODUCTS

STRUCTURAL NOTES

STANDARDS

- 2015 INTERNATIONAL BUILDING CODE
- ASCE/SEI 7 MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES
- ANSI/AWC NDS-2012 NATIONAL DESIGN SPECIFICATION FOR WOOD CONSTRUCTION
- ACI 318 BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE
- AISC 360 SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS

BUILDING PROPERTIES

- OCCUPANCY GROUP DESIGNATION = U
- CONSTRUCTION TYPE = VB

DESIGN LOADS

- GROUND SNOW = 40
- ROOF SNOW LOAD (UNHEATED) = 33.6
- ROOF LIVE LOAD = 20 PSF
- WIND LOAD BASED ON WIND VELOCITY OF V = 130 MPH
- RISK CATEGORY II, EXPOSURE C
- SEISMIC IMPORTANCE FACTOR I = 1
- S_s = 0.211
- S₁ = 0.069
- S_{0.5} = 0.225
- S_{0.1} = 0.110
- SITE CLASS = D
- DESIGN CATEGORY = B

STRUCTURAL STEEL

ALL STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST EDITION OF THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) "SPECIFICATIONS FOR THE DESIGN FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS"

STRUCTURAL STEEL TO CONFORM TO:

- STRUCTURAL STEEL PLATE = A-36
- HOLLOW STRUCTURAL SECTIONS = A500 GRADE C
- WIDE FLANGE SECTION = A992 GRADE 50
- CHANNEL SECTIONS = A36
- THESE MATERIAL SPECIFICATIONS SHALL BE USED UNLESS NOTED OTHERWISE.

WELDING

- ALL WELDING TO BE IN ACCORDANCE WITH THE LATEST EDITION OF THE AMERICAN WELDING SOCIETY (AWS) "STRUCTURAL WELDING CODE - STEEL" D1.1 AND AS INDICATED ON THE STRUCTURAL DRAWINGS.
- WELDING ELECTRODES, WELDING PROCESS, MINIMUM PREHEAT AND INTERPASS TEMPERATURES TO BE IN ACCORDANCE WITH THE AWS SPECIFICATIONS. ELECTRODES TO BE MIN 70KSI MATERIAL.

CONCRETE

- ALL CONCRETE SHOULD HAVE STONE AGGREGATE (NORMAL WEIGHT). 28-DAY COMPRESSIVE STRENGTH (F_c) SHOULD BE 3000PSI MINIMUM FOR CAST-IN-PLACE CONCRETE.
- MAX AGGREGATE DIAMETER OF $\phi\frac{3}{4}$ "
- REINFORCING BARS SHOULD BE MILD STEEL WITH A MINIMUM YIELD STRENGTH OF 60 KSI.
- REINFORCING BAR PROTECTION:
 - CONCRETE PLACED AGAINST EARTH - 3"
 - CONCRETE PLACED IN FORMS - $1\frac{1}{2}$ "
- FIELD WELDING OF REINFORCING SHOULD NOT BE PERMITTED.
- ALL REINFORCING BAR BENDS SHOULD BE MADE MECHANICALLY HEAT-BENDING SHOULD NOT BE PERMITTED.
- NON-SHRINK GROUT = 5000 PSI
- ANCHOR BOLTS SHALL CONFORM TO THE REQUIREMENTS OF F1554 GRADE 36

FOUNDATIONS

- FOUNDATIONS DESIGNED BASED ON PRESUMPTIVE LOAD-BEARING VALUES GIVEN IN TABLE 1806.2 OF THE INTERNATIONAL BUILDING CODE.
 - 1500 PSF VERTICAL FOUNDATION PRESSURE

NOTES:

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- PAVILION MANUFACTURER TO BE CEDAR FOREST PRODUCTS OR APPROVED EQUAL.
- CONTRACTOR TO REVIEW PURCHASE ORDER AND SPECS WITH OWNER PRIOR TO PURCHASE AND DELIVERY.
- FRAME: CEDAR SEMI TRANSPARENT STAIN.
- TRIM: STAINED WHITE BIRCH

1.2. 100 PSF LATERAL BEARING PRESSURE

- REMOVE ALL VEGETATION AND DEBRIS, INCLUDING PAVEMENTS, SIDEWALKS, BUILDING FOUNDATIONS, AND ABANDONED UTILITIES
- SOILS EXCAVATED FROM THE SITE THAT ARE FREE OF DELETERIOUS MATERIALS MAY BE USED AS FILL

STRUCTURAL WOOD

- WOOD FRAMING SHALL COMPLY WITH THE SOUTHERN PINE INSPECTION BUREAU, OR SHALL CONFORM TO SPECIFICATIONS AS PUBLISHED BY THE WESTERN WOODS PRODUCTS ASSOCIATION.
- WOOD FRAMING 2" X 4" AND LARGER SHALL BE NO. 1 SOUTHERN YELLOW PINE (U.N.O)
- WOOD COLUMNS 6" X 6" AND LARGER SHALL BE NO. 1 SOUTHERN YELLOW PINE (U.N.O)
- MECHANICALLY LAMINATED POSTS SHALL HAVE CERTIFIED STRUCTURAL GLUED END JOINTS.
- ALL MEMBERS IN CONTACT WITH CONCRETE OR GROUND SHALL BE PRESSURE TREATED.
- FASTENERS USED IN PRESSURE TREATED WOOD SHALL BE GALVANIZED, MADE FROM STAINLESS STEEL OR HAVE A COATING RATED FOR USE IN TREATED WOOD.
- GLUED-LAMINATED MEMBERS (U.N.O)
 - BEAMS SHALL USE 24F-V5 SP/SP FOR BALANCED LAYUPS
 - BEAMS SHALL USE 24F-V3 SP/SP FOR UNBALANCED LAYUPS WITH THE TOP CLEARLY MARKED FOR INSTALLATION
 - COLUMNS SHALL USE 24F-V5 SP/SP OR 20F-V15 POC/POC BALANCED LAYUPS
 - 1-3/8" ACTUAL LAMINATION THICKNESS
 - ADHESIVE TO BE WATERPROOF GLUE
 - APPEARANCE GRADE TO BE AITC ARCHITECTURAL
 - PROTECTION WRAPPED
- CONNECTORS NOT MANUFACTURED BY CFP SHALL BE AS MANUFACTURED BY THE SIMPSON CO. OR APPROVED EQUAL. CONNECTORS USED WITH PRESSURE TREATED LUMBER OR IN UNCONDITIONED SPACE, SHALL HAVE THE ZMAX (6185) COATING.
- NAILING, UNLESS NOTED OTHERWISE, SHALL BE PER THE INTERNATIONAL BUILDING CODE.
- BOLTS USED FOR WOOD CONNECTIONS SHALL MEET THE REQUIREMENT OF ANSI/ASME STANDARD B18.2.1.
 - Holes shall be a minimum of $\frac{1}{32}$ " to $\frac{1}{16}$ " larger than the bolt diameter.
 - A standard cut washer or metal plate of equal or greater dimensions shall be provided between the wood and the bolt head and nut.
- LAG SCREWS SHALL BE INSTALLED PER THE REQUIREMENTS OF ANSI/ASME STANDARD B18.2.1
 - LEAD HOLES FOR THE THREADED PORTION SHALL HAVE A DIAMETER EQUAL TO 60% TO 70% OF THE SHANK DIAMETER WITH A DEPTH EQUAL TO AT LEAST THE LENGTH OF THE THREADED PORTION.
- EACH COURSE OF STACKED CEDAR TIMBER WALLS SHALL BE CONNECTED TO THE COURSE BELOW WITH #14 X 10" TIMBER SCREWS AT 36" ON CENTER. EACH PIECE OF TIMBER SHALL BE CONNECTED WITH AT LEAST TWO SCREWS.

METAL ROOF

- ROOF PANELS SHALL BE 24 GA MULTI RIB WITH 50 KSI YIELD STRENGTH WHEN INSTALLED WITHOUT SUBSTRATE AND 29 GA MAX RIB WHEN INSTALLED OVER SUBSTRATE
- FINISH SHALL BE KYNAR 500

Troy Garland
Digitally signed by Troy Garland
Date: 2020.08.19 05:06:58 -04'00'



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No.	Description	Date
1	ISSUED FOR BID	8-20-2020

DWG ISSUE & REVISION HISTORY

Stamp



ISSUED FOR BID

Project Title:

PROSPECT HILL PARK
WALTHAM, MA

Drawing Title:

PAVILION DETAILS

Project No. 180619

Drawn By: PWH

Checked By: PWH

Scale: AS NOTED

Date: August 20, 2020

Drawing No. L7-1

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**Structure Erection: Installation of this structure is to be done with a competent supervisor in the construction trades. This supervisor must be capable of reading the drawing(s) & following Cedar Forest Products' installation instructions using good construction practices and procedures. The contractor will be required to shim, cut and make adjustments of fitting for proper building erection.

MODEL NUMBER:	GAP3444	REVISION DATES	DRAWN BY:	DATE:
DESCRIPTION:	GAP3444 W/ METAL ROOFING & CUPOLA	REV:	KLY	8/16/20
Project Name:	PROSPECT HILL	REV:	PROJ #:	3532B
Sales Rep:	O'BRIEN & SONS RECREATION	REV:		
Site Location:	322 TOTTEN POND ROAD, WALTHAM, MA 02451	REV:		1 of 5

NOTES:

1. CONTRACTOR RESPONSIBLE TO PURCHASE AND INSTALL PAVILION.
2. PAVILION MANUFACTURER TO BE CEDAR FOREST PRODUCTS OR APPROVED EQUAL.
3. CONTRACTOR TO REVIEW PURCHASE ORDER AND SPECS WITH OWNER PRIOR TO PURCHASE AND DELIVERY.
4. FRAME: CEDAR SEMI TRANSPARENT STAIN.
5. TRIM: STAINED WHITE BIRCH

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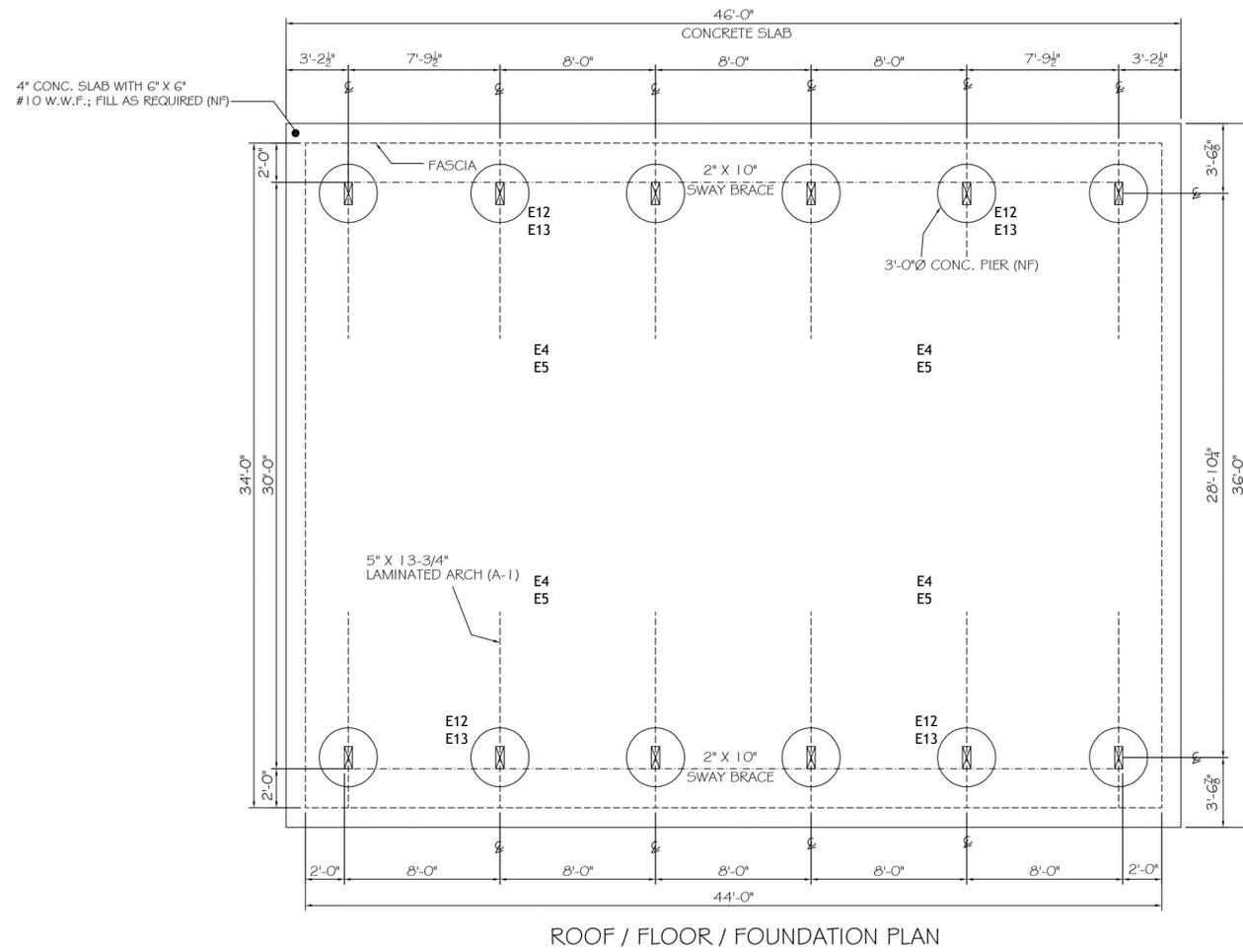
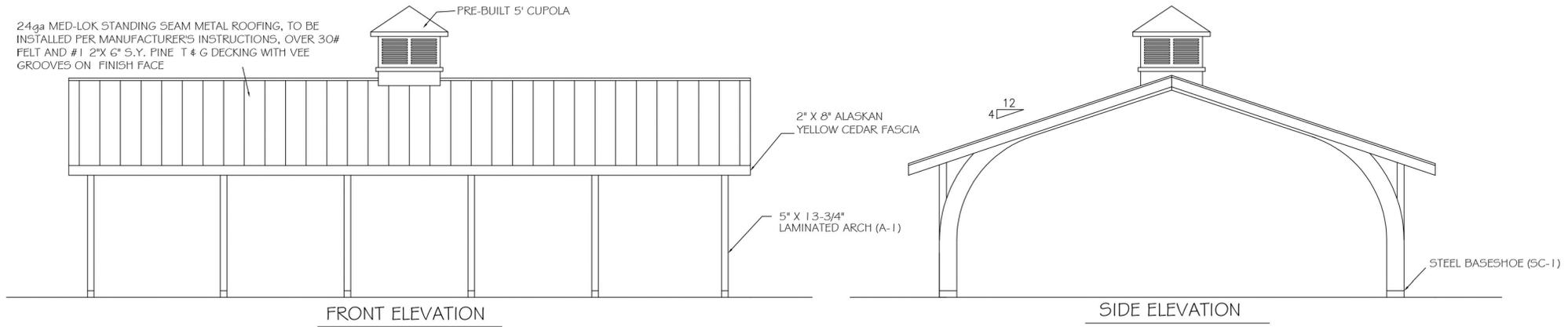
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NOT TO SCALE



ELECTRICAL LIST

CALLOUT	QTY.	DESCRIPTION	MODEL #	MANUFACTURER
E4	4	VR4 LED 12X12	VR5	LITHONIA
E5	4	BASE FOR VR4	EB5	LITHONIA
E12	4	OUTDOOR W/P COVER	WTG100CV-DPL	PERFECT LINE
E13	4	GFCI OUTLET	G5262-WTG	LEVITON

LIGHTING NOTES:

1. SEE PLAN TO LEFT FOR LIGHT AND RECEPTACLE LOCATIONS.
2. ALL LIGHTING AND WIRING TO ADHERE TO CITY OF WALTHAM CODE AND TO BE APPROVED BY CITY INSPECTOR OF WIRES PRIOR TO PURCHASING AND FINAL INSTALLATION - SEE SPECS.
3. BOND ANY METAL SURFACES ON PAVILION LIKELY TO ENERGIZED BACK TO POWER SOURCE, INCLUDING METAL ROOF.
4. LIGHTS TO BE CONTROLLED BY BREAKER SWITCH AT ADJACENT UTILITY POLE - SEE PLANS.



No.	Description	Date
1	ISSUED FOR BID	8-20-2020

DWG ISSUE & REVISION HISTORY

Stamp



ISSUED FOR BID

Project Title:

PROSPECT HILL PARK
WALTHAM, MA

Drawing Title:

PAVILION DETAILS

Project No. 180619

Drawn By: PWH

Checked By: PWH

Scale: AS NOTED

Date: August 20, 2020

Drawing No. L7-2

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DESCRIPTION GAP3444 - METAL ROOF - CUPOLA

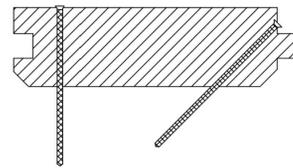
PROJECT DETAILS
PROJECT NAME: PROSPECT HILL
SALES REP: O'BRIEN & SONS RECREATION
SITE LOCATION: 322 TOTTON POND RD. - WALTHAM, MA, 02451

REVISION DATES
DRAWN BY: KLY
DATE: 8-16-20
PRJ #: 3532B
PG: 2 OF 5

NOTES:

1. CONTRACTOR RESPONSIBLE TO PURCHASE AND INSTALL PAVILION.
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4. FRAME: CEDAR SEMI TRANSPARENT STAIN.
5. TRIM: STAINED WHITE BIRCH

NOT TO SCALE

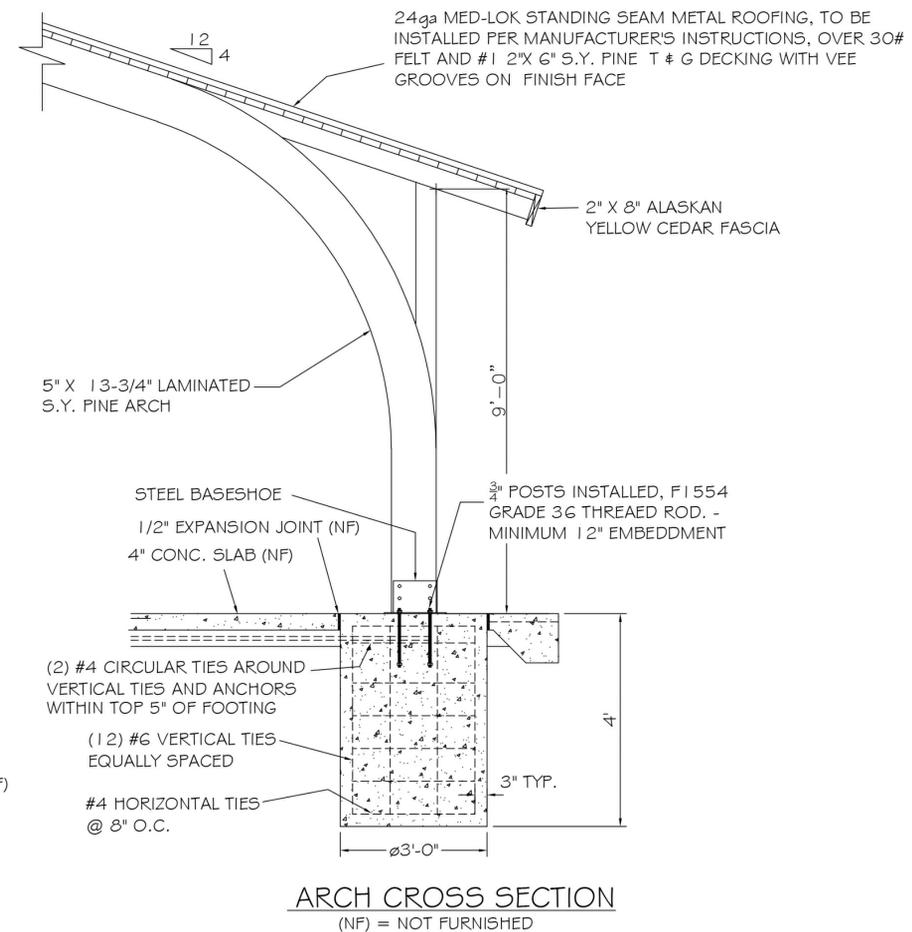
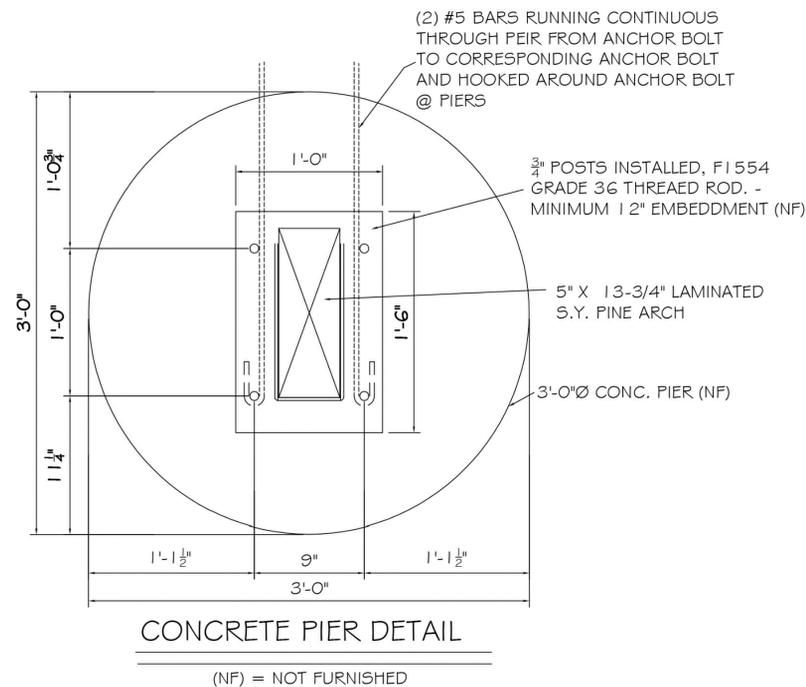
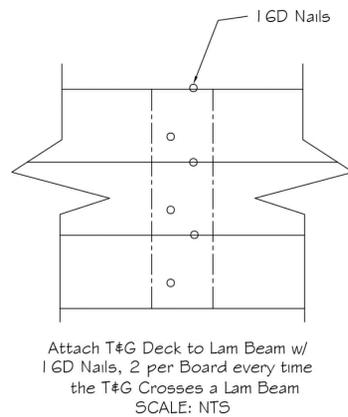


EACH PIECE SHALL BE FACE
NAILED AND TOENAILED
THROUGH THE TONGUE
SCALE: NTS

DECKING LIST		
AMOUNT	LENGTH	L.F.
	20'	
92	18'	1656
92	16'	1472
	14'	
	12'	
92	10'	920
	8'	
TOTAL L.F.		4048
WOOD TYPE		S.Y. PINE

CONTINUE SEQUENCE TO RIDGE

10'	16'	18'
18'	16'	10'
10'	16'	18'
18'	16'	10'



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COMPETENT SUPERVISOR IN THE CONSTRUCTION TRADES. THIS SUPERVISOR MUST BE
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INSTALLATION INSTRUCTIONS USING GOOD CONSTRUCTION PRACTICES AND
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construction unless approved by a C.F.P. Representative.

DESCRIPTION	GAP3444 - METAL ROOF - CUPOLA
PROJECT DETAILS	PROJECT NAME: PROSPECT HILL SALES REP: O'BRIEN & SONS RECREATION SITE LOCATION: 322 TOTTEN POND RD. - WALTHAM, MA. 02451

REVISION DATES	DRAWN BY:	DATE:
REV: KLY	KLJ	8-16-20
REV: PRJ #:	3532B	
REV: PG:	3 OF 5	

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No.	Description	Date
1	ISSUED FOR BID	8-20-2020

DWG ISSUE & REVISION HISTORY

Stamp



ISSUED FOR BID

Project Title:

PROSPECT HILL PARK
WALTHAM, MA

Drawing Title:

PAVILION DETAILS

Project No. 180619

Drawn By: PWH

Checked By: PWH

Scale: AS NOTED

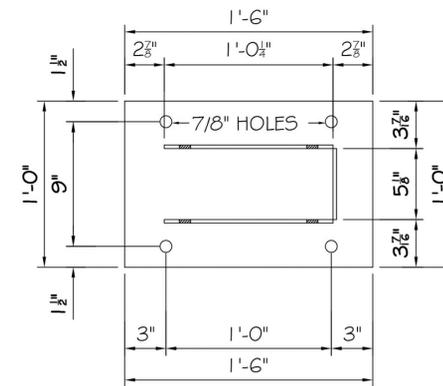
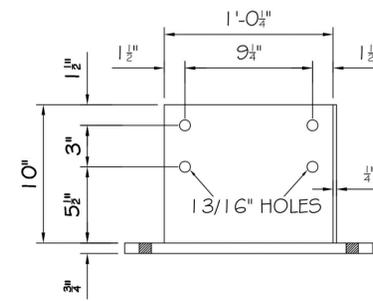
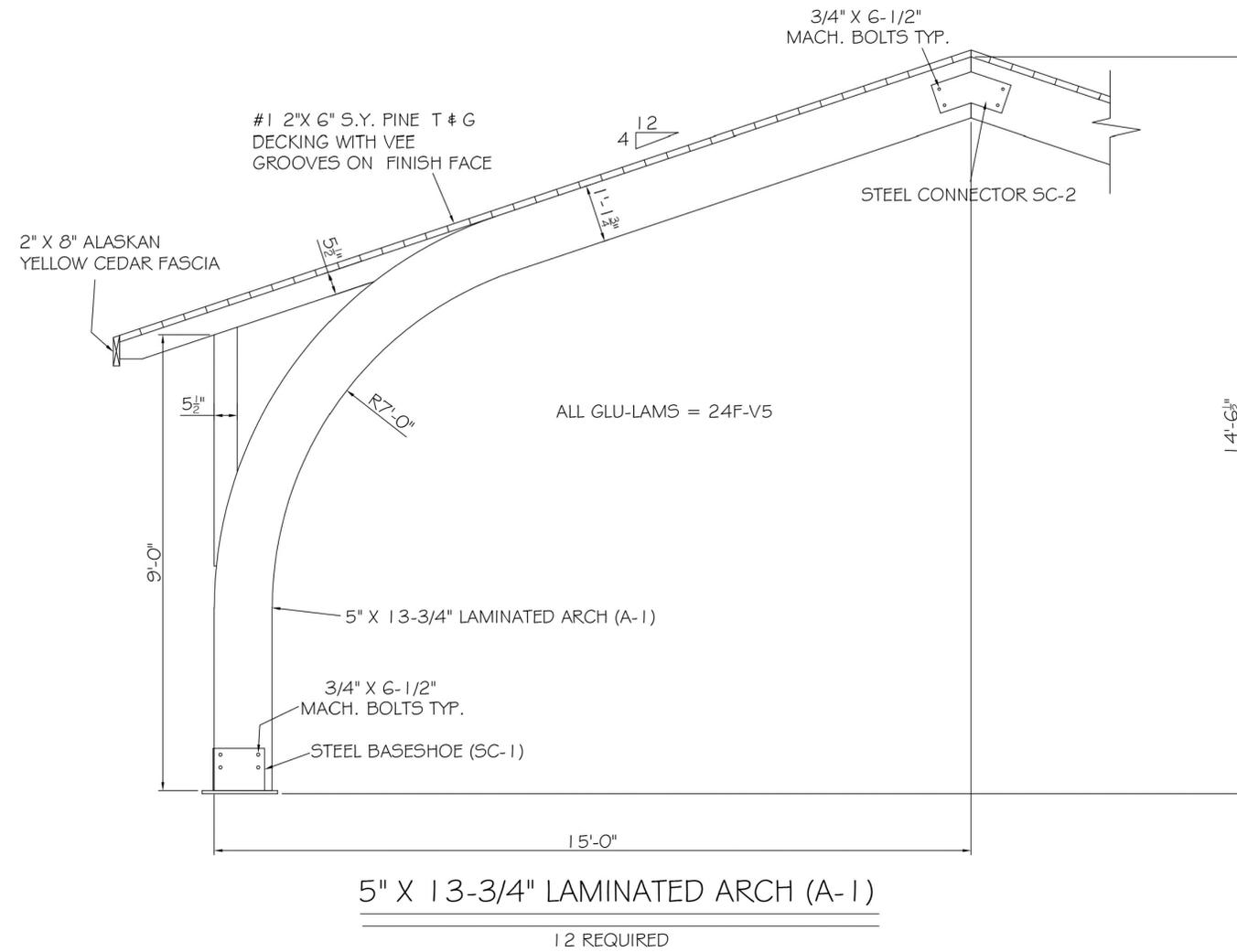
Date: August 20, 2020

Drawing No. L7-3

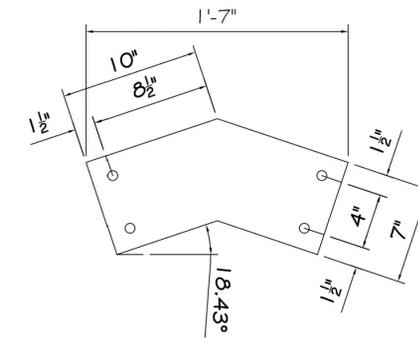
NOTES:

1. CONTRACTOR RESPONSIBLE TO PURCHASE AND INSTALL PAVILION.
2. PAVILION MANUFACTURER TO BE CEDAR FOREST PRODUCTS OR APPROVED EQUAL.
3. CONTRACTOR TO REVIEW PURCHASE ORDER AND SPECS WITH OWNER PRIOR TO PURCHASE AND DELIVERY.
4. FRAME: CEDAR SEMI TRANSPARENT STAIN.
5. TRIM: STAINED WHITE BIRCH

NOT TO SCALE



STEEL BASESHOE (SC-1)
12 REQUIRED



STEEL CONNECTOR (SC-2)
12 REQUIRED



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DESCRIPTION	GAP3444 - METAL ROOF - CUPOLA
PROJECT DETAILS	PROJECT NAME: PROSPECT HILL SALES REP: O'BRIEN & SONS RECREATION SITE LOCATION: 322 TOTTEN POND RD. - WALTHAM, MA, 02451

REVISION DATES	DRAWN BY:	DATE:
REV:	KLY	8-16-20
REV:	PRJ #:	3532B
REV:	PG:	4 OF 5

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1	ISSUED FOR BID	8-20-2020
No.	Description	Date

DWG ISSUE & REVISION HISTORY

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ISSUED FOR BID

Project Title:

PROSPECT HILL PARK
WALTHAM, MA

Drawing Title:

PAVILION DETAILS

Project No. 180619

Drawn By: PWH
Checked By: PWH
Scale: AS NOTED
Date: August 20, 2020

Drawing No. L7-4



NOTES:

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NOT TO SCALE

GABLE METAL ROOFING OVER WOOD DECKING

Once roof decking is installed per decking sequence lay 30# felt over decking (per manufactures suggestions).

Then the eave/starter trim to decking using pancake head screws. Now it's time to start installing metal roof panels.

NOTE: BEFORE PERMANENTLY ATTACHING METAL PANELS, CHECK FOR SQUARENESS OF PANELS IN RELATIONSHIP TO THE SHELTER.

ALL PANELS MUST BE FIELD HEMMED, SEE DETAILS

Start in left corner, place first panel, see panel layout, male rib should be to the right.

(Female rib on the left may need to be removed for proper attachment of Zee trim, see details)

Panel should be in line with the fascia board and the rake board.

Attach the panel per the screw schedule.

Overlap the next panel, female rib over the male rib. Attach per the screw schedule.

Repeat until all panels are installed.

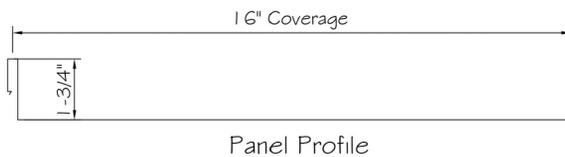
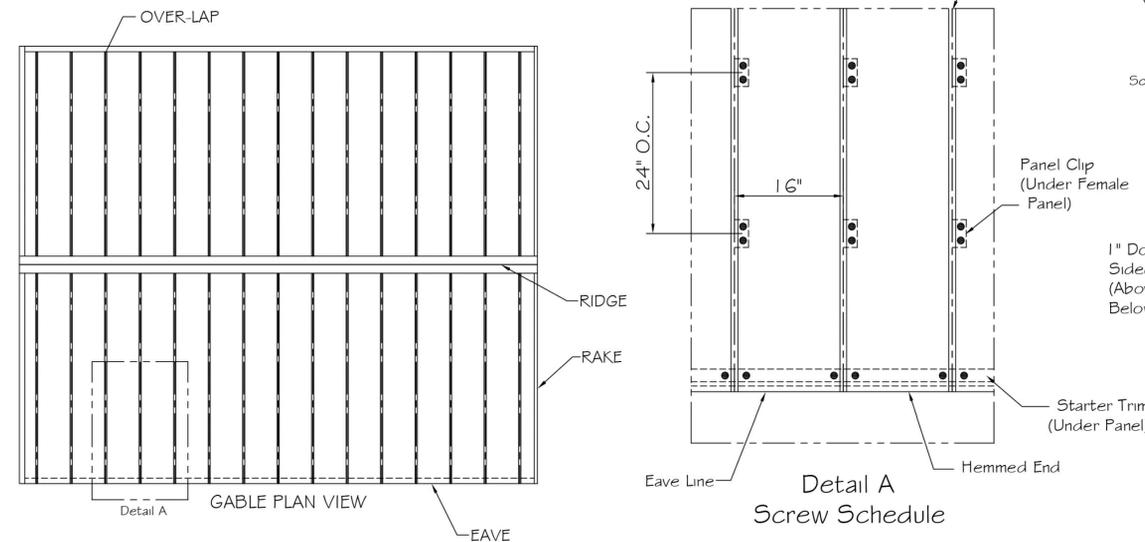
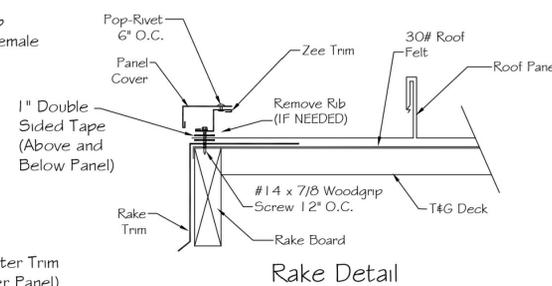
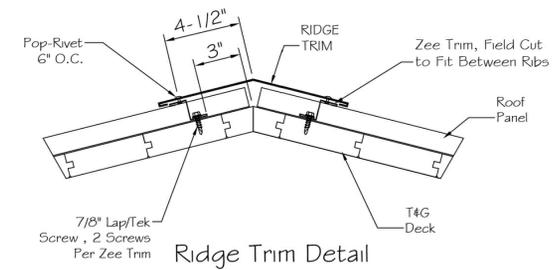
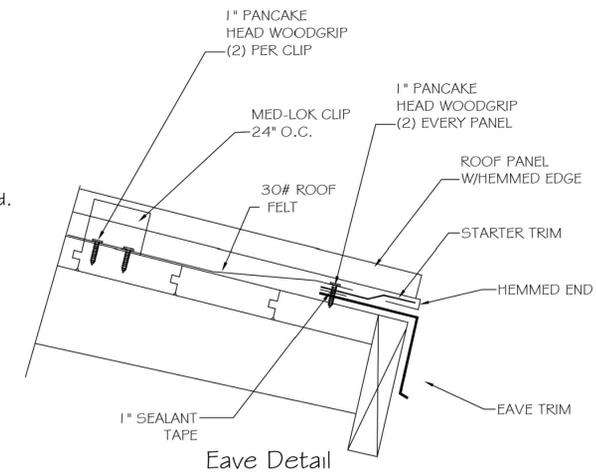
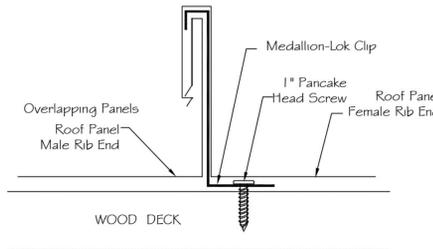
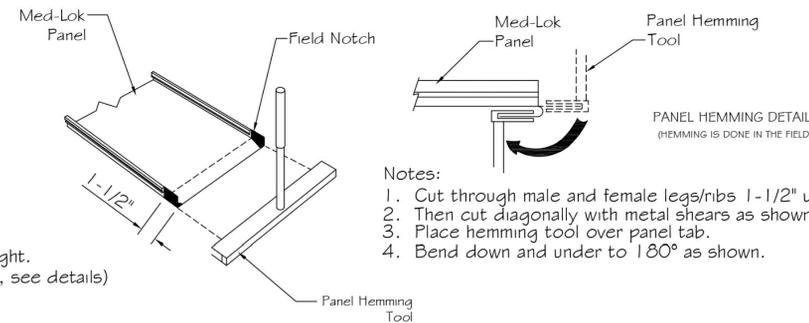
Attach Zee Trim to Rakes and Ridge Lines, see details.

Attach the Panel cover along the eave lines, see details.

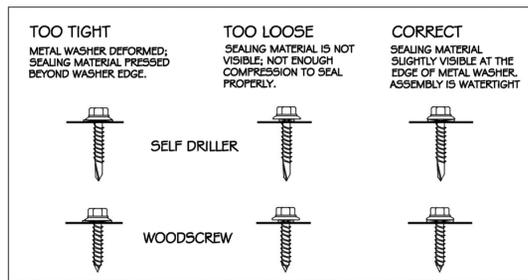
Attach the Panel cover along the rake lines, see details.

Install Ridge Trim at the peak, see details.

DO NOT USE IMPACT TOOLS ON WOOD SCREWS
(SCREW GUN IS RECOMMENDED)



PROPER SCREW ENGAGEMENT



- 1" PANCAKE HEAD WOOD SCREW
- #14 X 7/8" STITCH SCREW



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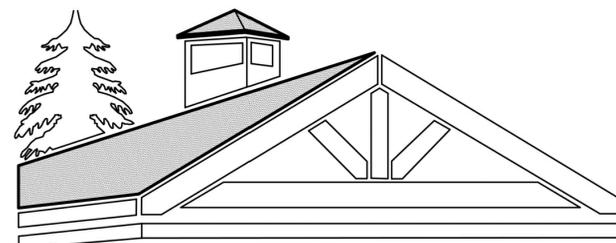
DESCRIPTION	GAP3444 - METAL ROOF - CUPOLA
PROJECT DETAILS	PROJECT NAME: PROSPECT HILL SALES REP: O'BRIEN & SONS RECREATION SITE LOCATION: 322 TOTTEN FOND RD. - WALTHAM, MA. 02451

REVISION DATES	DRAWN BY:	DATE:
REV:	KLY	8-16-20
REV:	PRJ #:	3532B
REV:	PG:	5 OF 5

Project Title:	PROSPECT HILL PARK WALTHAM, MA
Drawing Title:	PAVILION DETAILS
Project No. 180619	Project Name: PROSPECT HILL
Drawn By: PWH	Checked By: PWH
Scale: AS NOTED	Date: August 20, 2020
Drawing No. L7-5	

ENTRY KIOSK NOTES:

1. CONTRACTOR RESPONSIBLE TO PURCHASE AND INSTALL SIGNAGE KIOSK.
2. MANUFACTURER TO BE CEDAR FOREST PRODUCTS OR APPROVED EQUAL.
3. CONTRACTOR TO REVIEW PURCHASE ORDER AND SPECS WITH OWNER PRIOR TO PURCHASE AND DELIVERY.
4. FRAME: CEDAR SEMI TRANSPARENT STAIN
5. TRIM: STAINED WHITE BIRCH



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STRUCTURAL NOTES

STANDARDS

1. 2015 INTERNATIONAL BUILDING CODE
2. ASCE/SEI 7 MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES
3. ANSI/AWC NDS-2012 NATIONAL DESIGN SPECIFICATION FOR WOOD CONSTRUCTION
4. ACI 318 BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE
5. AISC 360 SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS

BUILDING PROPERTIES

1. OCCUPANCY GROUP DESIGNATION = U
2. CONSTRUCTION TYPE = VB

DESIGN LOADS

3. GROUND SNOW = 40
4. ROOF SNOW LOAD (UNHEATED) = 33.6
5. ROOF LIVE LOAD = 20 PSF
6. WIND LOAD BASED ON WIND VELOCITY OF V = 130 MPH
7. RISK CATEGORY II, EXPOSURE C
8. SEISMIC IMPORTANCE FACTOR I = 1
9. $S_s = 0.211$
10. $S_1 = 0.069$
11. $S_{DS} = 0.225$
12. $S_{D1} = 0.110$
13. SITE CLASS = D
14. DESIGN CATEGORY = B

STRUCTURAL STEEL

ALL STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST EDITION OF THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) "SPECIFICATIONS FOR THE DESIGN FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS"

STRUCTURAL STEEL TO CONFORM TO:

1. STRUCTURAL STEEL PLATE = A-36
2. HOLLOW STRUCTURAL SECTIONS = A500 GRADE C
3. WIDE FLANGE SECTION = A992 GRADE 50
4. CHANNEL SECTIONS = A36
5. THESE MATERIAL SPECIFICATIONS SHALL BE USED UNLESS NOTED OTHERWISE.

WELDING

1. ALL WELDING TO BE IN ACCORDANCE WITH THE LATEST EDITION OF THE AMERICAN WELDING SOCIETY (AWS) "STRUCTURAL WELDING CODE - STEEL" D1.1 AND AS INDICATED ON THE STRUCTURAL DRAWINGS.
2. WELDING ELECTRODES, WELDING PROCESS, MINIMUM PREHEAT AND INTERPASS TEMPERATURES TO BE IN ACCORDANCE WITH THE AWS SPECIFICATIONS. ELECTRODES TO BE MIN 70KSI MATERIAL.

CONCRETE

1. ALL CONCRETE SHOULD HAVE STONE AGGREGATE (NORMAL WEIGHT). 28-DAY COMPRESSIVE STRENGTH (F_c) SHOULD BE 3000PSI MINIMUM FOR CAST-IN-PLACE CONCRETE.
2. MAX AGGREGATE DIAMETER OF $\phi_{3/4}$ "
3. REINFORCING BARS SHOULD BE MILD STEEL WITH A MINIMUM YIELD STRENGTH OF 60 KSI.
4. REINFORCING BAR PROTECTION:
 - 4.1. CONCRETE PLACED AGAINST EARTH - 3"
 - 4.2. CONCRETE PLACED IN FORMS - $1\frac{1}{2}$ "
5. FIELD WELDING OF REINFORCING SHOULD NOT BE PERMITTED.
6. ALL REINFORCING BAR BENDS SHOULD BE MADE MECHANICALLY HEAT-BENDING SHOULD NOT BE PERMITTED.
7. NON-SHRINK GROUT = 5000 PSI
8. ANCHOR BOLTS SHALL CONFORM TO THE REQUIREMENTS OF F1554 GRADE 36

FOUNDATIONS

1. FOUNDATIONS DESIGNED BASED ON PRESUMPTIVE LOAD-BEARING VALUES GIVEN IN TABLE 1806.2 OF THE INTERNATIONAL BUILDING CODE.
 - 1.1. 1500 PSF VERTICAL FOUNDATION PRESSURE

1.2. 100 PSF LATERAL BEARING PRESSURE

2. REMOVE ALL VEGETATION AND DEBRIS, INCLUDING PAVEMENTS, SIDEWALKS, BUILDING FOUNDATIONS, AND ABANDONED UTILITIES
3. SOILS EXCAVATED FROM THE SITE THAT ARE FREE OF DELETERIOUS MATERIALS MAY BE USED AS FILL

STRUCTURAL WOOD

1. WOOD FRAMING SHALL COMPLY WITH THE SOUTHERN PINE INSPECTION BUREAU, OR SHALL CONFORM TO SPECIFICATIONS AS PUBLISHED BY THE WESTERN WOODS PRODUCTS ASSOCIATION.
2. WOOD FRAMING 2" X 4" AND LARGER SHALL BE NO. 1 SOUTHERN YELLOW PINE (U.N.O)
3. WOOD COLUMNS 6" X 6" AND LARGER SHALL BE NO. 1 SOUTHERN YELLOW PINE (U.N.O)
4. MECHANICALLY LAMINATED POSTS SHALL HAVE CERTIFIED STRUCTURAL GLUED END JOINTS.
5. ALL MEMBERS IN CONTACT WITH CONCRETE OR GROUND SHALL BE PRESSURE TREATED.
6. FASTENERS USED IN PRESSURE TREATED WOOD SHALL BE GALVANIZED, MADE FROM STAINLESS STEEL OR HAVE A COATING RATED FOR USE IN TREATED WOOD.
7. GLUED-LAMINATED MEMBERS (U.N.O)
 - 7.1. BEAMS SHALL USE 24F-V5 SP/SP FOR BALANCED LAYUPS
 - 7.2. BEAMS SHALL USE 24F-V3 SP/SP FOR UNBALANCED LAYUPS WITH THE TOP CLEARLY MARKED FOR INSTALLATION
 - 7.3. COLUMNS SHALL USE 24F-V5 SP/SP OR 20F-V15 POC/POC BALANCED LAYUPS
 - 7.4. 1-3/8" ACTUAL LAMINATION THICKNESS
 - 7.5. ADHESIVE TO BE WATERPROOF GLUE
 - 7.6. APPEARANCE GRADE TO BE AITC ARCHITECTURAL
 - 7.7. PROTECTION WRAPPED
8. CONNECTORS NOT MANUFACTURED BY CFP SHALL BE AS MANUFACTURED BY THE SIMPSON CO. OR APPROVED EQUAL. CONNECTORS USED WITH PRESSURE TREATED LUMBER OR IN UNCONDITIONED SPACE, SHALL HAVE THE ZMAX (6185) COATING.
9. NAILING, UNLESS NOTED OTHERWISE, SHALL BE PER THE INTERNATIONAL BUILDING CODE.
10. BOLTS USED FOR WOOD CONNECTIONS SHALL MEET THE REQUIREMENT OF ANSI/ASME STANDARD B18.2.1.
 - 10.1. HOLES SHALL BE A MINIMUM OF $\frac{1}{32}$ " TO $\frac{1}{16}$ " LARGER THAN THE BOLT DIAMETER.
 - 10.2. A STANDARD CUT WASHER OR METAL PLATE OF EQUAL OR GREATER DIMENSIONS SHALL BE PROVIDED BETWEEN THE WOOD AND THE BOLT HEAD AND NUT.
11. LAG SCREWS SHALL BE INSTALLED PER THE REQUIREMENTS OF ANSI/ASME STANDARD B18.2.1
 - 11.1. LEAD HOLES FOR THE THREADED PORTION SHALL HAVE A DIAMETER EQUAL TO 60% TO 70% OF THE SHANK DIAMETER WITH A DEPTH EQUAL TO AT LEAST THE LENGTH OF THE THREADED PORTION.
12. EACH COURSE OF STACKED CEDAR TIMBER WALLS SHALL BE CONNECTED TO THE COURSE BELOW WITH #14 X 10" TIMBER SCREWS AT 36" ON CENTER. EACH PIECE OF TIMBER SHALL BE CONNECTED WITH AT LEAST TWO SCREWS.

METAL ROOF

1. ROOF PANELS SHALL BE 24 GA MULTI RIB WITH 50 KSI YIELD STRENGTH WHEN INSTALLED WITHOUT SUBSTRATE AND 29 GA MAX RIB WHEN INSTALLED OVER SUBSTRATE
2. FINISH SHALL BE KYNAR 500

Troy Garland
Digitally signed by Troy Garland
Date: 2020.08.19 05:03:28 -04'00'

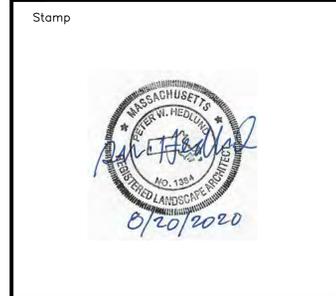


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Sustainable Environmental Solutions
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Sandwich, MA 02563
508-833-6600 voice
508-833-3150 fax

No.	Description	Date
1	ISSUED FOR BID	8-20-2020

DWG ISSUE & REVISION HISTORY



ISSUED FOR BID

Project Title:
**PROSPECT HILL PARK
WALTHAM, MA**

Drawing Title:
ENTRY KIOSK DETAILS

Project No. 180619
Drawn By: PWH
Checked By: PWH
Scale: AS NOTED
Date: August 20, 2020

Drawing No. **L8-1**

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**Structure Erection: Installation of this structure is to be done with a competent supervisor in the construction trades. This supervisor must be capable of reading the drawing(s) & following Cedar Forest Products' installation instructions using good construction practices and procedures. The contractor will be required to shim, cut and make adjustments of fitting for proper building erection.

MODEL NUMBER: MBB8
DESCRIPTION: MBB8 W/ METAL ROOFING
Project Details: Project Name: PROSPECT HILL
Sales Rep: O'BRIEN & SONS RECREATION
Site Location: 322 TOTTEN POND ROAD, WALTHAM, MA 02451

REVISION DATES	DRAWN BY:	DATE:
REV:	KLY	8/16/20
REV:		PROJ #: 3532A
REV:		1 of 4

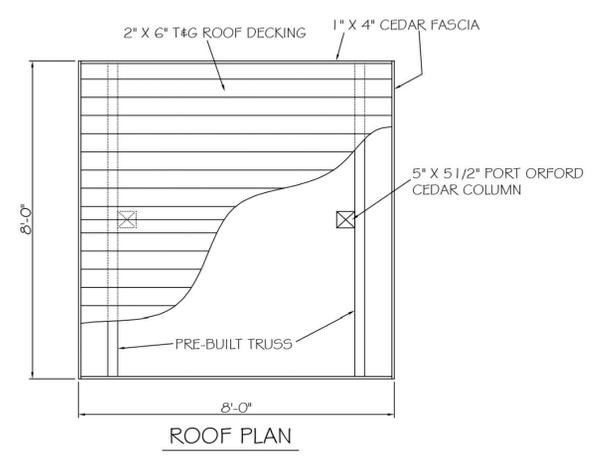
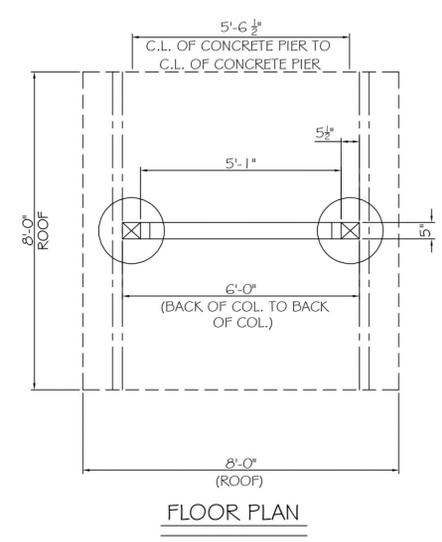
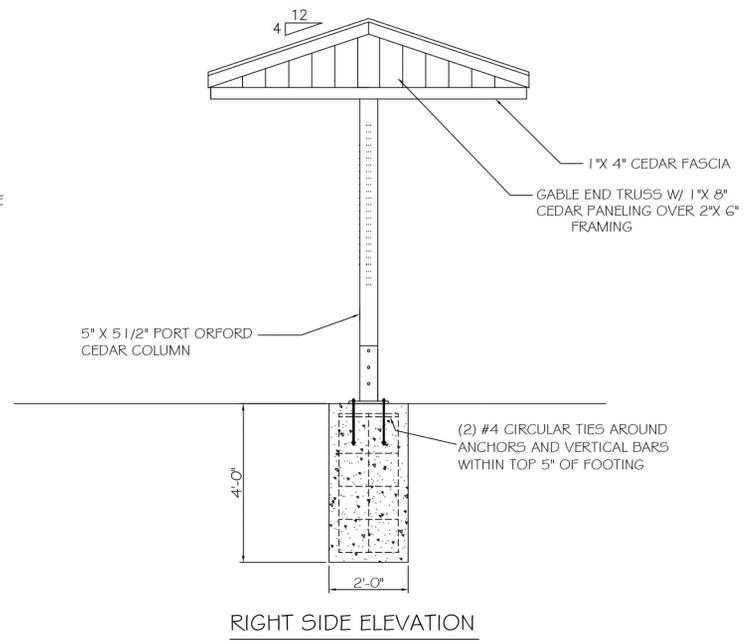
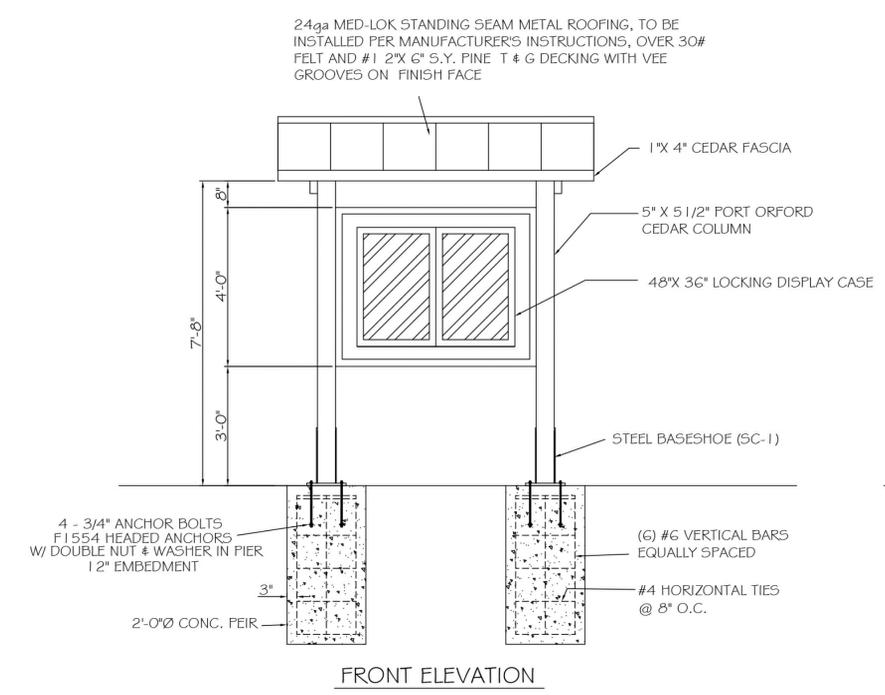
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4. FRAME: CEDAR SEMI TRANSPARENT STAIN
5. TRIM: STAINED WHITE BIRCH

HEDLUND DESIGN GROUP
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 Landscape Architecture + Planning
 10 Central Street, Arlington MA 02476 USA
 † 617-826-9302 † www.hedlunddesign.com

Horsley Witten Group, Inc.
 Sustainable Environmental Solutions
 www.horsleywitten.com
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 Sandwich, MA 02563
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NOT TO SCALE



No.	Description	Date
1	ISSUED FOR BID	8-20-2020



ISSUED FOR BID

Project Title:
**PROSPECT HILL PARK
 WALTHAM, MA**

Drawing Title:
ENTRY KIOSK DETAILS

Project No. 180619
 Drawn By: PWH
 Checked By: PWH
 Scale: AS NOTED
 Date: August 20, 2020

Drawing No. **L8-2**

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DESCRIPTION	MBB8 W/ METAL ROOFING
PROJECT DETAILS	PROJECT NAME: PROSPECT HILL SALES REP: O'BRIEN & SONS RECREATION SITE LOCATION: 322 TOTTEN POND RD. - WALTHAM, MA. 02451

REVISION DATES	DRAWN BY:	DATE:
REV:	KLY	8-16-20
REV:		PRJ #: 3532A
REV:		PG: 2 OF 4

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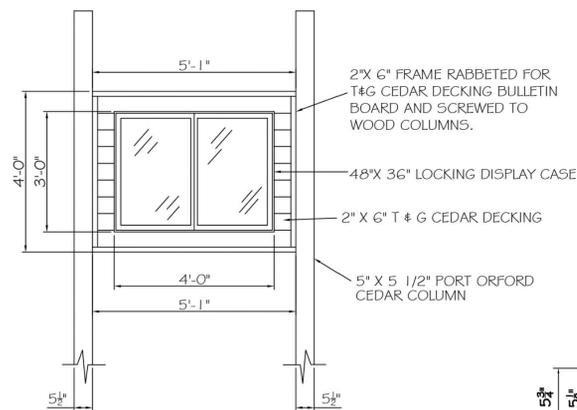
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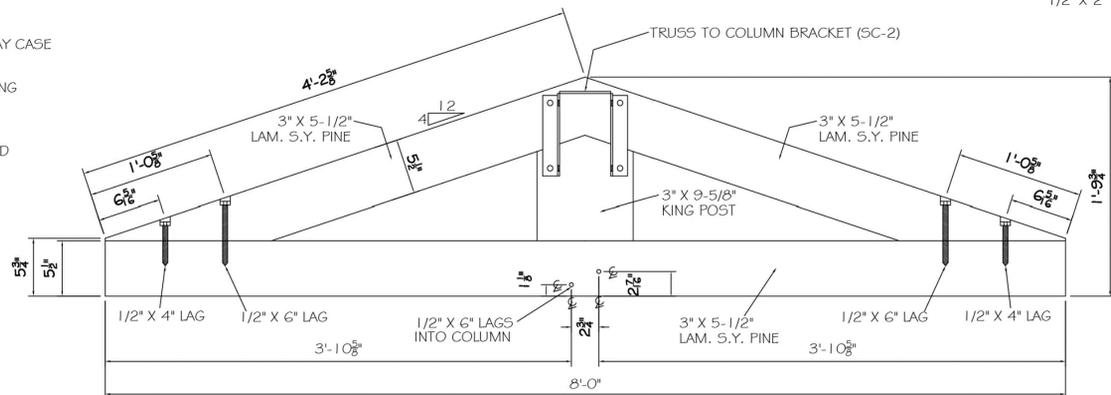
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NOT TO SCALE

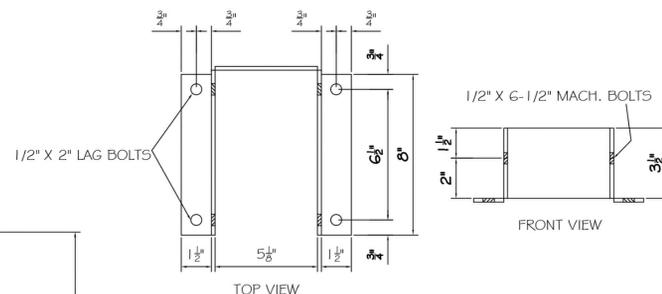


BULLETIN BOARD & FRAME DETAIL



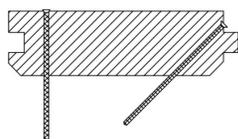
GABLE END TRUSS SCALE: 1 1/2" = 1'-0"

(2) REQUIRED



TRUSS TO COLUMN BRACKET (SC-2)

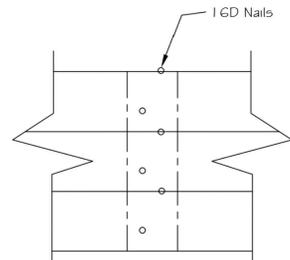
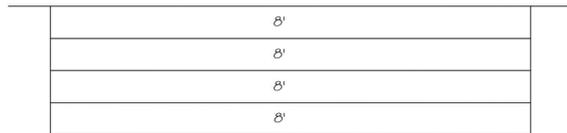
(2) REQUIRED



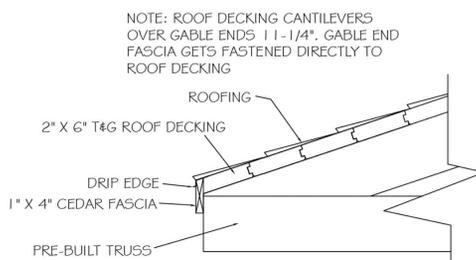
EACH PIECE SHALL BE FACE NAILED AND TOENAILED THROUGH THE TONGUE
SCALE: NTS

DECKING LIST		
AMOUNT	LENGTH	L.F.
	20'	
	18'	
	16'	
	14'	
	12'	
	10'	
24	8'	192
TOTAL L.F.		192
WOOD TYPE		S.Y. PINE

CONTINUE SEQUENCE TO RIDGE

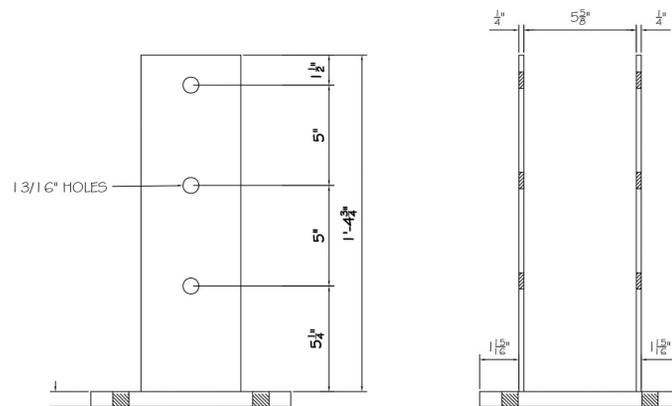


Attach T&G Deck to Lam Beam w/ 1GD Nails, 2 per Board every time the T&G Crosses a Lam Beam
SCALE: NTS



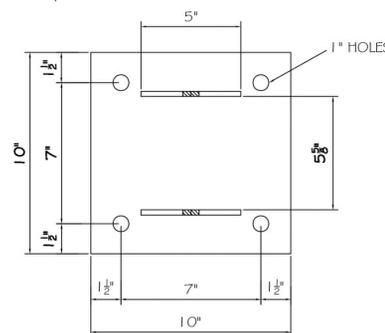
EAVE DETAIL

NOTE: ROOF DECKING CANTILEVERS OVER GABLE ENDS 1 1/4". GABLE END FASCIA GETS FASTENED DIRECTLY TO ROOF DECKING



STEEL BASESHOE (SC-1)

(2) REQUIRED



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DESCRIPTION MBB8 W/ METAL ROOFING

PROJECT DETAILS PROJECT NAME: PROSPECT HILL SALES REP: O'BRIEN & SONS RECREATION SITE LOCATION: 322 TOTTEN POND RD. - WALTHAM, MA. 02451

REVISION DATES	DRAWN BY:	DATE:
REV: KLY		8-16-20
REV: PRJ #:	3532A	
REV: PG:	3 OF 4	



No.	Description	Date
1	ISSUED FOR BID	8-20-2020

DWG ISSUE & REVISION HISTORY

Stamp



ISSUED FOR BID

Project Title:

PROSPECT HILL PARK
WALTHAM, MA

Drawing Title:

ENTRY KIOSK DETAILS

Project No. 180619

Drawn By: PWH

Checked By: PWH

Scale: AS NOTED

Date: August 20, 2020

Drawing No. L8-3

ENTRY KIOSK NOTES:

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NOT TO SCALE

GABLE METAL ROOFING OVER WOOD DECKING

Once roof decking is installed per decking sequence lay 30# felt over decking (per manufactures suggestions).

Then the eave/starter trim to decking using pancake head screws. Now it's time to start installing metal roof panels.

NOTE: BEFORE PERMANTLY ATTACHING METAL PANELS, CHECK FOR SQUARENESS OF PANELS IN RELATIONSHIP TO THE SHELTER.

ALL PANELS MUST BE FIELD HEMMED, SEE DETAILS

Start in left corner, place first panel, see panel layout, male nb should be to the right.

(Female rib on the left may need to be removed for proper attachment of Zee trim, see details)

Panel should be in line with the fascia board and the rake board.

Attach the panel per the screw schedule.

Overlap the next panel, female rib over the male nb. Attach per the screw schedule.

Repeat until all panels are installed.

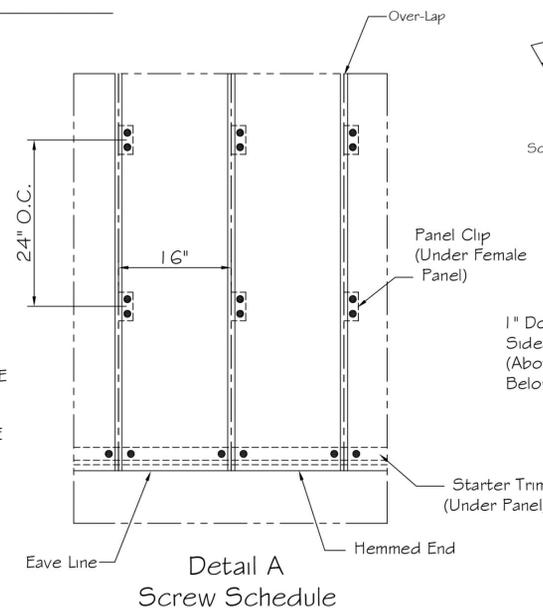
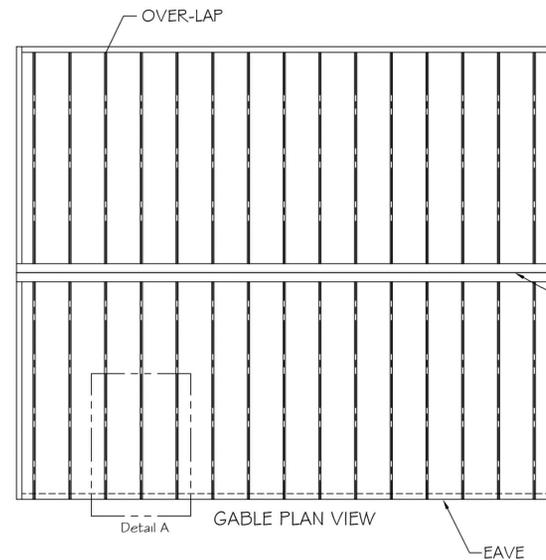
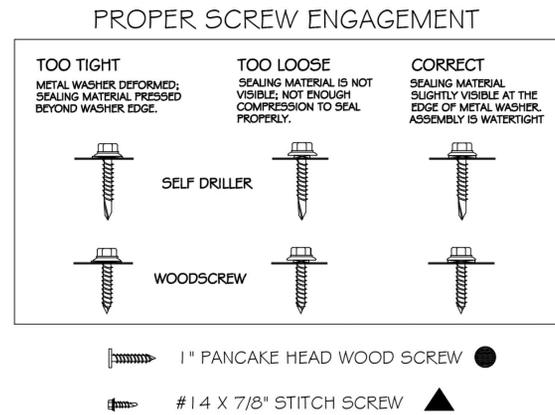
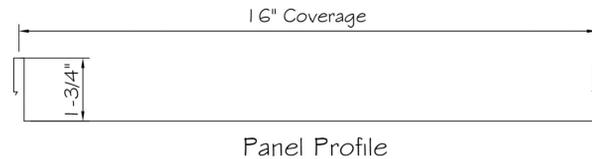
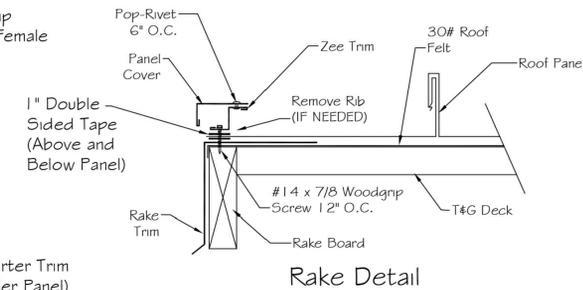
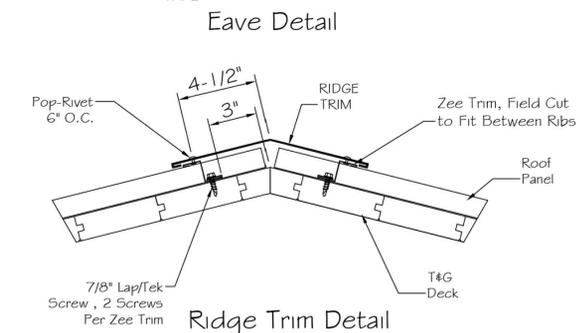
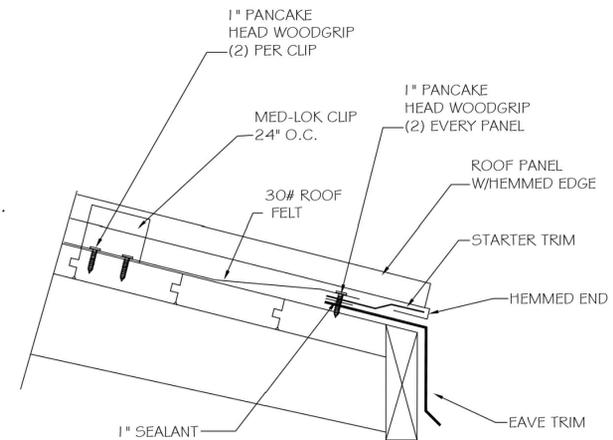
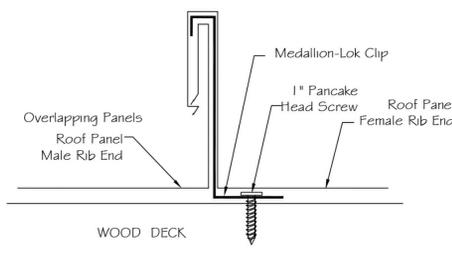
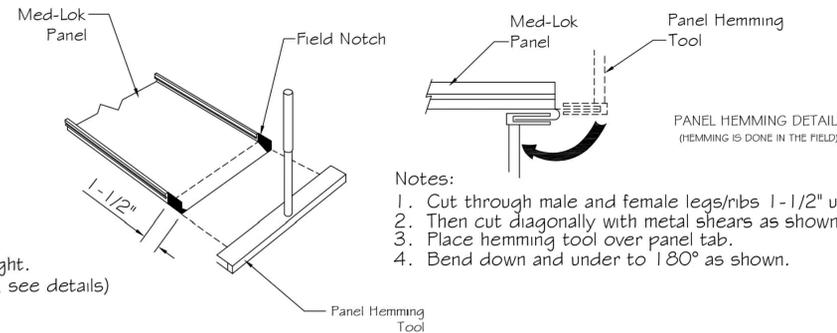
Attach Zee Trim to Rakes and Ridge Lines, see details.

Attach the Panel cover along the eave lines, see details.

Attach the Panel cover along the rake lines, see details.

Install Ridge Trim at the peak, see details.

DO NOT USE IMPACT TOOLS ON WOOD SCREWS (SCREW GUN IS RECOMMENDED)



1	ISSUED FOR BID	8-20-2020
No.	Description	Date

DWG ISSUE & REVISION HISTORY

Stamp



ISSUED FOR BID

Project Title:

**PROSPECT HILL PARK
WALTHAM, MA**

Drawing Title:

ENTRY KIOSK DETAILS

Project No. 180619

Drawn By: PWH

Checked By: PWH

Scale: AS NOTED

Date: August 20, 2020

Drawing No. **L8-4**

CFP
CEDAR FOREST PRODUCTS

P.O. BOX 145
WEST OLIVE, MI 49460
800-552-9495
WWW.CEDARFORESTPRODUCTS.COM

**STRUCTURE ERECTION: INSTALLATION OF THIS STRUCTURE MUST BE DONE WITH COMPETENT SUPERVISOR IN THE CONSTRUCTION TRADES. THIS SUPERVISOR MUST BE CAPABLE OF READING THE DRAWINGS & FOLLOW CEDAR FOREST PRODUCTS INSTALLATION INSTRUCTIONS USING GOOD CONSTRUCTION PRACTICES AND PROCEDURES. THE CONTRACTOR WILL BE REQUIRED TO SHIM, CUT, AND MAKE ADJUSTMENTS OF FITTING FOR PROPER BUILDING ERECTION.

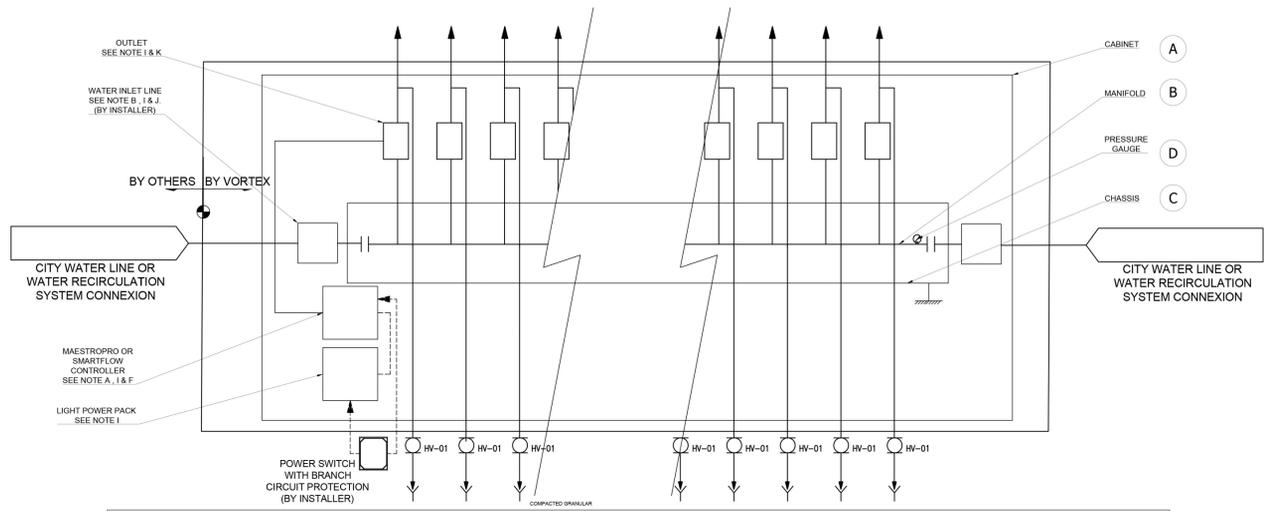
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DESCRIPTION **MBB8 W/ METAL ROOFING**

PROJECT DETAILS
PROJECT NAME: PROSPECT HILL
SALES REF: OBRIEN 4 SONS RECREATION
SITE LOCATION: 322 TOTTEN POND RD. - WALTHAM, MA. 02451

REVISION DATES	DRAWN BY:	DATE:
REV: KLY	8-16-20	
REV: PRJ #:	3532A	
REV: PG:	4 OF 4	

THESE DRAWINGS PROVIDE A GENERIC OVERVIEW OF THE INSTALLATION. THEY ARE NOT PROJECT SPECIFIC OR REFLECT ANY CUSTOMIZATION UNLESS NOTED. PLEASE CONTACT VORTEX AQUATIC STRUCTURES INTERNATIONAL FOR MORE DETAILS.



- NOTES:**
1. CONTRACTOR RESPONSIBLE TO INSTALL SPLASHPAD EQUIPMENT CABINET PURCHASED BY THE CITY OF WALTHAM.
 2. CONTRACTOR RESPONSIBLE FOR ALL PLUMBING AND ELECTRICAL CONNECTIONS.
 3. CONTRACTOR TO REVIEW EQUIPMENT CABINET LOCATION WITH LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.
 4. CITY OF WALTHAM ELECTRICAL AND PLUMBING DEPARTMENTS TO APPROVE PLANS BEFORE INSTALLATION.

ITEM	ITEM	PROVIDED BY	DESCRIPTION	QTY
A	CABINET	VORTEX	ALUMINUM EQUIPMENT CABINET. FEATURING CONTROLLER READY LOCATION SEE PRODUCT SPECIFICATION SHEET FOR MORE DETAILED INFORMATION	1
B	WATER DISTRIBUTION MANIFOLD	VORTEX	PRE-ASSEMBLED AND WIRED UP TO 15 VALVES PAINTED STAINLESS STEEL MANIFOLD	1
C	CHASSIS	VORTEX	GALVANIZED STEEL CHASSIS SUPPORTING THE MANIFOLD ASSEMBLY	1
D	PRESSURE GAUGE	VORTEX	SEE PRODUCT SPECIFICATION SHEET	1

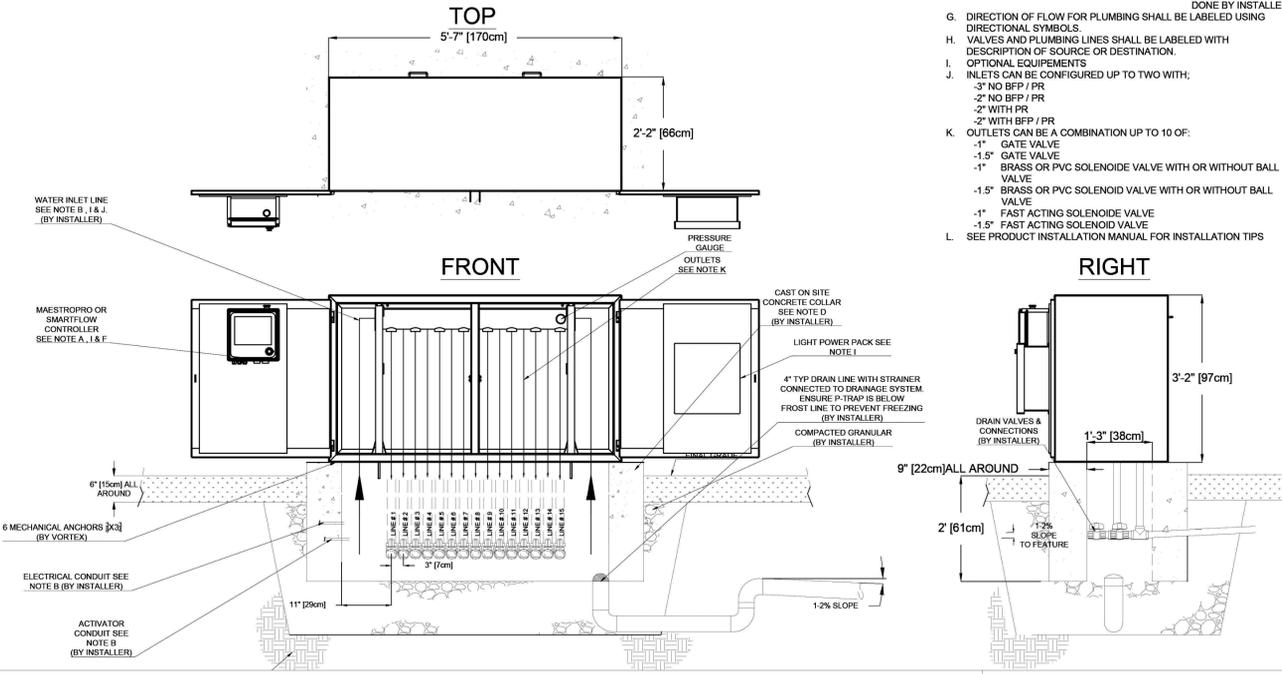
PRODUCT NAME: EQUIPEMENT CABINET 15 (EC15)
 PRODUCT NUMBER: D1750 DATE: 24/APR/2018 SHEET NO: 2/2 11"x17" SHEET SIZE



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1 SPLASHPAD - EQUIPMENT CABINET
 SCALE: NTS

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- A. A COMMON NEUTRAL MAY BE USED FOR UP TO TEN ELECTRIC VALVES WHEN CONTROLLER IS REMOTE LOCATED
- B. REFER TO P&E DRAWINGS FOR PIPE SIZES AND ELECTRICAL CONNECTIONS
- C. REFER TO PRODUCT SPECIFICATION DOCUMENT FOR ADDITIONAL INFORMATION
- D. CONCRETE SURFACE, VERIFY LOCAL CODES FOR TYPE, THICKNESS & REINFORCEMENTS REQUIREMENTS.
- E. "BY INSTALLER" MAY REFER TO SERVICE PROVIDERS OTHER THAN EQUIPMENT MANUFACTURER. PLEASE REFER TO THE PROJECT SCOPE OF WORK FOR DETAILS OF RESPONSIBILITIES.
- F. IF THE CONTROLLER IS REMOTE LOCATED, CONDUCTORS # 18 AWG AT 10' LONG ARE PROVIDED BY VORTEX. FOR QUANTITY SEE PIPING AND ELECTRICAL SCHEMATIC DETAIL. GROUNDING OF J-BOX DONE BY INSTALLER
- G. DIRECTION OF FLOW FOR PLUMBING SHALL BE LABELED USING DIRECTIONAL SYMBOLS.
- H. VALVES AND PLUMBING LINES SHALL BE LABELED WITH DESCRIPTION OF SOURCE OR DESTINATION.
- I. OPTIONAL EQUIPEMENTS
- J. INLETS CAN BE CONFIGURED UP TO TWO WITH:
 -3" NO BFP / PR
 -2" NO BFP / PR
 -2" WITH PR
 -2" WITH BFP / PR
- K. OUTLETS CAN BE A COMBINATION UP TO 10 OF:
 -1" GATE VALVE
 -1.5" GATE VALVE
 -1" BRASS OR PVC SOLENOID VALVE WITH OR WITHOUT BALL VALVE
 -1.5" BRASS OR PVC SOLENOID VALVE WITH OR WITHOUT BALL VALVE
 -1" FAST ACTING SOLENOID VALVE
 -1.5" FAST ACTING SOLENOID VALVE
- L. SEE PRODUCT INSTALLATION MANUAL FOR INSTALLATION TIPS

HEDLUND DESIGN GROUP
 LLC

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 10 Central Street, Arlington MA 02476 USA
 † 617-826-9302 www.hedlunddesign.com

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No.	Description	Date
1	ISSUED FOR BID	8-20-2020

DWG ISSUE & REVISION HISTORY

Stamp

ISSUED FOR BID

Project Title:
**PROSPECT HILL PARK
 WALTHAM, MA**

Drawing Title:
**SPLASHPAD EQUIPMENT
 CABINET DETAILS**

Project No. 180619
 Drawn By: PWH
 Checked By: PWH
 Scale: AS NOTED
 Date: August 20, 2020

Drawing No. **L9-1**

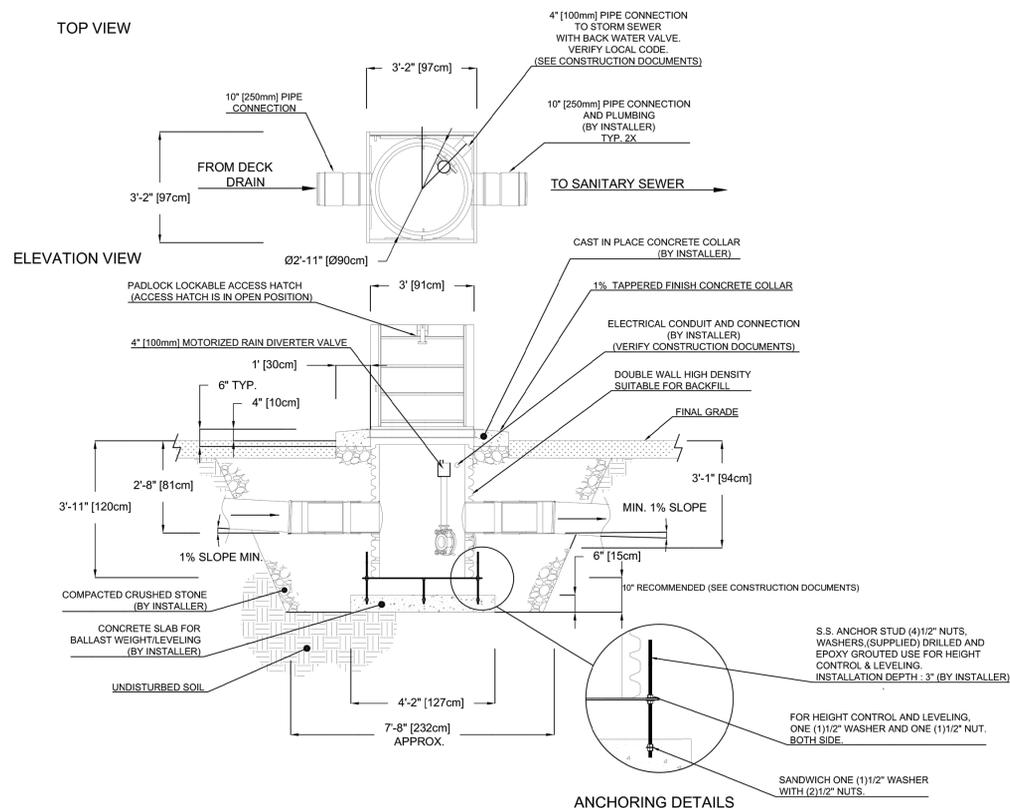
PRODUCT NAME: EQUIPEMENT CABINET 15 (EC15)
 PRODUCT NUMBER: D1750 DATE: 24/APR/2018 SHEET NO: 1/2 11"x17" SHEET SIZE



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2 SPLASHPAD - EQUIPMENT CABINET - ELEVATIONS AND PLAN
 SCALE: NTS

TOP VIEW



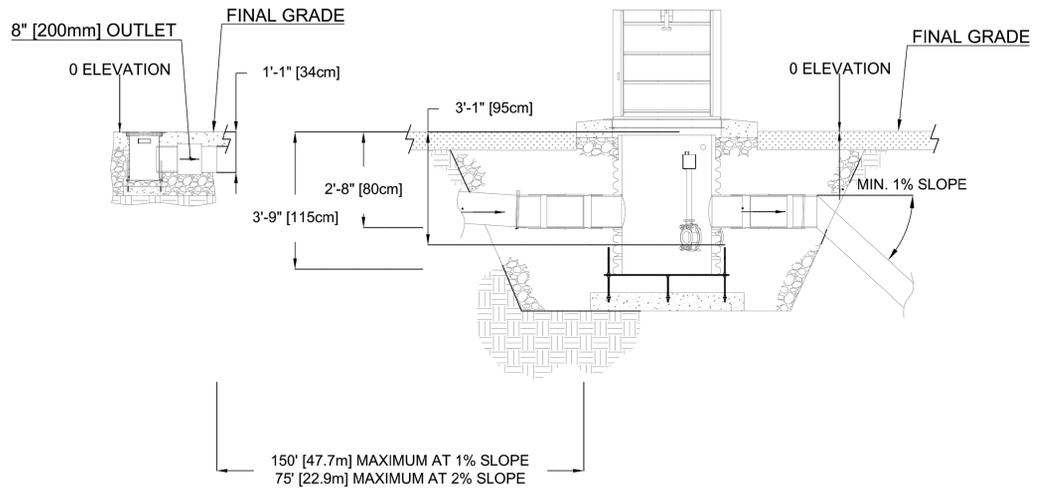
- NOTES:
1. CONTRACTOR RESPONSIBLE TO INSTALL RAIN DIVERTER PURCHASED BY THE CITY OF WALTHAM.
 2. CONTRACTOR RESPONSIBLE FOR ALL PLUMBING AND ELECTRICAL CONNECTIONS.
 3. CONTRACTOR TO REVIEW RAIN DIVERTER LOCATION WITH ENGINEER PRIOR TO INSTALLATION.
 4. CITY OF WALTHAM ELECTRICAL AND PLUMBING DEPARTMENTS TO APPROVE PLANS BEFORE INSTALLATION.

PROJECT NAME: MANHOLE HDPE WITH RAIN DIVERTER		PROJECT INFORMATION	
PROJECT NUMBER: VOR-5324.0000R02	DATE: 03/04/19	SHEET NO: 1/2	11"x17" SHEET SIZE



1 SPLASHPAD - RAIN DIVERTER AND MANHOLE
SCALE: NTS

DECK DRAIN DEBRIS TRAP



- NOTES:
1. ALL DRAINAGE LINES ARE GRAVITY FEED. 1% SLOPE MIN, 2% SUGGESTED.

PROJECT NAME: MANHOLE HDPE WITH RAIN DIVERTER		PROJECT INFORMATION	
PROJECT NUMBER: VOR-5324.0000R02	DATE: 03/04/19	SHEET NO: 2/2	11"x17" SHEET SIZE



2 SPLASHPAD - RAIN DIVERTER AND MANHOLE SECTION
SCALE: NTS

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No.	Description	Date
1	ISSUED FOR BID	8-20-2020

DWG ISSUE & REVISION HISTORY

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ISSUED FOR BID

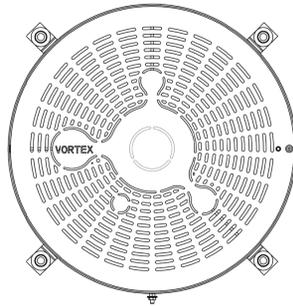
Project Title:
**PROSPECT HILL PARK
WALTHAM, MA**

Drawing Title:
**SPLASHPAD
RAIN DIVERTER
DETAILS**

Project No. 180619
Drawn By: PWH
Checked By: PWH
Scale: AS NOTED
Date: August 20, 2020

Drawing No. **L9-2**

PLAN VIEW

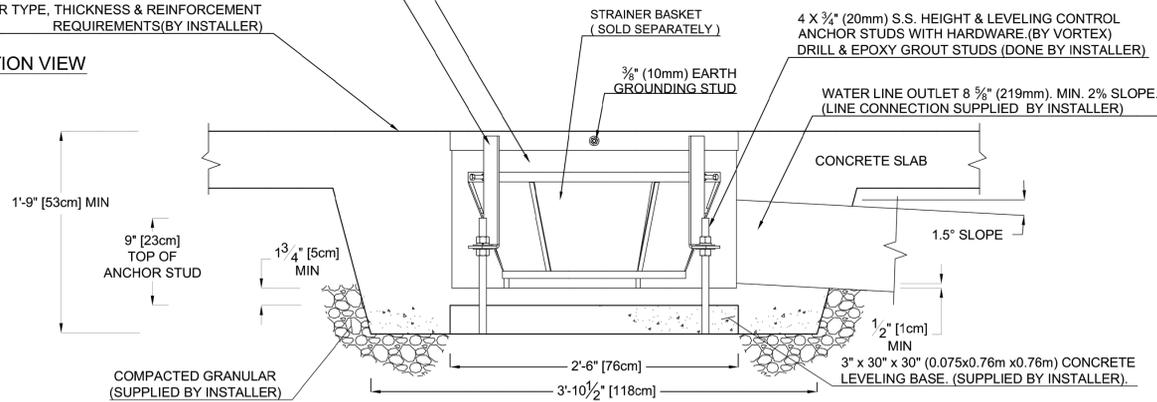


EXPANDED POLYPROPYLENE DRAIN BOX FOAM (BY VORTEX)

ANCHORING SYSTEM TO BE INSTALLED LEVEL, PLUMB & FLUSH TO FINISHED GRADE (BY INSTALLER)

CONCRETE SURFACE. VERIFY LOCAL CODES FOR TYPE, THICKNESS & REINFORCEMENT REQUIREMENTS (BY INSTALLER)

FRONT ELEVATION VIEW



VOR-1001.4000 PLAYSAFE DRAIN, No1 (Construction Detail)

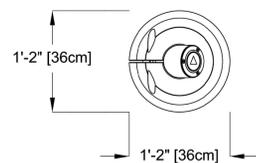
- NOTES:
1. CONTRACTOR RESPONSIBLE TO INSTALL SPLASHPAD ELEMENTS PURCHASED BY THE CITY OF WALTHAM.
 2. CONTRACTOR RESPONSIBLE FOR ALL PLUMBING CONNECTIONS.
 3. CONTRACTOR TO REVIEW LOCATIONS WITH LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.
 4. CITY OF WALTHAM ELECTRICAL AND PLUMBING DEPARTMENTS TO APPROVE PLANS BEFORE INSTALLATION.

PRODUCT NAME: PLAYSAFE DRAIN, No1	PRODUCT INFORMATION		
PRODUCT NUMBER: VOR-1001.4000	DATE: 07/29/11	SHEET NO: 1/1	11"x17" SHEET SIZE

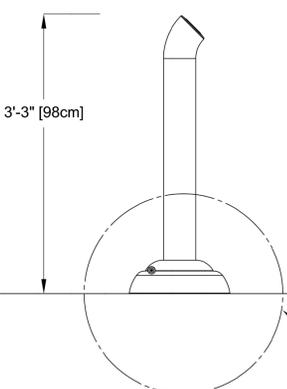


1 SPLASHPAD - PLAYSAFE DRAIN INSTALLATION DETAILS
SCALE: NTS

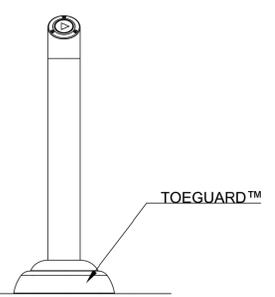
PLAN VIEW



FRONT ELEVATION VIEW



SIDE ELEVATION VIEW



TYPICAL ANCHORING SAFESWAP N°1
FOR THIS APPLICATION, 2" NPT FEMALE COUPLING OF THE SAFESWAP N°1 WILL BE USED TO CONNECT THE ELECTRICAL CONDUIT, SUPPLIED BY INSTALER, AND RUN THE ELECTRICAL CABLE.

ELECTRICAL CABLE SPECIFICATION
M12-5PIN CONNECTOR CABLE, 22AWG, MAXIMUM O.D. : 0.25"
(SUPPLIED UP TO 75M WITH ACTIVATOR BY VORTEX)

VOR-0611.2XXX BOLLARD ACTIVATOR N°3 (Construction Detail)

PRODUCT NAME: BOLLARD ACTIVATOR No 3	PRODUCT INFORMATION		
PRODUCT NUMBER: VOR-0611.2XXX	DATE: 12/20/19	SHEET NO: 1/1	11"x17" SHEET SIZE



2 SPLASHPAD - BOLLARD ACTIVATOR INSTALLATION DETAILS
SCALE: NTS

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1	ISSUED FOR BID	8-20-2020
No.	Description	Date

DWG ISSUE & REVISION HISTORY

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Project Title:

PROSPECT HILL PARK
WALTHAM, MA

Drawing Title:

SPLASHPAD DETAILS

Project No. 180619

Drawn By: PWH

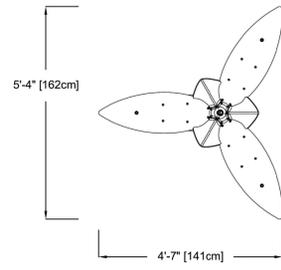
Checked By: PWH

Scale: AS NOTED

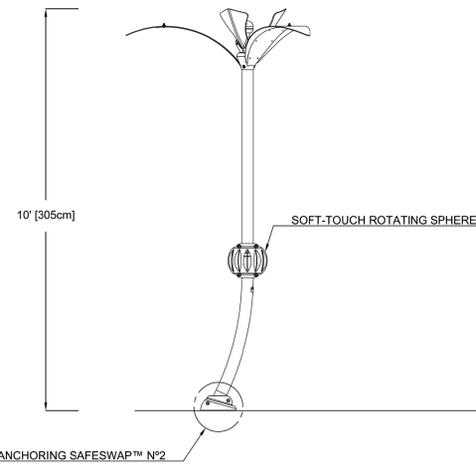
Date: August 20, 2020

Drawing No. L9-3

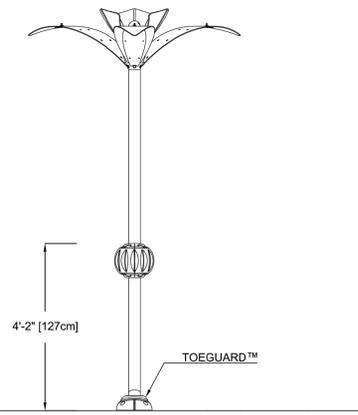
PLAN VIEW



FRONT ELEVATION VIEW



SIDE ELEVATION VIEW



NOTES:

1. CONTRACTOR RESPONSIBLE TO INSTALL SPLASHPAD ELEMENTS PURCHASED BY THE CITY OF WALTHAM.
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4. CITY OF WALTHAM ELECTRICAL AND PLUMBING DEPARTMENTS TO APPROVE PLANS BEFORE INSTALLATION.

PRODUCT NAME: BLOOM No1

PRODUCT INFORMATION

PRODUCT NUMBER: VOR-7486.200X

DATE: 06/06/14

SHEET NO: 1/1

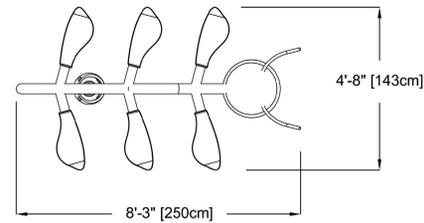
11"x17" SHEET SIZE



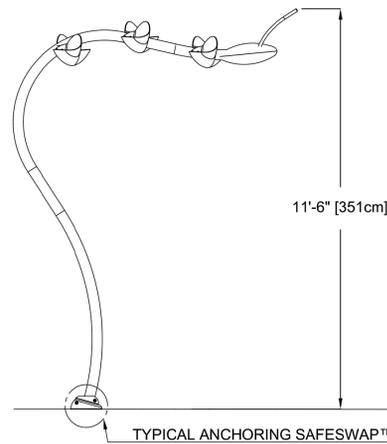
1 SPLASHPAD - BLOOM INSTALLATION DETAILS

SCALE: NTS

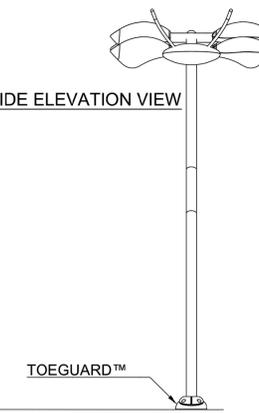
PLAN VIEW



FRONT ELEVATION VIEW



SIDE ELEVATION VIEW



PRODUCT NAME: GARDEN BUG

PRODUCT INFORMATION

PRODUCT NUMBER: VOR-7785.2XXX

DATE: 11/11/15

SHEET NO: 1/1

11"x17" SHEET SIZE



2 SPLASHPAD - GARDEN BUG INSTALLATION DETAILS

SCALE: NTS

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www.horsleywitten.com
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No.	Description	Date
1	ISSUED FOR BID	8-20-2020

DWG ISSUE & REVISION HISTORY

Stamp



ISSUED FOR BID

Project Title:

PROSPECT HILL PARK
WALTHAM, MA

Drawing Title:

SPLASHPAD DETAILS

Project No. 180619

Drawn By: PWH

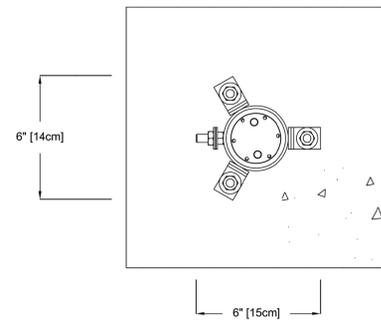
Checked By: PWH

Scale: AS NOTED

Date: August 20, 2020

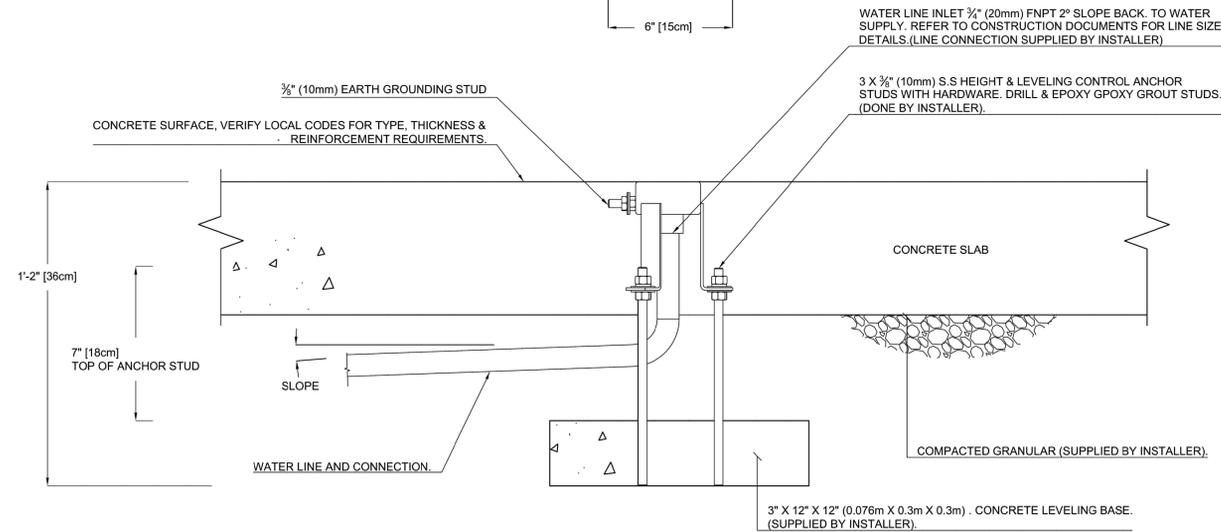
Drawing No. L9-4

PLAN VIEW



NOTE:
BY INSTALLER/CONTRACTOR *MAY REFER TO SERVICE PROVIDERS OTHER THAN THE EQUIPMENT MANUFACTURER. PLEASE REFER TO PROJECT SPECIFICATION FOR DETAILS OF RESPONSIBILITY.

FRONT ELEVATION VIEW



- NOTES:
1. CONTRACTOR RESPONSIBLE TO INSTALL SPLASHPAD ELEMENTS PURCHASED BY THE CITY OF WALTHAM.
 2. CONTRACTOR RESPONSIBLE FOR ALL PLUMBING CONNECTIONS.
 3. CONTRACTOR TO REVIEW LOCATIONS WITH LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.
 4. CITY OF WALTHAM ELECTRICAL AND PLUMBING DEPARTMENTS TO APPROVE PLANS BEFORE INSTALLATION.

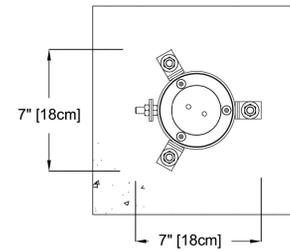
PRODUCT NAME: GEYSER	PRODUCT INFORMATION		
PRODUCT NUMBER: VOR-0301.4XXX	DATE: 08/23/16	SHEET NO: 1/1	11"x17" SHEET SIZE



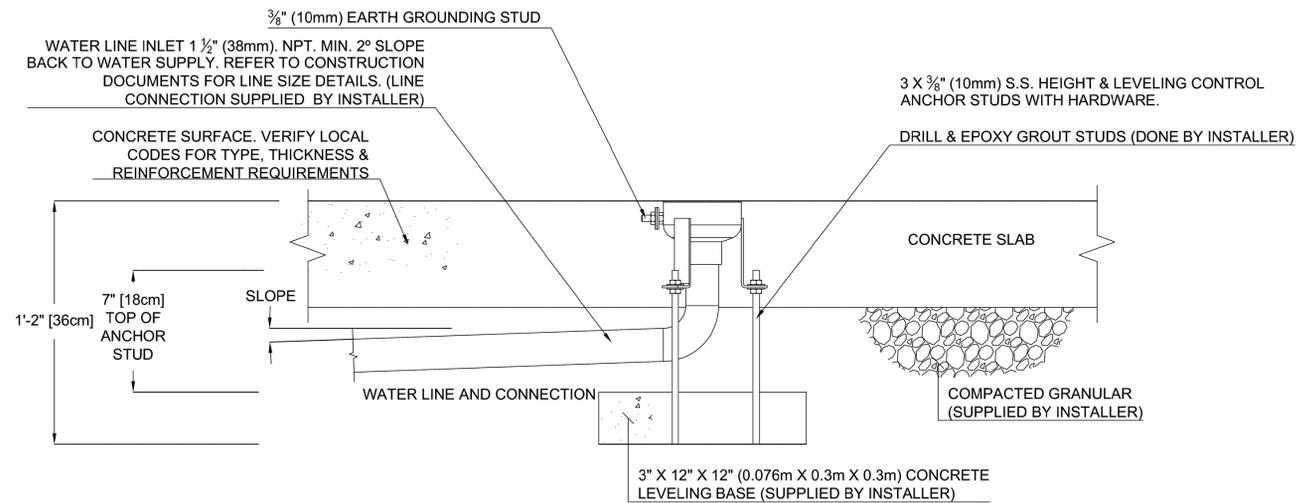
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1 SPLASHPAD - GEYSER INSTALLATION DETAILS
SCALE: NTS

PLAN VIEW



FRONT ELEVATION VIEW



VOR-0324.4XXX SPARKLE No.1 (Construction Detail)

PRODUCT NAME: SPARKLE No.1	PRODUCT INFORMATION		
PRODUCT NUMBER: VOR-0324.4XXX	DATE: 08/05/16	SHEET NO: 1/1	11"x17" SHEET SIZE



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2 SPLASHPAD - SPARKLE INSTALLATION DETAILS
SCALE: NTS

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1	ISSUED FOR BID	8-20-2020
No.	Description	Date

DWG ISSUE & REVISION HISTORY

Stamp



ISSUED FOR BID

Project Title:

PROSPECT HILL PARK
WALTHAM, MA

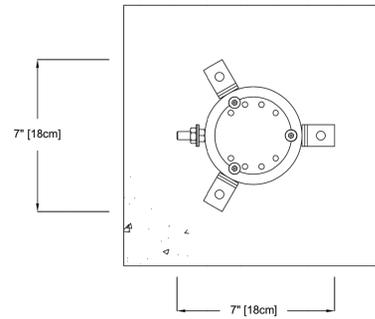
Drawing Title:

SPLASHPAD DETAILS

Project No. 180619
Drawn By: PWH
Checked By: PWH
Scale: AS NOTED
Date: August 20, 2020

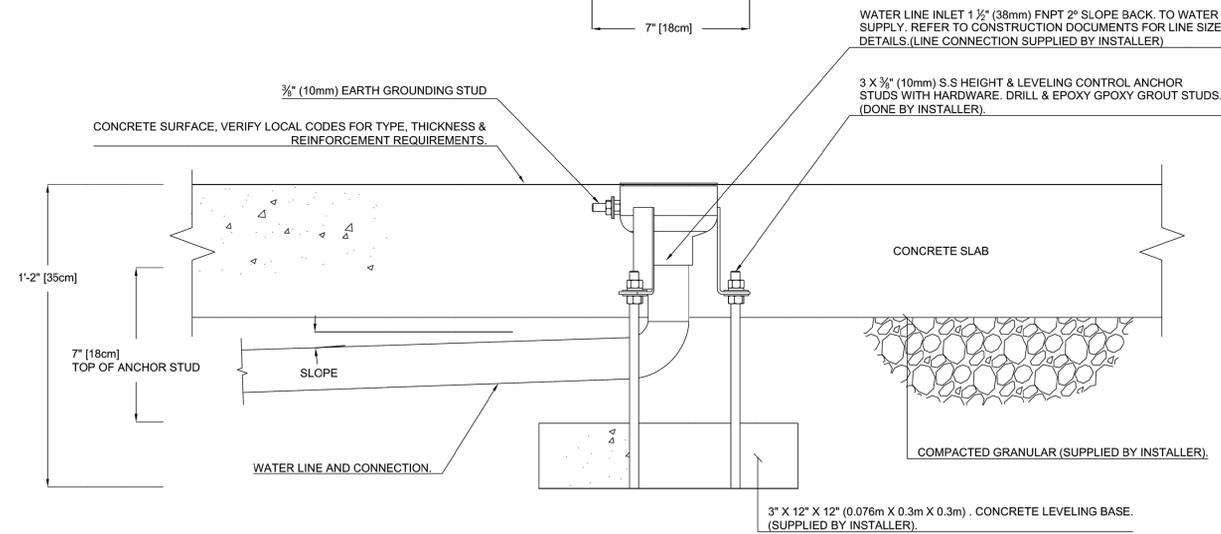
Drawing No. L9-5

PLAN VIEW



NOTE:
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FRONT ELEVATION VIEW



NOTES:

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PRODUCT NAME: SPIDEY SPRAY N°2

PRODUCT NUMBER: VOR-7674.0XXX

DATE: 05/26/15

PRODUCT INFORMATION

SHEET NO: 1/1

11"x17" SHEET SIZE

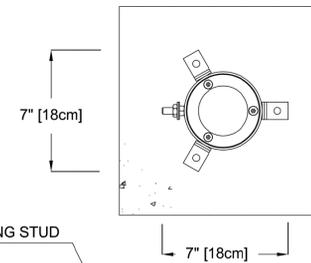


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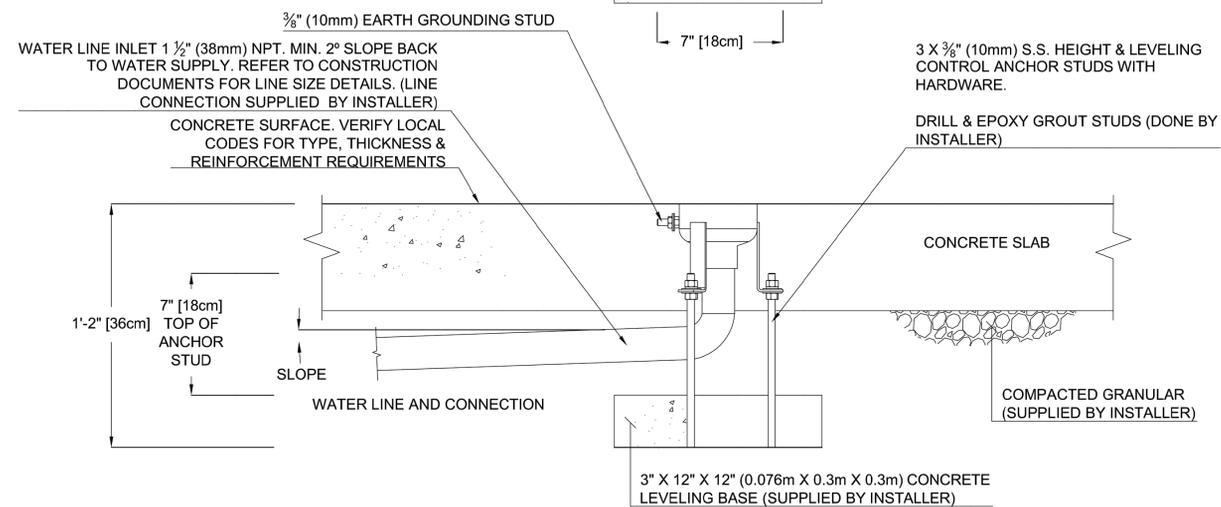
1 SPLASHPAD - SPIDEY SPRAY INSTALLATION DETAILS

SCALE: NTS

PLAN VIEW



FRONT ELEVATION VIEW



VOR-7516.0XXX SPLIT STREAM (Construction Detail)

PRODUCT NAME: SPLIT STREAM

PRODUCT NUMBER: VOR-7516.0XXX

DATE: 12/03/10

PRODUCT INFORMATION

SHEET NO: 1/1

11"x17" SHEET SIZE



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2 SPLASHPAD - SPLIT STREAM INSTALLATION DETAILS

SCALE: NTS

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Landscape Architecture + Planning

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No.	Description	Date
1	ISSUED FOR BID	8-20-2020

DWG ISSUE & REVISION HISTORY

Stamp



ISSUED FOR BID

Project Title:

PROSPECT HILL PARK
WALTHAM, MA

Drawing Title:

SPLASHPAD DETAILS

Project No. 180619

Drawn By: PWH

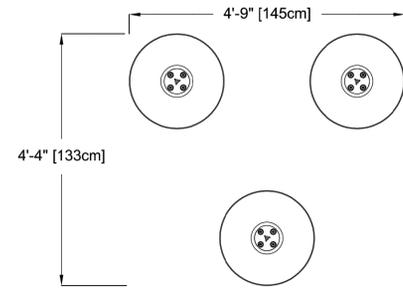
Checked By: PWH

Scale: AS NOTED

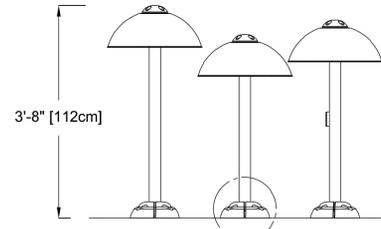
Date: August 20, 2020

Drawing No. L9-6

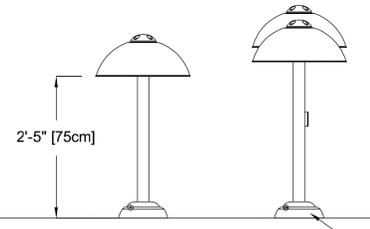
PLAN VIEW



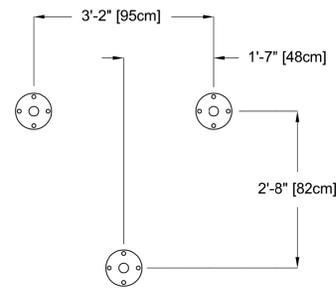
FRONT ELEVATION VIEW



SIDE ELEVATION VIEW



ANCHORING LOCATIONS



NOTES:

1. CONTRACTOR RESPONSIBLE TO INSTALL SPLASHPAD ELEMENTS PURCHASED BY THE CITY OF WALTHAM.
2. CONTRACTOR RESPONSIBLE FOR ALL PLUMBING CONNECTIONS.
3. CONTRACTOR TO REVIEW LOCATIONS WITH LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.
4. CITY OF WALTHAM ELECTRICAL AND PLUMBING DEPARTMENTS TO APPROVE PLANS BEFORE INSTALLATION.

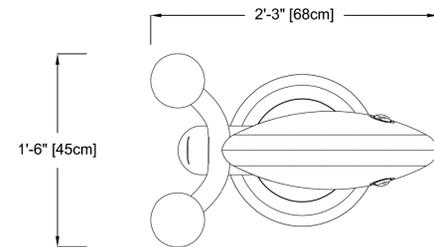
VOR-7000.0XXX AQUALIEN RAINFOREST N°7 (Construction Detail)

PRODUCT NAME: AQUALIEN RAINFOREST N°7	PRODUCT INFORMATION		
PRODUCT NUMBER: VOR-7000.0XXX	DATE: 03/18/13	SHEET NO: 1/1	11"x17" SHEET SIZE

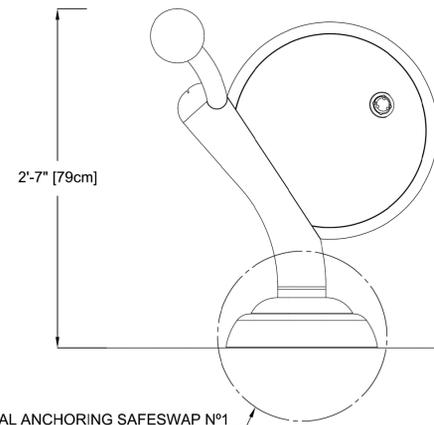


1 SPLASHPAD - AQUALIEN RAINFOREST INSTALLATION DETAILS
SCALE: NTS

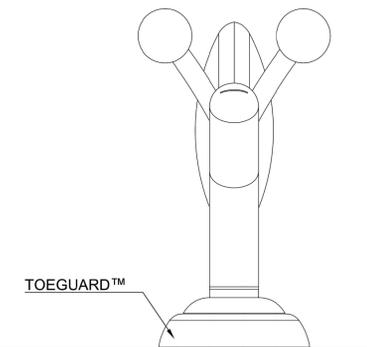
PLAN VIEW



FRONT ELEVATION VIEW



SIDE ELEVATION VIEW



TYPICAL ANCHORING SAFESWAP N°1

VOR-7217.2XXX SNAIL No4 (Construction Detail)

PRODUCT NAME: SNAIL No4	PRODUCT INFORMATION		
PRODUCT NUMBER: VOR-7217.2XXX	DATE: 01/23/15	SHEET NO: 1/1	11"x17" SHEET SIZE



2 SPLASHPAD - SNAIL NO. 4 INSTALLATION DETAILS
SCALE: NTS

HEDLUND DESIGN GROUP
LLC

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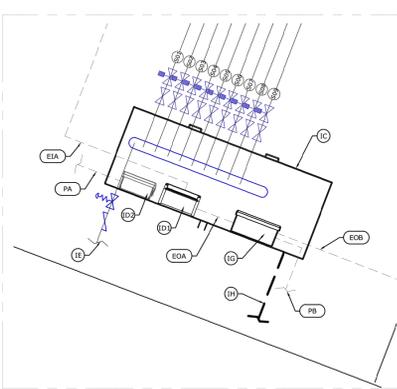
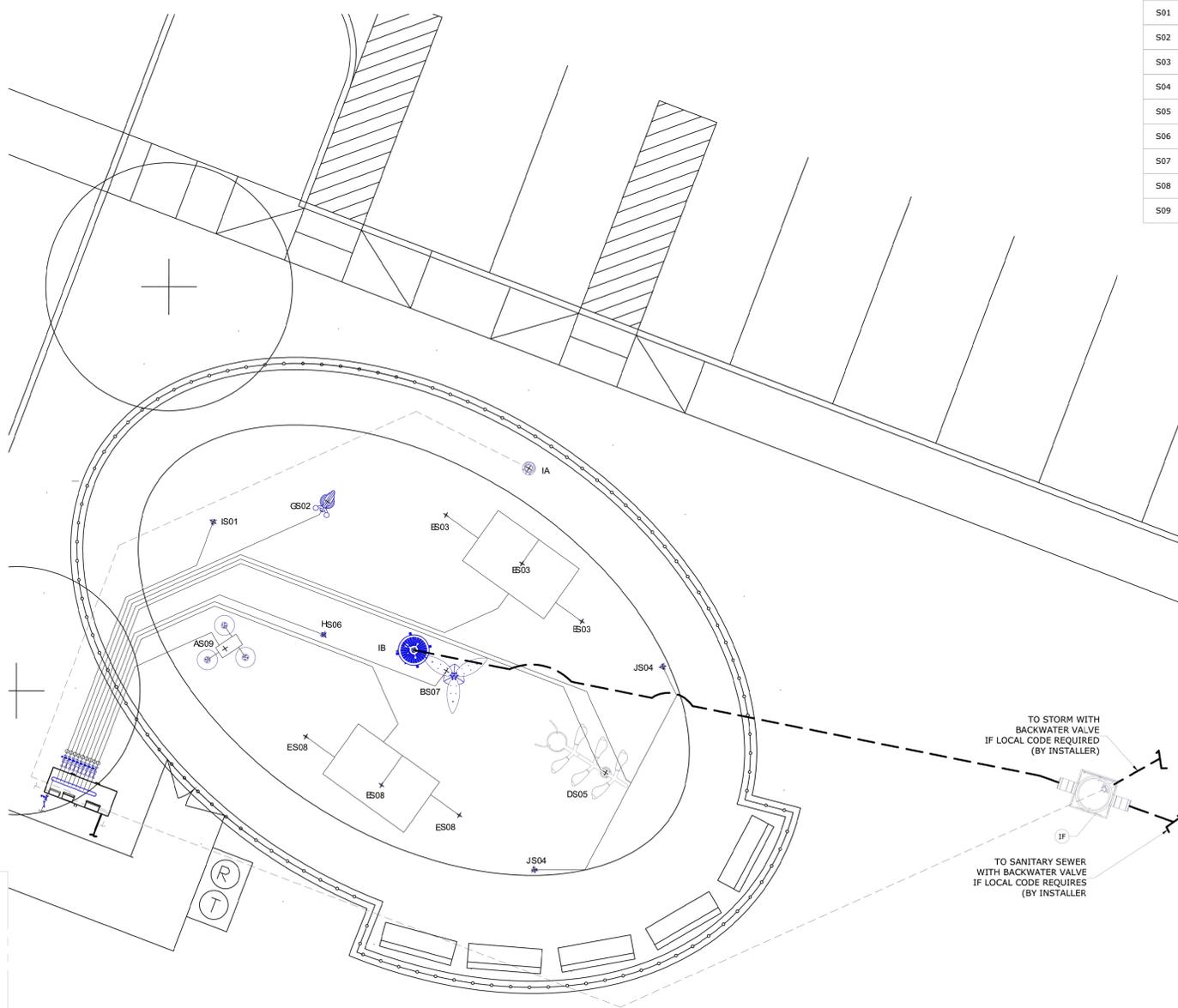
Checked By: PWH

Scale: AS NOTED

Date: August 20, 2020

Drawing No. **L9-7**

- 1 PIPING**
- 1.1 WDS CONFIGURATION ARE SCHEMATIC AND MAY BE MOVED OR ADJUSTED ON SITE BY VORTEX CERTIFIED INSTALLER TO ADJUST FOR SITE CONDITIONS
 - 1.2 ANY REQUIRED WATER METER ON THE CITY WATER MAIN SHALL BE PROVIDED BY INSTALLER. BACKFLOW PREVENTER AND PRESSURE REGULATOR WILL BE PROVIDED BY VORTEX.
 - 1.3 ALL PIPE LINES TO FEATURES TO HAVE A 1% MINIMUM RECOMMENDED SLOPE FOR PROPER WINTERIZATION.
 - 1.4 ALL LINE SIZING (FEATURE CONNECTION TABLE) ASSUMES A MAXIMUM DISTANCE OF 100 FEET BETWEEN THE WATER DISTRIBUTION MANIFOLD AND THE FURTHEST PLAY PRODUCT. DISTANCES ABOVE 100 FEET MAY REQUIRE AN INCREASE IN LINE SIZING. PLEASE CONTACT VORTEX.
 - 1.5 THE LINE DIAMETER FROM DRAIN SHALL BE 8" BASED ON THE MAXIMUM APPROXIMATE FLOW AT 1% SLOPE. FINAL LOCATION OF DRAIN AND LINE ROUTING ARE TO BE DETERMINED BY OTHERS.
 - 1.6 PRESSURE LINES ARE RECOMMENDED TO BE SCHEDULE 80 PVC OR PEX, AND NON-PRESSURE LINES TO BE SCHEDULE 40, UNLESS OTHERWISE REQUESTED BY LOCAL CODE.
 - 1.7 DRAINAGE LINES ARE RECOMMENDED TO BE SDR 35, UNLESS OTHERWISE REQUESTED BY LOCAL CODE.
 - 1.8 PIPING SHOULD BE INSPECTED AFTER TRANSPORTATION FOR CUTS, SCRATCHES, GOUGES OR SPLITS; DAMAGED SECTIONS MUST BE DISCARDED OR CUT OUT.
 - 1.9 PIPE SHALL BE INSTALLED BELOW THE FROST LEVEL NOT LESS THAN 12" (ASTM F-645) UNLESS OTHERWISE REQUESTED BY LOCAL CODE.
 - 1.10 PIPE INSTALLATION MINIMUM COVER SHOULD BE EVALUATED ACCORDING TO ASTM D-2774, UNLESS OTHERWISE REQUESTED BY LOCAL CODE.
 - 1.11 SPECIAL CONSIDERATIONS SHOULD BE TAKEN FOR THERMAL CONDITIONS, EXPANSION AND CONTRACTIONS DUE TO TEMPERATURE SHOULD BE EVALUATED BEFORE THE INSTALLATION BY THE CONTRACTOR.
 - 1.12 VALVE NUMBER 1 IS LOCATED TO THE LEFT OF THE MANIFOLD FACING THE SOLENOID.
 - 1.13 MINIMUM 50 PSI REQUIRED AT THE INLET OF THE BACKFLOW PREVENTER AND PRESSURE REGULATING DEVICE.
 - 1.14 MAXIMUM FLOW CAPACITY OF MANIFOLD IS 72 GPM.
 - 1.15 TOTAL FLOW OF THE FEATURE IS 83 GPM.
 - 1.16 FACTORY MAXIMUM SEQUENCING FLOW IS 72 GPM. ACTUAL FLOW MAY VARY DUE TO SITE CONDITIONS.
- 2 ELECTRICAL**
- 2.1 WIRING FROM THE CONTROLLER TO EACH ACTIVATOR SHALL BE #22 AWG. A TOTAL OF FIVE (5) CONDUCTORS PER ACTIVATOR, CABLE LENGTH UP TO 246' (75m), PROVIDED BY VORTEX.
 - 2.2 ALL CONNECTIONS TO THE CONTROLLER AND OTHER VORTEX ELECTRICAL PANEL SHALL BE PERFORMED USING AN APPROVED NEMA 4X CONNECTOR.
 - 2.3 WIRE FROM MAIN POWER TO VORTEX PANEL TO BE DETERMINED BY OTHERS RESPECTING THE LOCAL CODE.
 - 2.4 MAINTAIN A MINIMUM CLEARANCE ZONE OF 36" IN FRONT OF ELECTRICAL PANEL, UNLESS OTHERWISE REQUESTED BY LOCAL CODE.
 - 2.5 USE #8 BARE COPPER BONDING WIRE BETWEEN FEATURES TO A GROUNDING ROD IN THE SOIL, TIED INTO REBAR GRID, OR AS PER LOCAL CODE.
 - 2.6 AS PER ELECTRICAL CONSTRUCTION AND SAFETY CODES: CONTROLLER AND/OR ANY OTHER RAIN DIVERTER JUNCTION BOX MUST BE HARD-WIRED TO A GROUND FAULT CIRCUIT INTERRUPTER (GFCI) FROM THE INPUT POWER SOURCE.
 - 2.7 ALL ELECTRICAL WORK SHOULD BE PERFORMED BY A LICENCE ELECTRICIAN IN ACCORDANCE TO LOCAL ELECTRICAL CONSTRUCTION AND SAFETY CODES.
 - 2.8 THE MAESTROPRO CONTROL PANEL IS POWERED THROUGH A MAESTROPRO POWER BOX.
 - 2.9 THE POWER CABLE TO MAESTROPRO POWER BOX IS SUPPLIED BY INSTALLER.
 - 2.10 THE MAESTROPRO CONTROL PANEL INTEGRATES 24 DIGITAL OUTPUTS WITH 24 VAC AND 12 DIGITAL INPUTS.



Feature Connection Table						
Manifold Output Ref.	Solenoid Valve	Feature Ref.	Feature	Qty	Line Size	Gpm Output (ID1)
S01	1 1/2" Std	I	Spidey Spray N°2 VOR 7674	1	1 1/2"	8.5
S02	1 1/2" Std	G	Snail N°4 VOR 7217	1	1 1/2"	6.5
S03	1 1/2" Std	E	Geysier VOR 0301	3	1 1/2"	13.5
S04	1 1/2" Std	J	Spit Stream VOR 7516	2	1 1/2"	15
S05	1 1/2" Std	D	Gardenbug VOR 7785	1	1 1/2"	9
S06	1 1/2" Std	H	Sparkle N°1 VOR 0324	1	1 1/2"	2.5
S07	1 1/2" Std	B	Bloom N°1 VOR 7486	1	1 1/2"	8.5
S08	1 1/2" Std	E	Geysier VOR 0301	3	1 1/2"	13.5
S09	1 1/2" Std	A	Aqualien Rain Forest N°7 VOR 7000	1	1 1/2"	6

Electrical Line Connections Power					
Product Code	From	To	# Conductors	Gauge/Type	Note
PA	Main Power Line (by Owner)	ID2-120VAC	3	TBD (by other)	120V, 1 Phase, 60Hz, 10Amps Breaker Recommended ± 5% Voltage Drop is Acceptable
PB	Main Power Line (by Owner)	IG-120VAC	3	TBD (by other)	120V, 1 Phase, 60Hz, 10Amps Breaker Recommended ± 5% Voltage Drop is Acceptable

Electrical Line Connections Controller Outputs (EO'X')					
Connection Ref.	From	To	# Conductors	Gauge/Type	Note
EOA	ID1-Output 21	IG-Rain Diverter Junction Box	2	16	Signal from Maestro Controller to Rain Diverter Junction Box, 24VAC, Max 300 mA (by Installer)
EOB	IG-Rain Diverter Junction Box	IF-Rain Diverter Valve	4	14	Electrical Conduit from Rain Diverter Junction Box to Rain Diverter, 24VAC, Max 300mA (by Installer)

Electrical Line Connections Controller Inputs					
Product Code	From	To	# Conductors	Gauge/Type	Note
EIA	ID1- Input 1	IA	5	22	Bollard Activator No3, 24 VDC, Max 345 mA, 246' Long Cable (by Vortex)

Product Legend		
Product Ref.	Product	Qty
IA	Bollard Activator No3 VOR-611	1
IB	Playsafe Drain No. 1 VOR-1001-0000	1
IC	Water Distribution System: ECCC Cabinet Command Center 34674D2003R01	1
ID1	MaestroPRO Controller 24 out/ 12 in	1
ID2	MaestroPRO Power Box	1
IE	2" City Water Line (by Installer)	1
IF	Manhole HDPE with Rain Diverter VOR-5324.0000	1
IG	Rain Diverter Junction Box VOR-5324.0000	1
IH	4" TYP Drain Line With Strainer Connected to Drainage System. Ensure P-Trap is Below Frost Line to Prevent Freezing. (by Installer)	1
IS03	Pressure Regulator (by Vortex)	1
IS04	Backflow Preventer (by Vortex)	1
IS05	Solenoid Valve 1 1/2"	9
IS06	Ball Valve 1 1/2"	9

1 PLUMBING & ELECTRICAL LAYOUT
PE-001 SCALE: 3/16"=1'-0"
 WATER LINE —————
 DRAIN LINE - - - - -
 ELECTRICAL LINE - - - - -

2 PLUMBING & ELECTRICAL LAYOUT
PE-001 SCALE: 1/2"=1'-0"

VORTEX
 VORTEX USA Inc.
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Prospect Hill Splashpad

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DWG ISSUE & REVISION HISTORY

Stamp

Project Location
 City of Waltham, MA
 Project Number
 34674
 Order Number

ISSUED FOR BID
 Project Title:
**PROSPECT HILL PARK
 WALTHAM, MA**

Drawing Title:
**SPLASHPAD PLUMBING
 AND ELECTRICAL PLANS**

Project No. 180619
 Drawn By: PWH
 Checked By: PWH
 Scale: AS NOTED
 Date: August 20, 2020

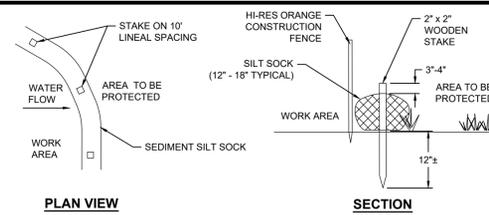
Drawing No. **L9-9**

EROSION & SEDIMENT CONTROL NOTES:

- PRIOR TO THE START OF CONSTRUCTION A NOTICE OF INTENT (NOI) MUST BE FILED WITH NPDES. REFER TO THE STORMWATER AND POLLUTION PREVENTION PLAN (SWPPP) REGARDING ALL EROSION CONTROL MATTERS. MAINTAIN A WORKING COPY OF THE SWPPP ON SITE AT ALL TIMES. FOLLOW THE SWPPP PROTOCOL FOR SITE MAINTENANCE, INSPECTIONS AND PROPER DOCUMENTATION UNTIL THE SITE HAS BEEN ACCEPTED BY THE OWNER. AT THE COMPLETION OF THE PROJECT THE CONTRACTOR OR OWNER MUST FILE A NOTICE OF TERMINATION WITH NPDES. IN ACCORDANCE WITH NPDES REGULATIONS, THE COMPLETED SWPPP MUST INCLUDE ALL OF THE SITE EROSION CONTROL DOCUMENTATION, WEEKLY EROSION INSPECTION REPORTS COMPLETED BY THE DESIGNATED SITE PERSONNEL, AND ANY OTHER PERTINENT SITE DOCUMENTATION MUST BE RETAINED FOR A MINIMUM OF 3 YEARS FROM THE DATE OF TERMINATION.
- DESIGNATE THE SITE CONSTRUCTION FOREMAN AS THE ON-SITE PERSONNEL RESPONSIBLE FOR THE DAILY INSPECTION AND MAINTENANCE OF ALL SEDIMENT AND EROSION CONTROLS AND IMPLEMENTATION OF ALL NECESSARY MEASURES TO CONTROL EROSION AND PREVENT SEDIMENT FROM LEAVING THE SITE.
- INSTALL ALL EROSION AND SEDIMENT CONTROL (ESC) MEASURES AS INDICATED ON DRAWINGS IN CONSULTATION WITH THE CONSERVATION AGENT, AND ENGINEER BEFORE ANY CONSTRUCTION ACTIVITIES BEGIN. INSPECT, MAINTAIN REPAIR AND REPLACE EROSION CONTROL MEASURES, AS NECESSARY, DURING THE ENTIRE CONSTRUCTION PERIOD OF THE PROJECT. THE SITE PERIMETER EROSION CONTROLS ARE THE DESIGNATED LIMIT OF WORK. INFORM ALL PERSONNEL WORKING ON THE PROJECT SITE THAT NO CONSTRUCTION ACTIVITY IS TO OCCUR BEYOND THE LIMIT OF WORK AT ANY TIME THROUGHOUT THE CONSTRUCTION PERIOD.
- MAINTAIN A MINIMUM SURPLUS OF 100 FEET OF EROSION CONTROL BARRIER (SILT FENCE &/OR SILT SOCK) ON SITE AT ALL TIMES.
- PROTECT THE ADJACENT RESOURCE AREA FROM SEDIMENTATION DURING PROJECT CONSTRUCTION UNTIL ACCEPTANCE BY THE OWNER & IN CONFORMANCE WITH THE ORDER OF CONDITIONS.
- PROVIDE CONSTRUCTION EXITS AS INDICATED ON DRAWINGS TO SHED DIRT FROM CONSTRUCTION VEHICLE TIRES. CLEAN AND/OR REPLACE THE CRUSHED STONE PAD, AS NECESSARY, TO MAINTAIN ITS EFFECTIVENESS.
- KEEP THE LIMIT OF CLEARING, GRADING AND DISTURBANCES TO A MINIMUM WITHIN THE PROPOSED AREA OF CONSTRUCTION. PHASE THE SITE WORK IN A MANNER TO MINIMIZE AREAS OF EXPOSED SOIL. IF TREES ARE TO BE CUT ON THE ENTIRE SITE, CLEAR AND GRUB ONLY THOSE AREAS WHICH ARE ACTIVELY UNDER CONSTRUCTION. PROPERLY INSTALL THE SEDIMENTATION CONTROLS PRIOR TO BEGINNING ANY LAND CLEARING ACTIVITY AND/OR OTHER CONSTRUCTION RELATED WORK.
- MONITOR LOCAL WEATHER REPORTS DURING CONSTRUCTION AND PRIOR TO SCHEDULING EARTHMOVING OR OTHER CONSTRUCTION ACTIVITIES WHICH LEAVE LARGE DISTURBED AREAS UNSTABILIZED. IF INCLEMENT WEATHER IS PREDICTED, USE BEST PROFESSIONAL JUDGEMENT AND GOOD CONSTRUCTION PRACTICES WHEN SCHEDULING CONSTRUCTION ACTIVITIES AND ENSURE THE NECESSARY EROSION CONTROL DEVICES ARE INSTALLED AND FUNCTIONING PROPERLY TO MINIMIZE EROSION FROM ANY IMPENDING WEATHER EVENTS.
- INSPECT EROSION AND SEDIMENT CONTROL DEVICES AND STABILIZED SLOPES ON A WEEKLY BASIS AND AFTER EACH RAINFALL EVENT OF .25 INCH OR GREATER. REPAIR IDENTIFIED PROBLEMS WITHIN 24 HOURS TO ENSURE EROSION AND SEDIMENT CONTROLS ARE IN GOOD WORKING ORDER. RESET OR REPLACE MATERIALS AS REQUIRED.
- SURROUND THE PERIMETER OF SOIL STOCKPILES WITH SILT SOCK, SILT FENCE, STRAWBALES, OR A COMBINATION OF SILT FENCE WITH STRAWBALE, AS DETERMINED NECESSARY.
- DISTURBED AREAS AND SLOPES MUST NOT BE LEFT UNATTENDED OR EXPOSED FOR EXCESSIVE PERIODS OF TIME SUCH AS THE INACTIVE WINTER SEASON. PROVIDE APPROPRIATE STABILIZATION PRACTICES ON ALL DISTURBED AREAS AS SOON AS POSSIBLE BUT NOT MORE THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT AREA HAS TEMPORARILY OR PERMANENTLY CEASED. REINFORCE TEMPORARY AREAS HAVING A SLOPE GREATER THAN 4:1 WITH EROSION BLANKETS OR APPROVED EQUIVALENT UNTIL THE SITE IS PROPERLY STABILIZED. TEMPORARY SWALES MAY ALSO BE REQUIRED IF DETERMINED NECESSARY IN THE FIELD BY THE ENGINEER.
- INSTALL A SILT SOCK OR APPROVED EQUIVALENT IN EACH EXISTING CATCH BASIN RECEIVING RUNOFF FROM THE SITE. UPON THE INSTALLATION OF EACH CATCH BASIN, INSTALL A SILT SOCK OR APPROVED EQUIVALENT. INSPECT SILT SOCKS, AFTER EACH SIGNIFICANT STORM EVENT AND REMOVE AND EMPTY AS NEEDED FOR THE DURATION OF THE CONSTRUCTION PERIOD.
- SMALL SEDIMENTATION BASINS MAY BE CONSTRUCTED ON AN AS-NEEDED BASIS DURING CONSTRUCTION TO AID IN THE CAPTURE OF SITE RUNOFF AND SEDIMENT. IT WILL BE THE RESPONSIBILITY OF THE SITE CONTRACTOR, IN CONSULTATION WITH THE ENGINEER, TO SIZE AND CREATE THESE BASINS IN APPROPRIATE LOCATIONS.
- CONTAIN ALL SEDIMENT ON SITE. SWEEP ALL EXITS FROM THE SITE, AS NECESSARY INCLUDING ANY SEDIMENT TRACKING. SWEEP PAVED AREAS AS NEEDED TO REMOVE SEDIMENT AND POTENTIAL POLLUTANTS ACCUMULATED DURING SITE CONSTRUCTION.
- REMOVE ACCUMULATED SEDIMENT FROM ALL TEMPORARY PRACTICES AND DISPOSE OF IN A PRE-APPROVED LOCATION.
- PROVIDE ON SITE OR MAKE READILY AVAILABLE THE NECESSARY EQUIPMENT AND SITE PERSONNEL DURING CONSTRUCTION HOURS FOR THE DURATION OF THE PROJECT TO ENSURE ALL EROSION AND SEDIMENTATION CONTROL DEVICES ARE PROPERLY MAINTAINED AND REPAIRED IN A TIMELY AND RESPONSIBLE MANNER. IF SITE WORK IS SUSPENDED DURING THE WINTER MONTHS THE CONTRACTOR MUST CONTINUE TO PROVIDE PERSONNEL AND EQUIPMENT EITHER ON SITE OR READILY AVAILABLE TO PROPERLY MAINTAIN AND REPAIR ALL EROSION AND SEDIMENTATION CONTROL DEVICES IN A TIMELY AND RESPONSIBLE MANNER.
- PRIOR TO THE INSTALLATION OF FILTER FABRIC AND MEDIA WITHIN THE BIORETENTION AREAS, REMOVE AND PROPERLY DISPOSE OF SEDIMENT ACCUMULATED IN ANY PARTIALLY CONSTRUCTED OR TEMPORARILY BIORETENTION/DRAINAGE AREA USED FOR SEDIMENT CONTROL DURING CONSTRUCTION. PROVIDE A SURFACE ELEVATION AT A MINIMUM 1-FOOT ABOVE THE BOTTOM OF MEDIA ELEVATION AS SHOWN IN THE BIORETENTION SCHEDULE FOR PARTIALLY CONSTRUCTED BIORETENTION AREAS. THIS ALLOWS FOR AN OVER-DIG OF THE COLLECTED SEDIMENT FROM WITHIN THE BIORETENTION AREA PRIOR TO MEDIA/FABRIC INSTALLATION.
- CONTROL DUST BY WATERING OR OTHER APPROVED METHODS AS NECESSARY, OR AS DIRECTED BY THE ENGINEER.
- THE CONTRACTOR IS RESPONSIBLE FOR THE INSPECTION AND MAINTENANCE DURING CONSTRUCTION OF ALL STORMWATER FACILITIES INSTALLED OR AFFECTED BY THE PROJECT. REMOVE SEDIMENT OR DEBRIS COLLECTED WITHIN THESE FACILITIES FROM THE PROJECT WORK PRIOR TO THE OWNER'S ACCEPTANCE.

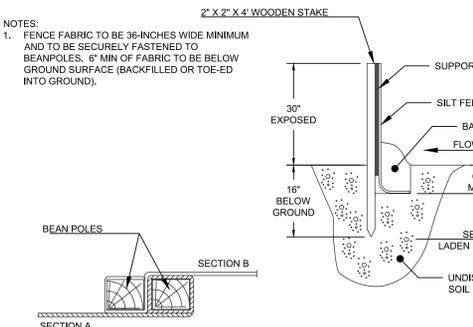
DEWATERING:

- A HIGH WATER TABLE IS ANTICIPATED. IF DEWATERING IS REQUIRED DURING EXCAVATION, TEMPORARILY LOWER THE WATER TABLE, PER SPECIFICATIONS, BY PUMPING. INSTALL A DEWATERING BASIN AS INDICATED IN THE DEWATERING BASIN DETAIL AND PROVIDE A DEWATERING PLAN DETAILING DEWATERING LOCATION FOR REVIEW AND APPROVAL. DIRECT THE PUMP DISCHARGE TO BASIN TO PREVENT SEDIMENTS FROM LEAVING THE CONSTRUCTION AREA. INSTALL ADDITIONAL BASINS IF REQUIRED. INSTALL THE BASIN AS INDICATED ON DRAWINGS IF SO NOTED, OTHERWISE INSTALL THE BASIN(S) WITHIN THE LIMIT OF DISTURBANCE INDICATED BY THE SILT FENCE OR STRAWBALES, OR
- PRIOR TO ANY DEWATERING, THE DEWATERING PLAN MUST BE APPROVED BY THE ENGINEER.
- IF DEWATERING IS NECESSARY DURING CONSTRUCTION, IMPLEMENT THE PROPER ESC MEASURES ON SITE TO PREVENT EROSION OR SEDIMENT RUNOFF. THESE MEASURES CAN INCLUDE DEWATERING BAGS, TEMPORARY STRAWBALES, SILT FENCES, SILT SOCKS AND/OR OTHER APPROVED DEVICES AS INDICATED IN THE DETAILS.



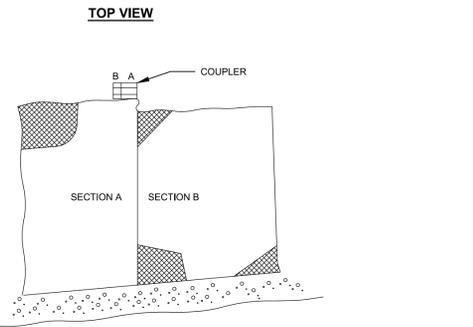
- NOTES:**
- SILT SOCK MANUFACTURER TO BE SILT SOXX OR ENGINEER APPROVED EQUIVALENT.
 - ALL MATERIAL TO MEET MANUFACTURER'S SPECIFICATIONS.
 - SEDIMENT SILT SOCK TO BE FILLED WITH LEAF COMPOST AND/OR WOODY MULCH PER MANUFACTURER'S REQUIREMENTS.
 - FOLLOWING CONSTRUCTION AND SITE STABILIZATION, COMPOST MATERIAL TO BE REMOVED OR DISPERSED ON SITE, AS APPROVED BY THE ENGINEER.

SEDIMENT SILT SOCK
NOT TO SCALE



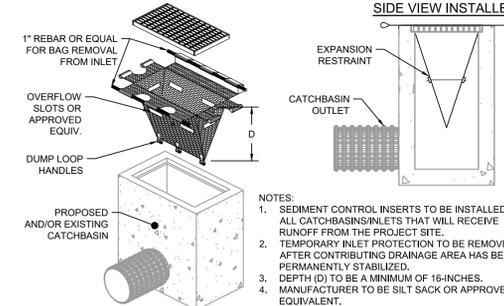
- NOTE:**
- STONE CONSTRUCTION ENTRANCE(S) TO REMAIN UNTIL INSTALLATION OF PAVEMENT SUB-BASE IS TO BEGIN.
 - SEE SITE PLAN FOR LOCATION & ACTUAL DIMENSIONS.

STONE CONSTRUCTION ENTRANCE
NOT TO SCALE



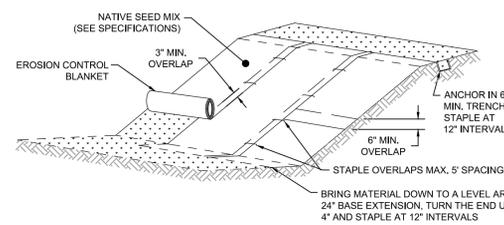
JOINING SECTIONS OF FENCE
NOT TO SCALE

EROSION/SILTATION CONTROL FENCE
NOT TO SCALE



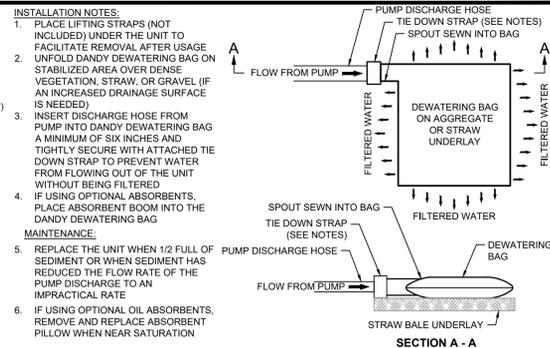
- NOTES:**
- SEDIMENT CONTROL INSERTS TO BE INSTALLED OVER ALL CATCHBASIN/INLETS THAT WILL RECEIVE RUNOFF FROM THE PROJECT SITE.
 - TEMPORARY INLET PROTECTION TO BE REMOVED AFTER CONTRIBUTING DRAINAGE AREA HAS BEEN PERMANENTLY STABILIZED.
 - DEPTH (D) TO BE A MINIMUM OF 16-INCHES.
 - MANUFACTURER TO BE SILT SOCK OR APPROVED EQUIVALENT.

INLET PROTECTION
NOT TO SCALE



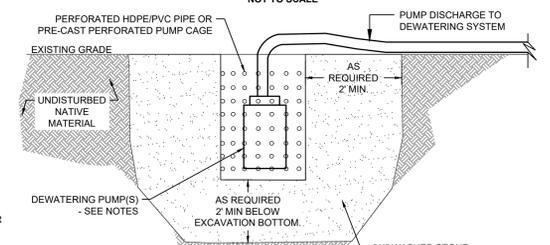
- NOTES:**
- EROSION CONTROL BLANKET TO BE ALL NATURAL MATERIAL SUITABLE FOR TEMPORARY STABILIZATION - NORTH AMERICAN GREEN BIONET S150BN OR APPROVED EQUIVALENT.
 - SLOPE SURFACE SHALL BE SMOOTH BEFORE PLACEMENT FOR PROPER SOIL CONTACT.
 - STAPLING PATTERN AS PER MANUFACTURER'S RECOMMENDATIONS.
 - DO NOT STRETCH BLANKETS/MATTINGS TIGHT. ALLOW THE ROLLS TO MOLD TO ANY IRREGULARITIES.
 - FOR SLOPES LESS THAN 3H:1V, ROLLS MAY BE PLACED IN HORIZONTAL STRIPS.
 - LIME, FERTILIZER AND SEED BEFORE INSTALLATION. PLANTING OF SHRUBS, TREES, ETC. SHOULD OCCUR AFTER INSTALLATION.

EROSION CONTROL BLANKET
NOT TO SCALE



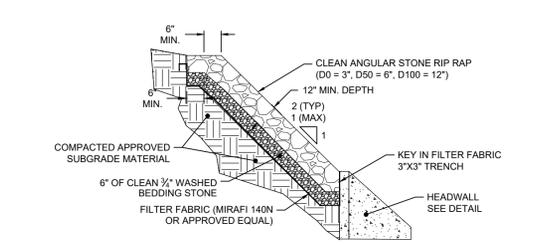
- INSTALLATION NOTES:**
- PLACE LIFTING STRAPS (NOT INCLUDED) UNDER THE UNIT TO FACILITATE REMOVAL AFTER USAGE
 - UNFOLD DANDY DEWATERING BAG ON STABILIZED AREA OVER DENSE VEGETATION, STRAW, OR GRAVEL (IF AN INCREASED DRAINAGE SURFACE IS NEEDED)
 - INSERT DISCHARGE HOSE FROM PUMP INTO DANDY DEWATERING BAG A MINIMUM OF SIX INCHES AND TIGHTLY SECURE WITH ATTACHED TIE DOWN STRAP TO PREVENT WATER FROM FLOWING OUT OF THE UNIT WITHOUT BEING FILTERED
 - IF USING OPTIONAL ABSORBENTS, PLACE ABSORBENT BOOM INTO THE DANDY DEWATERING BAG
- MAINTENANCE:**
- REPLACE THE UNIT WHEN 1/2 FULL OF SEDIMENT OR WHEN SEDIMENT HAS REDUCED THE FLOW RATE OF THE PUMP DISCHARGE TO AN IMPRACTICAL RATE
 - IF USING OPTIONAL OIL ABSORBENTS, REMOVE AND REPLACE ABSORBENT PILLLOW WHEN REATURATION

DEWATERING BAG
NOT TO SCALE



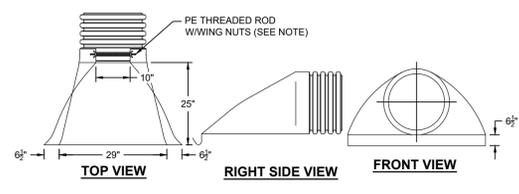
- NOTES:**
- PUMP AND EQUIPMENT IS TEMPORARY AND MUST BE REMOVED AFTER USE. STONE AND/OR NATURAL MATERIAL CAN REMAIN.
 - LOCATE PUMP OUTSIDE OF THE MAIN EXCAVATION AREA TO MINIMIZE SEDIMENTATION.
 - SIZE PUMP TO SUFFICIENTLY DEWATER EXCAVATION. MULTIPLE PUMPS TO BE INSTALLED AS NECESSARY.
 - PUMP CHAMBER SIZE TO BE DETERMINED BASED ON PUMP DIMENSIONS.
 - FINAL DEPTH TO BE DETERMINED BY CONTRACTOR BASED ON EXISTING GRADE AND DEPTH OF WATER.

DEWATERING SUMP
NOT TO SCALE



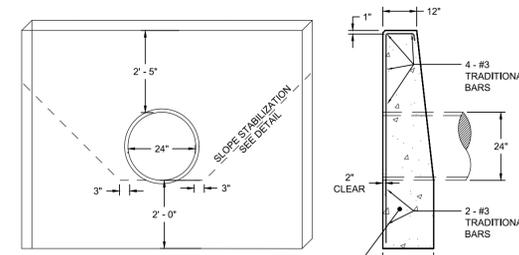
- NOTES:**
- FILTER FABRIC MUST BE COMPLETELY COVERED AND NOT EXPOSED TO THE SURFACE.
 - RIP RAP STONES TO BE INSTALLED WITHOUT BEDDING STONE AND PLACED BY HAND WHEN SLOPE IS 1:1.

SLOPE STABILIZATION
NOT TO SCALE

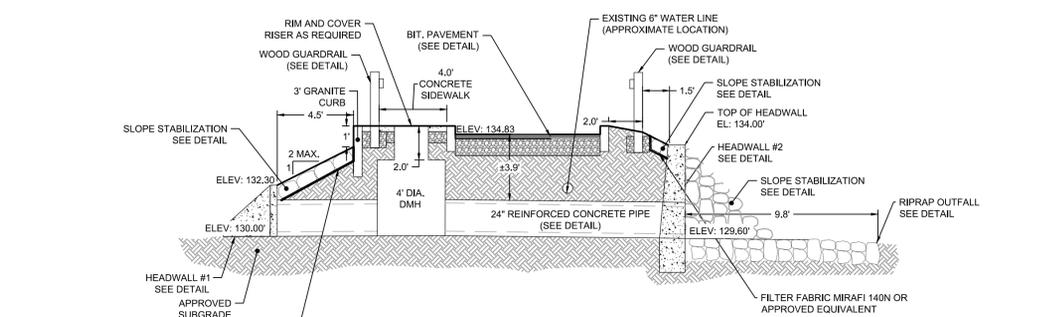


- NOTES:**
- PE THREADED ROD W/ WING NUTS PROVIDED FOR END SECTIONS
 - 12\"/>

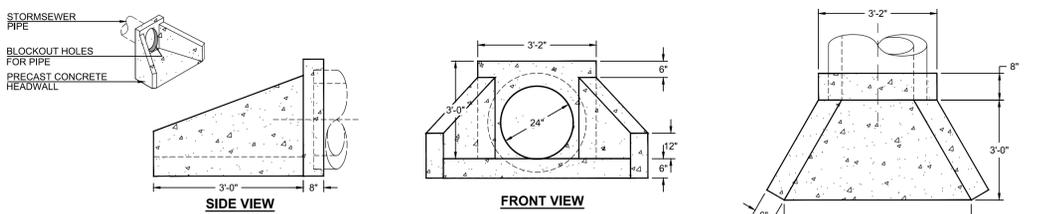
12\"/>HDPE FLARED END SECTION
NOT TO SCALE



HEADWALL #2
NOT TO SCALE

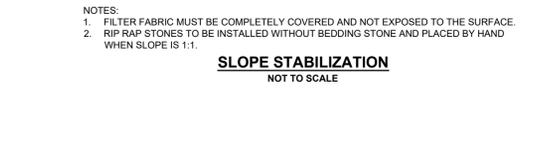


CULVERT PROFILE
NOT TO SCALE



HEADWALL #1
NOT TO SCALE

- NOTES:**
- CLASS II CONCRETE OF DESIGN STRENGTH OF 4500 PSI AT 28 DAYS. UNIT IS OF MONOLITHIC CONSTRUCTION INCLUDING WALLS AND FLOORS.
 - GRADE 60 REINFORCED, NO. 4 STEEL REBAR TO CONFORM TO ASTM A615 ON REQUIREMENTS OR EQUAL. BAR BENDING AND PLACEMENT WITH THE LATEST ACI STANDARDS



SECTION A-A
CULVERT OUTLET
NOT TO SCALE

- NOTE:**
- MINIMUM H=1/2 PIPE DIAMETER



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No.	Description	Date
1	ISSUED FOR BID	8-20-2020

DWG ISSUE & REVISION HISTORY

Stamp



8-20-2020
 Clayton

ISSUED FOR BID

Project Title:

PROSPECT HILL PARK
 WALTHAM, MA

Drawing Title:
EROSION AND SEDIMENT CONTROL & CULVERT DETAILS

Project No. 18163
 Drawn By: GSG
 Checked By: BRK
 Scale: 1"=20'
 Date: AUGUST 2020

Drawing No. L10 - 1

GENERAL SITE CONSTRUCTION NOTES:

- ALL SITE WORK TO COMPLETE THIS PROJECT AS INDICATED ON THE DRAWINGS AND IN THE SPECIFICATIONS IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
- ALL EXISTING CONDITIONS SHOWN ARE APPROXIMATE AND ARE BASED ON THE BEST INFORMATION AVAILABLE. PRIOR TO THE START OF CONSTRUCTION VERIFY THAT THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS DO NOT CONFLICT WITH ANY LOCAL EXISTING OR OTHER PROPOSED IMPROVEMENTS. IF ANY CONFLICTS ARE DISCOVERED, NOTIFY THE ENGINEER PRIOR TO INSTALLING ANY PORTION OF THE SITE WORK WHICH WOULD BE AFFECTED. IMMEDIATELY CONTACT AND COORDINATE WITH THE ENGINEER AND OWNER IF ANY DEVIATION OR ALTERATION OF THE WORK PROPOSED ON THESE DRAWINGS IS REQUIRED.
- UTILIZE ALL PRECAUTIONS AND MEASURES TO ENSURE THE SAFETY OF THE PUBLIC. ALL PERSONNEL AND PROPERTY DURING CONSTRUCTION IN ACCORDANCE WITH OSHA STANDARDS, INCLUDING THE INSTALLATION OF TEMPORARY FENCING BARRICADES, SAFETY LIGHTING, CONES, POLICE DETAIL AND/OR FLAGMEN AS DETERMINED NECESSARY BY THE CITY OF WALTHAM. THE CONTRACTOR IS RESPONSIBLE FOR THE COST OF POLICE DETAIL AND FOR COORDINATING WITH THE LOCAL OR STATE POLICE DEPARTMENT FOR ALL REQUIRED POLICE DETAIL.
- MAKE ALL NECESSARY CONSTRUCTION NOTIFICATIONS AND APPLY FOR AND OBTAIN ALL NECESSARY CONSTRUCTION PERMITS. PAY ALL FEES INCLUDING POLICE DETAILS AND POST ALL BONDS, IF NECESSARY, ASSOCIATED WITH THE SAME, AND COORDINATE WITH THE OWNER AND THE ENGINEER.
- COORDINATE ALL TRENCHING WORK WITH ROADWAYS WITH THE PROPER LOCAL & STATE AGENCY. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRENCH SAFETY INCLUDING ANY LOCAL AND/OR STATE PERMITS REQUIRED FOR THE TRENCH WORK. IF THIS WORK IS REQUIRED TO OCCUR OUTSIDE THE AGREED UPON HOURS OF OPERATION FOR THE FACILITY, THE CONTRACTOR MUST PLAN ACCORDINGLY.
- SAWCUT ALL TRENCH WORK WITHIN EXISTING PAVEMENT AS INDICATED ON THE DRAWINGS. BACKFILL AND COMPACT TRENCH WORK AS INDICATED ON THE DRAWINGS AND IN THE SPECIFICATIONS. IF SETTLEMENT OCCURS DUE TO INADEQUATE COMPACTION, AS DETERMINED BY THE ENGINEER, WITHIN THE WARRANTY PERIOD, THE CONTRACTOR IS REQUIRED TO REMOVE, PATCH AND REPAVE AFTER ONE COMPLETE 12-MONTH CYCLE.
- IMPORT ONLY CLEAN MATERIAL. MATERIAL FROM AN EXISTING OR FORMER 21E SITE. AS DEFINED BY THE MASSACHUSETTS CONTINGENCY PLAN 310 CMR 40.0000 WILL NOT BE ACCEPTED.
- IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ESTABLISH AND MAINTAIN ALL CONTROL POINTS AND BENCHMARKS DURING CONSTRUCTION INCLUDING BENCHMARK LOCATIONS AND ELEVATIONS AT CRITICAL AREAS. COORDINATE WITH THE ENGINEER THE LOCATION OF ALL CONTROL POINTS AND BENCHMARKS.
- SITE LAYOUT SURVEY REQUIRED FOR CONSTRUCTION MUST BE PROVIDED BY THE CONTRACTOR AND PERFORMED BY A MASSACHUSETTS REGISTERED PROFESSIONAL LAND SURVEYOR. THE SURVEYOR SHALL BE RESPONSIBLE FOR COORDINATING WITH THE SURVEYOR FOR ALL SITE SURVEY WORK.
- MAINTAIN ALL GRADE STAKES SET BY THE SURVEYOR. GRADE STAKES ARE TO REMAIN UNTIL A FINAL INSPECTION OF THE ITEM HAS BEEN COMPLETED BY THE ENGINEER. RE-STAKING OF PREVIOUSLY SURVEYED SITE FEATURES IS THE RESPONSIBILITY (INCLUDING COST) OF THE CONTRACTOR.
- UNLESS OTHERWISE INDICATED ON THE DRAWINGS AND/OR IN THE SPECIFICATIONS, ALL SITE CONSTRUCTION MATERIALS AND METHODOLOGIES ARE TO CONFORM TO THE MOST RECENT VERSION OF THE COMMONWEALTH OF MASSACHUSETTS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGES LATEST EDITION.
- PROVIDE ALL CONSTRUCTION SERVICE IN ACCORDANCE WITH APPLICABLE LAWS AND REGULATIONS REGARDING NOISE, VIBRATION, DUST, SEDIMENTATION CONTAINMENT, AND TRENCH WORK.
- COLLECT SOLID WASTES AND STORE IN A SECURED DUMPSTER. THE DUMPSTER MUST MEET ALL LOCAL AND STATE SOLID WASTE MANAGEMENT REGULATIONS.
- RESTORE ALL SURFACES EQUAL TO THEIR ORIGINAL CONDITION AFTER CONSTRUCTION IS COMPLETE PER SPECIFICATIONS. LEAVE ALL AREAS NOT DISTURBED BY CONSTRUCTION IN THEIR NATURAL STATE. TAKE CARE TO PREVENT DAMAGE TO SHRUBS, TREES, OTHER LANDSCAPING AND/OR NATURAL FEATURES. WHEREAS THE PLANS DO NOT SHOW ALL LANDSCAPE FEATURES, EXISTING CONDITIONS MUST BE VERIFIED BY THE CONTRACTOR IN ADVANCE OF THE WORK.
- PROVIDE A UNIT PRICE COST IN CUBIC YARD MEASURE FOR EDGE AND/OR BOULDER REMOVAL. EDGE AND/OR BOULDERS LESS THAN 1 CUBIC YARD IN SIZE BASED ON THE AVERAGE DIMENSIONS WILL NOT BE CONSIDERED PAYABLE ROCK. PROVIDE UNIT PRICES FOR BOTH ON AND OFF SITE DISPOSAL. IF ADDITIONAL FILL MATERIAL IS REQUIRED INCLUDE THE COST OF ALL FILL MATERIAL.
- REGULARLY INSPECT THE PERIMETER OF THE PROPERTY TO CLEAN UP AND REMOVE LOOSE CONSTRUCTION DEBRIS BEFORE IT LEAVES THE SITE. PROMPTLY REMOVE ALL DEMOLITION DEBRIS FROM THE SITE TO AN APPROVED DUMP SITE.
- ALL TRUCKS LEAVING THE SITE MUST BE COVERED.
- DO NOT WASH ANY CONCRETE TRUCKS ON SITE. REMOVE BY HAND ANY CEMENT OR CONCRETE DEBRIS LEFT IN THE DISTURBED AREA.
- BURIAL OF ANY STUMPS, SOLID DEBRIS, AND/OR STONES/BOULDERS ON SITE IS

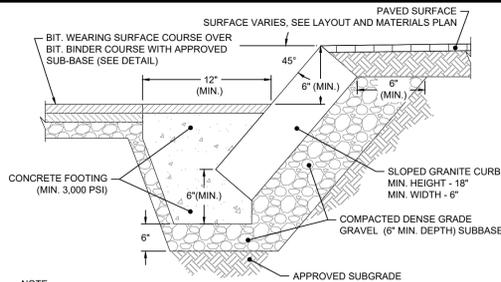
PROHIBITED. DO NOT USE ROAD SALT OR OTHER DE-ICING CHEMICALS ON THE ACCESS ROADWAY.

- AT THE END OF CONSTRUCTION, REMOVE ALL CONSTRUCTION DEBRIS AND SURPLUS MATERIALS FROM THE SITE. PERFORM A THOROUGH INSPECTION OF THE WORK PERIMETER. COLLECT AND REMOVE ALL MATERIALS AND BLOWN OR WATER CARRIED DEBRIS FROM THE SITE.

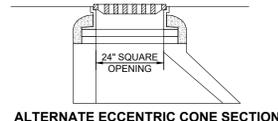
BASIC SITE CONSTRUCTION SEQUENCE:

THE FOLLOWING CONSTRUCTION SEQUENCE IS TO BE USED AS A GENERAL GUIDELINE ONLY. COORDINATE WITH THE OWNER, ENGINEER, AND LANDSCAPE ARCHITECT AND SUBMIT A PROPOSED CONSTRUCTION SEQUENCE FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.

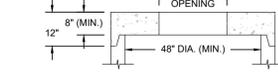
- SURVEY AND STAKE THE PROPOSED LIMIT OF DISTURBANCE AND LIMIT OF SEDIMENTATION BARRIERS.
- PLACE SEDIMENTATION BARRIERS AS INDICATED ON DRAWINGS AND STAKED OUT IN THE FIELD. UNDER NO CIRCUMSTANCES IS THE LIMIT OF WORK TO EXTEND BEYOND THE SEDIMENTATION BARRIERS. LIMIT OF DISTURBANCE AS INDICATED ON DRAWINGS AS APPROVED BY THE LOCAL CONSERVATION COMMISSION AND DEPARTMENT OF ENVIRONMENTAL PROTECTION (DEP).
- INSTALL TEMPORARY CONSTRUCTION ENTRANCES IN LOCATIONS INDICATED ON DRAWINGS. NO OTHER ENTRANCES ARE TO BE USED TO GAIN ACCESS TO THE SITE BY ANY CONSTRUCTION OR DELIVERY VEHICLES.
- BEGIN SITE DEMO AND CLEARING THE SITE AS REQUIRED.
- SURVEY AND STAKE CENTERLINE OF THE PROPOSED ROADS, AND PARKING AREAS.
- SURVEY AND STAKE STORMWATER MANAGEMENT AREAS, AND DRAINAGE LINES.
- EXCAVATE AND ROUGH GRADE THE PROPOSED STORMWATER MANAGEMENT AREAS AND ANY ADDITIONAL TEMPORARY BASINS NECESSARY TO CONTROL SITE RUNOFF AND SEDIMENTS. TEMPORARILY STABILIZE/SEED PERMANENT STORMWATER MANAGEMENT AREAS AS NECESSARY TO REDUCE SOIL EROSION AND SEDIMENT ACCUMULATION.
- BEGIN CLEARING AND GRUBBING THE AREAS OF ROADWAYS AND STORMWATER MANAGEMENT AREAS. TOPSOIL IS TO BE STRIPPED FROM THE AREA OF THE PROPOSED ROADWAYS AND STORMWATER MANAGEMENT AREAS AND STOCKPILED IN APPROVED LOCATIONS. TOPSOIL STOCKPILES MUST BE PROTECTED BY A SEDIMENT BARRIER.
- INSTALL TEMPORARY CONVEYANCE DEVICES (SWALES, CHECK DAMS, PIPES, ETC.) AS NECESSARY TO CONVEY RUNOFF TO TREATMENT AREAS.
- BEGIN ROUGH GRADING AREAS FOR ROADS, PARKING AND PARK FEATURES. BRING ROUGH GRADING TO PROPER ELEVATIONS AS SOON AS PRACTICABLE. COORDINATE WORK TO MINIMIZE TIME SOILS ARE UN-STABILIZED.
- BEGIN UTILITY CONSTRUCTION. THE CONTRACTOR IS FREE TO INSTALL THE UTILITIES IN THE SEQUENCE HE/SHE CHOOSES. IMMEDIATELY REPAIR, REPLACE AND STABILIZE ANY UTILITY DEVICES DISTURBED DURING THE UNDERGROUND UTILITY CONSTRUCTION. MODIFY TEMPORARY CONVEYANCE DEVICES, AS NECESSARY, TO CONVEY RUNOFF TO TREATMENT AREAS.
- INSTALL DRAINAGE PIPES, DRAINAGE MANHOLES, CATCH BASINS, AND UNDERGROUND DRAINAGE STRUCTURES. BEGIN WORK AT THE STORMWATER MANAGEMENT AREAS AND PROGRESS UP-GRADE. PROTECT DISCHARGE OUTLETS WITH RIP-RAP APRONS. THE STORMWATER MANAGEMENT AREAS AND DRAINAGE NETWORK ARE TO BE PROTECTED FROM SEDIMENTATION UNTIL ALL UN-STABILIZED AREAS ARE STABILIZED WITH STONE SUB-BASE OR VEGETATION. INSTALL SEDIMENT BARRIERS AT ALL POINTS OF ENTRY INTO THE DRAINAGE NETWORK. TAKE PARTICULAR CARE TO PROTECT THE UNDERGROUND STRUCTURES FROM SEDIMENT.
- PERMANENTLY SEED ALL DISTURBED AREAS OUTSIDE OF THE AREA TO BE PAVED.
- UPON COMPLETION OF UNDERGROUND UTILITIES INSTALLATION, PLACE COMPACTED GRAVEL FOUNDATION AND ROUGH GRADE THE ROADWAYS/PARKING AREAS IN ACCORDANCE WITH THE SITE PLANS AND IN ACCORDANCE WITH APPLICABLE STATE AND LOCAL REGULATIONS AS SOON AS POSSIBLE.
- COMPLETE ROAD AND PARKING INSTALLATION PER SITE PLANS AND IN ACCORDANCE WITH APPLICABLE STATE AND LOCAL REGULATIONS. ROADS AND PARKING AREAS ARE NOT TO BE PAVED UNTIL THE ENTIRE PERMANENT DRAINAGE SYSTEM HAS BEEN INSTALLED AND ALL PIPE CONNECTIONS COMPLETE.
- FINISH PERMANENT STABILIZATION, COMPLETE PERMANENT STORMWATER MANAGEMENT AREA SEEDING AND PLANTING AFTER THE CONTRIBUTING AREA TO THE BASIN HAS REACHED A MINIMUM OF 80% STABILIZATION AND IS NO LONGER REQUIRED AS A CONSTRUCTION SEDIMENTATION BASIN.
- COMPLETE ALL REMAINING PLANTING AND SEEDING.
- SWEEP THE ROADWAY TO REMOVE ALL SEDIMENTS. REPAIR DRAINAGE OUTLETS AND BASINS AS REQUIRED. CLEAN AND FLUSH THE DRAINAGE STRUCTURES AND PIPES AT THE END OF CONSTRUCTION AND REMOVE ALL ACCUMULATED SEDIMENTS IN THE STORMWATER MANAGEMENT AREAS. CONTRACTOR MUST INSPECT THE DRAINAGE NETWORK AND REPAIR ANY DAMAGE IMMEDIATELY.
- ENGINEER TO APPROVE THE REMOVAL OF ALL TEMPORARY SOIL EROSION AND SEDIMENTATION CONTROL MEASURES FOLLOWING VEGETATIVE ESTABLISHMENT OF ALL DISTURBED AREAS AND DETERMINE WHEN THE CONTRIBUTING AREA HAS REACHED A MINIMUM OF 80% STABILIZATION.



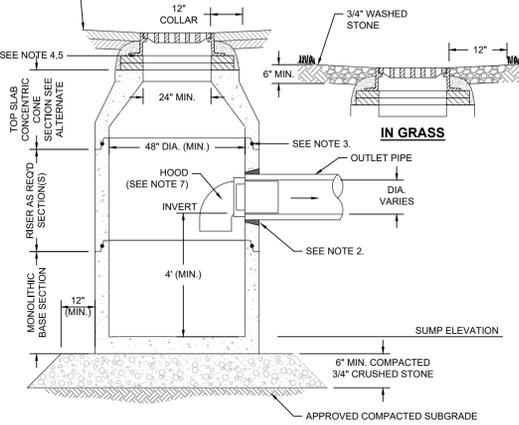
MOUNTABLE GRANITE CURB
NOT TO SCALE



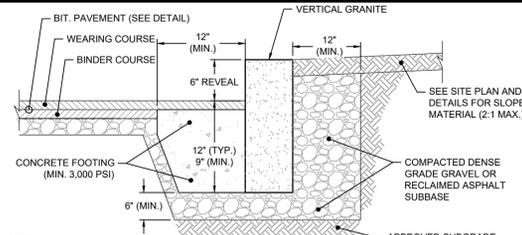
ALTERNATE ECCENTRIC CONE SECTION



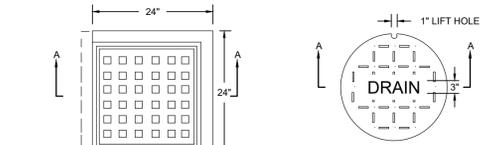
ALTERNATE TOP SLAB



PRECAST CONCRETE CATCH BASIN (CB) WITH HOOD
NOT TO SCALE

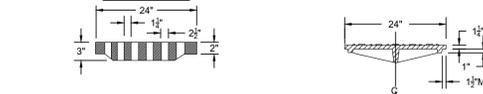


VERTICAL CURB
NOT TO SCALE

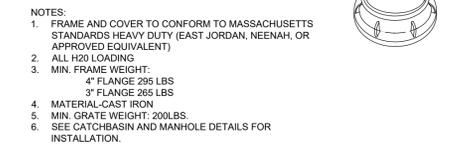


GRATE PLAN

SOLID COVER PLAN

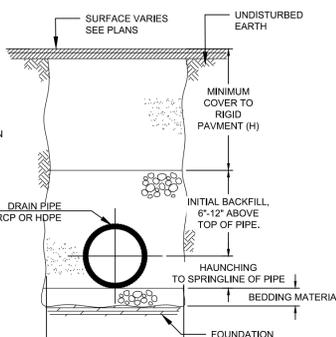


SECTION A-A

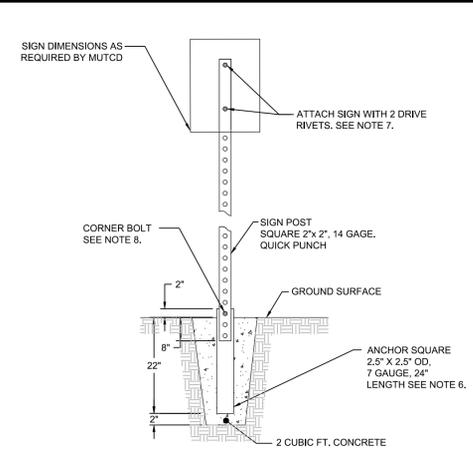


DRAINAGE STRUCTURE FRAME AND COVER/GRATE
NOT TO SCALE

- NOTES:**
- FOUNDATION: WHERE THE TRENCH BOTTOM IS UNSTABLE, THE CONTRACTOR SHALL EXCAVATE TO A DEPTH REQUIRED BY THE ENGINEER AND REPLACE WITH A SUITABLE COMPACTED GRAVEL MATERIAL OR AS AN ALTERNATIVE AND AT THE DISCRETION OF THE ENGINEER, THE TRENCH BOTTOM MAY BE STABILIZED USING A WOVEN GEOTEXTILE FABRIC.
 - BEDDING, HAUNCHING AND INITIAL BACKFILL: SUITABLE MATERIAL TO CONSIST OF CLEAN, HARD, PARTICLES OF GRAVEL MEETING THE FOLLOWING:
SIEVE SIZE % PASSING
3/8" 85-95
NO. 4 5-15
NO. 8 0-2
UNLESS OTHERWISE APPROVED BY THE ENGINEER
 - MINIMUM TRENCH WIDTHS TO BE AS FOLLOWS:
NOMINAL TRENCH WIDTH, in (mm)
MIN. RECOMMENDED COVER, in (mm)
H25 (FLEXIBLE PAVEMENT) 12 (300)
H25 (RIGID PAVEMENT) E80 12 (300)
RAILWAY HEAVY CONSTRUCTION 24 (610)
48 (1220)
 - MINIMUM COVER: MINIMUM RECOMMENDED DEPTHS OF COVER FOR VARIOUS LIVE LOADING CONDITIONS ARE SUMMARIZED IN THE FOLLOWING TABLE. UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE TAKEN FROM THE TOP OF PIPE TO THE GROUND SURFACE.
GENERAL BACKFILL: BACKFILL (INCLUDING DISTURBED AREAS SURROUNDING TRENCHES) SHALL BE PLACED AND COMPACTED IN 12" (MAX.) VERTICAL LIFTS.
CONTRACTOR SHALL ACHIEVE 95% COMPACTION FOR THE BEDDING UNLESS OTHERWISE APPROVED BY THE ENGINEER.

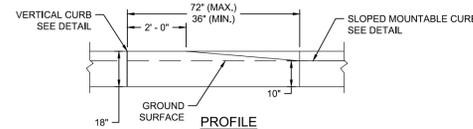


DRAINAGE PIPE TRENCH
NOT TO SCALE

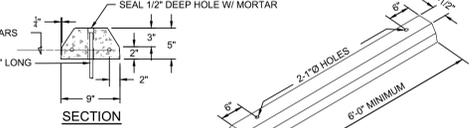


SIGN INSTALLATION
NOT TO SCALE

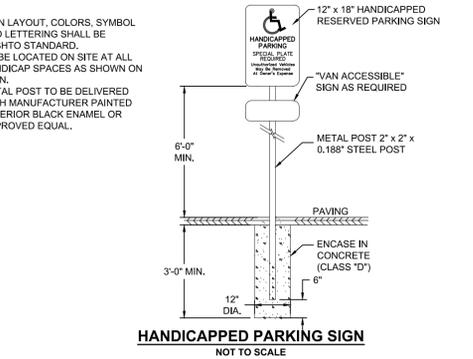
- NOTES:**
- SIGN HEIGHT - 7' FROM BOTTOM OF SIGN TO STREET OR SIDEWALK, 6' FROM BOTTOM OF LOWER SIGN FOR MULTIPLE SIGNS ON ONE POST. EXCEPTIONS ONLY AS SPECIFICALLY STATED ON PLANS OR APPROVED BY THE ENGINEER.
 - METAL POSTS SHALL BE TELESPAR QUICK PUNCH POST.
 - METAL STOP AND YIELD SIGN POSTS SHALL HAVE ALTERNATING 1" BANDS OF RED AND WHITE 3M DIAMOND GRADE SHEETING. ALL OTHER POSTS SHALL BE UNSHEETED.
 - FOR IN-SIDEWALK INSTALLATIONS, CORE 4" DIAM. HOLE, ANCHOR LENGTH MAY BE DECREASED TO 12".
 - POST SHALL BE ROLLED CARBON SHEET STEEL, ASTM A570 GRADE 50 AND BE HOT DIPPED GALVANIZED AASHTO M-120 YIELD STRENGTH 60,000 PSI MIN. POST SHALL HAVE 7/16" DIE-PUNCHED KNOCKOUTS ON 1" CENTERS FULL LENGTH FOUR SIDES.
 - ANCHOR SHALL HAVE 4 7/16" HOLES ONE EACH SIDE 2" FROM TOP END, FINISH SHALL BE ZINC HOT DIPPED GALVANIZED MATERIAL TO MEET ASTM A500 GRADE B.
 - DRIVE RIVETS TO BE TL306 3/8" DIA.
 - CORNER BOLTS TO BE TLCS16M.



VERTICAL TO MOUNTABLE TRANSITION
NOT TO SCALE

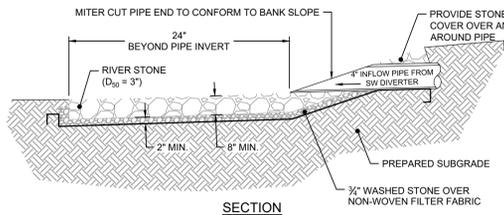


PRECAST CONCRETE CURB STOPS (BUMPER)
NOT TO SCALE

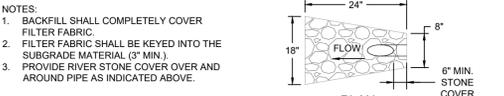


HANDICAPPED PARKING SIGN
NOT TO SCALE

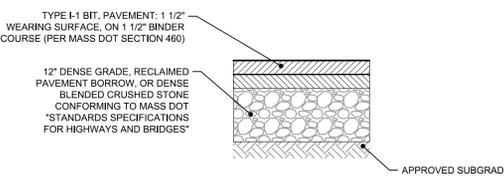
- NOTES:**
- SIGN LAYOUT, COLORS, SYMBOL AND LETTERING SHALL BE ASHTO STANDARD.
 - TO BE LOCATED ON SITE AT ALL HANDICAP SPACES AS SHOWN ON PLAN.
 - METAL POST TO BE DELIVERED WITH MANUFACTURER PAINTED EXTERIOR BLACK ENAMEL OR APPROVED EQUAL.



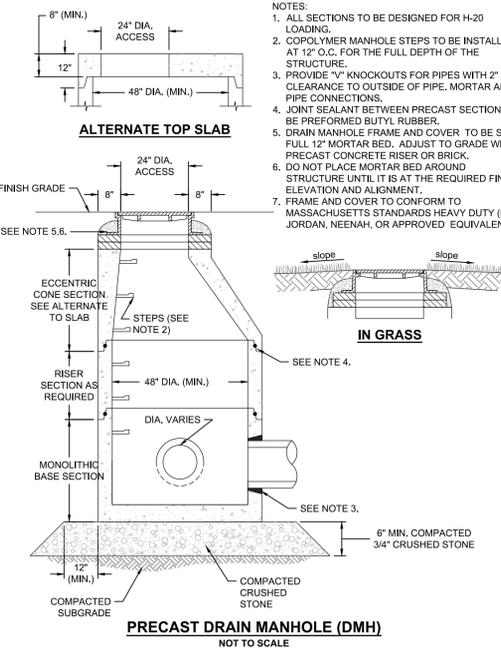
PIPE INFLOW (FROM STORMWATER DIVERTER)
NOT TO SCALE



ALTERNATE TOP SLAB



BITUMINOUS PAVEMENT
NOT TO SCALE



PRECAST DRAIN MANHOLE (DMH)
NOT TO SCALE

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No.	Description	Date
1	ISSUED FOR BID	8-20-2020

DWG ISSUE & REVISION HISTORY

Stamp

COMMONWEALTH OF MASSACHUSETTS
REGISTERED PROFESSIONAL ENGINEER
RICHARD A. CLAYTON
CIVIL NO. 45116
8-20-2020
Reid

ISSUED FOR BID

Project Title:
**PROSPECT HILL PARK
WALTHAM, MA**

Drawing Title:
SITE DETAILS

Project No. 18163
Drawn By: GSG
Checked By: BRK
Scale: 1"=20'
Date: AUGUST 2020

Drawing No. L10 - 2

