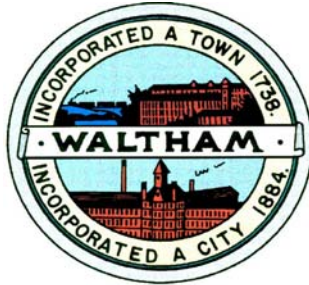


The City of Waltham



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

**JAMES FALZONE MEMORIAL PARK 3
AND
NIPPER MAHER PARK, PHASE 6 -
IMPROVEMENTS**

The GENERAL BID is due: Tuesday November 27, 2012 at 10:00 am

**PRE BID Meeting and Briefing on Site: Friday November 16, 2012 at 10:00 am
Meet at 901 Trapelo Rd, Waltham**

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Falzone Memorial Park & Nipper Maher Park
Waltham, Massachusetts

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Falzone and Nipper Maher Parks Improvements

SECTION 00020 CITY OF WALTHAM MASSACHUSETTS

NOTICE TO BIDDERS

JAMES FALZONE MEMORIAL PARK AND NIPPER MAHER PARK, PHASE 6 IMPROVEMENTS WALTHAM, MASSACHUSETTS

The City of Waltham, Massachusetts invites sealed bids from Contractors for the **Improvements of James Falzone Memorial Park, located at 901 Trapelo Road and Nipper Maher Park, Phase 6, located at 65 Dartmouth Street**, Waltham, Massachusetts. The work at Falzone Memorial Park includes park-wide improvements related to the installation of a synthetic turf field and sub-drainage system, demolition of an existing building, general earthwork and grading operations, parking lot reconstruction, drainage improvements, invasive vegetation removal, and selective site furnishings. The work at Nipper Maher Park includes subsurface drainage improvements, relocation of play equipment with new safety surfacing (resilient rubber + wood fiber), installation of a splash pad, concrete unit pavers, pervious asphalt, selective site furnishings and parking lot improvements.

PLANS, SPECIFICATIONS and other Contract Documents may be obtained by visiting the City's Web Site at www.city.waltham.ma.us/open-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 **10:00 AM on November 27, 2012**, at which place and time they shall be publicly opened, read aloud and recorded for presentation to the Awarding Authority.

A **PRE-BID CONFERENCE AND SITE INSPECTION** will be held for all interested parties at **10:00 AM on November 16, 2012** at the site of the **James Falzone Park, 901 Trapelo Rd., Waltham**. Attendance at this pre-bid conference is strongly recommended but not mandatory for parties submitting a bid. It will be the only opportunity to visit the site prior to the bid opening.

LAST DAY FOR WRITTEN QUESTIONS is at 12 noon November 20, 2012. Questions are to be sent via e-mail only to jpedulla@city.waltham.ma.us

THE BUDGET for this entire project is **NOT TO EXCEED \$1,800,000.00.**

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/open-bids .

Falzone and Nipper Maher Parks Improvements

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

Falzone and Nipper Maher Parks Improvements

SECTION 00100 - 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, 2012.
- B. **Pre-bid walkthrough and site inspection: November 16, 2012, at 10:00 AM.** Meet at **Falzone Park 601 Trapelo Rd. Waltham.**
- 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 November 20, 2012.**
- 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: 10:00 A.M. on November 27, 2012,** 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.

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.

Falzone and Nipper Maher Parks Improvements

- 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

Falzone and Nipper Maher Parks Improvements

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" enclosed. 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:
Construction of a Vault and Archival Spaces, Phase II

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.

Falzone and Nipper Maher Parks Improvements

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 conference will be held at the site on **November 16, 2012, at 10:00 AM.** at the **Falzone Park, 610 Moody Street, Waltham, MA.** 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 pre-bid conference.

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/open-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.

Falzone and Nipper Maher Parks Improvements

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 Substantially Complete in **180 calendar days** after the date of the Notice-to-Proceed and **not including winter shut-down**.

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/open-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.

Falzone and Nipper Maher Parks Improvements

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

Falzone and Nipper Maher Parks Improvements

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.

Falzone and Nipper Maher Parks Improvements

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

**JAMES FALZONE MEMORIAL PARK AND NIPPER MAHER PARK, PHASE 6 IMPROVEMENTS
WALTHAM, MASSACHUSETTS**

General Bid Opening Date: 10:00 am, November 27, 2012

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:

TOTAL Bid (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".

Falzone and Nipper Maher Parks Improvements

- 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 Substantially Completed in one hundred and eighty **(180) calendar days not including winter shut-down.**
- 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 00500

AGREEMENT

CITY OF WALTHAM

ARTICLE 1. This agreement, made this _____ day of _____, 2012 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 required by not included in the items herein mentioned, and also for all loss or damage arising out of the nature of the work aforesaid, or from the action of the elements, or from any unforeseen obstruction or difficulty encountered in the prosecution of the work, and for all expenses incurred by or in consequence of the suspension or discontinuance of the work specified, and for well and faithfully completing the work, and the whole thereof, as herein provided, such prices as are set forth in the accompanying bid.

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

Sandra Tomasello, 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 00503

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

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 Labor and Materials or Payment Bond equal to 100% 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.

A LETTER FROM A SURETY COMPANY CERTIFYING THAT THE CONTRACTOR IS QUALIFIED AND CAPABLE OF OBTAINING THE ABOVE BONDS MUST BE INCLUDED WITH HIS/HERS BID.

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 under the provisions of 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/open-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.

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.

PREVAILING WAGES SCHEDULES.

The prevailing wages schedules can be found by visiting the city web site at www.city.waltham.ma.us/open-bids in the same location where this bid was placed.

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 Bond for 100% of the contract value and naming the City of Waltham
(Letter must be included with your response)

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.

NON-COLLUSION FORM AND TAX COMPLIANCE FORM

CERTIFICATE OF NON-COLLUSION

The undersigned certifies under penalties of perjury that this bid or proposal has been made and submitted in good faith and without collusion or fraud with any other person. As used in this certification, the word “person” shall mean any natural person, business, partnership, corporation, union, committee, club, or other organization, entity or group of individuals. The undersigned certifies that no representations made by any City officials, employees, entity, or group of individuals other than the Purchasing Agent of the City of Waltham was relied upon in the making of this bid

_____, _____
(Signature of person signing bid or proposal) Date

(Name of business)

TAX COMPLIANCE CERTIFICATION

Pursuant to M.G.L. c. 62C, & 49A, I certify under the penalties of perjury that, to the best of my knowledge and belief, I am in compliance with all laws of the Commonwealth relating to taxes, reporting of employees and contractors, and withholding and remitting child support.

_____, _____
Signature of person submitting bid or proposal Date

Name of business

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 _____

Company Name: _____

Project Name: _____

Awarding Auth.: _____

Work Week Ending: _____

☐ Final Report

[illegible]

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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 A

SPECIAL CONDITIONS

PROJECT SITE

All of the work of this contract is located within the confines of Falzone Memorial Park on Trapelo Road and Nipper Maher Park, located off of Dartmouth Street in Waltham, Massachusetts. Nipper Maher is accessible via Bedford Street and South Street.

SUMMARY OF WORK

The work at Falzone Memorial Park includes park-wide improvements related to the installation of a synthetic turf field and sub-drainage system, demolition of an existing building, general earthwork and grading operations, parking lot reconstruction, drainage improvements, invasive vegetation removal, and selective site furnishings. The work at Nipper Maher Park includes subsurface drainage improvements, relocation of play equipment with new safety surfacing (resilient rubber + wood fiber), installation of a splash pad, concrete unit pavers, pervious asphalt, selective site furnishings and parking lot improvements.

COOPERATION OF THE CONTRACTOR

Prospective bidders are advised that all of the work of this contract shall be accomplished in a time and sequence that is acceptable to the City of Waltham. The City, before the start of work under this contract, shall approve routes of travel to work areas. Trips to work areas shall be kept within the approved routes of travel. Vehicle access and circulation beyond the agreed upon routes will be strictly prohibited.

WORK WITHIN A PUBLIC PARK

As a point of information, all of the work to be undertaken is located within the confines of a large, unsecured public park, and as such is subject to acts of vandalism. The contractor shall take all means and measures necessary to protect work in progress, work completed, and all furnishings, materials and equipment stored at the site through completion of the project. The repair or replacement of work in place or in progress shall be the sole responsibility of the contractor and shall be accomplished at no cost to the Owner. As a point of information, the work of this Contract occurs within the confines of a fenced-in baseball field, which contains lockable gates.

STORAGE OF MATERIALS AND EQUIPMENT

The storage of equipment and materials within the confines of the Park shall be subject to the approval of Project Representatives and shall be at the Contractor's own risk.

Falzone Memorial Park & Nipper Maher Park
Waltham, Massachusetts

TIME FOR COMPLETION AND SEQUENCE OF WORK

- A. The work of this Contract shall be commenced at the time stipulated by the Owner in the Notice to Proceed and shall be fully completed within 180 calendar days thereafter except as the work may be interrupted by weather conditions. The Contractor shall employ sufficient equipment and workers to complete the installation as expeditiously as possible as directed by the Owner's Representative.
- B. The City shall determine when the work shall be interrupted due to unsatisfactory weather conditions. Determination of the period to be included in the Time for Completion shall cease when the City directs that the work stop due to weather and shall commence again on the first working day thereafter that the City may designate for the work to be resumed.
- C. The Contractor is advised that the 180 day Time for Completion is anticipated to be interrupted by a winter shutdown, and thus the project is intended to be completed during next calendar year, including punch list or grow-in related work required during the early part of 2013.

REFERENCES

All references contained in the Contract Documents to “landscape architect” or “engineer” shall refer to the Owner's Representative.

RESPONSIBILITIES OF CONTRACTOR

- A. Except as otherwise specifically stated in the Contract Documents and Technical Specifications, the Contractor shall provide and pay for all materials, tools, labor, equipment, water, light, heat, power, transportation, superintendence, temporary construction of every nature, charges, levies, fee or other expenses, permits and backcharges and all other services and facilities of every nature whatsoever necessary for the performance of the Contract and to deliver all improvements embraced in this Contract completed in every respect within the specified time.
- B. Unless otherwise specified herein all materials, workmanship, methods, and practices shall conform to the current Standards of the appropriate Department or Commission of the City.
- C. The Contractor shall be responsible for detailed layout; all stakeout and grade control, and shall employ a registered Professional Engineer or a registered Land Surveyor for this purpose. The Owner will provide coordination by the Designer.
- D. The Contractor shall verify dimensions and utility locations shown on the plans and if any inconsistencies or discrepancies should be noted on the Drawings, or between the Drawings and actual field conditions, or between the Drawings and the Specifications

Falzone Memorial Park & Nipper Maher Park
Waltham, Massachusetts

he/she shall immediately notify the Owner. The Contractor will be held responsible for any errors resulting from his/her failure to exercise the aforementioned precaution. Such information shall be marked on copies of the as-built drawings and the original As-Built drawings.

- E. The Contractor shall maintain a full time supervisor or supervisor on the construction site, whether the construction forces are employed by his construction company or employed by a Sub-Contractor.
- F. As soon as the Contract is executed, the Contractor shall order materials, submit construction schedules as hereinafter specified, and otherwise anticipate the Notice to Proceed. When the Owner gives the Notice to Proceed, the work of construction shall begin at the time stipulated therein and shall be completed within the Time for Completion specified.
- G. It is the Contractor's responsibility to make his own investigation and related assumptions, to satisfy himself/herself as to subsurface conditions, and to insure that these are reflected in the bid.
- H. The Contractor's attention is called to the necessity of obtaining permits especially those required by various departments of the City. These permit fees will not be waived by the City and must be paid in full by the Contractor.
- I. The contractor shall furnish and maintain all temporary fence, barriers, enclosures, lights and warning devices necessary to protect his/her work area and to protect the public and his work forces throughout the life of this contract.

COMMUNICATIONS

- A. All notices, demands, requests, instructions, approvals, proposals and claims must be in writing and must be presented to the Engineer in person or by mail to the Owner.
- B. Any notice to or demand upon the Contractor shall be considered sufficiently given if delivered at the office or field office of the Contractor stated on the signature page of the Agreement (or at such other office as the Contractor may from time to time designate in writing to the Owner), or if deposited in the United States mail in a sealed, postage prepaid envelope, or delivered with charges prepaid to any telegraph company for transmission, in each case addressed to such office.
- C. All papers required to be delivered to the Owner shall, unless otherwise specified in writing to the Contractor, be delivered to Sandra Tomasello, Director of the Waltham Recreation Department, Totten Pond Road, Waltham, MA 02154 and any notice to or demand upon the Owner shall be sufficiently given if so delivered, or if deposited in the United States mail in a sealed, postage-prepaid envelope, or delivered with charges prepaid to any telegraph company for transmission to said Owner at such address, or to such other representatives of the Owner or to such other address as the Owner may sub-

**Falzone Memorial Park & Nipper Maher Park
Waltham, Massachusetts**

sequently specify in writing to the Contractor for such purpose.

- D. Any such notice shall be deemed to have been given as of the time of actual delivery or (in the case of mailing) when the same should have been received in due course of post, or in the case of telegrams, at the time of actual receipt, as the case may be.

PARTIAL USE OF SITE IMPROVEMENTS

The Owner, at its election, may give notice to the Contractor and place in use those sections of the improvements which have been completed, inspected and can be accepted as complying with the Technical Specifications and if, in its opinion, each such section is reasonably safe, fit and convenient for the use and accommodation for which it was intended, provided:

1. The use of such sections of the improvements shall in no way impede the completion of the remainder of the work by the Contractor.
2. The Contractor shall not be responsible for any damages or maintenance costs due directly to the use of such sections.
3. The use of such sections shall in no way relieve the Contractor of his liability due to having used defective materials or due to poor workmanship.
4. The period of guarantee stipulated in the specifications shall not begin to run until the date of the final acceptance of all work which the Contractor is required to construct under this Contract.

CONTRACT DOCUMENTS

The Owner will furnish the Contractor, without charge, six (6) complete copies of the Contract Documents. Additional copies requested by the Contractor will be furnished at cost.

FIRE PROTECTION AND PREVENTION

The Contractor shall keep the site free of rubbish and construction debris at all times.

1. He shall provide sufficient metal barrels or dumpsters into which all refuse and garbage shall be deposited. All containers shall have tight fitting covers. These shall be secured overnight or removed daily.
2. At the end of each workweek, the Contractor shall thoroughly clean premises of rubbish and debris of any nature, and remove such from the premises.

RUBBISH REMOVAL

The Contractor and each Subcontractor shall remove all rubbish, waste, tools, equipment, and appurtenances caused by and used in the execution of his work; but this shall in no way be construed to relieve the Contractor of his primary responsibility for maintaining the site clean and free of debris, leaving all work in a clean condition.

RECORD DRAWINGS - AS-BUILT

- A. The Contractor shall cooperate with the Engineer and shall prepare and maintain a set of drawings on which shall be recorded accurately, as the work progresses, the actual "as built" locations and dimensions of all his work, indicating thereon all variations from the Contract Drawings. This record of "as built" conditions shall include the work of all subcontractors and shall be submitted, upon final acceptance of all work, to the Engineer.
- B. Prior to final acceptance of the work, all "as built" data shall be transferred to a complete set of reproducible record drawings in ink or photolithograph reproductions on mylar (4 mil.), or in pencil on the mylar originals of the Contract Drawings. This work shall be performed by the Contractor's Registered Land Surveyor with the cooperation of the Contractor as required. After review and approval by the Engineer the record drawings will be completed and delivered to the Owner.

CONSTRUCTION SCHEDULES AND PAYMENT ESTIMATES

- A. The Contractor must submit a construction schedule to the Owner indicating the general sequence of all work under this Contract. This schedule must be submitted within 7 days of the date of the Notice-to-Proceed and shall be revised if required to the satisfaction of the Owner.
- B. The Contractor shall submit a breakdown cost estimate for all items of work in categories approved by the Engineer.
- C. The established breakdown of items, categories and values shall be utilized to prepare the monthly pay requisition forms. It is recommended that the Contractor submit a draft pay requisition to the Engineer for approval, no later than the second week of every month. The Engineer shall review and edit this copy to indicate the amount of payment to be approved and return this to the Contractor after field review. The Contractor shall then formally submit four (4) copies of the pay requisition, conforming to the Engineer's approval, for payment by the Owner.

PROGRESS MEETINGS ARE REQUIRED FOR THIS PROJECT

- A. The Contractor and other Sub-contractors as the Engineer may direct shall attend a regular weekly or bi-monthly meeting with the Owner present for the purpose of justifying the payment requests and facilitating with coordination of the project.

- B. Other meetings may be desired by the Engineer from time to time, and these shall be attended by the Contractor and such Sub-contractors as are directed to attend.
- C. The Contractor shall hold regularly scheduled weekly coordinating and scheduling meetings at the job site. The Owner and the Engineer shall be admitted and may participate in such meetings.

PHOTOGRAPHS

The Contractor shall be required to furnish five (5) views of before, during and after photographs of site conditions. The Contractor is encouraged to submit "during" photographs along with each pay requisition to facilitate approvals.

UTILITIES

- A. The Contractor shall obtain and pay for all licenses and/or permits, which are required by the City or any other agencies that may be involved; he shall comply with all codes, regulations and standards of the City.
- B. DIG SAFE (1-800-322-4844), the City, and all private companies or any agencies whose utilities are in the construction, shall be notified by the Contractor at least seventy-two (72) hours prior to the start of any excavation. The Contractor shall be required to cooperate with the utility companies involved in order to assure completion of all work with the least amount of delay.

SHOP DRAWINGS/SUBMITTALS

- A. The Contractor shall be required to submit shop drawing, samples or other submittals as indicated in the technical specifications.
- B. If it is the intent of the Contractor to furnish and install appurtenances and elements as specified and detailed on the plans, and where shop drawings are requested, a letter to the Engineer indicating that these will be ordered and installed as specified shall suffice. In the instance of any discrepancies in the plans and the actual dimensions or size of materials, the Contractor shall be responsible to make any and all adjustments necessary to install the materials as set forth in the Contract Documents.
- C. The Contractor shall furnish one (1) reproducible copy of any shop drawings that may be required.
- D. The Contractor shall be responsible for the prompt submission of all shop and working drawings so that there will be no delay in the work.
- E. The approval of shop and working drawings will be general and shall not relieve the Contractor from the responsibility for details of design, dimensions, etc., necessary for

**Falzone Memorial Park & Nipper Maher Park
Waltham, Massachusetts**

proper fittings and construction of the work as required by the Contract and to ensure the safety of the public.

PROVISIONS FOR PUBLIC SAFETY AND CONVENIENCE

- A. Particular care shall be taken to establish and maintain such methods and procedures as will not create hazards. Access to all park facilities and shall be maintained in a reasonable and safe manner for the duration of the construction period.
- B. Every reasonable effort shall be made to reduce to a minimum any interference with or inconveniences to park operations and park patrons due to the construction work. Excavated material shall be trucked away and returned if the Engineer deems it necessary and practical as a means for avoiding serious interference with and inconvenience to business concerns and abutters.
- C. The Contractor's attention is directed to the fact that the work on this project is to be performed within a recreation area and adjacent to park drives and walkways which are utilized by pedestrians, bikers, joggers and vehicles. The Contractor shall be responsible for the installation of adequate precautions and other safety measures and controls deemed necessary by the Engineer in order to protect all park users. Any automotive equipment not protected by traffic cones that is operating on a public way under this project shall have one amber flashing warning light mounted on the cab roof or on the highest practical point of the machinery. This light shall be in operation while the equipment is so working.
- D. Trenches shall not be opened in park areas until all material and equipment required for the work are on the site and available for immediate use. The work at each trench shall be practically continuous, with the placing of utilities, backfill and patching (where applicable) of the surface closely following each preceding operation. When work is not in progress, trenches in areas subject to use by park patrons shall be covered with steel plates capable of safely sustaining all anticipated loads.
- E. The Contractor shall provide traffic signs, warning markers and other construction safety measures as necessary to maintain public safety and optimum traffic flow. Parking of personal vehicles will be prohibited in construction areas as directed.
- F. With suspension of construction activities during holidays, weekends and nights, the Contractor shall remove temporary traffic and/or safety control devices, as requested, and return them to their positions when work begins again. Payment for the installation and maintenance of appropriate safety provisions shall be included under the base bid price and no separate payment shall be considered.
- G. The Contractor shall without additional compensation be required to maintain access to the project area for fire apparatus and other emergency vehicles at all times.

**Falzone Memorial Park & Nipper Maher Park
Waltham, Massachusetts**

SITE INSPECTION

It shall be contingent upon the Contractor to inspect the site as an aid to determining the extent of his work under the various contract items before submission of his bid.

PROTECTION OF EXISTING FACILITIES

- A. All existing walks, pipes, conduits, poles, fences, stairways, curbing, walls, buildings, trees and other structures which are to remain in place shall be carefully supported and protected from injury by the Contractor without additional compensation and in case of injury they shall be restored by him without compensation therefor to as good condition as that in which they were found. The value of any trees damaged shall be determined in accordance with established practices of the American Association of Nurserymen or a Registered or Certified Arborist selected by the Engineer. Limits of liability shall not be limited to the replacement with new and immature trees.
- B. The Contractor shall, at his own expense, provide suitable and safe bridges and other crossings, where required for accommodation of travel and to provide access to private property during construction, and shall remove said structures thereafter.
- C. The location of prior existing utility systems is not known and therefore may not be shown on the drawings prepared for this project. The existence of utilities shall not be considered as an unusual obstacle, and the Contractor shall not be entitled to extra compensation for maintaining, protecting, or repairing these utilities. The Contractor shall use the exploratory excavation included in his contract price, whenever he/she or the Owner's representatives deem it necessary to verify, or prevent interruption of, existing services. The Contractor shall utilize the exploratory excavation included in his contract price, whenever he or the owner's representatives deems it necessary to verify, or prevent interruption of existing services.

SAMPLING AND TESTING OF MATERIALS AND COMPACTION

- A. Sampling and testing ordered by the Engineer to ensure that materials are as specified and that compaction of all materials conforms to the necessary requirements shall be taken and completed by representatives of a Massachusetts certified testing laboratory satisfactory to the Engineer, and shall be paid for by the Contractor or by the City as described in the technical specifications.

- - - END OF SECTION - - -

SECTION 01010

SUMMARY OF WORK

PART 1- GENERAL:

1.01 PROJECT DESCRIPTION

The project is the improvements to Falzone Memorial Park & Nipper Maher Park as described in the Contract Documents.

1.02 CONTRACT TIME

- A. The work of this contract shall be completed by June 15, 2012.
- B. 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 Weston & Sampson Engineers, Inc.

1.04 INSPECTION OF THE SITE

It is a contract requirement of the Contractor that his/her subcontractor shall have thoroughly inspected the site during the bidding period. By submitting a bid they confirm that they are thoroughly familiar with the site and all existing conditions which impact and affect their 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 Falzone Memorial Park & Nipper Maher Park:

- - - END OF SECTION - - -

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 - GENERAL:

1.01 BASE BID

A. Measurement

1. Measurement for payment of Falzone Memorial Park & Nipper Maher Park Improvements 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 01010, 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 Landscape Architect/Engineer.

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 01028

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 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.

- - - END OF SECTION - - -

**Falzone Memorial Park & Nipper Maher Park
Waltham, Massachusetts**

**01028-5
CHANGE ORDER PROCEDURE**

SECTION 01040

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 insure 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

**Falzone Memorial Park & Nipper Maher Park
Waltham, Massachusetts**

**01040-2
CONTROL OF WORK**

- 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

- 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. So conduct operations 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

- 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 made 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.
- D. 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 01200

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 PRECONSTRUCTION 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 01400

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.
- B. The work includes the following, without limiting the generality thereof;
 - 1. The making available to the Owner's testing laboratory any samples or specimens which the laboratory may require to perform quality control testing on concrete, fill materials, or other material as the Owner may elect.
 - 2. The coordinating and scheduling of work and the giving of timely notice so as to afford the Owner's testing laboratory the opportunity to take samples and make observations or tests.

1.03. TESTING LABORATORY

- 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 01500

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 01570

ENVIRONMENTAL PROTECTION

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. The work covered by this section of the specifications consists of furnishing all labor, materials, tools and equipment and performing all work required for the prevention of environmental pollution during and as a result of construction operations under this contract.
- B. The requirements set forth in this section of the specifications apply to cross-country areas, river and stream crossings, and construction in and adjacent to wetlands, unless otherwise specifically stated.
- C. All work under this Contract shall be in accordance with the Conservation Commissions' Orders of Conditions as well as any conditional requirements applied, all of which are attached to Section 00890, PERMITS.
- D. Prior to commencement of work, the Contractor shall meet with representatives of the Engineer to develop mutual understandings relative to compliance of the environmental protection program.

1.02 RELATED WORK:

- A. Section 00890, PERMITS
- B. Section 01330, SUBMITTALS
- C. Section 01562, DUST CONTROL
- D. Section 02230, CLEARING AND GRUBBING
- E. Section 02240, DEWATERING
- F. Section 02252, SUPPORT OF EXCAVATION
- G. Section 02300, EARTHWORK
- H. Section 02347, BENTONITE DAMS
- I. Section 02921, SURFACE RESTORATION OF CROSS COUNTRY AREAS

1.03 SUBMITTALS:

- A. The Contractor shall submit for approval six sets of details and literature fully describing environmental protection methods to be employed in carrying out construction activities within 100 feet of wetlands or across areas designated as wetlands.

PART 2 - PRODUCTS

2.01 SILT FENCE:

- A. The silt fence shall consist of a 3-foot wide continuous length sediment control fabric, stitched to a 22-foot wide, continuous length support netting, and stapled to preweathered oak posts installed as shown on the drawings. The oak posts shall be 1½-inches by 1½-inches (Minimum Dimension) by 48 inches and shall be tapered. The support netting shall be industrial strength polypropylene. The bottom edge of the sediment control fabric shall be buried as shown on the drawings. The sediment control fabric shall conform to the following properties:

| Property | Value | Test Method |
|---|--------------|--------------------|
| 1. Grab Strength (lbs.) | 124 | ASTM D-4632 |
| 2. Elongation (%) | 15% | ASTM D-4632 |
| 3. Puncture Strength (lbs.) | 65 | ASTM D-4833 |
| 4. Burst Strength (psi) | 300 | ASTM D-3786 |
| 5. Trapezoid Tear (lbs.) | 60 | ASTM D-4533 |
| 6. Equivalent Opening Size (U.S. Sieve) | No. 30 | ASTM D-4571 |
| 7. Permittivity (sec ⁻¹) | 0.10 | ASTM D-4491 |
| 8. Water Flow Rate (gal/min/sf.) | 10 | ASTM D-4491 |
| 9. UV Resistance (%) | 70 | ASTM D-4355 |

- B. The silt fence shall be Mirafi Envirofence manufactured by Mirafi, Inc. or approved equal.

PART 3- EXECUTION

3.01 NOTIFICATION AND STOPPAGE OF WORK:

- A. The Engineer will notify the Contractor in writing of any non-compliance with the provisions of the Order of Conditions. The Contractor shall, after receipt of such notice, immediately take corrective action. Such notice, when delivered to the Contractor or his authorized representative at the site of the work, shall be deemed sufficient for the purpose. If the Contractor fails to act promptly, the Owner may order stoppage of all or part of the work through the Engineer until satisfactory corrective action has been taken. No claim for an extension of time or for excess costs or damage incurred by the Contractor as a result of time lost due to any stop

work orders shall be made unless it was later determined that the Contractor was in compliance.

3.02 AREA OF CONSTRUCTION ACTIVITY:

- A. Insofar as possible, the Contractor shall confine his construction activities to those areas defined by the plans and specifications. All land resources within the project boundaries and outside the limits of permanent work performed under this contract shall be preserved in their present condition or be restored to a condition after completion of construction at least equal to that which existed prior to work under this contract.

3.03 PROTECTION OF WATER RESOURCES:

- A. The Contractor shall not pollute streams, lakes or reservoirs with fuels, oils, bitumens, calcium chloride, acids or other harmful materials. It is the Contractor's responsibility to comply with all applicable Federal, State, County and Municipal laws regarding pollution of rivers and streams.
- B. Special measures should be taken to insure against spillage of any pollutants into public waters.

3.04 CONSTRUCTION IN AREAS DESIGNATED AS WETLANDS ON THE DRAWINGS:

- A. Insofar as possible, the Contractor shall make every effort to minimize disturbance within areas designated as wetlands. Total easement widths shall be limited to the widths shown.
- B. The Contractor shall perform his work in such a way that these areas are left in the condition existing prior to construction.
- C. The elevations of areas designated as wetlands shall not be unduly disturbed by the Contractor's operations outside of the trench limits. If such disturbance does occur, the Contractor shall take all measures necessary to return these areas to the elevations which existed prior to construction.
- D. In areas designated as wetlands, the Contractor shall carefully remove and stockpile the top 24 inches of soil. This topsoil material shall be used as backfill for the trench excavation top layer. The elevation of the trench shall be restored to the preconstruction elevations wherever disturbed by the Contractor's operation.
- E. The Contractor shall use a trench box, sheeting or bracing to support the excavation in areas designated as wetlands.

- F. Excavated materials shall not be permanently placed or temporarily stored in areas designated as wetlands. Temporary storage areas for excavated material shall be as required by the Engineer.
- G. The use of a temporary gravel roadway to construct the pipeline in the wetlands area is not acceptable. The Contractor will be required to utilize timber or rubber matting to support his equipment in these areas. The timber or rubber matting shall be constructed in such a way that it is capable of supporting all equipment necessary to install the pipeline. The timber or rubber matting shall be constructed of materials and placed in such a way that when removed the material below the matting will not be unduly disturbed, mixed or compacted so as to adversely affect recovery of the existing plant life.
- H. Bentonite dams shall be placed in wetlands to prevent drainage. Locations for dams are as indicated on the drawings or as required by the Engineer.
- I. During construction, easements within wetlands shall be lined with a continuous hay bale/siltation fence barrier.

3.05 PROTECTING AND MINIMIZING EXPOSED AREAS:

- A. The Contractor shall limit the area of land which is exposed and free from vegetation during construction. In areas where the period of exposure will be greater than two (2) months, temporary vegetation, mulching or other protective measures shall be provided as specified.
- B. The Contractor shall take account of the conditions of the soil where temporary cover crop will be used to insure that materials used for temporary vegetation are adaptive to the sediment control. Materials to be used for temporary vegetation shall be approved by the Engineer.

3.06 LOCATION OF STORAGE AREAS:

- A. The location of the Contractor's storage areas for equipment and/or materials shall be upon cleared portions of the job site or areas to be cleared as a part of this project, and shall require written approval of the Engineer. Plans showing storage facilities for equipment and materials shall be submitted for approval of the Engineer.
- B. No excavated materials or materials used in backfill operations shall be deposited within a minimum distance of one hundred (100) feet of any watercourse or any drainage facility. Adequate measures for erosion and sediment control such as the placement of baled hay or straw around the downstream perimeter of stockpiles shall be employed to protect any downstream areas from siltation.
- C. There shall be no storage of equipment or materials in areas designated as wetlands.

- D. The Engineer may designate a particular area or areas where the Contractor may store materials used in his operations.
- E. Storage areas in cross-country locations shall be restored to pre-construction conditions with the planting of native species of trees and shrubs.

3.07 PROTECTION OF LANDSCAPE:

- A. The Contractor shall not deface, injure, or destroy trees or shrubs nor remove or cut them without written authority from the Owner. No ropes, cables, or guys shall be fastened to or attached to any existing nearby trees for anchorages unless specifically authorized by the Engineer. Excavating machinery and cranes shall be of suitable type and be operated with care to prevent injury to trees which are not to be removed, particularly overhanging branches and limbs. The Contractor shall, in any event, be responsible for any damage resulting from such use.
- B. Branches, limbs, and roots shall not be cut except by permission of the Engineer. All cutting shall be smoothly and neatly done without splitting or crushing. When there is unavoidable injury to branches, limbs and trunks of trees, the injured portions shall be neatly trimmed and covered with an application of grafting wax or tree healing paint as directed.
- C. Where, in the opinion of the Engineer, trees may possibly be defaced, bruised, injured, or otherwise damaged by the Contractor's equipment or by his blasting or other operations, the Engineer may require the Contractor to adequately protect such trees by placing boards, planks, poles or fencing around them. Any trees or landscape feature scarred or damaged by the Contractor's equipment or operations shall be restored as nearly as possible to its original condition at the expense of the Contractor. The Engineer will decide what method of restoration shall be used, and whether damaged trees shall be treated and healed or removed and disposed of under the provisions of Section 02230, CLEARING AND GRUBBING.
- D. Cultivated hedges, shrubs, and plants which could be injured by the Contractor's operations shall be protected by suitable means or shall be dug up, balled and temporarily replanted and maintained. After construction operations have been substantially completed, they shall be replanted in their original positions and cared for until growth is re-established. If cultivated hedges, shrubs, and plants are injured to such a degree as to affect their growth or diminish their beauty or usefulness, they shall be replaced by items of a kind and quality at least equal to that existing at the start of the work.

3.08 CLEARING AND GRUBBING:

- A. The Contractor shall clear and grub only on the Owner's land or the Owner's easements, and only the area required for construction operations, as approved by the

Engineer. Removal of mature trees (4 inches or greater DBH) will not be allowed on temporary easements.

- B. The Contractor shall not remove trees in the Owner's temporary easements without permission of the Engineer.

3.09 DISCHARGE OF DEWATERING OPERATIONS:

- A. Any water that is pumped and discharged from the trench and/or excavation as part of the Contractor's water handling shall be filtered by an approved method prior to its discharge into a receiving water or drainage system.
- B. Under no circumstances shall the Contractor discharge water to the areas designated as wetlands. When constructing in a wetlands area, the Contractor shall discharge water from dewatering operations directly to the nearest drainage system, stream, or waterway after filtering by an approved method.
- C. The pumped water shall be filtered through filter fabric and baled hay, a vegetative filter strip or a vegetated channel to trap sediment occurring as a result of the construction operations. The vegetated channel shall be constructed such that the discharge flow rate shall not exceed a velocity of more than 1 foot per second. Accumulated sediment shall be cleared from the channel periodically.

3.10 DUST CONTROL:

- A. During the progress of the work, the Contractor shall conduct his operations and maintain the area of his activities, including sweeping and sprinkling of streets as necessary, to minimize creation and dispersion of dust. If the Engineer decides it is necessary to use calcium chloride for more effective dust control, the Contractor shall furnish and spread the material, as directed. Calcium chloride shall be as specified under Section 01562, DUST CONTROL.
- B. Calcium Chloride shall not be used for dust control within a drainage basin or in the vicinity of any source of potable water.

3.11 SEPARATION AND REPLACEMENT OF TOPSOIL:

- A. Topsoil shall be carefully removed from cross-country areas where excavations are to be made, and separately stored to be used again as directed. The topsoil shall be stored in an area acceptable to the Engineer and adequate measures shall be employed to prevent erosion of said material.

3.12 BALED HAY OR STRAW:

- A. To trap sediment and to prevent sediment from clogging drainage systems, baled hay or straw shall be used where shown on the drawings. Care shall be taken to keep the

bales from breaking apart. The bales should be securely staked to prevent overturning, flotation, or displacement. All deposited sediment shall be removed periodically. Hay bales shall not be placed within a waterway during construction of the pipeline crossing.

3.13 ERECTION AND MAINTENANCE OF SILT FENCE:

- A. Where indicated on the drawings or where required by the Engineer, the Contractor shall erect and maintain a temporary silt fence. In areas designated as wetlands, the Contractor shall line the limits of the construction easement with a silt fence. The silt fence shall be used specifically to contain sediment from runoff water and to minimize environmental damage caused by construction.

3.14 SURFACE RESTORATION OF CROSS COUNTRY AREAS:

- A. Plantings detailed in Section 02921 shall be conducted when construction of the pipeline has been completed within the areas designated. A one-year guarantee of maintenance will be required on these plantings to ensure that they establish in the area.

3.15 CATCH BASIN PROTECTION:

- A. Catch basin protection shall be used for every catch basin, shown on the plans or as required by the Engineer, to trap sediment and prevent it from clogging drainage systems and entering wetlands. Siltation fabric shall be securely installed under the catch basin grate. Care shall be taken to keep the siltation fabric from breaking apart or clogging. All deposited sediment shall be removed periodically and at times prior to predicted precipitation to allow free drainage flow. Prior to working in areas where catch basins are to be protected, each catch basin sump shall be cleaned of all debris and protected. The contractor shall properly dispose of all debris at no additional cost to the Owner.

END OF SECTION

SECTION 01600

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 as shown on the plans by a registered Engineer or Land Surveyor. The Contractor shall familiarize himself with the existing conditions and shall be responsible for locating or re-establishing survey field ties, property lines, and benchmarks indicated on the plans.
- B. Existing survey tie information, if available, shall be provided by the City upon request.
- C. The individual retained to perform the work of this Section shall be as approved by the City Representative.

1.02 QUALIFICATIONS & SUBMITTALS

- A. The Contractor shall engage the services of a Professional Engineer or Land Surveyor Registered in the Commonwealth of Massachusetts and shall submit the name, address, and registration number of such person or persons to the Engineer in writing.
- B. Whenever reference is made on the plans or in these specifications to a Land Surveyor registered in the Commonwealth of Massachusetts, the Contractor may substitute a Registered Professional Engineer, qualified in the laying out of similar facilities.

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 01700

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 - - -

SECTION 02220

DEMOLITION

PART I - GENERAL

1.01 SCOPE OF WORK

- A. Work under this Section shall consist of the careful removal, storage for reuse, transportation off-site, or demolition, of all structures and site features encountered or noted to be removed or abandoned to a minimum of three feet below finished grade, and the removal and disposal of all materials not called for to be reused or salvaged, in accordance with the contract drawings, these specifications, and the directions of the Engineer. Provide all labor, equipment, materials and transportation necessary to complete the work.
- B. Items plan referenced to be removed and stored shall be carefully removed and stored on site in a manner and location designated by the Engineer for reinstallation later as shown on the plans or as directed by the Engineer.
- C. Items plan referenced, or as directed by the Engineer to be removed and disposed of shall be removed from the site and properly and legally disposed of by the Contractor.
- D. Items indicated on the contract drawings or in the specifications to be removed and salvaged, or other items directed to be removed by the Engineer, shall be transported to a municipal storage facility, located within the City confines, and unloaded and stacked as directed by the Engineer.
- E. The following scope describes the general work/demolition requirements of this Section.
 - 1. Cement concrete and bituminous concrete pavements.
 - 2. Curbing
 - 3. Cement spectator bleachers, play area and all related concrete footings complete.
 - 4. Chain link fencing and footings complete.
 - 5. Swings & play equipment
 - 6. Wood guard rail
 - 7. Boulders & wall stone

8. Other features as indicated on the drawings.

1.02 PROTECTION

- A. The Contractor shall assume complete responsibility and liability for the safety and structural integrity of all work and utilities to remain during demolition.
- B. Provide safeguards including, but not limited to, warning signs, barricades, temporary fences, warning lights and other items required for protection of personnel and the general public during performance of all work.
- C. All features related to protection shall be maintained until that work has been completed to the point when such safeguards are no longer required.

1.03 SPECIAL REQUIREMENTS

- A. The Contractor shall salvage items label as such demolition work and transport these to the City Yard unless these are called for to be reused or ordered by the Engineer to be disposed of.
- B. Install erosion controls to protect adjacent areas from eroded materials likely to enter wetlands, resource areas, or drainage ways/systems, downstream of areas disturbed by work activities.
- C. Where items to be demolished are located within or adjacent to pavements to remain, the Contractor shall make provisions to protect that pavement to remain. Cut concrete pavement back to score line and cut bituminous concrete pavement back far enough so as not to allow disturbance to base course materials. Pavements damaged as a result of Contractor activities shall be replaced to the extent determined by the Engineer at no additional cost to the Owner.

PART II - MATERIALS

2.01 BACKFILL

- A. The Contractor shall provide suitable backfill as specified under Section 02330 of these Specifications, to fill voids left by removal or abandonment of site features, and shall provide all pipe cap ends, mortar, brick and other material needed to cap off or plug pipes of various sizes and kinds.
- B. Suitable materials shall be used as base course fill and topsoil to the depth as specified herein. Restore disturbed areas with similar materials blended to match the line and grades of adjacent surfaces.

2.02 TEMPORARY FENCE

**Falzone Memorial Park & Nipper Maher Park
Waltham, Massachusetts**

- A. The work under these Items shall conform to the relevant provisions of section 644 of the MassDOT standard specifications.
- B. The work shall include temporary installation of chain link fence around the perimeter of the work limits where shown on the plans, and as directed by the engineer, and as Contractor sees fit to protect work.
- C. Temporary fence shall consist of 6' high chain link fence anchored into a base that is both stable and movable to allow access and adjustment as needed. Reclaimed existing fence fabric and materials may be used with the approval of the owner's representative. The contractor will be required to submit a shop drawing to the engineer for approval prior to installation.

PART III - EXECUTION

3.01 SALVAGEABLE MATERIAL

- A. Frames, grates and other salvageable material shall be carefully removed to minimize damage and stored for later reuse, transport, or removal from site.

3.02 ABANDONED STRUCTURES

- A. All inlets and outlets shall be plugged with at least eight (8) inches of brick and mortar masonry. Upper portions of masonry structures shall be removed to a depth of three feet. The bottoms of all structures shall be broken to allow drainage, and the structure shall be filled with suitable backfill material placed in six (6) inch layers and thoroughly compacted at each level.
- B. The Engineer shall review work related to abandoned structures before backfilling. Those items not reviewed before backfilling shall be uncovered and backfill procedures observed, at no expense to the Owner.

3.03 ABANDONED PIPES OR CONDUITS

- A. Plug previously abandoned drainpipes encountered with masonry brick at least eight (8) inches in thickness.
- B. Abandon discontinued water supplies that are encountered during the execution of this contract in accordance with City requirements.
- C. Electrical conduits encountered and previously abandoned shall be capped or plugged.

END OF SECTION

SECTION 02222

UTILITY ABANDONMENT

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This Section covers the abandonment, cutting/capping/plugging, termination and discontinuance of existing utilities within the limit of work as designated on the Contract Drawings and described herein, including: sewer, water, gas, and electrical, telephone, cable utilities.
- B. The location of existing underground services and utilities shown on the Contract Drawings is based on available records. It is not warranted that all existing utilities and services are shown, nor that shown locations are correct. The Contractor shall be responsible for determining the location of existing utilities and having the utility companies locate their respective utilities on the ground prior to excavating. The Contractor shall coordinate utility termination work with the applicable utility companies to ensure services have been shutoff.
- C. The Contractor shall furnish all materials, tools, labor, and equipment to abandon, cut/cap/plug, terminate, and discontinue existing utilities as specified herein.
- D. Except where specifically noted otherwise, the Contractor shall protect sewer manholes, hydrants, and the existing stormwater collection system (catchbasins, drain manholes, piping, and culverts).
- E. Contractor shall extend and cap existing electrical, water and sewer utility lines from existing support building to be demolished to proposed concrete pad as noted on the plans. All extensions shall be permitted, reviewed and approved with City inspectional services during installation and prior to backfilling.

1.02 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. The Contractor shall submit material specifications and shop drawings for all materials and equipment for abandoning existing utilities under this Section. The Contractor shall also submit details/plan for protecting utilities to be left in place. The specifications, shop drawings, details/plan shall be submitted to and reviewed by the Engineer prior to utility termination/protection work.
- B. Submit to the Engineer an As-Built Drawing showing locations of all utility abandonment's/terminations. Horizontal locations shall be by survey location or a minimum of three swing ties to fixed structures to remain (hydrants, manholes, catch

basins, etc.). The Contractor shall also indicate vertical location based on depth from existing grade. This As-Built Drawing will serve as the Owner's record of utility termination locations.

PART 2 - PRODUCTS

2.01 CAPPING MATERIALS:

- A. Cast Iron/Ductile Iron Piping - Caps shall be ductile iron and mechanical jointed with individually actuated wedges of same diameter of pipe. Caps are to be "Megalug" as manufactured by EBAA Iron Sales, Inc. or approved equal. Provide concrete thrust blocks.
- B. Asbestos-Concrete Piping – Capping shall be done by installing a transition coupling, a ductile iron nipple and a mechanical joint cap with retainer gland. Provide concrete thrust blocks.
- C. Sanitary Sewer - Concrete or masonry plugs shall be used.
- D. Copper, Iron Piping - Caps or plugs shall be permanent screwed or silver soldered cap fittings. Termination materials shall be of the same materials as the pipe.

2.02 CONCRETE AND MASONRY PLUGS:

- A. Plugs installed at the open ends of the pipe to be abandoned shall be 12-inch thick 3,000-psi cement concrete, or 8-inch thick brick masonry as directed. The pipes to be abandoned as specified herein and as shown on the Contract Drawings.
- B. Precast cement concrete plugs that are used shall meet the requirements for 3,000 psi concrete and shall be free of cracks and spalls. Brick masonry plugs shall be made of brick meeting the requirements of ASTM C32, for grade SS, hard brick.
- C. Mortar shall be composed of portland cement, hydrated lime, and sand, and the volume of sand shall not exceed three times the sum of the volumes of cement and lime. The proportions of cement and lime shall be as directed and may vary from 1:1/4 for dense hard-burned brick to 1:3/4 for softer brick. In general, mortar for grade SS brick shall be mixed in the volume proportions of 1:1/2:4-1/2; portland cement to hydrated lime to sand. The cement concrete plug shall be covered with non-shrink grout to prevent leakage at the plug.

PART 3 - EXECUTION

3.01 GENERAL:

- A. The Contractor shall determine the location of existing utilities to be abandoned from the Contract Drawings, field investigations, electronic utility detectors, coordination with applicable utility companies, and test pits.
- B. The Contractor shall at least 72 hours, exclusive of Saturdays Sundays and holidays, prior to excavation contact DIGSAFE before working below ground and shall maintain the DIGSAFE numbers throughout the course of the project.
- C. Before backfilling any underground utility termination, the Contractor shall notify the Engineer so the Engineer can inspect and photograph the termination. If the area is covered prior to inspection/approval the work shall be uncovered for inspection at the Contractor's expense. Any and all costs associated with uncovering the work and damages resulting from such uncovering are the sole responsibility of the Contractor. Immediately following the Engineer's inspection/approval, test pits and excavations for utility cutting/capping/abandonment shall be backfilled and the surface restored and maintained in a manner satisfactory to the Engineer.
- D. The Contractor shall abandon, cut/cap/plug, terminate, and discontinue individual building utility services as designated on the Contract Drawings and described in these Specifications. Except where specifically noted otherwise, the Contractor shall protect sewer manholes, hydrants, and the existing stormwater collection system (catchbasins, drain manholes, piping, and culverts) as designated on the Contract Drawings and described in these Specifications.
- E. All utility shut offs shall be coordinated with the Owner and applicable utility company. The Owner shall be responsible for any fees associated with the shut off of utilities. The Contractor shall obtain written authorization from the utility companies before shutting off or terminating any utility service, including terminating water and sewer service.
- F. The Contractor shall not remove underground piping except as necessary to terminate utilities.

3.02 UTILITY ABANDONMENT:

- A. Sanitary Sewer System:
 - 1. Existing sewers shall be cut and plugged with 3,000 psi concrete or with brick masonry, within the Limit of Work as shown on the Contract Drawings or as directed by the Engineer. Abandoned sewer branches that are connected to manholes that will remain shall be cut as shown on the Contract Drawings. The manhole shall be plugged at the abandoned sewer entrance, and the end of the severed sewer shall be plugged as shown on the Contract Drawings. Where the

sewer main is in the paved roadway, sewer services that are designated to be cut shall be cut as close to the edge of pavement as possible. The Contractor shall not excavate in the paved roadway nor damage any road pavement. The Contractor shall repair all damaged pavement to the satisfaction of the Owner at no additional cost. Sewer mains shall be plugged before proceeding with demolition of the buildings.

2. For non-circular pipes, the largest interior cross sectional dimension shall govern in determining size of abandonment.
3. The Contractor shall protect all sewer manhole frames and covers within the limit of work unless indicated otherwise on the Contract Drawings or directed by the Engineer. When a manhole is indicated to be demolished, completely remove the structure and backfill with gravel borrow to bring the area to final grade. The Contractor shall patch any pavement damaged or removed during capping operations.
4. All sewer services to each building shall be plugged at all building drains at the housing unit floor slabs. At the housing unit floor slabs, the building drains shall be plugged with a minimum of 4 inches of minimum 3000 psi concrete. Concrete so used shall be installed according to the manufacturer's written instructions and shall be cured properly to minimize future degradation.
5. Plugs shall be of adequate strength to withstand the full soil and groundwater pressure but not less than 5 psi. Plugs and caps shall be watertight.
6. Open ends of sewer services less than 12 inches in diameter shall be plugged with the appropriate VC plugs or concrete plug as directed by the Engineer. Such plug shall be made watertight with an application around the plug of an approved watertight compound.
7. Masonry plugs shall be at least 8-inches thick and concrete plugs shall be at least 12-inches thick. Pipes entering a manhole or catch basin that are to be abandoned shall have a plug installed that is flush with the interior wall of the structure.

B. Water Services:

1. The Contractor shall terminate water services and water service headers as shown on the Contract Drawings. The Contractor shall locate, in the field, the water service lines/headers and service/header valves for each building. The buildings may have more than one service/header from the water main. Where such service lines and valves are shown on the Contract Drawings, the locations are not guaranteed. Water service lines/headers shall be disconnected at the water main by first closing the corporation stop or service header valve at the main, then removing the water service or header from the stop/valve and installing a threaded watertight cap on the stop or at the valve, as applicable, and installing a threaded watertight cap on the severed piping. The severed piping shall be abandoned in

place. Where a corporation stop or a valve cannot be located, or where a complete shutoff cannot be made, a new valve shall be added to the service/header line within 2 feet of the main and then shut off and capped. The Contractor shall patch any pavement damaged or removed during capping operations. The Contractor shall not close any valves that will shut off water service to buildings outside the work area without the prior written permission of the Owner.

2. Where active water lines are to be capped, restrained caps with thrust blocks shall be used.
3. All fire hydrants shall remain accessible and functional unless indicated otherwise on the Contract Drawings.
4. Valve boxes shall be removed from all valves and curb stops which are on the abandoned main.
5. Plugs and caps shall be watertight. Metallic pipe shall be capped with caps of the same material as the pipe.

C. Electrical Service:

1. The disconnection of electrical utilities to be done by others. Scheduling of disconnection will require coordination between Contractor and Owner. Contractor shall remove all dropped wires within the limit of work, unless noted otherwise, and dispose of them in compliance with current local, State, and Federal Regulations.
2. The Owner will arrange to have the electrical services terminated at main utility poles. The Contractor shall remove and dispose of all wire and electrical appurtenances that are abandoned, including abandoned utility poles between active utility poles and the buildings. The Contractor shall not remove any transformers or any active utility poles. The Contractor shall coordinate with the Owner before handling any utility poles, electrical wiring, and appurtenances.

D. Gas Service:

1. The Owner will arrange to have the gas company disconnect gas service to the buildings and remove exterior gas appurtenances. **The local Gas Company shall remove individual gas services to each building.** The Contractor shall coordinate the abandonment of gas utilities with Owner to assure that the gas has been disconnected. The Contractor is responsible for the protection of gas mains during the demolition work, and ensuring that the connections to each building have been removed and plugged at the main by the Gas Company. The Contractor shall remove and dispose of all interior gas piping and appurtenances, **and all appurtenances remaining outside the building.** The Contractor shall

also remove remaining above grade gas piping to the point where the piping turns horizontal underground

E. Telephone:

1. The Contractor shall arrange with the telephone provider to have telephone services to each building disconnected at the pole. The Contractor shall remove and dispose of all abandoned wiring and appurtenances. The Contractor shall coordinate with the Owner before arranging to have telephone service disconnected.

F. Cable:

1. The Contractor shall arrange with the cable provider to have cable services to each building disconnected at the pole. The Contractor shall remove and dispose of all abandoned cable wiring and appurtenances. The Contractor shall coordinate with the Owner before arranging to have cable services disconnected.

3.03 CASTINGS.

- A. All frames, grates and covers on existing manholes that are specified to be abandoned shall become the property of the Contractor.

3.04 CONCRETE PLACING DURING COLD WEATHER:

- A. Concrete shall not be placed on frozen ground, and no frozen material or material containing ice shall be used. Materials for concrete shall be heated when temperature is below 40°F, or is expected to fall to below 40°F, within 73 hours, and the concrete after placing shall be protected by covering, heat, or both.
- B. All details of CONTRACTOR's handling and protecting of concrete during freezing weather shall be subject to the approval and direction of the ENGINEER. All procedures shall be in accordance with provisions of ACI 306.

3.05 CONCRETE PLACING DURING HOT WEATHER:

- A. Concrete just placed shall be protected from the direct rays of the sun and the forms and reinforcement just prior to placing, shall be sprinkled with cold water. The CONTRACTOR shall make every effort to minimize delays, which will result in excessive mixing of the concrete after arrival on the job.
- B. During periods of excessively hot weather (90°F or above), ingredients in the concrete shall be cooled insofar as possible and cold mixing water shall be used to maintain the temperature of the concrete at permissible levels all in accordance with the provisions

of ACI 305. Any concrete with a temperature above 90°F, when ready for placement, will not be acceptable, and will be rejected.

END OF SECTION

SECTION 02225

BUILDING DEMOLITION

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. Demolition of the Falzone Memorial Park support building, as stipulated throughout the Contract Documents, shall generally include the following:
 - 1. Complete demolition, disposal of all interior and exterior building elements including floors, slabs, foundations, walls, partitions, ceilings, roof structures and buried utilities.
 - 2. Complete demolition, removal and disposal of all building equipment and fixtures.
 - 3. Extension OR cutting, capping, removal and abandonment of all utility systems as detailed and specified throughout the Contract Documents.
 - 4. Complete removal of existing utility poles and overhead wires currently providing electrical service to the support building. Contractor is responsible for any required coordination with the utility company; ensuring power supply has been deactivated from the street, removal and legal disposal of all lines, poles and associated fixtures.
 - 5. Installation of environmental controls including silt fencing / erosion controls prior to commencing work of any kind on premises.
 - 6. Protection of the any adjacent wetland areas and adjacent City park property, coordination with City of Waltham representatives as needed and required, conducting demolition and restoration operations in a manner that does not disrupt or inconvenience normal activities and/or special events at the park property.
- B. Prospective bidders are advised that certain materials and equipment will have been salvaged and removed from the premises by City and sports league representatives prior to initiation of the work of this contract.
- C. Complete Lead testing, reporting and abatement shall be performed prior to the work described under this Section in accordance with federal and state regulations.
- D. Contractor shall hold an allowance of \$10,000 for related work.
- E. Restoration of all project areas shall be undertaken upon the successful and satisfactory execution of all demolition efforts as specified throughout the Contract Documents.

1.02 REGULATORY REQUIREMENTS:

- A. Conform to applicable codes and requirements for demolition of structure, safety of adjacent structure, dust control, service utilities, and discovered hazards.
- B. Dispose or recycle all demolition debris in accordance with all applicable regulations.
- C. Regulations, Fees And Permits
 - 1. All materials and the installation thereof shall conform to the requirements of all Federal, State and local laws, rules and regulations and codes pertaining thereto. Where Provisions of the Contract drawings conflict with any codes, rules and regulations, the laws, codes or regulations shall govern.
 - 2. All legally imposed charges made by local authorities for the work of this Section involving the connection, inspection and approval services of all bureaus administering all applicable codes and regulations shall be provided hereunder at no additional expense to the Owner.
 - 3. The Contractor shall give the proper authorities all required notices or information relating to work in his charge, pay all fees necessary to obtain all official licenses, permits and certificates, and comply with the rules of the Massachusetts Department of Public Safety.

1.03 RELATED WORK:

- A. Section 02350, EARTHWORK

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. Submit three (3) copies of a demolition plan and schedule to the Owner for review at least two weeks prior to the start of work, describing the proposed sequence, methods, and equipment required for the demolition and disposal. Also, indicate measures to be taken to protect adjacent properties and all adjacent facilities to remain.
- B. Do not proceed with the demolition until the Department has given written acceptance of the demolition plan.
- C. The Contractor shall certify in writing that the debris has been disposed of in accordance with all applicable regulations.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

Falzone Memorial Park & Nipper Maher Park
Waltham, Massachusetts

3.01 PREPARATION:

- A. Provide, erect, and maintain temporary barriers and security devices. Existing chain link fences may be maintained in place throughout the demolition process. Erect temporary chain link construction fencing as voids are created in the perimeter of the work area (formed by buildings to be demolished.)
- B. Notify Owner of procedures and operations that may affect the property or adjacent properties, of potential noise, utility outages, or other potential disruptions. Coordinate with Owner.
- C. Erect and maintain temporary partitions to prevent spread of dust, odors and noise.
- D. Protect all existing site features and elements that are to remain or that are to be removed and transported as stipulated elsewhere in the Contract Documents.
- E. Arrange with, pay for all required fees, and perform work required by utility companies and municipal departments for discontinuance or interruptions of utility services due to demolition work.

3.02 DEMOLITION REQUIREMENTS:

- A. Conduct demolition in accordance with approved plans and in compliance with all relevant specifications, details and plans, so as to minimize interference with adjacent building areas.
- B. Under no circumstances shall explosives be used.
- C. Conduct operations with minimum interference to public or private properties and access routes. Gain access to the premises at designated locations only.
- D. Maintain protected access and egress at all times. Do not close or obstruct roadways without permits.
- E. Cease operations immediately if adjacent properties or facilities appear to be in danger. Notify the Owner for direction prior to commencing with work.
- F. All disturbed areas shall be loamed and seeded unless otherwise indicated on contract drawings. Remove and replace all elements that are intended to remain, or have been damaged, to the satisfaction of the Owner.

3.03 BUILDING DEMOLITION:

- A. Extend OR disconnect, cap, identify and remove designated utilities. Coordinate with all Utility representatives and pay all fees associated with all work.
- B. Demolish components indicated in an orderly and careful manner. Unless specifically authorized otherwise, all demolished materials shall be removed from the premises and disposed of in a lawful manner. Provide evidence of satisfactory disposal as required.
- C. Backfill foundations and substructure excavations with suitable Backfill. Compact backfill in accordance with Section 02350, EXCAVATION BORROW AND BACKFILL.
- D. Fill, grade, and compact areas affected by demolition to achieve smooth and uniform grades to match existing at the limits of demolition. See Grading Plan.

3.04 CLEAN UP:

- A. Remove demolished materials from site as work progresses. Provide evidence of satisfactory disposal for all demolished materials.
- B. Leave areas of work in a safe and clean condition at the end of each work day.
- C. Restore all project areas and adjacent project areas in conformance with the Contract Documents.

3.05 SCHEDULE OF PRODUCTS TO BE REMOVED:

- A. Remove, store, and protect the following materials and equipment:

NONE

END OF SECTION

SECTION 02230

CLEARING AND GRUBBING

PART I - GENERAL

1.01 SCOPE OF WORK

- A. The work under this Section shall consist of clearing, grubbing, cutting, removal and disposal of all vegetation and debris from areas within the Limit of Work where noted on the plans or as designated by the Engineer. The work shall also include the preservation from injury or defacement of all vegetation and objects designated or directed to remain.

1.02 SPECIAL INSTRUCTIONS

- A. The burning of trees, brush, stumps, etc., shall not be permitted. The Contractor shall provide other satisfactory methods of disposal without additional compensation.
- B. When fencing is installed outside normal clearing areas, every reasonable effort shall be made to preserve trees or shrubs whose removal is not essential to the installation of the fencing.
- C. Trees and shrubs that are not to be cut, removed, destroyed or trimmed shall be saved from harm and injury. All damage done to trees by the Contractor's operation shall be appropriately pruned in accordance with accepted horticultural practice unless damage is so extensive that the damage claim process shall be adopted.
- D. Equipment and supply storage areas shall be kept well away from the root zones of existing trees. This zone is determined to be equal to the outreach of the above ground branch structure of the trees. All effort shall be made to minimize any activity in these areas to help insure the continued good health of the existing trees.

1.03 PERMITS

- A. Per Permit Section of these Specifications, the Engineer shall be furnished notarized copies of agreements between the Contractor and owners of legal landfills and disposal or storage areas upon request. The Contractor shall make arrangements and negotiations necessary for the satisfactory legal disposal of trees, shrubs, stumps, roots, dead-wood and other litter off site.

PART II - MATERIALS

**Falzone Memorial Park & Nipper Maher Park
Waltham, Massachusetts**

2.01 SUITABLE BACKFILL

- A. Refer to Specification Section 02350 Excavation Borrow and Backfill for suitable backfill requirements.

PART III - EXECUTION

3.01 CLEARING AND GRUBBING

- A. Clear and grub all areas as designated on the plans. At the discretion of the Owner, individual plant materials, not plan referenced, may be denoted in the field to remain as determined by the Project Representative.
- B. The stumps of all trees, brush and major roots shall be grubbed and removed per Section 02235 of these Specifications.

3.02 DISPOSAL OF TREES, BRUSH AND STUMPS

- A. Trees and stumps shall be properly disposed of off-site at a legal dump site as specified.

3.03 DISPOSAL OF DUTCH ELM DISEASED WOOD SHALL BE DONE IN THE MANNER HEREIN SPECIFIED:

- A. Dutch Elm diseased wood shall be disposed of in accordance with the provisions of General Law, Chapter 87, Section 5 and Chapter 132, Sections 8 and 11, as amended; and in accordance with any additional local regulations.
- B. Where the work includes the removal of elm trees or the limbs of elm trees, such trees or limbs thereof shall be disposed of immediately after cutting or removal and in such a manner as to prevent the spread of Dutch Elm disease. This shall be accomplished by covering them with earth to a depth of at least six (6) inches at the off-site location where the Contractor has arranged for disposal.
- C. Where the work includes the removal and disposal of stumps of elm trees, such stumps shall be completely disposed of immediately after cutting in the manner specified above.

3.04 BACKFILLING

- A. Fill all voids with suitable backfill in controlled eight (8) inch maximum compacted lifts flush with proposed subgrades in adjacent areas.

END OF SECTION

SECTION 02235

TREE PRUNING AND TREE AND STUMP REMOVALS

PART I - GENERAL

1.01 SCOPE OF WORK

- A. The work of this Section includes the following:
 - 1. Pruning - Class II, including the removal of all limbs necessary to execute the field, playground and fence work required under this contract.
 - 2. Removal of trees and stumps.
- B. Refer to the Contract Drawings for general location of trees along the site perimeter. Tree removals shall be limited to the area denoted on the plans and shall include the removal of individual trees that would impede the construction of proposed facilities.

1.02 QUALIFICATIONS OF CONTRACTOR

- A. This work shall be limited to individuals, partnerships and corporations who are actively engaged in the field of Arboriculture, and who demonstrate competence, experience and financial capability to carry out the terms of this project. Eligible contractors must derive a majority of their income from arboricultural work. The Owner may require proof of these qualifications.
- B. All work shall be conducted by qualified and trained personnel under the direct supervision of a Massachusetts Certified Arborist in the Contractor's employ.

1.03 SPECIAL REQUIREMENTS

- A. Dutch Elm diseased wood shall be disposed of in accordance with provisions of General Laws, Chapter 87, Section 5, and Chapter 132, Sections 8 and 11 as amended; and in accordance with any additional local regulations. All wood shall be removed from the site and be properly disposed of in accordance with state and local regulations.
- B. No burning shall be permitted on the project site.

- C. Prior to commencing work, the Contractor shall submit a plan to the Owner for legal disposal of removed materials, in conformance with State and Federal regulations.

1.04 STANDARDS AND DEFINITIONS

- A. All pruning work shall be performed in accordance with the following:
 - 1. The ANSI A300 'Standard Practices for Trees, Shrubs, and Other Wood Plant Materials' of the Secretariat: National Arborist Association, Post Office Box 1094, Amherst, New Hampshire 03031.
 - 2. American National Standards Institute (ANSI) Standard Z-133.1.
 - 3. The standards and practices of the International Society of Arborists.
 - 4. The standards and practices of the Massachusetts Arborist Association.
 - 5. The standards and practices of the American Association of Nurserymen.
- B. The term 'Owner' shall mean the City of Waltham's designated representative charged with carrying out the requirements of this Project – 'Landscape Architect', 'Engineer', 'Planner', or 'Tree Warden' as referenced herein, rendering approvals for the Owner.

1.05 EXAMINATION OF SITE AND DOCUMENTS

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

1.06 ORDER OF WORK

- A. Based on the site conference, the Contractor shall submit a schedule of work for the Owner's review and approval prior to beginning work. Unless otherwise authorized by the Owner, failure of the Contractor to comply with the approved removal schedule shall be sufficient cause to give notice that the Contractor is in default of the contract.

1.07 PROTECTION OF THE VEGETATION TO BE PRESERVED

- A. The Contractor shall protect all existing trees, shrubs, lawns and other site features designated to remain. The placement of protection devices, such as snow fences, shall, however, be at the Contractor's discretion.
- B. Damage no plant to remain by burning, pumping water, cutting of live roots or branches, or any other means. Neither vehicles nor equipment shall be parked within the dripline of trees to remain, or where ever damage may result to trees to be saved. Construction material shall not be stored beneath trees to be saved.
- C. The Contractor shall be liable for any damage to any trees, shrub, lawn or other site features to remain, and shall immediately report to the Owner. Damaged shrubs or lawns shall be restored or replaced to match existing to remain to the satisfaction of the Owner.
- D. The Contractor shall compensate the Owner for damages by installing replacement tree(s) of the size and species approved by the City and of sufficient quantity such that the sum of the Diameter at Breast Height (DBH) inches for replacement trees equals the total DBH inches of the damaged tree(s). Damaged shrubs shall be replaced with shrubs(s) of the same size, species, and quantity, unless determined otherwise by the Owner.

1.08 USE AND CARE OF THE SITE

- A. The Contractor shall leave the work site at the end of each working period in a condition satisfactory to the Owner.
- B. Pavements shall be swept and lawns or other surfaces raked and/or otherwise cleaned of all material related to the work operation. Degree of clean-up required will be described by the Owner and will be based upon the character of the work area.
- C. All trimmings or any other form of debris (except diseased materials or trimmings from Elms) shall be collected and chipped. The Contractor shall remove all materials and shall dispose of such materials off site in a legal manner.
- D. The Contractor shall be fully and solely responsible for any damage to equipment or vehicles left at the site of the work. All necessary permits shall be obtained by the Contractor.

PART II - MATERIALS

2.01 EQUIPMENT

- A. Equipment necessary for this Contract shall be properly maintained and in good operating condition to the City's satisfaction. The Contractor shall promptly remove and replace any equipment which the Owner deems to be in unsatisfactory condition or otherwise unsuitable.
- B. Cutting tools shall be kept well sharpened to provide clean smooth cuts. Any tools utilized on any tree suspected to have cankers or other fungal, bacterial or viral diseases shall be sterilized or not used on any other specimen.
- C. A disc chipper shall be used which will process material up to twelve (12) inches in diameter.

2.03 PERSONNEL

- A. The Contractor shall submit each employee's name and title prior to the commencement of work. The Contractor shall advise the Owner of any changes in roster assigned to this Contract.
- B. A crew shall consist of one (1) tree trimmer/climber, and one (1) ground person (one which shall be a crew foreman). The crew foreman shall have a minimum of five (5) years climbing/pruning experience. At least one (1) crew person shall be a MCA and shall be certified in CPR.
- C. Each trimmer shall be experienced and highly qualified with the necessary tree worker skills to successfully complete the work of this Section, including the ability and training to perform aerial rescue. Said skill shall also include worker safety and ability in compliance with current OSHA and ANSI Z-133.1 Standards.

PART III - EXECUTION OF PRUNING/REMOVALS

3.01 PRUNING

- A. Under this Section, the Contractor shall furnish all labor, materials, equipment and transportation required to complete all aspects of the work in accordance with all local, state and federal regulations in force at the same time of this Contract and in accordance with tree pruning as specified herein.

- B. The work of this Section consists of all pruning work and related items as specified herein and includes, but is not limited to:
 - 1. Pruning - Class II throughout the designated areas and limb removal required to allow for the proper installation of all fields, play equipment and new fencing.

Class II pruning is defined as medium pruning and shall consist of the removal of dead, dying, diseased, interfering, objectionable and weak branches on the main trunks as well as those within the leaf area. An occasional branch one (1) inch or less in diameter may remain within the main leaf area where it is not practical to remove it.

3.02 DESCRIPTION OF PRUNING WORK

- A. Pruning and trimming are generally described as the removal and disposal of limbs, branches and stubs which are either dead, potentially detrimental to the health of the tree or dangerous to pedestrians, visually deficient, interfering or otherwise objectionable as determined by the Owner.
- B. The limits of all trees to be pruned have been identified on the plans or referenced elsewhere in this specification section.
- C. Vehicle access shall be controlled and approved by the City Representative.
- D. If the Contractor discovers tree(s) which have not been marked for pruning, but whose condition is such that removal is warranted, whether due to death, disease, decay, or structural weakness, such tree(s) shall not be pruned and the Contractor shall immediately report these findings in writing to the Owner and await the Owner's direction before proceeding with work on the particular tree(s) in question.
- E. All pruning shall be performed in a manner that maintains the natural aesthetic characteristics of the species and variety of trees. No topping or dehorning of trees or stubbing back of branches shall be permitted. All cuts shall be made to a lateral branch that is a minimum of one third (1/3) the size of the branch being removed, unless otherwise instructed by the Owner.
- F. The use of climbing spurs or spiked shoes shall not be permitted and their use will result in the immediate cancellation of the contract.

- G. All cuts shall be made sufficiently close to the parent stem so that wound closure can be readily started under normal conditions. Cuts shall, however, never be made through the branch collar. Slab cuts and rip cuts will result in cancellation of the contract.
- H. All limbs over two (2) inches in diameter to be removed shall be precut to prevent splitting. Any branches that by falling would injure existing trees to remain or other objects shall be lowered to the ground by proper ropes.
- I. On trees known to be diseased and where there is known to be danger of transmitting the disease on tools, tools shall be disinfected with alcohol or bleach after each cut between trees.
- J. Lateral branches as well as occasional branch suckers (“water sprouts”) may be retained. Complete removal of secondary laterals and branch suckers resulting in the stripping of major limbs, (“lion tailing”) will not be permitted.
- K. Tree paint to seal pruning cuts shall not be used.
- L. All branches and limbs shall be manually lowered to the ground via rope and pulley. This practice must be consistent with the National Arborist Association Standards for Pruning. All grade-level artifacts and landscaping must be protected from damage.

3.03 REMOVALS

- A. The Contractor shall furnish all labor, materials, equipment and transportation required to complete all aspects of the removals work in accordance with all local, state, and federal regulations in force at the time of this contract and in accordance with tree and stump removals as specified herein.

3.04 DESCRIPTION OF WORK

- A. Removal is generally described as the removal of groups and individual invasive trees and shrubs which impede installation of improvements.
- B. The Contractor shall adhere to the specifications and provide suitable facilities for inspecting the work. Failure of the Owner to immediately reject unsatisfactory work or to notify the Contractor of deviations from the specification shall not relieve the Contractor of responsibility to correct or remedy unsatisfactory work.
- C. The Contractor shall only work on trees designated by the Owner. No compensation will be made for work performed on any other tree or trees.
- D. Trees designated to be removed shall be taken down and all leaves, branches and trunks of trees properly disposed of by chipping and removal from the premises.

- E. Fell trees in a manner that allows all site features and those trees to be saved undamaged.
- F. Removal of all the parts of each tree shall be completed on the same day that the tree is cut.
- G. Stumps shall be ground to eighteen (18) inches below grade by grinding or other means acceptable to the Owner. The void from the stump removal operations shall be filled with ordinary borrow soil to within six (6) inches of finished grade. The top six (6) inches shall be filled with screened loam, moderately tamped to prevent future settling. In grass areas the disturbed area shall be sown with grass seed of a mix appropriate to the location, as directed by the Owner.
- H. Excavation or grading within the branch spread of trees to be saved shall be performed only under the direction of the Owner unless otherwise directed.
- I. All equipment to be used and all work to be performed must be in full compliance with all standards as promulgated by OSHA at the time of bidding, including, but not limited to those regulations concerning noise levels, protective devices and operator safety.
- J. The Contractor shall be solely responsible for pedestrian and vehicular safety and control within the work site and shall protect the public and its property from injury or damage that could be caused by the progress of the work. To this end the Contractor shall provide, erect, and maintain protective devices acceptable to the Owner, including but not limited to barricades, lights and warning signs.
- K. Any practice employed by the Contractor that is obviously hazardous as determined by the Owner shall be immediately discontinued by the Contractor upon receipt of either written or oral notice from the Owner to discontinue such practice.

END OF SECTION

SECTION 02240

DEWATERING

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section specifies designing, furnishing, installing, maintaining, operating and removing temporary dewatering systems as required to lower and control water levels and hydrostatic pressures during construction; disposing of pumped water; constructing, maintaining, observing and, except where indicated or required to remain in place, removing of equipment and instrumentation for control of the system. It is not anticipated that dewater efforts will be extensive. The deepest trench excavation is approximately 48”.

Water was encountered in the test pits at 56” below the surface.

1.02 RELATED WORK:

- A. Section 02350, EXCAVATION BORROW AND BACKFILL

1.03 SYSTEM DESCRIPTION:

- A. Dewatering includes lowering the water table and intercepting seepage which would otherwise emerge from the slopes or bottom of the excavation; increasing the stability of excavated slopes; preventing loss of material from beneath the slopes or bottom of the excavation; reducing lateral loads on sheeting and bracing; improving the excavation and hauling characteristics of sandy soil; preventing rupture or heaving of the bottom of any excavation; and disposing of pumped water.
- B. Normal dewatering is defined as using conventional pumps installed in open excavations, ditches, or sumps.

1.04 QUALITY ASSURANCE:

- A. The Contractor is responsible for the adequacy of the dewatering systems.
- B. The dewatering systems shall be capable of effectively reducing the hydrostatic pressure and lowering the groundwater levels to a minimum of 2 feet below excavation bottom, unless otherwise directed by the Engineer, so that all excavation bottoms are firm and dry.
- C. The dewatering system shall be capable of maintaining a dry and stable subgrade until the structures, pipes and appurtenances to be built therein have been completed to the extent that they will not be floated or otherwise damaged.

- D. The dewatering system and excavation support shall be designed so that lowering of the groundwater level outside the excavation does not adversely affect adjacent structures, utilities or wells.

1.05 SUBMITTALS

- A. Contractor shall submit six copies a plan indicating how they intend to control the discharge from any dewatering operations on the project, whether it is discharge of groundwater from excavations or Stormwater runoff during the life of the project.

PART 2 - PRODUCTS: NOT APPLICABLE

PART 3 - EXECUTION

3.01 DEWATERING OPERATIONS:

- A. All water pumped or drained from the work shall be disposed of in a manner which will not result in undue interference with other work or damage to adjacent properties, pavements and other surfaces, buildings, structures and utilities. Suitable temporary pipes, flumes or channels shall be provided for water that may flow along or across the site of the work. All disposal of pumped water shall conform to the requirements of the owner.
- B. Dewatering facilities shall be located where they will not interfere with utilities and construction work to be done by others.
- C. Dewatering procedures to be used shall be as described below:
 - 1. Crushed stone shall encapsulate the suction end of the pump to aid in minimizing the amount of silt discharged.
 - 2. For dewatering operations with relatively minor flows, pump discharges shall be directed into hay bale sedimentation traps lined with filter fabric. Water is to be filtered through the hay bales and filter fabric prior to being allowed to seep out into its natural water course.
 - 3. For dewatering operations with larger flows, pump discharges shall be into a steel dewatering basin. Steel baffle plates shall in used to slow water velocities to increase the contact time and allow adequate settlement of sediment prior to discharge into waterways.
 - 4. Where indicated on the contract drawings or in conditions of excess silt suspended in the discharge water, silt control bags are to be utilized in catch basins.
 - 5. The Contractor shall be responsible for repair of any damage caused by his dewatering operations, at no cost to the Owner.

END OF SECTION

SECTION 02350

EXCAVATION, BORROW AND BACKFILL

PART I - GENERAL

1.01 SCOPE OF WORK

- A. Under this Section, the Contractor shall furnish all labor, materials, equipment and transportation required to complete Excavation, Borrow and Backfill work indicated on the drawings, as designated by the Landscape Architect, or as specified herein, to complete all proposed work.
- B. Without limiting the generality thereof, Excavation, Borrow and Backfill shall include excavating, furnishing borrow materials as necessary and back-filling for the construction of all proposed work from existing grades to finished grades. Work shall include the removal of unclassified material, such as bituminous pavements, curbs, ledge and boulders under one (1) cubic yard in size, concrete, reinforced and plain, structures, fencing of various types, and metal or wood posts; and unsuitable materials of every nature throughout the site within twelve (12) inches below finished subgrade elevations for proposed work; transportation of the excavated materials; back-filling to proposed base course subgrades with approved excavated and/or furnished materials; and the disposal of unsuitable, and/or surplus excavated materials.
- C. Work under this Section shall also include the discing and harrowing of existing grass or topsoil areas to break down all sod clumps and vegetation and the complete excavation, stockpiling, rehandling, spreading, and re-use (placing) of on-site topsoil in conformity with the lines, grades and dimensions shown on the plans. This material may be utilized where general embankment (not beneath pavements or structural improvements) is proposed. The Contractor shall take extreme care in the process of discing and harrowing of the existing topsoil to insure that subsoil to remain in place is not mixed with the topsoil. Disc compacted areas subject to construction traffic to the full depth of topsoil without mixing in subsoil.
- D. Work under this Section shall also include the excavation of existing base courses under existing pavement areas for re-use in proposed fill areas up to base course subgrades or loam borrow subgrades if the existing material is deemed suitable and is excavated without contamination by or mixing with unsuitable materials and subsoils. This material may be utilized for backfill over pipe cover in trenches only if all material over four (4) inches in size is removed prior to back filling. All existing materials shall be removed to the full depth of proposed work.

- E. Work under this Section shall also include the excavation of subsoil to the limit lines of proposed work. If deemed suitable by the Landscape Architect, as meeting the criteria or intent of paragraph 2.02 of this Specification, this material may be used as fill material for grading and general filling of any unpaved areas to bottom of proposed work. **No subsoil** shall be used for fill at proposed pavement areas or below proposed pipes or structures without meeting the requirements for paragraph 2.02a below.
- F. Work under this Section shall include the furnishing of all borrow materials required to complete the proposed work as designed. Where "processed gravel", "gravel borrow", or "gravel" is indicated in the specifications or on the drawings, only gravel conforming to this section of the specifications may be utilized.
- G. All topsoil/loam for sod, seed or plant material beds, whether re-used or furnished from off-site, shall conform to the loam borrow section of these Specifications.

1.02 REFERENCE STANDARDS AND SPECIFICATIONS

- A. References to specific standards, specifications and tests of the following technical societies, organizations, and governmental bodies may be made in the contract documents.
 - 1. AASHTO - American Association of State Highway and Transportation Officials (tests or specifications). AASHTO or AASHO
 - 2. ASTM - American Society for Testing and Materials.
 - 3. Mass. Standard Specs. - Latest edition of the Standard Specifications for Highways, Bridges and Waterways, 1988 Edition, the Commonwealth of Massachusetts, Department of Public Works, hereinafter referred to as the "Massachusetts Standard Specifications."
 - 4. AWWA - American Waterworks Association.

1.03 SAMPLING AND TESTING

- A. Four samples each of materials requested to be tested by the Landscape Architect shall be taken at the locations ordered by, and in the presence of, the Landscape Architect at the site or at the source of supply and under his direction for testing in accordance with requirements stated herein. The Contractor shall pay for these tests regardless of their results.
- B. Test results shall be submitted directly to the Landscape Architect by a Certified Testing Laboratory to be approved by the Landscape Architect. No material shall be re-used or furnished until the Landscape Architect's approval is given.

- C. All tests of any kind ordered by the Landscape Architect shall be paid for by the Contractor regardless of test results.

1.04 SPECIAL REQUIREMENTS

- A. If test results indicate that existing base course materials are suitable backfill material per paragraph 2.02, they shall be utilized as fill up to subgrade and for trench backfill over pipe cover. If results indicate that they meet the specifications for gravel, they may be utilized where gravel is proposed.
- B. The sequence of all excavation operations shall be such as to insure the most efficient re-use of suitable excavated materials and the use of a minimum amount of specified borrow.
- C. The Contractor shall inform and satisfy himself as to the character, quantity, and distribution of all material to be excavated. No payment will be made for the placement of any excavated material that is used for purposes other than those designated and as specified herein. Further, these shall be removed at no cost to the Owner if so directed by the Landscape Architect.
- D. The Landscape Architect shall have final determination over the excavation, moving, placing and disposition of all materials, and shall determine the suitability of materials to be placed in excavated areas.
- E. All backfill to subgrade shall be compacted to not less than ninety-five percent (95%) of the maximum dry density of the material as determined by the Standard AASHTO Test Designation T-180-86, Modified Proctor Test.
- F. Unsuitable and/or excess excavated materials shall be removed and properly disposed of in legal disposal areas off of the site at no additional cost to the Owner.
- G. Exploratory excavation to locate existing utilities or obstructions shall be at the Contractor's discretion to assist him in the work of this project and no extra payment shall be made for such verification. Although extra payment is not considered, lack of such payment does not constitute a waiver of the Contractor's responsibility to verify all utilities. The contractor must ensure verification of existing services and ensure the safety of the Contractor's work forces.
- H. No on-site excavated backfill materials may be used as base courses for any pavements or structural elements unless test results show these materials to meet this specification for the type of material to be utilized and are so approved by the Landscape Architect.

1.05 SUBMITTALS/COORDINATION

**Falzone Memorial Park & Nipper Maher Park
Waltham, Massachusetts**

**02350-3
EXCAVATION, BORROW AND BACKFILL**

- A. The Contractor, per Sections SUBMITTALS and SAMPLING AND TESTING of these Specifications shall furnish all necessary submittals and certifications as to Certified Testing Laboratory, disposal sites, etc.
- B. The Contractor shall notify Digsafe at 1-888-344-7233 at least seventy-two (72) hours prior to initiating excavation.

PART II - MATERIALS

2.01 BORROW MATERIALS

- A. Excavated topsoil and furnished topsoil to be utilized for sodding, seeding and landscaping must conform to Section 02910 Screened Loam in order to be used as Loam. Existing topsoil not passing tests for Loam may be considered suitable as general fill below subgrade, in landscaped areas only and may be utilized throughout the proposed sod and seeded areas, up to subgrades of proposed work, but not under athletic fields.
- B. Gravel Borrow shall be as specified under paragraph 2.04 and shall be utilized whenever gravel is noted, including beneath pavements and structural elements unless otherwise noted. Gravel Borrow shall satisfy the requirements listed in MassDOT Specification Section M1.03.0, Type b.
- C. Although suitable excavated backfill materials and topsoil may be reused to fill to subgrade as specified herein, if there are insufficient quantities of materials available the Contractor shall furnish Suitable Backfill as specified in paragraph 2.02a below.
- D. If approved by the Engineer, Suitable Backfill materials excavated from beneath pavements may be utilized as backfill from four (4) inches above the overt of pipes so long as all material over four (4) inches in size is removed from the material prior to backfilling and all trench compaction requirements may be met.
- E. Where Sand Borrow is required, materials shall conform to Section M1.04.1 of the Massachusetts Standard Specifications. Utilize Sand Borrow as necessary for pipe bedding and cover.
- F. Where Crushed Stone is required, materials shall conform to Section M2.01 of the Massachusetts DOT Standard Specifications. Utilize Crushed Stone as necessary for granite block setting beds, backfill for sub-drains, and other details as noted in contract documents.

2.02 SUITABLE BACKFILL

- A. All other materials to be placed where Specifications or Drawings call for "fill," "back-filling," or "filling" to subgrade, shall be natural soil, well-graded and free

from all organic weak, compressible, and frozen materials, and shall contain no stone larger than four (4) inches in maximum dimension. It shall be of such nature and character that it can be dried and compacted and shall be free of all expansive materials (such as high plastic clays) and of materials subject to decay, decomposition, or dissolution, and shall conform to the following gradations:

| <u>U.S. Sieve No.</u> | <u>Total Percent Passing by Weight</u> |
|-----------------------|--|
| 4 inch | 100 |
| #4 | 20-75 |
| #40 | 0-25 |
| #200 | 0-5 |

- B. If, sufficient suitable fill material is not available from excavations under this Contract, to complete filling to subgrades as specified above, additional fill, as specified under paragraph 2.02a above, shall be furnished by the Contractor from other sources at no additional cost. Excavated material from the site, and furnished material for use as Suitable Backfill, shall be deemed suitable only if they meet the requirements of paragraph 2.02a above, can be properly compacted, and are satisfactory to the Landscape Architect.
- C. Use Suitable Backfill compacted as specified for general grading as backfill except as specified herein; fill to sub-grades of proposed work where shown.

2.03 CRUSHED STONE FOR TRENCHES (IN WATER ONLY)

- A. If trench excavations contain water, the Contractor shall substitute crushed stone, one and one-half (1-1 /2) inch minus, for bedding and backfill, in accordance with MDPW Standard Specifications M2.01.2, at no additional cost to the Owner, to three (3) inches above the standing water level; unless otherwise directed by the Landscape Architect.

2.04 GRAVEL BORROW

- A. All references to "Processed Gravel", "Gravel Borrow", or "Gravel" shall conform to the following:
- B. All proposed gravel areas, utilizing salvaged or furnished materials shall conform to Section M1.03.0 Type "b", with maximum stone size three (3) inches in dimension, and Section 150 Embankment, of the Standard Specifications (MDPW).
- C. Excavated materials from on-site may be utilized in all areas calling for gravel if they pass the test requirements for paragraph 2.04b above except that only stones above four (4) inches must be removed to reutilize the materials.

PART III - EXECUTION

3.01 EXCAVATION AND FILLING

- A. Excavation and filling shall be executed to such depth that sufficient material will be left above the designated grade to allow for specified compaction to the required sub-grade. Should the Contractor, through negligence or other fault, excavate below the designated lines, he shall replace such excavation with approved materials, in an approved manner and condition, at his own expense.
- B. When the plans require excavation in areas in proximity to existing sidewalks, structures and utilities, it shall be the responsibility of the Contractor, at his own expense, to provide adequate and suitable drainage away from proposed work and existing features or use other satisfactory means and methods to protect and maintain the stability of such construction within or adjacent to the limits of work.
- C. Protect all existing trees, shrubs or other plan referenced features to remain. Hand excavate around all items to remain including tree roots or where utilities must be verified. Exposed tree roots shall be immediately covered with Loam Borrow in accordance with these specifications.
- D. No roots greater than two (2) inches in diameter shall be cut from trees to remain without approval of the Landscape Architect. Roots greater than one (1) inch in diameter that are cut or broken shall be promptly pruned to a smooth clean cut and painted with an approved compound.
- E. Any removal of existing facilities required in order to achieve the excavation to proceed, such as fences, walls, walkways, etc., shall be accomplished by the Contractor at no additional cost to the Owner. Restoration of these facilities shall be to a condition equal to that before removal, and safe and operational to the satisfaction of the Landscape Architect.
- F. Excavation shall be performed to the lines, grades, and elevations shown on the plans or as directed by the Landscape Architect, and shall be made in such a manner that the requirements for formation of the subgrade can be followed.
- G. No excavation shall be started until the Landscape Architect has reviewed and acknowledged the area of proposed construction. All material encountered, of whatever nature within the limits indicated, shall be removed and disposed of as directed. During the process of excavation, the grade shall be maintained in such condition that it will be well drained at all times.
- H. The planes at the bottom of the excavation (in cut), or the top of the fill, when completed, shall be known as the subgrade, and shall be true to the lines, grades and cross section shown on the plans, to allow proposed work (base courses and finished courses) to be completed.

- I. Hardpan, loose rock, boulders or other material unsatisfactory for subgrades shall be excavated to a depth as the Landscape Architect may direct below the contemplated subgrade. Muck, peat, matted roots or other yielding material unsatisfactory for subgrade foundation shall be removed to such depth as directed to provide a satisfactory foundation. Unsatisfactory materials shall be disposed of by the Contractor. The portion so excavated shall be refilled with suitable backfill as specified, furnished or obtained from the grading operations, or gravel borrow, as directed, and thoroughly compacted. Such excavation and filling beyond the limits called for on the plans shall be considered extra work and shall be processed accordingly. Solid ledge (not able to be removed by machine) or boulders (over 1 c.y.) encountered within the proposed work lines shall be removed as directed by the Landscape Architect and shall be considered extra work and processed accordingly. Clean off overburden for measurement by the Landscape Architect and do not proceed without the written approval of the Landscape Architect. Cross sections shall be taken and reviewed by the Landscape Architect for quantity approval.
- J. The removal of existing structures and utilities required to permit the orderly prosecution of the work shall be accomplished by the Contractor as directed and under this Section, unless otherwise shown on the plans. All existing foundations and structures shall be excavated to at least three (3) feet below the bottom of the proposed subgrade and the material properly disposed of off site. All such excavations shall be back-filled with Suitable Backfill and compacted. Floors of structures to be abandoned shall be broken, to ensure drainage, at no additional cost.
- K. All unsuitable excavated material shall be legally disposed of outside of, and away from, the project limits. All suitable excavated material deemed surplus by the Landscape Architect shall become the property of the Contractor and shall be properly removed from the site.
- L. The subgrade under areas to be paved shall be brought to proper line and grade by excavating and/or placement of compacted fill with suitable excavated material or gravel borrow as specified herein. Where filling is not required, the undisturbed subgrade shall be compacted according to the requirements stated herein.
- M. Fills to subgrade level shall be formed of successive layers not exceeding six (6) inches in depth and each layer shall be compacted to not less than 95 percent of maximum dry density of the material as determined by the standard AASHTO Test Designation T-180-86, Modified Proctor Test.
- N. No additional payment will be made for materials removed, manipulated or replaced by the Contractor in order to obtain the specified density. Any removal, manipulation, aerating, replacement and re-compaction of materials necessary to obtain the required density shall be considered as incidental to the excavation and

compaction operations and shall be performed by the Contractor at no additional cost.

- O. Topsoil excavation and rehandling shall consist of discing and harrowing grassed and existing topsoil areas at ninety (90) degrees to each prior operation, and removing topsoil from all areas of proposed work and placing and grading the topsoil in embankment areas. Topsoil encountered below subgrade shall remain in place unless new paving is to be placed thereon and only as directed by the Landscape Architect. Then, such topsoil shall be excavated and rehandled, replaced with Suitable Backfill materials or gravel borrow and compacted as herein specified or as directed by the Landscape Architect. Such work beneath proposed subgrade shall be considered extra work and shall be processed accordingly.
- P. All areas exhibiting grass or weed growth shall be tilled by disc/harrow or rototilled in two directions to completely break up sod clumps prior to stripping the topsoil, and shall be stored in stockpiles if necessary to ensure organic matter decomposition. Such on-site stockpiled materials must be tested prior to reuse, and treated to prevent weed growth.
- Q. After the areas to receive loam borrow or skinned infield (if required) mix have been brought to subgrade, and immediately prior to placing and spreading such material, the subgrade shall be loosened by discing or rototilling to a depth of at least three inches to permit bonding of the finished material to the subgrade material. Then place and spread the loam borrow or skinned infield material to the depths required by the Drawings to establish finish grades. Refer to Loam Borrow Specifications and Skinned Infield Mix Specifications (as applicable).
- R. Protect all existing areas against damage due to the work under this Contract, and perform all repair and replacement work to any such areas which are damaged hereunder.
- S. Perform all excavation and back-filling required for the installation of subdrains, utility structures, and utility lines, and appurtenances required to the lines and grades shown on the Contract Drawings and as directed by the Landscape Architect.
- T. No extra work shall be initiated without notification of the Landscape Architect in writing, and the written approval of the Landscape Architect in response.
- U. The Contractor shall be responsible for any and all pumping or bailing necessary to complete his operations, and to keep all areas sufficiently dry to guarantee compaction in accordance with paragraph 3.01m. above.
- V. Sawcut, with approved diamond-blade cutting device, at lines of all pavements to remain. Mark out prior to cutting for Landscape Architect's approval.

- W. Where insufficient suitable materials of any kind exist on site for incorporation into the proposed work within proposed work lines, the Contractor shall furnish materials from off site, as necessary and in accordance with these specifications, at no additional cost to the Owner.

3.02 DRAINAGE AND DEWATERING

- A. Upon entering the premises, the Contractor shall assume responsibility for site and surface drainage of all areas affected by his work and shall maintain such drainage during the life of his Contract in a manner acceptable to the Official, at all times protecting and maintaining the existing conditions in adjacent areas.
- B. Legally remove by pumping, draining or bailing all water that may accumulate or be found on the site within the contract limits where excavation and grading are to be done. Excavate and form all pump wells, sumps, dams, flumes or other necessary work to keep excavations entirely clear of water. Newly made and existing concrete and masonry shall be protected from injury resulting from dewatering work by the use of canvas, tar paper or by such other sufficient method. Maintain at all times upon the work sufficient and satisfactory pumping machinery, including standby equipment. Provide pump wells or well points and underdrains as may be required, where needed to properly handle the water. Maintain excavations free from water until date of acceptance of the project by the Owner.
- C. Water from excavations shall be disposed of in such a manner as will not cause injury to public health nor to public or private property, nor to existing work, nor to the work completed or in progress, nor cause any interference with the use of the same by the public. Under no circumstances place concrete, place fill, or install appurtenances in excavations containing free water.

3.03 SHEETING AND BRACING

- A. The Contractor shall furnish, put in place, and maintain such sheeting and bracing, etc., as may be required to support the sides of the excavation and to prevent any movement of earth which could in any way diminish the width of the excavation below that necessary for proper construction, or otherwise injure or delay the work or endanger adjacent structures or personnel. If the Landscape Architect is of the opinion that sufficient or proper supports have not been provided at any points, he may order additional supports put in at the expense of the Contractor.
- B. Whenever possible, sheeting shall be driven ahead of the excavation to avoid loss of material from behind the sheeting. If necessary to excavate below the sheeting, care shall be taken to avoid trimming behind the face along which the sheeting will be driven. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, they shall be immediately filled with sand borrow and

compacted.

- C. The Contractor shall leave in place, to be embedded in the backfill, all sheeting, bracing, etc., which the Landscape Architect may direct him to leave in place at any time during the progress of the work, for the purpose of preventing injury to structures, personnel, utilities or property at no additional cost. Timber or steel sheeting and bracing to be left in place shall be cut-off at least two (2) feet below finish grade. This shall not constitute a waiver of the Contractor's responsibility to use his own judgement as to where sheeting shall be left in place, regardless of the Landscape Architect's direction.
- D. All sheeting and bracing not to be left in place shall be carefully removed in such a manner as not to endanger the construction or other structures. All voids left or caused by withdrawal of sheeting shall be immediately back-filled with approved material and compacted by ramming with tools especially adapted to that purpose, by watering, or otherwise as may be directed.

3.04 TRENCH HAND EXCAVATION

- A. When approaching the vicinity of significant tree roots, underground pipes, conduits, or other structures, or any suspected functioning underground features, digging by machinery shall be discontinued and the excavation shall be done by hand. Hand excavation shall also be undertaken when so directed by the Landscape Architect. Such hand excavation shall be considered incidental to the trench excavation and no additional compensation will be allowed.
- B. Protection of Existing Structures - All existing pipes, conduits, poles, wires, fences, curbing, property line markers, and other structures which, in the opinion of the Landscape Architect, are not required to be changed in location, shall be carefully supported and protected from injury by the Contractor, and in case of damage, they shall be restored by the Contractor without additional compensation, to as good a condition as that in which they were found.

3.05 BACKFILLING IN OPEN TRENCH

- A. As soon as practical after the pipe has been installed and tested, back-filling shall begin, and shall thereafter be prosecuted expeditiously.
- B. Drainage pipe shall be back-filled with Suitable Backfill or Gravel Borrow from a plane one (1) foot above the top of the pipe to the proposed subgrade.
- C. The area around the pipe shall be bedded with Sand Borrow and back-filled only with suitable backfill material conforming to paragraphs 2.01d or 2.02b of this Specification, or Gravel Borrow from the mid-diameter of the pipe to twelve (12) inches above the top of the pipe. Substitute crushed stone as specified if water is encountered.

- D. Water pipe shall be back-filled with Suitable Backfill material or Gravel Borrow from six (6) inches above the top of the pipe to the proposed subgrade. The area around the pipe shall be bedded and back-filled only with Sand Borrow per these specifications, to six (6) inches above the top of the pipe.

END OF SECTION

M E M O R A N D U M

TO: Project File

FROM: Alyssa Peck

DATE: July 22, 2011

SUBJECT: Test Pits and Soils Analysis at Falzone Memorial Park

Test pits were performed at Falzone Memorial Park in Waltham on July 6, 2011. Test pits were performed in order to better understand subsurface soil and drainage conditions so that proper drainage can be provided for the renovation and replacement of the recreational outdoor facilities. The site is currently used as soccer fields and recreational outdoor space and also houses a building that is home to the Waltham Youth Soccer Association. An unused baseball field is also present on the site. Below are brief descriptions of the test pits. Detailed soil profile information is in the attached test pit logs.



Test Pit 1 was performed at the northern left corner of the parking lot in the grass area beyond the asphalt. The test pit was dug to a depth of 60 inches below ground surface (b.g.s.). The entire test pit was comprised of urban fill that included tires, wood, cinder blocks, metal, rocks, and wires. Some of these items are visible in the photo to the left. No groundwater was observed in this test pit.

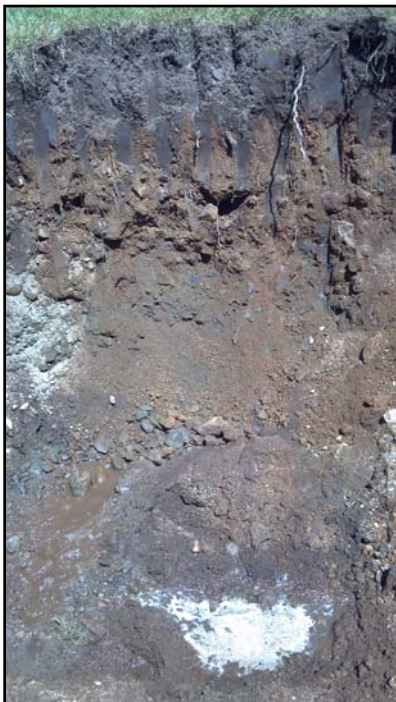


Test Pit 2 was performed in the southern corner of the field, to the south of the 1st base fence line. Standing groundwater was observed at 43 inches b.g.s. Dark brown sandy loam is present from the ground surface to a depth of 6 inches b.g.s. Underlying dark brown loam from a depth of 6 to 20 inches b.g.s. is gravelly coarse sand to 43 inches b.g.s. Mottling was seen at the interface of the loam and coarse sand.

Test Pit 3 was performed in the southwest corner of the field, nearby the existing building. Standing groundwater was observed at 27 inches b.g.s. However, the test pit was excavated to a depth of 36 inches b.g.s. because groundwater was first encountered at that location and then later equalized at 27 inches b.g.s. From the ground surface to a depth of 14 inches b.g.s., dark brown sandy loam is present.



Underlying this layer is medium brown very fine sandy loam to a depth of 23 inches b.g.s. Gravelly coarse sand was present from 23 to 36 inches b.g.s.



Test Pit 4 (photo above left) occurred in the northern corner of the field. Standing groundwater was observed at 52 inches b.g.s.; however, mottling was present at 32 inches b.g.s. The top 10 inches of the test pit profile is dark brown sandy loam. Medium brown very fine sandy loam is present from 10 to 22 inches b.g.s. Underlying this sandy loam layer is very gravelly coarse sand to the bottom of the excavation at 52 inches b.g.s.



Test Pit 5 (photo above right) was performed in the northeast corner of the field. No groundwater was observed, but mottling was seen at a depth of 32 inches b.g.s. Dark brown sandy loam is present to 6 inches b.g.s and light/medium brown gravelly fine sandy loam occurs to a depth of 15 inches b.g.s. From 15 inches b.g.s. to the bottom of the test pit at 60 inches b.g.s., medium brown stony loamy sand is present. There are pockets of coarse sand throughout this layer.

M E M O R A N D U M

TO: Project File
FROM: Alyssa K. Rezendes
DATE: September 18, 2009
SUBJECT: Test Pits and Soils Analysis at Nipper Maher Park

Test pits and percolation tests were performed at Nipper Maher Park in Waltham on September 17, 2009. Test pits were performed in order to better understand subsurface soil and drainage conditions, and in order to devise potential solutions to the drainage problems that continue to plague the 225' baseball field and surrounding park and residential areas.



Photo at left: Standing water was observed within several low areas on September 17, 2009, approximately 4 days after the receipt of the last local rainfall. **Photo at right:** Test Pit 1.

Test Pit 1 was performed within the northern part of the park property, in a grass area adjacent to the sidewalk. Groundwater was observed and encountered at 45 inches below ground surface. The soil profile indicates a dark brown sandy loam from zero to seven inches below ground surface and yellowish brown gravelly loamy sand from seven to 15 inches below ground surface. Most notable in this soil profile is a 6 inch thick dark brown organic layer that begins 15 inches below ground surface. Underlying this organic layer is sand. A percolation hole was dug from the surface to the top of the organic layer in order to determine whether the organic layer was restricting water movement. The percolation rate is 2 minutes/inch. As this is much faster than expected, it is likely that the water is receding laterally, as opposed to vertically through the organic layer. A second percolation hole was dug at 12 inches below ground surface, 14 inches

deep, to determine what the percolation rate is below the organic layer. The percolation rate at the lower depth is 7 minutes/inch.



Test Pit 2 was performed in the outfield of the 225' baseball field, just beyond second base, where the drainage problem is located. Standing groundwater was observed at 56 inches below ground surface. As shown in the picture to the left, the perforated drain pipe was hit during digging. A similar organic layer was present in this test pit; however, it only occurred on one face of the test pit, just above the sand layer visible in the picture to the left. With the exception of the organic layer, the remainder of the soil profile was uniform throughout the test pit.

Sandy loam was present from the surface to the sand layer at 29 inches below ground surface, but the texture was gravelly from 16 inches to the sand layer. A percolation test was performed at the surface, 12 inches deep. As this test was not performed for septic purposes, the test was abandoned after 20 minutes and a water level drop of only one quarter of an inch. This equates to an approximate percolation rate of 80 minutes per inch.

| TEST PIT LOG | | | |
|--|--|-------------------------------------|-----------------------------|
| PROJECT NAME/NO. | <u>Nipper Maher Park</u> | | TEST PIT NUMBER |
| LOCATION | <u>Waltham, MA</u> | | TP - <u>1</u> |
| CLIENT | | | GROUND SURFACE |
| CONTRACTOR | | | ELEVATION <u>See Survey</u> |
| OBSERVED BY | <u>A. Rezendes</u> | FOREMAN: | DEPTH TO GROUNDWATER BELOW |
| CHECKED BY | | DATE | SURFACE <u>45"</u> |
| | | DATE | |
| DEPTH BELOW GROUND SURFACE (ft.) | TEST PIT DIAGRAM AND SOIL DESCRIPTION | | |
| 0" | GRASS | | |
| 7" | DARK BROWN SANDY LOAM | | |
| 15" | YELLOWISH BROWN GRAVELLY LOAMY SAND | | |
| 21" | VERY DARK BROWN ORGANIC MAT'L (VERY FIRM IN PLACE) | | |
| | SAND w/ TRACE SILT | | |
| | NOTE: HAIRLIKE ROOTS PRESENT THROUGHOUT STRATA; REDOX PRESENT AT THESE ROOTS. | | |
| 45" | ▽ | | |
| NOTES: | | TEST PIT NUMBER | |
| | | TP - <u>1</u> | |
| | | WESTON & SAMPSON ENGINEERS, INC. | |

T:\ES&E\Forms\Test pit.XLS\TP-1

| TEST PIT LOG | | | |
|--|--|-------------------------------------|-----------------------------|
| PROJECT NAME/NO. | <u>Nipper Maher Park</u> | | TEST PIT NUMBER |
| LOCATION | <u>Waltham, MA</u> | | TP - <u>2</u> |
| CLIENT | | | GROUND SURFACE |
| CONTRACTOR | | | ELEVATION <u>see survey</u> |
| OBSERVED BY | <u>A. Rezendes</u> | FOREMAN: | DEPTH TO GROUNDWATER BELOW |
| CHECKED BY | | DATE | SURFACE <u>56"</u> |
| | | DATE | |
| DEPTH BELOW GROUND SURFACE (ft.) | TEST PIT DIAGRAM AND SOIL DESCRIPTION | | |
| 0" | Face under drain pipe | Face w/o drain pipe | |
| 16" | | | |
| 20 1/2" | DARKER BROWN GRAVELLY SANDY LOAM | | |
| 29" | DARK BROWN GRAVELLY SANDY LOAM → SAME ORGANIC MAT'L | | |
| 56" | SAND w/ TRACE SILT | | |
| NOTES: | | TEST PIT NUMBER | |
| * all faces of the test pit were not uniform | | TP - <u>2</u> | |
| | | WESTON & SAMPSON ENGINEERS, INC. | |

T:\ESSE\Forms\Test pit.XLS\TP-1

SECTION 02365

SAND BORROW

PART I - GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all labor, materials, equipment and transportation required for the placement and compaction of approved Sand Borrow in accordance with these specifications and to the lines and grades shown on the plans or established by the Engineer.

PART II - MATERIALS

2.01 SAND BORROW

- A. The Sand Borrow shall consist of inert material that is hard durable coarse sand, free from loam, clay, roots, trash, frozen materials and other deleterious or organic materials. The sieve gradation requirements shall conform to the following:

Percent By Weight Passing

| <u>Size of Sieve</u> | <u>Minimum</u> | <u>Maximum</u> |
|----------------------|----------------|----------------|
| # 4 | 100 | |
| # 16 | 55 | 80 |
| # 50 | 10 | 25 |
| #100 | 2 | 8 |
| #200 | 0 | 2 |

PART III - EXECUTION

3.01 PROCEDURES

- A. The Contractor shall deliver, spread and compact Sand Borrow to conform to the lines and grades shown on the plans, and shall spread and compact the Sand Borrow in no greater than six (6) inch layers.
- B. Compaction shall continue until the surface is even and true to the proposed lines and grades indicated on the plans or as directed by the Engineer.
- C. Sand shall not be placed if it is excessively moist and unable to be satisfactorily spread and compacted.
- D. Compaction for Sand Borrow shall be not less than ninety-five percent (95%) of

the maximum dry density as determined by the standard AASHTO-T99, Standard Proctor Test.

- E. Compaction of the sand and any adjoining embankment material shall be done simultaneously so that the respective materials will be confined substantially to the indicated lines.
- F. Sand borrow shall be graded to a true even surface to the proposed lines and grades within a tolerance of three-eighths (3/8) inches above or below the required elevation.
- G. Any tests of materials, and/or compaction, shall be as ordered by the Engineer and paid for by the Contractor regardless of their result.

END OF SECTION

SECTION 02430

SLIP LINING WITH HDPE PIPE

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section provides for installation of an HDPE sewer pipeline within an abandoned water main, with associated excavations. Work shall be performed by a Contractor experienced in slip lining procedures.

1.02 SYSTEM DESCRIPTION:

The finished pipeline shall be installed to withstand internal pressures as specified and exposure to domestic and industrial septic tank effluent.

1.03 REFERENCES:

The following standards from a part of this specification as referenced:

American Standards for Testing and Materials (ASTM)

| | | |
|------|--------|---|
| ASTM | D-1248 | Specification for Polyethylene Plastics Molding and Extrusion Materials |
|------|--------|---|

| | | |
|------|--------|--|
| ASTM | D-3350 | Specification for Polyethylene Plastics Pipe and Fittings Material |
|------|--------|--|

American Water Works Association (AWWA)

| | | |
|------|------|--|
| AWWA | C111 | Rubber Gasket Joints for Ductile-Iron Pressure Pipe and Fittings |
|------|------|--|

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. Shop drawings shall consist of manufacturer's scale drawings, cuts or catalogs including descriptive literature and complete characteristics and specifications, and code requirements.
- B. Samples of pipe shall be forwarded to the Engineer.
- C. The Contractor shall submit an implementation plan prior to cleaning of the abandoned water main. Following cleaning and video taping of the main, the Contractor shall

submit plans for slip lining. Plans shall include proposed access locations, identification of obstructions and a description of work to be performed.

PART 2 - PRODUCTS

2.01 HIGH DENSITY POLYETHYLENE PIPE (HDPE):

- A. The pipe shall be manufactured from high molecular weight, high density ethylene / hexene copolymer conforming to ASTM D 1248 and D 3350 and shall have a nominal IPS (Iron Pipe Size) outside diameter.
- B. HDPE pipe 3-inch through 8-inch shall be SDR 15.5 and pressure rated 110 psi. HDPE pipe 1 1/2-inch and 2-inch shall be SDR 11.0 and pressure rated 160 psi.
- C. Pipe fittings shall be standard products manufactured by injection molding or fabricated from the same material as the pipe. Fittings shall have a working pressure equal or greater than that of the pipe.
- D. Pipe-to-pipe joints shall be by the butt fusion method. Saddle tees shall be PVC and strapped to the HDPE pressure sewer main for services and lateral sewer lines following the installation of the pressure sewer main.
- E. Pipe-to-valve joints shall be with flanged or grooved mechanical couplings.

2.02 MECHANICAL COUPLINGS:

- A. Grooved end couplings shall be as manufactured by Victaulic Co, Gustin-Bacon or approved equal. Couplings shall engage and lock the grooved or shouldered pipe ends allowing some degree of contraction, expansion and angular deflection. Coupling housing shall be of ductile iron or malleable iron and shall consist of two or more segments held together with at least two bolts. Sealing gaskets shall be of such design that internal pressure in the pipe increases the tightness of the seal and shall be of materials suitable for the intended service. The coupling shall have a rated working pressure not less than the pressure rating of the pipe.
- B. Flexible couplings shall be of the full sleeve type, split sleeve type or flanged adaptor type as shown on the drawings, as specified or as required by the Engineer. They shall provide the requisite pipe flexibility without jeopardizing pipe joint integrity due to hydraulic thrust and shall have the same pressure rating as the pipe. Couplings shall have all metal bearing surfaces and shall be provided with galvanized bolts and nuts. Flexible couplings shall be restrained unless otherwise approved by the Engineer. Full sleeve couplings shall be properly gasketed and shall be of sufficient diameter to fit the pipe. Each coupling shall consist of a steel middle ring, 2 steel followers, 2 gaskets, and the necessary steel bolts and nuts to compress the gaskets. The couplings shall be Dresser Style 38, Smith Blair Type 411, or approved equal. Couplings to be installed underground shall have a hot-dipped galvanized steel sleeve with corrosion resistant bolts conforming to AWWA C-111 (type 316 stainless steel).

PART 3 - EXECUTION

3.01 INSPECTION BEFORE INSTALLATION:

Cleaning and inspection of pipelines shall be performed by experienced slip lining personnel trained in cleaning, locating breaks, obstacles and service connections by closed circuit television. The interior of the pipeline shall be carefully inspected to determine the location of any conditions which may prevent proper installation of the HDPE pipeline, and they shall be noted so that the unsatisfactory conditions can be corrected. A video tape and suitable log shall be kept for later reference by the Owner.

3.02 PREPARATION:

- A. The Contractor shall carry out his operations in strict accordance with all OSHA and manufacturer's safety requirements.
- B. The Contractor shall remove all internal debris from the abandoned water line.
- C. If hydraulic cleaning methods are utilized, water used for cleaning shall be treated as necessary to prevent degradation of nearby water bodies or environmentally sensitive areas.
- D. The Contractor shall clear the line of obstructions such as solids, offset joints, protruding service connections or valves that will prevent the insertion of the HDPE pipeline. If inspection reveals an obstruction that cannot be removed by conventional cleaning equipment, the Contractor shall make a point repair excavation to uncover and remove or repair the obstruction. Such excavation shall be approved in writing by the Owner's representative prior to commencement of the work and shall be considered as a separate pay item.
- E. The Contractor shall dispose of all debris from the water main, in accordance with applicable state and local laws and regulations.

3.03 INSTALLATION:

HDPE PIPE:

- 1. The Contractor shall designate locations where the pipe shall be inserted through an existing manhole or other approved access.
- 2. If so directed, the Contractor shall furnish satisfactory written certification that the materials used comply with manufacturer's standards.
- 3. After the pipe has been installed, the Contractor shall connect the proposed service connections at the location shown on the plans or as designated by the Engineer. The Contractor shall utilize a method of providing access to the HDPE pipe to fuse the service connections that will not affect the integrity of the HDPE pipe. A minimum of one-quarter (1/4) cubic yard of concrete grout per service or

lateral connection shall be uniformly placed in the annular space between the HDPE pipe and existing pipe, to encase each service or lateral connection to prevent differential settlement.

3.04 TESTING:

Following installation of service connections and television inspection of the completed pipeline, pressure testing shall be conducted. The test shall be conducted at 110 psi for a duration of 3 hours. Water shall be added during the test as required. All testing procedures shall be in accordance with manufacturer's recommendations. The Contractor shall provide sufficient quantities of water for testing if water is not available from the Owner.

END OF SECTION

SECTION 02510

WATER SERVICE SYSTEM

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Work under this section shall include the extension of an existing, on-site water service (two inch) to support the Water Spray Area (at Nipper Maher) and to extend existing service from the existing building to be demolished to the proposed concrete pad and cap in place (at Falzone), as indicated on the drawings.
- B. Responsibilities will include furnishing and installing piping as sized on the plans, tapping sleeves, corporation stops and boxes, curb stops and boxes, PVC service pipe, thrust blocks, straps and clamps for pipe restraints, strainers, backflow preventers, testing and disinfection (sterilization) of mains, installation of backflow preventer, and all other specified work and connections as shown on the plans and details. The work by the Contractor shall be performed in accordance with the recognized plumbing standards and all applicable standards. The work shall include all fittings and piping and other appurtenances necessary for complete and proper installation of the work, including connections to the existing work. All lines shown are approximate and must be coordinated with other utilities or site improvements to be installed.
- C. All work herein described and/or shown on the Plans shall be in strict accordance with the best-recognized practices for water service installations. The standards set forth in the selection of materials and supplies are intended to conform to those adopted by the Municipality, and the Contractor shall further familiarize himself with the Municipality's requirements when the occasion or choice of materials or supplies so demand.
- D. Per Municipality regulations and requirements, the Contractor performing the work of this section shall be an MA licensed master plumber.
- E. The Municipality, through their authorized agents, reserves the right to make inspections of the work during its manufacture or progress.
- F. Sheeting, shoring and bracing, excavation and backfill shall be accomplished in accordance with these Specifications and the applicable provisions of the Standard Specifications. The cost of the sheeting, shoring and bracing, unclassified excavation and backfill shall be included under the Lump Sum Bid.

1.02 RELATED SECTIONS

- A. Refer to Section 02885 Water Play Features and Section 02515 Backflow
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Preventer Cabinet, for related work.

PART II - MATERIALS

2.01 MATERIALS

A. Gate Valve

1. Gate valves for water lines shall be New York Pattern Metropolitan Type or AWWA C500-71, in accordance with requirements of the Municipality. Gate valves shall turn right to open and be rated at 200 psi working pressure; 350 psi hydrostatic test pressure. Gate valve outlet and connection shall be furnished with threaded joints.
2. Gate valve stems shall be manganese bronze having tensile strength of not less than 35,000 psi, and an elongation of not less than 15% in 2 inches.
3. Gate valves shall be furnished with O-ring stem seat that utilizes two O-rings. The upper O-ring shall serve as the pressure seal. The design of the valve and seal plate shall be such that the seal plate can be fitted with new O-rings when the valve is under pressure in the fully open position. Housing for the valve stem thrust collar shall be carefully machined and fully bronze lined.
4. Gate valve disc shall be cast iron and shall be accurately machined to receive bronze disc seat ring. The disc seat ring surface in contact with the iron disc and the conetail projections shall be rolled, peened or pressed into the machine grooves on the iron discs and when secured in place, a rough and finish cut shall be taken over the disc seat ring bearing surfaces.
5. Gate valve wedges shall be made of bronze.

B. Copper Tubing

1. (a) Copper pipe for buried service diameter as stated on plans, as required, shall be soft, annealed, seamless copper tubing conforming to Federal Specification WW-T-799E or ASTM Standard B88-76, Type "K".
- (b) Copper service pipe for installation in meter pits, valves, manholes, and backflow preventer cabinets, 2 inch diameter and smaller, shall be ASTM B88, Type "K", hard copper tubing.
- (c) The Contractor shall furnish the Owner with satisfactory evidence that the copper tubing meets the requirements of these Specifications.

2. Joints in the copper service shall be kept to a minimum.
 - (a) For buried application, joints shall be made with cast brass three-part compression couplings or flared tube fittings conforming to ANSI Standard Specifications B16.26, latest issue. Bends in copper service pipe, particularly gooseneck bends, shall be made with tool especially designed for the purpose.
 - (b) Pipe joints inside meter vaults and backflow preventer cabinets shall be fittings conforming to ANSI B16.18 cast bronze solder fittings, or ANSI B16.22 wrought copper solder fittings and couplings. Solder shall be ASTM B32, Grade 95 TA, up to 250 degrees. Solder threaded bronze fittings will be used for connections of pipe to meters, strainers, valves, backflow preventers and pipe nipples..

C. PVC Piping

1. PVC pipe shall be as sized on the drawings and details, Class 200, SDR 21, solvent weld PVC, ASTM No. D1784 as manufactured by Cresline or approved equal.
2. Fittings for all PVC piping shall be Schedule 40 solvent weld PVC as manufactured by Dura, Lasco, or approved equal.
3. PVC 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.

D. Water Meters

1. Water Meter exists on site. Should water meter require replacement it shall be furnished and installed as indicated on the plans within the existing below ground pit. The water meters shall be a 4-inch Neptune T-10, or approved equal, with provisions for a remote ARB reading device to be mounted to the meter pit frame near the cover.

E. Meter Pit

1. No meter required for Falzone Park. Water meter is required for nipper Maher Playground.

F. Backflow Preventers

1. All backflow preventers shall be 2" Reverse Pressure devices, Watts #009-

M2Q2, or approved equal.

PART III - EXECUTION

3.01 PIPE AND FITTINGS

- A. All pipe, fittings and such other items shall be carefully examined for defects immediately before lowering into the trench and no pipe or fittings shall be laid which is known to be defective in anyway. Any pipe or fitting discovered as defective after laying shall be promptly removed and replaced. Proper and suitable tools and appliance for the safe and convenient handling and laying of the pipe, fittings and appurtenances shall be used, and great care shall be taken to prevent damage to the pipe coating and lining. Pipe and fittings shall be thoroughly cleaned before being lowered into the trench and shall be kept clean until accepted in the completed work. Open ends shall be closed with wooden or other suitable bulkheads at all times when pipe laying is not actually in progress. Pipes shall be carefully lowered into trenches with rope slings or other mechanical means. Rolling or dropping the pipe into trenches will not be permitted. Whenever the pipe requires cutting to fit the line, the work shall be done only by experienced persons and in such a manner as to leave a smooth end at right angles to the axis of the pipe.
- B. Each length of pipe, fitting or valve shall be firmly supported for its entire length upon original undisturbed trench bottom. Permanent blocking will not be permitted. Where temporary blocking is used, it shall be removed. The underside of the pipe, fittings or valve shall be completely filled and thoroughly compacted with bank gravel before refilling trenches. Fittings and valves shall be carefully set in the line, plumb and true to grade and thoroughly compacted to a firm and uniform bearing.

3.02 JOINTING

- A. Jointing shall be in strict accordance with the manufacturer's recommendation for the type of joint being made. Jointing of pipe or fittings shall be made only by persons thoroughly skilled in this work.

3.03 BACKFLOW PREVENTERS, METERS AND RELATED APPURTENANCES

- A. The installation of all the new backflow preventer and meter and related valves, hangers, straps, clamps and other appurtenances shall be accomplished in a safe, and complete manner by licensed plumbers.
- B. All work in this regard shall be completed in compliance with Municipal standards and industry requirements and to the satisfaction of the project representatives.

3.04 CONDUCTING TEST FOR LEAKAGE

A. Description

1. Test for leakage shall be conducted on all portions of completed water work. In trenches, the testing shall be conducted with partial backfilling over the barrel of the pipe, but all joints between the pipe, fittings and valves shall be left exposed for the duration of the tests. At the Engineer's direction, temporary backfilling of certain portions of the completed work may be required prior to conducting leakage tests.
2. All air shall be released and the mains completely filled with water, and after allowing twenty-four (24) hours for absorption the internal pressure shall be built up to an equivalent hydrostatic head of three hundred-fifty (350) feet of water of one hundred-fifty (150) pounds per square inch, and so maintained for the full period of tests.
3. All visible leaks in the joints shall be stopped, and any cracks or defective pipe, fitting or valve shall be removed and replaced.
4. The test shall be conducted for a period of at least sixty (60) minutes after all visible leaks have been stopped, and the inflow of water from a force pump to maintain the required pressure shall not exceed seventy (70) gallons per inch of internal diameter per mile of pipe per day.
5. In case the specified rate of leakage is exceeded, the leaks shall be found and repaired, and the mains shall be re-tested until the required conditions are met.

3.05 DISINFECTION OF NEW MAINS

A. Upon completion, all water mains shall be disinfected as follows:

1. Pipes shall be completely filled with water; all air released, and then thoroughly flushed out in the amount twice the capacity of the section to be treated. A disinfecting solution of the Sodium Hypochlorite shall be introduced into the main near the point of water supply, in the concentration of one hundred (100) parts of available chlorine per million parts of water. The main shall then be washed or bled from the extreme end opposite to the point of application of the disinfecting supply, and the wasting continued until tests indicate the disinfecting solution has reached the end opposite to the point of application in the concentration of not less than fifty (50) parts available chlorine.
2. All gates shall then be closed, and the disinfecting solution left in the mains under full pressure for a period of not less than forty-eight (48)

hours. The entire section shall then be repeatedly and thoroughly flushed out until all traces of chemicals are removed.

3. Samples of water shall then be taken by the Contractor and laboratory analysis made by him to determine the effectiveness of treatment.
4. Any main or section of pipe failing to meet laboratory standards for disinfecting shall be repeatedly treated until the desired results are obtained. **A COPY OF LABORATORY REPORTS SHALL BE PROVIDED TO THE OWNER BY THE CONTRACTOR WITHIN FIVE (5) DAYS AFTER TESTING IS COMPLETED.**
5. Particular attention is directed to the requirement that a double check valve installation shall be made in the water supply to the main under treatment, to prevent possible backflow or siphonage of treated solution into the distribution system in service.

3.06 OTHER DATA

- A. All iron castings shall conform to the latest revisions of ASTM Designation A126 or physical and chemical requirements.
- B. All ironwork shall be thoroughly cleaned and painted with two coats of asphaltum or other varnish or paint that the Engineer may approve. After the valves are assembled and tested, a third coat shall be applied to the exterior. All composition tool-finished work shall be left bright and unpainted.
- C. All connections shall be made permanently watertight.
- D. All other work required to complete the improvements listed in the Contract Documents shall be accomplished in accordance with the requirements of the Municipality.

END OF SECTION

SECTION 02515

BACKFLOW PREVENTER CABINETS

PART I - GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish and install one (1) Backflow Preventer Cabinet complete in place in accordance with the Contract Drawings.
- B. Service lines, internal cabinet features and other related water work shall be accomplished in accordance with the requirements this specification and all relevant details and plans.

1.02 REFERENCE STANDARDS AND SPECIFICATIONS

- A. Reference to specific standards, specifications and tests of the following technical societies, organizations, and governmental bodies may be made in the contract documents.
 - 1. AASHTO - American Association of State Highway and Transportation Officials (tests or specifications). AASHTO or AASHO
 - 2. ASTM - American Society for Testing and Materials.
 - 3. Mass. Standard Specs. - Latest edition of the Standard Specifications for Highways, Bridges and Waterways, 1988 Edition, the Commonwealth of Massachusetts, Department of Public Works, hereinafter referred to as "the Massachusetts Standard Specifications."
 - 4. AWWA - American Waterworks Association.

1.03 SHOP DRAWINGS

- A. Submit shop drawings and manufacturer's cuts per Submittal Requirements of these Specifications.

PART II - MATERIALS

2.01 BACKFLOW PREVENTER CABINET

- A. The backflow preventer chamber shall be a standard manufactured item or custom built, conforming to the Contract details and requirements herein. The cabinet shall be constructed of galvanized, zinc-primed steel, .25" thick, painted black, and mounted on a concrete pad. The cabinet shall be furnished in the dimensions identified in the drawings, metal vandal resistant box over the handle/padlock area. No lifting eye bolts or holes shall be permitted in the top/roof of the cabinet.

2.02 CEMENT CONCRETE

- A. Forms, reinforcing, and cement concrete cast in place for all backflow preventer/electric control cabinets shall conform to Section 03300.

PART III - EXECUTION

3.01 INSTALLATION

- A. Include all necessary transportation, shipping and handling as necessary to properly and completely install the specified cabinets.

3.02 CONCRETE BASE

- A. Install concrete base in conformance with the Contract Details. Pitch at edges for positive drainage.
- B. Any surfaces of the specified cabinets that are chipped or scratched shall be wire brushed, primed and painted or otherwise restored to a flawless condition in a manner that is acceptable to the City Representative.

END OF SECTION

SECTION 02533

CONNECTIONS TO EXISTING STRUCTURES

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. The Contractor shall furnish materials, tools, labor and equipment to cut suitable openings into the existing manholes, make connections to existing and all other work necessary to direct the existing flow as indicated on the drawings and as herein specified.

1.02 RELATED WORK:

- A. Section 02630, DRAINAGE STRUCTURES

1.03 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF THE GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. Prior to start of work, submit details of the methods proposed for doing the work and for maintaining the sewage flow as herein specified.

PART 2 - PRODUCTS - NOT APPLICABLE

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. The Contractor shall provide temporary plugs or provide other suitable means for maintaining the new free of flow until such time as it can be inspected and tested for leakage.
- B. Connections to the new structure shall be made when directed by the Engineer and only after the new pipeline has been inspected and has successfully passed the leakage test.
- C. The Contractor shall modify each existing structure for installation of the necessary piping, but in so doing shall confine the cutting to the smallest amount possible consistent with the work to be done.
- D. All new piping connected to existing structures shall be encased in concrete in a manner satisfactory to the Engineer.
- E. All work shall be done with the proper tools and by careful workmen competent to do work.

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CONNECTIONS TO EXISTING STRUCTURES

- F. The Contractor shall cut, reshape and fill the existing manhole tables and plug existing outlets as indicated on the drawings and as directed by the Engineer, to accommodate the new connections. Reshaped manhole invert channels shall be smoothly shaped to permit the flow of sewage. Manhole invert channels shall be reconstructed as specified under Section 02631, DRAINAGE STRUCTURES.

END OF SECTION

SECTION 02620

CLEANING DRAIN LINES, CATCH BASINS AND MANHOLES

PART I - GENERAL

1.01 SCOPE OF WORK

- A. The work of this Section consists of cleaning existing drain pipes and drainage structures to remain as designated on the drawings and/or if required due to construction activity or failed erosion control measures. It shall include furnishing all equipment, labor and material to perform all work necessary for cleaning removal and disposal of all roots, dirt, gravel, grease and other debris from drain pipes, drain inlets, manholes and catch basins constituting the site's drainage system, to the public street connection or outlet. All work shall be done in strict accordance with these Specifications.

PART II - MATERIALS

2.01 EQUIPMENT

- A. Cleaning shall be accomplished with mechanical and/or hydraulic equipment. Mechanical equipment shall consist of rodding and bucketing machines with buckets, brushes, and scrapers. Hydraulic equipment shall consist of high velocity type equipment. No hydraulic equipment that operates under a head of water or that would cause excessive internal pressure shall be permitted without written approval of the Engineer before commencing operation.
- B. Mechanical equipment shall be equipped with a belt booster or overload clutch to guard against damage to the line. No direct drive type of equipment shall be permitted.
- C. The equipment used for the final operation shall be a full size porcupine brush, or, where a full size brush will not enter through the manhole opening, a collapsible scraper that will open to the full size of the line may be used. Choice of equipment for this final operation shall be reviewed and approved by the Engineer

PART III - EXECUTION

3.01 PROCEDURES

- A. Satisfactory precautions shall be taken to protect the drain lines at all times. All workmen shall be experienced and skilled in the use of the equipment used.

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CLEANING DRAIN LINES, CATCH BASINS AND MANHOLES

- B. All sludge, dirt, sand, gravel, roots, grease, and other debris resulting from the cleaning operations shall be removed from the job site and disposed of legally by the Contractor.
- C. A suitable weir or dam shall be constructed in a downstream manhole in such a manner that both solid and other material shall be trapped. Passing the material from one section to the next, which could cause blockage of the lines, shall not be permitted.
- D. During bucketing operations, the Contractor shall provide a suitable container to receive materials dumped from the buckets. No solids removed from the lines, manholes, or catch basins shall be pumped or dumped onto streets or into ditches, catch basins, or other storm drains.
- E. Upon completion of the cleaning of each section of drain line, a full-sized brush or scraper shall be pulled through the line to insure complete removal of all debris from the drain.
- F. When the drain line flows are exceeding the minimum requirements (generally not more than one-fourth of the pipe diameter) or inspection of the complete periphery of the pipe is necessary, one or both of the following control methods shall be used. (The method to be used will be determined by the Engineer, depending on the time needed for control.)
 - 1. A line plug shall be inserted into the line at a manhole upstream from the section to be inspected. During the inspection of the section, the flow shall be reduced or shut off. After the inspection, the flow shall be returned to normal.
 - 2. When adequate flow control cannot be obtained by plugging or blocking, pumps shall be used to bypass all or part of the flow. The cost of such bypass pumping shall be included in the bid, and no separate payment shall be made.
- G. The Contractor shall be responsible to furnish his own supply of water to the site at no extra cost. All work injured or damaged due to the use of too much water shall be the Contractor's responsibility to correct at no cost to the Owner.

END OF SECTION

SECTION 02625

DRAINAGE PIPE

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Under this Section, the Contractor shall furnish all materials, equipment, labor, transportation, facilities and all operations and adjustments required for the installation of drainage and sanitary pipe and all incidentals thereto.
- B. Drainage pipes shall be placed in the sizes and lengths indicated on the plans.

1.02 SHOP DRAWINGS/MANUFACTURER'S CUTS AND SPECIFICATIONS

- A. The Contractor shall submit to the Landscape Architect for approval six (6) copies of all materials and equipment proposed for use indicating manufacturers' names and addresses, identifying data and expected delivery dates. No consideration will be given to partial lists submitted from time to time. Intention of using specified materials and equipment shall not relieve the Contractor from submitting the above list, nor shall submission of the list relieve him from submission of shop drawings. Any item of material or of equipment not submitted for approval on the list will not be approved unless of the exact make and characteristics specified. Refer to Special Conditions Section of these Specifications.
- B. If the material or equipment is installed before it is approved, the Contractor shall be liable for the removal and replacement at no extra charge to the Owner, if, in the opinion of the Landscape Architect, the material or equipment does not meet the intent of the Contract Documents.
- C. The Contractor shall submit the following information with all equipment shop drawings:
 - 1. Manufacturer's certified scale drawings, cuts or catalogs, including installation details.
 - 2. Manufacturer's specifications, including certified performance characteristics and capacity ratings.

1.03 SAMPLES

- A. The Contractor shall submit all samples as requested in accordance with the provisions of the GENERAL CONDITIONS. Samples accepted will be returned to the Contractor within five (5) days and may be incorporated into the work.

Samples not accepted will be returned for disposition by the Contractor.

1.04 CODES, ORDINANCES AND PERMITS

- A. All work shall be performed in strict accordance with local and state codes and regulations.
 - 1. Site utilities work shall be done in strict accordance with the Commonwealth of Massachusetts State Plumbing Code, latest edition, and all revisions thereto.
 - 2. Any material or workmanship called for in the above-mentioned requirements, which are not specified or shown on the drawings, shall be furnished and installed by the Contractor as though same has been specifically mentioned or indicated. If the drawings and specifications are at variance with any regulations, the bidder shall notify the Landscape Architect ten (10) days before the date for submitting his bid. In many cases the drawings are in excess of the requirements in the codes and these shall be followed to the fullest. If the Contractor fails to notify the Landscape Architect at this time and installs work in variance with the above-mentioned codes and regulations, he shall assume the responsibility and the expense to rectify the installation.
 - 3. Before commencing work, the Contractor shall obtain all permits necessary in connection with the installation of this equipment and pay fees required for same. He shall include the cost and backcharge of installing any portion of the work where performed by municipal departments or utility companies.

1.05 SUBSTITUTIONS

- A. Any reference to a particular device, product, material, article or system shall be interpreted as establishing a standard of quality, design, performance, or function, and shall not be construed as limiting competition.

1.06 RECORD DRAWINGS

- A. The Contractor shall submit record drawings as specified in the SPECIAL CONDITIONS.

1.07 SITE VISITATION

- A. It is recommended that all prospective bidders visit the job site to acquaint themselves with the general and special conditions that may be encountered which will have a bearing on labor, transportation, cutting and patching, material handling and storage, and similar items, during the prosecution of the work. Failure to do so shall not relieve him of his responsibility for properly estimating

the difficulties involved in the work to be performed under this section.

1.08 REFERENCE STANDARDS

- A. References herein to any technical society, organization, group or body are made in accordance with the following:
 - 1. AASHTO (AASHO) - American Association of State Highway and Transportation Officials (tests or specifications).
 - 2. ASTM – American Society for Testing Materials
 - 3. Massachusetts Standard Specifications - Latest edition of the Standard Specifications for Highways, Bridges and Waterways, the Commonwealth of Massachusetts, Department of Public Works, Sections 2.01, M2.01 and M4.05 AND Plate #203.1.0 of the 1977 MDPW Construction standards.
 - 4. AWWA – American Water Works Association
 - 5. Municipal Standard Specifications and Procedures, as applicable.

1.09 MATERIALS AND WORKMANSHIP

- A. It is the intent of these specifications to establish quality standards for all material and equipment incorporated in the work of this section. All material and equipment installed hereunder shall be new and shall be the best of each respective kind and type. Proper care shall be exercised in handling all equipment and materials herein specified.
- B. The installation shall be as indicated on the drawings and in accordance with the manufacturer's recommendations as approved by the Landscape Architect. The installation shall be accomplished by workmen skilled in this type of work.
- C. All conduits, pipes, structures, etc. in use and which are damaged during excavation, whether uncovered or not and whether or not they are shown on the plans, shall be repaired at the expense of the Contractor.
- D. Storage of materials by the Contractor for incorporation into the work shall be off the site for other than material that is scheduled to be installed in the time span of two (2) working days. The storage site selected by the Contractor shall be made accessible to the City inspection forces at all times during normal working hours.

PART II-MATERIALS

2.01 GENERAL

- A. Drawings and specifications are intended to supplement and explain each other. Materials not specifically mentioned in the specifications shall be as indicated on the drawings. Where conflicts occur between the drawings and/or specifications, or within either document itself, the item or arrangement of better quality, greater quantity or higher cost shall be included in the Contractor's bid. Where no specific kind of quality of material is given, a first-class standard article, shall be furnished.

2.02 CORRUGATED POLYETHYLENE DRAINAGE PIPE

- A. Pipe and fittings shall be made of virgin PE compounds which conform with the requirements of Type III, Category “4” or “5”, Grade P 33, Class C, or Grade P 34, Class C as defined and described in ASTM 1248.
- B. Clean reworked material generated from the manufacturer’s own production may be used by the manufacturer provided that the tubing or fittings produced meet all requirements of this specification.
- C. When perforated tubing is specified, the perforations shall be cleanly cut so as not to restrict the inflow of water, and uniformly spaced along the length and circumference of the tubing. Circular perforations shall not exceed 3/16 in. in diameter. Width of slots shall not exceed 1/8 in. The length of individual slots shall not exceed 1-1/4 in. on 3 in. diameter tubing, 10 percent of the tubing inside nominal circumference on 4 to 8 in. diameter tubing, and 2-1/2 in. on 10 in. diameter tubing. Slots shall be centered in the valleys of the corrugations. The water inlet area shall be a minimum of 1 square inch per linear foot of tubing.
- D. Only fitting supplied or recommended by the tubing manufacturer should be used.
- E. Fittings shall not reduce the inside diameter of the tubing being joined by more than 5 percent of the nominal inside diameter. Reducer fittings shall not reduce the cross-sectional area of the smaller size.
- F. Visible Defects: Cracks, creases, un-pigmented or non-uniformly or non-uniformly pigmented pipe are not permissible.
- G. All pipe and fittings shall be clearly marked at intervals of no more than 10 feet with the following:
 - 1. Manufacturer’s name or trademark.
 - 2. Nominal size
 - 3. This specification designation, “M294”
 - 4. The plant designation code.

5. The date of manufacture or an appropriate code.
- H. Pipe bedding and backfill shall be installed in a manner protection the integrity of the pipe. Improper preparation could result in the crushing of the pipe even with no other additional weight applied to the finish grade.

2.03 APPURTENANCES

- A. Provide all appurtenance and incidentals necessary to make the storm drainage and sanitary pipe installation complete and acceptable, including all materials necessary for the excavation, backfill, compaction and restoration of right-of-way pavements, sidewalks and curb lines, as required.

PART III - EXECUTION

3.01 PIPE INSTALLATION

- A. Prior to excavating trenches the Contractor shall field verify all existing inverts and inform the Landscape Architect of any discrepancies. Record these inverts on Record Drawings.
- B. The trench for the pipe shall be excavated to the required line and grade and be of sufficient width to permit thorough tamping of the fill material under the haunches and around the pipe. Soft or unsuitable material encountered below the normal bedding line of the pipe shall be removed as directed, replaced with selected material, gravel or crushed stone and thoroughly compacted. The bottom of the trench shall be shaped to conform to the curvature of the pipe. This bed shall also be excavated to accommodate the bells of pipes.
- C. The pipe shall be laid true to the specified lines and grades where shown on the Plans and as directed. The bell end shall be toward rising grade and each section of pipe shall have a firm bearing throughout its length. Material placed around and under the pipe shall be free of stones larger than three (3) inches in diameter.
- D. No load greater than three (3) tons shall be moved over any pipe until a fully-compacted backfill of at least two (2) feet has been placed over the top of the pipe. This minimum will be increased to three and one-half (3-1/2) feet for a forty thousand (40,000) pound single wheel load and to four (4) feet for a sixty thousand (60,000) pound single wheel load. The required fully-compacted backfill cover shall be placed a minimum of fifty (50) feet on both sides of the pipe crossing. However, compliance with this requirement is not to be construed as relieving the Contractor of any responsibility concerning damage to the pipe.
- E. Gravel Filter Backfill for pipes shall be placed between the pipe and the walls of the trench in layers not exceeding six (6) inches in depth and thoroughly compacted. Each layer, if dry, shall be moistened and then compacted by rolling

or by tamping with mechanical rammers. Compaction with iron hand tampers having a tamping face not exceeding twenty-five (25) square inches in area may be allowed only after permission has been given by the Landscape Architect. Special care shall be taken to thoroughly compact the fill under the haunches of the pipe. This method of filling and compacting shall be continued until the material is level with the top of the pipe. The remainder of the filling shall consist of suitable material placed in successive layers not more than six (6) inches in depth. Each layer shall be thoroughly compacted in accordance with AASHTO-T99 Standard Proctor Test.

- F. Any pipe showing settlement after laying or which is not in true alignment or is otherwise unsatisfactory before final acceptance of the work shall be taken up and replaced or relayed by the Contractor without additional compensation.
- G. All foreign matter shall be removed from the interior of each length of pipe prior to installation and ends shall be cleaned both inside and outside.

3.02 WATER REMOVAL

- A. If water is encountered during construction, provisions must be made to remove the water by sheeting and pumping as required, or laying the pipe with a crushed stone bed so that the laying of pipe and other work can be done under stable conditions, all in accordance with Section 02240 of these Specifications.

3.03 CLEANING OF DRAIN LINES

- A. Satisfactory precautions shall be taken to protect the drain lines at all times. All workmen shall be experienced and skilled in the use of the equipment used.
- B. All sludge, dirt, sand, gravel, roots, grease, and other debris resulting from the cleaning operations shall be removed from the job site and disposed of by the Contractor.
- C. A suitable weir or dam shall be constructed in a downstream manhole in such a manner that both solid and other material shall be trapped. Passing the material from one section to the next, which could cause blockage of the lines, shall not be permitted.
- D. During bucketing operations, the Contractor shall provide a suitable container to receive materials dumped from the buckets. No solids removed from the lines, manholes, or catch basins shall be pumped or dumped onto streets or into ditches, catch basins, or other storm drains.
- E. Upon completion of the cleaning of each section of drain line, a full-sized brush or scraper shall be pulled through the line to insure complete removal of all debris from the drain.

- F. When the drain line flows are exceeding the minimum requirements (generally not more than one-fourth of the pipe diameter) or inspection of the complete periphery of the pipe is necessary, one or both of the following control methods shall be used. (This method to be used will be determined by the Owner's Representative, depending on the time needed for control.)
1. A line plug shall be inserted into the line at a manhole, drain basin, or clean out upstream from the section to be inspected. During the inspection of the section, the flow shall be reduced or shut off. After the inspection, the flow shall be returned to normal.
 2. When adequate flow control cannot be obtained by plugging or blocking, pumps shall be used to bypass all or part of the flow. The cost of such bypass pumping shall be included in the bid, and no separate payment shall be made.

END OF SECTION

SECTION 02630

DRAINAGE STRUCTURES

PART I - GENERAL

1.01 SCOPE OF WORK

- A. The work to be done under this section shall include the installation of standard drainage structures as shown on the plans and specified under this item. The Contractor shall provide all material, labor, tools, equipment and transportation to complete these items. A grate and cover shall be provided for each structure.
- B. Drainage structures shall be installed in the quantities and locations identified on the Contract Drawings. Contact the Project Representative if obstructions or conflicts are encountered.

1.02 REFERENCE STANDARDS AND SPECIFICATIONS

- A. Reference to the standards, specifications and tests of technical societies, organizations, and governmental bodies is made in the Contract Documents.
 - 1. AASHTO - American Association of State Highway and Transportation Officials (tests or specifications).
 - 2. ASTM - American Society for Testing and Materials.
 - 3. Mass. Standard Specs. - Latest edition of the Standard Specifications for Highways, Bridges and Waterways, 1988 Edition, the Commonwealth of Massachusetts, Department of Public Works, hereinafter referred to as "the Massachusetts Standard Specifications", Sections 2.01, M2.01 and M4.05 AND Plate #203.1.0 of the 1977 MDPW Construction standards.
 - 4. Municipal Standard Specifications and Procedures, as applicable.

1.03 CODES, ORDINANCES AND PERMITS

- A. All work shall be performed in strict accordance with local and state codes and regulations.
 - 1. Site utility work shall be done in strict accordance with the Commonwealth of Massachusetts State Plumbing Code, dated September 1976, and all revisions thereto.
 - 2. The Contractor shall secure all permits deemed necessary in connection

with the installation of this equipment and pay fees required for same. He shall include the cost and back charge of installing any portion of the work where performed by municipal departments or utility companies.

1.04 SUBMITTALS/SHOP DRAWINGS

- A. Shop drawings shall be submitted to the engineer for all equipment. One (1) copy shall be submitted and shall include cuts, scale drawings, installation details, manufacturer's specifications, certified performance characteristics and capacity ratings.
- B. No material or equipment may be purchased or installed before the submission and written approval of the shop drawings.

PART II - MATERIALS

2.01 PRECAST REINFORCED CONCRETE STRUCTURES

- A. Precast reinforced concrete structures shall comply with material, design and construction standards specified under ASTM C-478.
- B. Minimum compressive strength of concrete in bases, risers and top sections shall be 4,000 psi.
- C. All joints shall be made with rubber gaskets meeting the requirements of ASTM C-443 (AASHTO M198)

2.02 DRAINAGE STRUCTURES

- a. Manholes and catch basins shall conform to the following specification:

PVC drainage structures shall be of the inline drain type as indicated on the contract drawings and referenced within the contract specification. Ductile iron grates for each of these fittings are to be used. The surface drainage inlets shall be as manufactured by Nyloplast a division of Advanced Drainage Systems, Inc., or approved equal. The drainage manholes and catch basins required for this contract shall be manufactured from PVC pipe stock, utilizing a thermo-molding process to reform the pipe stock to the furnished configuration. The drainage pipe connection stubs shall be manufactured from PVC pipe stock and formed to provide a watertight connection with the specified pipe system. The joint tightness shall conform to ASTM D3212 for joints or drain and sewer plastic pipe using flexible elastomeric seals. The pipe bell spigot shall be joined to the inline drain body by use of the swage mechanical joint. The pipe stock used to manufacture the inline drain body and pipe bell spigot of the surface drainage inlets shall meet the mechanical property requirements for fabricated fittings as described by ASTM D3034, Standard for Sewer PVC Pipe and Fittings; ASTM F1336, Standard for PVC

Gasketed Sewer Fittings.

The grates furnished for all surface drainage inlets shall be ductile iron. Grates and covers for drains shall be capable of supporting H-25 wheel loading for heavy-duty traffic. Metal used in the manufacture of the castings shall conform to ASTM A536 grade 70-50-05 for ductile iron.

2.03 CLAY SEWER BRICKS (FOR ADJUSTING NEW FRAMES)

- A. Clay sewer brick shall conform to the requirements of AASHTO Designation M91 with the following exceptions:
 - 1. The size of brick furnished shall be 8" x 3-3/4" x 2-1/4" nominal dimensions.
 - 2. The average of the absorption of five (5) representative samples shall not exceed fifteen percent (15%) and the individual absorption of any one sample shall not exceed seventeen and one-half percent (17-1/2%). The average compressive strength of the five (5) representative samples shall not be less than three thousand (3,000) pounds per square inch and the compressive strength of any one sample shall not be less than two thousand-five hundred (2,500) pounds per square inch.

2.04 CEMENT MORTAR (FOR ADJUSTING NEW FRAMES)

- A. Mortar shall be composed of one (1) part of Portland cement and two (2) parts of sand by volume with sufficient water to form a workable mixture. Cement, sand and water shall conform to the applicable provisions of Mass. Standard Specifications, M4.02.15.

2.05 CEMENT CONCRETE

- A. Material shall comply with Section 03300 of these Specifications.

2.06 CASTINGS

- A. Iron castings (frames, grates and covers) shall conform to the MassDOT Construction Manual standard designs and to the requirements of AASHTO Designation M105, Class No. 30, Gray Iron Castings, unless otherwise specified. Test Bar B, 1.20 inches in diameter.

2.07 INLETS

- A. Drain inlets (including grates, risers and sump boxes) shall be NDS, Inc. parts

(800-726-1994) or approved equal.

- B. 12" x 12" grate shall be NDS #1213 ADA Compliant, heavy-duty cast iron, black.
- C. 12" x 12" x 6" riser shall be NDS #1216
- D. 12" x 12" x 12" inlet box shall be NDS # 1217, with one opening for 6" pipe. Plug additional openings with Universal Adaptor Plug or NDS park # 1206.
- E. 12" x 12" x 12" sump box shall be NDS # 1225
- F. Set and backfill inlets with compacted crushed stone. Seal all joints with adhesive per manufacturer's recommendations.

2.08 SPECIAL MIX FOR SUBDRAINS

- A. Where designated, crushed stone for subdrains shall conform to the MassDOT Standard Specifications M2.01.6.
- B. A zone of crushed stone as shown in the details, meeting this specification, shall be placed around the entire perimeter of the subdrain structure.

PART III - EXECUTION

- 3.01 Structures of various types and depths shall be constructed to the line, grades, dimensions and design shown on the plans and as directed and furnished with the necessary frames, grates, covers, aluminum steps, etc., in accordance with these Specifications. Verify inverts of all utilities to remain. Refer to Section 3.01 of these Specifications.
- 3.02 The bricks and blocks (if required) shall be wetted as necessary before laying. All joints in brick masonry shall be thoroughly flushed full of mortar and no joints on the inside face shall be greater than one-quarter (1/4) inch. After the bricks and blocks are laid, the joints shall be pointed on the inside. As bricks or blocks are laid up, the outside of the structure shall be plastered with one-half (1/2) inch thick mortar coat.
- 3.03 Connections will be carefully made to all existing and proposed lines to the grades and elevations shown on the contract drawing.
- 3.04 All catch basins shall have an oil trap outlet of an appropriate size and material consistent with specific project requirements for drainpipe.
- 3.05 Unless otherwise directed or specified, two (2) weep holes shall be built into the walls of

all new structures. Each weep hole shall consist of a section of four (4) inch pipe or equivalent opening to carry water through the wall of the structure. The outside end of the pipe or opening shall be covered with a one-quarter (1/4) inch mesh galvanized wire screen 23 gauge satisfactorily fastened against the wall. The drain to the weep hole shall be excavated and backfilled with two (2) cubic feet of broken rock or crushed stone. The crushed stone shall be placed against and over the end of the pipe or opening with a section of filter cloth to prevent the entrance of fine material. Only one (1) type of weep hole shall be used consistently throughout the project.

- 3.06 Suitable materials obtained from the excavation or from borrow shall be placed between the outside of the structure and the limits of the excavation, uniformly distributed in successive layers not exceeding 6 inches in depth and thoroughly compacted by tamping with mechanical rammers or tampers. When required, the backfill material shall be moistened during the compacting. Compaction with iron hand tampers having a tamping face not exceeding twenty-five (25) square inches may be allowed, but only after permission has been given by the Engineer.
- 3.07 All materials removed in the excavation for catch basins, manholes, drop inlets, drywells, etc., and remaining after the filling about the finished structure has been made shall be used wherever possible within the project or removed and satisfactorily disposed of outside of the project limits without additional compensation.
- 3.08 Frame castings for structures shall be set in full mortar beds true to the lines and grades as directed.
- 3.09 Where directed, the castings shall be temporarily set at such grades as to provide drainage during the construction.
- 3.10 In general, all methods for installation of the catch basin and manhole units, brick adjustments, mortaring, and installation of frames, grates and covers, shall conform to Section 201 of the MassDOT Standard Specifications.

END OF SECTION

SECTION 02631

PRECAST MANHOLES AND CATCH BASINS

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers all precast manholes and catch basins complete, including, but not limited to, bases, walls, cones, mortar, inverts, frames and covers.

1.02 RELATED WORK:

- A. Section 02300, EARTHWORK
- B. Section 02745, PAVING
- C. Section 03302, FIELD CONCRETE

1.03 SYSTEM DESCRIPTION:

- A. Precast sections shall conform in shape, size, dimensions, materials, and other respects to the details indicated on the drawings or as ordered by the Engineer.
- B. All manholes and catch basins shall have concrete bases. Concrete bases shall be precast unless otherwise specified. Invert channels shall be formed of brick and mortar upon the base.
- C. Catch basins shall have a 3-foot deep sump unless otherwise specified. Leaching basins shall have a bottom opening as shown on the drawings.
- D. Riser and cone sections shall be precast concrete.

1.04 REFERENCES:

- A. The following standards form a part of this specification as referenced:

American Society for Testing and Materials (ASTM)

| | |
|------------|---|
| ASTM A48 | Gray Iron Castings |
| ASTM C32 | Sewer and Manhole Brick |
| ASTM C144 | Aggregate for Masonry Mortar |
| ASTM C207 | Hydrated Lime for Masonry Purposes |
| ASTM C478 | Precast Reinforced Concrete Manhole Sections |
| ASTM C923 | Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes |
| ASTM C1244 | Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test. |

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO M198 Joints for Circular Concrete Sewer and Culvert Pipe Using
Flexible Watertight Gaskets

Occupational Safety and Health Administration

OSHA 29 CFR 1910.27 Fall Prevention Protection

1.05 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. Six sets of manufacturer literature of the materials of this section shall be submitted to the Engineer for review.
- B. Tests reports as required shall be submitted to the Engineer.

PART 2 - PRODUCTS

2.01 PRECAST CONCRETE SECTIONS:

- A. All precast concrete sections shall conform to ASTM C478 with the following exceptions and additional requirements:

**Falzone Memorial Park & Nipper Maher Park
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PRECAST MANHOLES AND CATCH BASINS**

1. The wall thickness of precast sections shall be as designated on the drawings, meeting the following minimum requirements:

| <u>Section Diameter (Inches)</u> | <u>Minimum Wall Thickness (Inches)</u> |
|----------------------------------|--|
| 48 | 5 |
| 60 | 6 |
| 72 | 7 |
| 84 | 8 |

2. Type II cement shall be used except as otherwise approved.
 3. Sections shall be steam cured and shall not be shipped until at least five days after having been cast.
 4. Minimum compressive strength of concrete shall be 4000 psi at 28 days.
 5. No more than two lift holes may be cast or drilled in each section.
 6. The date of manufacture and the name or trademark of the manufacturer shall be clearly marked on the inside of each precast section.
 7. Acceptance of the sections will be on the basis of material tests and inspection of the completed product.
 8. Circumferential steel reinforcement in walls and bases shall be a minimum of 0.12 sq. in./lin. ft. for 4-foot diameter sections and 0.15 sq. in./lin. ft. for 5- and 6-foot diameter sections. Reinforcing shall extend into tongue and groove.
- B. Conical reducing sections shall have a wall thickness not less than 5-inches at the bottom and wall thickness of 8-inches at the top. Conical sections shall taper from a minimum of 48-inches diameter to 24 or 30-inches diameter at the top, as shown on the drawings.
- C. Except where insufficient depth of cover dictates the use of a shorter base, bases shall be a minimum of 4 feet in height.
- D. Slab top sections and flat riser sections (Grade Rings) shall conform to the contract drawings, with particular attention focused upon the reinforcing steel and be designed to meet or exceed an H-20 Loading requirement.
- E. The tops of the bases shall be suitably shaped by means of accurate ring forms to receive the riser sections.
- F. Precast sections shall be manufactured to contain wall openings of the minimum size to receive the ends of the pipes, such openings being accurately set to conform with line

and grade of the sewer or drain. Subsequent cutting or tampering in the field, for the purpose of creating new openings or altering existing openings, will not be permitted except as required by the Engineer.

- G. "Drop-over" manholes shall be placed where indicated on the drawings. The Contractor shall accurately measure the diameter of the existing outlet pipe and inform the manufacturer of its size, so that the "Drop-over" type opening can be cut into the precast manhole base. The bottom shall be cast in place by the Contractor in accordance with Section 03302, FIELD CONCRETE. The invert channel shall be formed of brick and mortar, as specified in this specifications section. The sub-base shall be a compacted, level foundation of crushed stone, at least 6-inches thick, as specified in Section 02300 EARTHWORK, but shall vary to the depth necessary to reach sound undisturbed earth.
- H. The exterior surfaces of all precast manhole bases, walls, and cones shall be given a minimum of one shop coat of bituminous dampproofing.
- I. The Engineer reserves the right to reject any unsatisfactory precast section and the rejected unit shall be tagged and removed from the job site immediately.
- J. The Engineer may also require the testing of concrete sections as outlined under Physical Requirements in ASTM C478 with the Contractor bearing all testing costs.

2.02 BRICK MATERIALS:

- A. Brick shall be sound, hard, and uniformly burned brick, regular and uniform in shape and size, of compact texture, and satisfactory to the Engineer. Bricks shall comply with ASTM C32, for Grade SS, hard brick, except that the mean of five tests for absorption shall not exceed 8 percent by weight.
- B. Rejected brick shall be immediately removed from the work and brick satisfactory to the Engineer substituted.
- C. Mortar shall be composed of portland cement, hydrated lime, and sand in which the volume of sand shall not exceed three times the sum of the volumes of cement and lime. The proportions of cement and lime shall be as directed and may vary from 1:1/4 for dense hard-burned brick to 1:3/4 for softer brick. In general, mortar for Grade SS Brick shall be mixed in the volume proportions of 1:1/2:4-1/2; portland cement to hydrated lime to sand.
- D. Cement shall be Type II portland cement as specified for concrete masonry.
- E. Hydrated lime shall be Type S conforming to ASTM C207.
- F. The sand shall comply with ASTM C144 specifications for "Fine Aggregate," except that all of the sand shall pass a No. 8 sieve.

2.03 FRAMES, GRATES, COVERS AND STEPS:

- A. Castings shall be of good quality, strong, tough, even-grained cast iron, smooth, free from scale, lumps, blisters, sandholes, and defects of every nature which would render them unfit for the service for which they are intended. Contact surfaces of covers and frame seats shall be machined to prevent rocking of covers.
- B. All castings shall be thoroughly cleaned and may be subject to a careful hammer inspection at the Engineer's discretion.
- C. Castings shall be ASTM A48 Class 30B or better.
- D. The surface of the manhole covers shall have a diamond pattern with the cast words "WATER," "DRAIN" or "SEWER," whichever is appropriate.
- E. Manhole frames with 32-inch covers for 30-inch openings shall be 500 pounds minimum by East Jordan Iron Works, No. LC328; Quality Water Products, Style 47; Neenah Foundry Co., R1740B or approved equal.
- F. Watertight type manhole frames with 32-inch diameter covers (bolted and gasketed) shall be 4 bolt, 556 pounds minimum by East Jordan Iron Works, No. LCB328; Quality Water Products, Style C47WT; Neenah Foundry Co., R-17550-H or approved equal.
- G. Manhole frames with 26-inch covers for 24-inch openings shall be 475 pounds minimum by East Jordan Iron Works No. LK110A; Neenah Foundry Co. R1720; Quality Water Products, Style 40; or approved equal.
- H. Watertight type manhole frames with 26-inch diameter covers (bolted and gasketed) shall be 4 bolt, 475 pounds minimum, and shall be East Jordan Iron Works No. LBB268; Mechanics Iron Foundry Type A2073; Quality Water Products, Style 40WT; or approved equal.
- I. Frostproof manhole frames, with 26-inch diameter covers and inner lids, 435 pounds minimum, shall be R-1758 series by Neenah Foundry Co., Neenah, WI; LBF series by East Jordan Iron Works, Brockton, MA; B-3045 (or similar) by Mechanics Iron Foundry, Boston, MA; or approved equal.
- J. 2-inch thick polystyrene insulation shall be firmly adhered to all frostproof inner lids.
- K. Catch basin frames with 2-inch square openings and 23-7/8-inch square grates shall be 8-inches in height and 453 pounds minimum. They shall be Neenah Foundry Co. No. 3405; Quality Water Products No. 45; East Jordan Iron Works Type F; or approved equal.
- L. Catch basin frames with bar grate openings and 23-7/8-inch square grates shall be 8-inches in height and 475 pounds minimum. Bar grates shall not be used in areas

where bicycle traffic could be present. They shall be Neenah Foundry Co. No. R-3589; Quality Water Products No. 45; East Jordan Iron Works LK121; or approved equal.

- M. Catch basin frames with cascade grate openings and 23-7/8-inch square grates shall be 8-inches in height and 512 pounds minimum. They shall be Neenah No. R-3589; Quality Water Products Mass Standard; East Jordan Iron Works LK121D; or approved equal.
- N. Catch basin frames set against curbing shall have three flanges only.

2.04 SEWER MANHOLE ACCESSORIES:

- A. Gasket materials shall be top grade (100% solids, vulcanized) butyl rubber and shall meet or exceed AASHTO M-198.
- B. Couplings at the manhole-pipe interface shall be made with a rubber seal system (with or without stainless steel straps) meeting the requirements of ASTM C923 and recommended for this type of connection.
- C. Stubs installed as specified and indicated on the drawings shall be short pieces of the same class pipe as that entering the manhole and shall have either stoppers or end caps as shown on the drawings. Stoppers or end caps shall be especially designed for that application.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. PRECAST SECTIONS:

1. Precast bases shall be supported on a compacted level foundation of crushed stone, as specified in Section 02300 EARTHWORK, at least 6-inches thick, but shall vary to the depth necessary to reach sound undisturbed earth.
2. Precast reinforced concrete sections shall be set vertical and with sections in true alignment.
3. Butyl rubber joint sealant shall be installed between each concrete section. Catch basin sections do not require joint sealant if so indicated on the drawings.
4. All holes in sections used for handling the sections shall be thoroughly plugged with mortar. Mortar shall be one part cement to 1-1/2 parts sand, mixed slightly damp to the touch (just short of "balling"), hammered into the holes until it is dense and an excess of paste appears on the surface, and then finished smooth and flush with the adjoining surfaces.

B. BRICK WORK:

1. Bricks shall be moistened by suitable means, as required, until they are neither so dry as to absorb water from the mortar nor so wet as to be slippery when laid.
2. Each brick shall be laid as a header in a full bed and joint of mortar without requiring subsequent grouting, flushing or filling, and shall be thoroughly bonded as directed.
3. The brick inverts shall conform accurately to the size of the adjoining pipes. Side inverts shall be curved and main inverts (where direction changes) shall be laid out in smooth curves of the longest possible radius which is tangent to the centerlines of adjoining pipe.

C. CASTINGS:

1. Cast iron frames, grates and covers shall be as specified. The frames and covers shall be set by the Contractor to conform accurately to the grade of the finished pavement, existing ground surface, or as indicated on the drawings. Frames shall be adjusted to meet the street surface.
2. Cast iron manhole frames and covers not located in paved areas shall be set 6-inches above finished grade, at a height as required by the Engineer, or as indicated on the drawings. The top of the cone shall be built up with a minimum of 1 course and a maximum of 5 courses of brick and mortar used as headers for adjustment to final grade.
3. Frames shall be set concentric with the top of the concrete section and in a full bed of mortar so that the space between the top of the concrete section or brick headers and the bottom flange of the frame shall be completely filled and made watertight. A thick ring of mortar extending to the outer edge of the concrete shall be placed all around the bottom flange. The mortar shall be smoothly finished to be flush with the top of the flange and have a slight slope to shed water away from the frame.
4. Covers and/or grates shall be left in place in the frames, for safety reasons, except while work is being performed.

D. ACCESSORIES:

1. Accessories shall be installed in accordance with manufacturer's instructions.
2. Stubs shall be set accurately to the dimensions indicated on the drawings. Stubs shall be sealed with suitable watertight plugs.

3.02 LEAKAGE TESTS:

A. Leakage tests shall be made by the Contractor and observed by the Engineer on each manhole. The test shall be by vacuum or by water exfiltration as described below:

B. VACUUM TEST:

1. The vacuum test shall be conducted in accordance with ASTM C1244. Test results will be judged by the length of time it takes for the applied vacuum to drop from 10 inches of mercury to 9 inches. If the time is less than that listed in Table 1 of ASTM C1244, the manhole will have failed the test. Test times from Table 1 are excerpted below.

TABLE 1

Minimum Test Times for Various Manhole Diameters

| <u>Depth (Feet)</u> | <u>Diameter (Inches)</u> | | |
|---------------------|--------------------------|----|-----|
| | 48 | 60 | 72 |
| | <u>Times (Seconds)</u> | | |
| 0-12 | 30 | 39 | 49 |
| 12-16 | 40 | 52 | 67 |
| 16-20 | 50 | 65 | 81 |
| 20-24 | 59 | 78 | 97 |
| 26-30 | 74 | 98 | 121 |

2. If the manhole fails the initial test, the Contractor shall locate the leaks and make proper repairs. Leaks may be filled with a wet slurry of accepted quick setting material. If the manhole should again fail the vacuum test, additional repairs shall be made, and the manhole water tested as specified below.

C. WATER EXFILTRATION TEST:

1. After the manhole has been assembled in place, all lifting holes shall be filled and pointed with an approved non-shrinking mortar. All pipes and other openings into the manhole shall be suitably plugged and the plugs braced to prevent blow out. The test shall be made prior to placing the shelf and invert. If the groundwater table has been allowed to rise above the bottom of the manhole, it shall be lowered for the duration of the test.
2. The manhole shall be filled with water to the top of the cone section. If the excavation has not been backfilled and observation indicates no visible leakage, that is, no water visibly moving down the surface of the manhole, the manhole may be considered to be satisfactorily water-tight. If the test, as described above, is unsatisfactory as determined by the Engineer or if the manhole excavation has

been backfilled, the test shall be continued. A period of time may be permitted if the Contractor so wishes, to allow for absorption by the manhole. At the end of this period, the manhole shall be refilled to the top of the cone, if necessary, and a measuring time of at least 8 hours begun. At the end of the test period, the manhole shall be refilled to the top of the cone, measuring the volume of water added. This amount shall be extrapolated to a 24-hour loss rate and the leakage determined on the basis of depth. The leakage for each manhole shall not exceed one gallon per vertical foot for a 24-hour period. If the manhole fails this requirement, but the leakage does not exceed 3 gallons per vertical foot per day, repairs by approved methods may be made as required by the Engineer to bring the leakage within the allowable rate of one gallon per foot per day. Leakage due to a defective section or joint or exceeding the 3 gallon per vertical foot per day, shall be cause for rejection of the manhole. It shall be the Contractor's responsibility to uncover the rejected manhole as necessary and to disassemble, reconstruct or replace it as required by the Engineer. The manhole shall then be retested and, if satisfactory, interior joints shall be filled and pointed.

3. No adjustment in the leakage allowance will be made for unknown causes such as leaking plugs, absorption, etc. It shall be assumed that all loss of water during the test is a result of leaks through joints or through the concrete. Furthermore, the Contractor shall take any steps necessary to assure the Engineer that the water table is below the bottom of the manhole throughout the test.
4. If the groundwater table is above the highest joint in the manhole, and there is no leakage into the manhole, as determined by the Engineer, such a test can serve to evaluate water-tightness of the manhole. However, if the Engineer is not satisfied with the results, the Contractor shall lower the water table and carry out the test as described hereinbefore.

3.03 CLEANING:

All new manholes shall be thoroughly cleaned of all silt, debris and foreign matter of any kind, prior to final inspection.

END OF SECTION

SECTION 02632

ADJUSTMENT OF STRUCTURES

PART I - GENERAL

1.01 SCOPE OF WORK

- A. The work under this section shall consist of removing the castings, adjusting the masonry, and resetting the castings of existing structures, six (6) inches or less in grade. The contractor shall furnish all labor, materials, equipment and transportation required to adjust existing manholes, catch basins, and other surface structures to be set at new grades.

PART II - MATERIALS

2.01 BLOCKS FOR CIRCULAR STRUCTURES

- A. Blocks for circular structures shall conform to ASTM C-139. Minimum thickness shall be eight (8) inches. Block surfaces shall be curved to the required radius to produce cylindrical structures. The minimum compressive strength for an average of three block units shall be 3,000 psi and the maximum water absorption rate shall be ten pounds per cubic foot.

2.02 BRICK FOR ADJUSTMENT COURSES

- A. Brick for adjustment courses and other application shall conform to ASTM C-32.
- B. Brick for inverts and shelves shall be graded SS. Brick for other purposes shall be grade MS and better.
- C. Size of brick shall be eight inches (8") long by three and three-quarter inches (3 ¾") wide, by two and one-quarter inches (2 ¼") deep. All dimensions shall be nominal.

2.03 MORTAR

- A. See Section 02630 – Drainage Structures for Mortar specifications.

PART III - EXECUTION

- A. Structures to be adjusted shall be carefully excavated to the depth required to achieve the proper adjustments or to receive the appropriate filler pieces as required and securely held in place during backfilling operations. The backfill shall be thoroughly tamped in place and the cover set to finished grade.

- B. The Contractor shall be held responsible for the protection of all castings and valves or other mechanical items. Any frames, grates or covers or operating items damaged in any manner during the progress of the construction shall be replaced by the Contractor at his expense.
- C. Transportation, delivery and/or installation of all salvaged castings or mechanical items shall be included in the contract price.

END OF SECTION

SECTION 02633

ABANDON STRUCTURES

PART I - GENERAL

1.01 SCOPE OF WORK

Under this Section the Contractor shall furnish all labor, materials, equipment and transportation necessary to abandon structures (manholes or catch basins) as designated on the plans or as directed by the City Representative to include:

- A. Removal, stacking and delivery of iron frames/castings
- B. Plugging of inlets and outlets
- C. Demolition of top portion of structure (36" min.) and filling in of remaining structure.

1.02 REFERENCE STANDARDS AND SPECIFICATIONS

- A. All work must conform to MHD Standard Specifications, Division II, Sections 140.26 and 140.63.

PART II - MATERIALS

2.01 SUITABLE BACKFILL

- A. Suitable backfill shall conform to the requirements of Section 02350 - Excavation, Borrow and Backfill.
- B. Gravel for use below new pavements shall meet the requirements for gravel borrow as described in Section 02355.

PART III - EXECUTION

3.01 CASTINGS

- A. The present castings shall be carefully removed and satisfactorily stored and protected until they are reinstalled or delivered to a municipal storage facility, located within the City confines, as designated and directed by the Engineer.

3.02 INLETS AND OUTLETS, REMOVALS AND BACKFILL

- A. Inlets and outlets of structures to be abandoned shall be plugged with brick masonry not less than eight (8) inches in thickness, conforming to Section 201 of the MHD Specifications. Upper portions of the masonry shall be removed to a depth of two (2) feet below the finished grade at the location designated by the Engineer, and the structures shall be completely filled with suitable material placed in six (6) inch layers and thoroughly compacted.

END OF SECTION

SECTION 02635

UNDERGROUND STORMWATER STORAGE SYSTEM

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This Section covers furnishing, handling, laying, joining and installation of an underground stormwater storage system as shown on the plans and as directed by the Engineer.
- B. The Contractor shall furnish and install the various chamber sections and appurtenant work as indicated on the Contract Drawings and as specified herein, or as reasonably required to produce a complete, proper, and functional installation in accordance with the intent of these Contract Documents.

1.02 RELATED WORK:

- A. SECTION 02625- DRAINAGE PIPE
- B. SECTION 02632- ADJUSTMENT OF STRUCTURES
- C. SECTION 02631 -PRECAST MANHOLES AND CATCH BASINS

1.03 REFERENCES:

- A. The following standards form a part of this specification as referenced:

American Society for Testing and Materials (ASTM)

ASTM F2418-05 Standard specifications for Polyethylene Polypropylene (pp)
Corrugated Wall Stormwater Collection Chambers

1.04 QUALITY ASSURANCE:

- A. All pipe and fittings shall be inspected and tested at the factory as required by the standard specifications to which the material is manufactured. The Contractor shall furnish in duplicate to the Engineer sworn certificates providing evidence of such tests.
- B. The Owner reserves the right to have any or all pipe, fittings, and special castings inspected and/or tested by an independent service at either the manufacturer's plant or elsewhere. Such inspection and/or tests shall be at the Owner's expense.

- C. Deflections in horizontal alignment will not be permitted at joints without written consent of the Engineer. If approved, deflections shall not exceed one-half the manufacturer's recommendation.
 - D. When requested by the Engineer, the Contractor shall ensure that a qualified representative of the manufacturer shall be present at the jobsite for the first day of pipe laying, to assure that proper procedures are followed.
 - E. The Engineer shall be notified in advance when the location of an existing pipeline conflicts with the proposed location of the Work.
 - F. Pipe and fittings of the same type shall be products of a single manufacturer.
 - G. All piping shall be of the type and size shown on the drawings and described in this section of the Specifications.
- 1.05 DELIVERY, STORAGE, AND HANDLING:
- A. Chamber sections, access units and end caps shall be carefully handled when loading and unloading.
 - B. Chamber sections and end caps shall be protected from exposure to sunlight (unless restrained in racks) to prevent bowing of the units due to expansion and contraction. Such protection shall consist of canvas covering, or other material, as recommended by the manufacturer. Plastic sheets, which may allow excessive temperatures to develop where the sections are stored, shall not be used.
- 1.06 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:
- A. Shop drawings shall consist of manufacturer's scale drawings or catalog cuts including descriptive literature and complete characteristics, specifications, and code requirements. Shop drawings shall be submitted for the chamber sections, connections, end caps, access covers etc.

PART 2 - PRODUCTS

2.01 POLYPROPYLENE UNITS:

- A. Chamber and end cap units shall be manufactured from virgin polypropylene resin to be inherently resistant to environmental stress cracking and to maintain adequate stiffness through higher temperatures experienced during installation and service. Units shall be SC-740 as manufactured by StormTech, R-280 as manufactured by Cultec, ChamberMaxx as manufactured by Contech or approved equal.

- B. The chamber units shall have a continuously curved section profile and be open-bottomed.
- C. The chamber unit shall have forty-eight orifices penetrating the sidewalls to allow for lateral conveyance of water. The units shall have two orifices near its top to allow for equalization of air pressure between interior and exterior.
- D. The chamber units shall have both of its ends open to allow for unimpeded hydraulic flows and visual inspections down a row's entire length. Each individual chamber unit shall have 14 corrugations. The chamber shall have a circular, indented flat surface on the top of the chamber for an optional 4-inch inspection port.
- E. The chamber and end cap units shall be able to accommodate HS20 loading and be manufactured in an ISO 9001:2000 certified facility.
- F. End cap shall be capable of fitting into any corrugation of a chamber unit. End caps shall have saw guides to allow easy cutting for various diameters of pipe that may be used to inlet the system. End cap shall have excess structural adequacies to allow cutting an orifice of any size at any invert elevation. The primary face of the end cap shall be curved outward to resist horizontal loads generated near the edges of beds.

PART 3 - EXECUTION

3.01 INSPECTION BEFORE INSTALLATION:

- A. Each chamber and end cap shall be carefully inspected prior to being installed. All materials not meeting the requirements of these specifications, or otherwise found defective or unsatisfactory by the Engineer, shall be rejected and immediately marked and removed from the jobsite by the Contractor.
- B. Bedding, sub-bedding, and other trench conditions shall be carefully inspected prior to laying chamber units. All conditions shall be made available to the Engineer for inspection.

3.02 CHAMBER INSTALLATION:

- A. The location of the proposed underground storage chamber shall be excavated to the limits and required depths as shown on the plans or as directed by the Engineer. Excavations shall be maintained free of water during the progress of the work. No chamber units shall be laid in water.
- B. The Contractor shall prepare the trench bed within the area shown the plan. Bedding material shall be granular, well graded soils/aggregate mixtures with < 35% fines. Bedding material shall be compacted in 6 inch lifts to 95% Proctor Density.

- C. Chamber units shall be installed in the locations and connected to catch basins as shown on the drawings or as directed by the Engineer, using an approved method of control. Backfill material shall be compacted in 6 inch lifts to 95% Proctor Density.

END OF SECTION

SECTION 02755

BITUMINOUS CONCRETE PAVEMENT

AND COLOR SEALCOAT

PART I - GENERAL

1.01 SCOPE OF WORK

- A. Under this Section, the Contractor shall furnish all necessary labor, materials, equipment, and transportation necessary to construct the following:
1. The bituminous concrete pavement for the parking areas, and porous bituminous concrete pavement for pedestrian walks, etc. shall be composed of materials as specified herein and shall be constructed on a prepared base course to the depth, grade and cross-section shown on the plans, as specified herein and as directed by the Engineer.
 2. Unless otherwise specified in the Contract one and a half (1.5) inch bituminous concrete binder course, and a one and a half (1.5) inch bituminous concrete dense mix (top) course.
 3. Where an overlay is proposed, the depth of the bituminous concrete dense mix (top) course shall be typically one and one-half (1 ½) inches except that it shall be of greater depth in places to eliminate puddling. Tack coat shall be applied utilizing Type SS-1 asphalt emulsion.
 4. Crack repair of existing bituminous concrete pavements prior to installation of overlay pavement.
 5. Color sealcoating of bituminous concrete pavements as shown on the plans and as specified herein.

1.02 REFERENCE STANDARDS AND SPECIFICATIONS

- A. Reference to the standards, specifications and tests of technical societies, organizations and governmental bodies are made in the Contract Documents.
1. AASHTO - American Association of State Highway and Transportation Officials (tests or specifications).
 2. ASTM - American Society for Testing and Materials.
 3. Mass. Standard Specs. - Latest edition of the Standard Specifications for

Highways, Bridges and Waterways, 1988 Edition, the Commonwealth of Massachusetts, Department of Public Works, hereinafter referred to as the "Massachusetts Standard Specifications."

- B. All references to "Hot Mix Asphalt" shall refer to this section 02755.

1.03 SUBMITTALS

- A. Asphalt emulsion Type SS-1 product and application specification.
- B. Color Sealcoat: The Contractor shall submit catalog cuts, manufacturer's specifications and color chips or charts.
- C. Field layout of color sealcoat must be approved by Landscape Architect prior to installation.
- D. Submit catalog cuts and manufacturer's specifications for Airport Grade Asphalt Emulsion Mix and Aggregate.
- E. Compaction tests are required on all bituminous concrete base surfaces on a 50' grid interval or per Owner's direction. At the Contractor's expense, an independent testing agency must perform the work and submit the results directly to the Landscape Architect.

1.04 QUALIFICATIONS/SPECIAL REQUIREMENTS – COLOR SEALCOAT APPLICATION

- A. The Contractor shall engage the manufacturer's representative to inspect and monitor the application of the initial filler coat upon the prepared surfaces of all pavements to receive color sealcoat.
- B. If a latex-ite acrylic sealer/surfacer is to be utilized, the addition of silica by mechanical agitation on-site shall be inspected and monitored by the manufacturer's representative who is to be engaged by the Contractor at the Contractor's cost.
- C. Adequate means shall be provided to protect the color seal coating(s) from damage until such time that each layer has cured sufficiently and no seal will adhere to and be picked up by the tires of vehicles or by pedestrian traffic.
- D. No color seal coating shall be applied during any period within which rain or sub-application temperatures are predicted within forty-eight (48) hours, unless otherwise specified by the manufacturer.

PART II - MATERIALS

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BITUMINOUS CONCRETE PAVEMENT AND COLOR SEALCOATING

2.01 BITUMINOUS CONCRETE PAVEMENT

- A. Bituminous Concrete Pavement shall consist of binder mix and top courses constructed to the thicknesses shown on the plans and shall conform to the relevant provisions of Sections 460 and (M3.11.03) of the Commonwealth of Massachusetts, Department of Public Works, Standard Specifications for Highways and Bridges, 1988 Edition, unless specified otherwise hereinafter.
- B. The joint sealant shall be a hot poured rubberized emulsified asphalt sealant meeting the requirements of Federal Specifications SS-S-1401 or SS-S-164.
- C. The tack coat shall be an asphalt emulsion, RS-1 if required, conforming to MHD Section M3.03.0.
- D. Porous pavement material shall be accordance with the following:
- | | |
|---|--------------|
| Asphalt Materials | |
| Performance Graded Binder, PG 70-22, or PG 76-22..... | 902.01(a) |
| Coarse Aggregates shall be Class B or higher | 904.03 |
| Fibers..... | AASHTO M 325 |
| Fine Aggregates | 904.02 |

A Design Mix Formula (DMF) shall be prepared in accordance with 402.04 except that the DMF will be based on OG19.0 mm open graded mixture designation in accordance with 401.05. The DMF shall be submitted in the current MassDOT format as a submittal. The DMF shall list the minimum plant discharge temperature for HMA and WMA as applicable to the mixture.

The DMF shall be determined for the porous asphalt mixture from a volumetric mix design for OG19.0 mm open graded mixture in accordance with 401.05. The DMF shall meet the following criteria.

- Course aggregates will be steel slag, limestone or crushed gravel with a crushed content of $\geq 90\%$ two face and one face.
- Binder selection will be PG 76-22 or PG 70-22 with fibers.
- Air void will be $\geq 16\%$ using ASTM D 6752, Vacuum Sealing method
- VMA should be $\geq 26\%$ using ASTM D 6752, Vacuum sealing method
- Draindown test will be $\leq 3\%$ (open graded mixtures may incorporate fibers).
- Gyration compaction shall be 20 gyrations at 260 ± 9 degrees F.

The single percentage of aggregate passing each required sieve shall be within the following limits:

| | | |
|-------------------------------------|----------|----------|
| Sieve Requirement Tolerances 19.0mm | 100% | - |
| 12.5mm | 70 – 90% | +/- 5% |
| 9.5mm | 40 – 65% | +/- 5% |
| 4.75mm | 15 – 30% | +/- 5% |
| 2.36mm | 8 – 15% | +/- 5% |
| 0.60mm | 5 – 9% | +/- 2% |
| 0.075mm | 1 – 8% | +/- 2% |
| Binder % | 5.5% min | +/- 0.7% |

2.02 ASPHALT EMULSION

- A. Asphalt emulsion tack coat shall be Type SS-1 or SS-1H as specified by the Asphalt Institute.

2.03 TROWELABLE ASPHALT FILLER/PATCH

- A. Airport grade asphalt emulsion mix and aggregate shall be used to repair gouges or cracks which can then be brought to grade to receive an overlay or color sealcoat.

2.04 ADHESIVE FABRIC FOR CRACK PATCHING

- A. Fabric shall be the Petromat/Petrotac system, as manufactured by Phillips Fibers Corporation, or approved equal.

2.05 COLOR SEALCOAT

- A. The layout and design of color sealcoating shall be installed per contract drawings.

The two (2) filler coats shall be Plexipave as manufactured by California Products Corporation, 169 Waverly Street, Cambridge, Massachusetts, or approved equal. Colors shall be as indicated on the plans. The two (2) Plexipave filler coats shall be applied to the cleaned bituminous pavement as specified hereunder. It shall be non-flammable upon exposure to flame. The filler coats shall contain a minimum of 9 lb./gal. of Silica, 100 percent (100%) passing a 100% mesh as pre-mixed at the manufacturer's plant. No sand or silica shall be added to the emulsion in the field. The bituminous pavement shall cure for fourteen (14) days prior to applying the Plexipave Acrylic Color System.

- B. Water, if approved, may be added to the Plexipave emulsion mixes. In no case may the quantity of water in the filler coat emulsion mix exceed thirty-three percent (33%) of the emulsion volume. (One (1) part water: two (2) parts filler coat). In no case may the quantity of water in the finish coat emulsion mix exceed fifty percent (50%) of the emulsion volume. (One (1) part water: one (1)

part finish coat). Water shall be potable and its temperature above forty degrees F (40°F) upon addition to the emulsions.

- C. The color emulsion coating shall be California Products Company's "Plexichrome" or an approved equal emulsion product. Colors shall match those of the Plexipave filler coats. The Plexichrome shall be applied lengthwise of the court with a wide type pushbroom.
- D. The base vehicle for the finish coat shall be an acrylic polymer dispersed in water and which has the ability to withstand extremes in temperature and general weathering. The film former shall provide a non-skid surface upon drying and under all weather conditions. Pigment dispersions in the color coating are to be of the best quality chrome oxides so as to obtain a permanent true color. The coating shall contain no material, which will cause cracking due to extremes in temperatures and is to be factory mixed and consistent in color. It shall be a one hundred percent (100%) acrylic emulsion containing no alkyds, butadiene styrene, or vinyls and shall be thinned with water. It shall not chalk or discolor any equipment.
- E. The finished surface shall be smooth and uniform, true to required grade and cross section, and free of depressions, ridges, or other irregularities.

PART III - EXECUTION

3.01 BITUMINOUS CONCRETE PAVEMENT

- A. Bituminous concrete pavements shall be constructed on a prepared foundation of gravel in accordance with the Massachusetts Standard Specifications, Section 405, except where overlayment is over existing pavement.
- B. The bituminous mixtures shall be placed on the approved base only when, in the opinion of the Engineer, the course is sufficiently dry and weather conditions are suitable.
- C. Where walls, curbing, or other suitable permanent supports are not present, the Contractor shall secure proper alignment and adequate compaction of the binder and surface courses as shown on the Contract Drawings and finish all edges with a neat tamped edge.
- D. The mixture shall be placed in two (2) courses as shown on the Contract Drawings. Each course shall be spread and finished as required in the Massachusetts Department of Public Works, Standard Specifications for Highways and Bridges, Section 460.63, 1988 edition.
- E. Prior to completion of bituminous concrete overlay, the Contractor shall have the existing patched surfaces tack coated and leveled to eliminate all "birdbaths" or

extreme lows which may create ponding or drainage problems. Leveling course (surface treatment) bituminous concrete applied as necessary, shall be raked and feathered and be properly rolled and compacted. The Contractor shall apply “level” lines, screeds, or use other measures to achieve the proper leveling surface suitable for overlay.

All adhesive fabric shall be in place and approved prior to completing this work.

- F. After completion, the bituminous concrete courses shall conform to the thickness shown on the Contract Drawings, smooth and even and of a dense and uniform structure. When tested with a sixteen (16) foot straight edge placed parallel to the centerline of the pavement, there shall be no deviation from a true surface in excess of one-quarter (1/4) inch.

3.02 ASPHALT EMULSION TACK COAT

- A. To all existing surfaces to be pave against or overlaid, apply a single very thin (0.05 to 0.15 gallons per square yard) application of diluted asphalt emulsion (Type SS-1) to cover the entire surface of existing pavement.
- B. Essential qualities of coverage are (1) it must be very thin and (2) uniformly cover entire surface of existing pavement.
- C. Place only that amount of tack coat which can be overlaid with new pavement by the end of each day, and; **IF RAIN IS ANTICIPATED DO NOT APPLY TACK COAT.**

3.03 COLOR SEAL COAT

- A. The bituminous concrete pavement shall cure for fourteen (14) days prior to applying the Color Sealcoat System where specified.
- B. The Contractor shall furnish and apply to the approved bituminous pavements so designated on the plans: two (2) filler coats and one (1) finish coat of acrylic emulsion color coating.
- C. Prior to application of the filler coats, all dirt, sand, dust, and other loose material shall be cleaned from the paved areas to be covered, by sweeping and pressure washing with water. All surfaces shall be dry prior to starting any color seal coating process. The Contractor shall take special precautions to assure that existing pavements are thoroughly cleaned and that all cracks or joints in existing pavements are repaired in conformance with these specifications and to the satisfaction of the Owner. Limits or areas to be color coated shall be taped with minimum two (2) inch wide tape true as to alignment prior to application of the color coating material.

- D. The two (2) filler coats shall be applied so that both coats are of a total quantity and with a uniform spread at the rate of one (1) gallon per each one hundred (100) square feet of surface area. Additional filler coating material is to be used if necessary to complete the court surfaces satisfactory to the Supervisor. The first coat shall be applied length-wise of the court or drive and the second coat cross-wise of the court or drive.
- E. After the filler coat applications have been completed and approved, apply one (1) acrylic color emulsion coating to the properly prepared surfaces with a uniform spread at the rate of one (1) gallon per each two hundred (200) square feet of surface area. The color emulsion coating shall be California Products Company's "Plexichrome" or an approved equal emulsion product. Colors shall match those of the Plexipave filler coats. The Plexichrome shall be applied lengthwise of the court with a wide type pushbroom.
- F. The entire system of two (2) filler and one (1) finish coat shall be applied with approved squeegees and hair-type pushbrooms, respectively. The material shall be thoroughly mixed by mechanical agitation and all work shall be done in a thorough and workmanlike manner. The emulsion shall be thoroughly stirred in its container as received, by stationery bucket power mixer, so that a creamy, smooth consistency of all the emulsion in the container is assured for ready application. The entire work of color coat surfacing shall be done in accordance with the recommendations of the manufacturer's representative. Special care shall be taken so as to allow none of the material to spatter or flow beyond the perimeter of areas to be covered. The filler coats and finish coat shall not be applied in foggy or rainy weather, or when ambient temperature is below forty-five degrees F (45°F), nor shall they be applied if such conditions are anticipated during the next forty-eight (48) hours.
- G. The finished surface shall be smooth and uniform, true to required grade and cross section, and free of depressions, ridges, or other irregularities.

3.04 Porous Asphalt Pavement (PAP)

- A. Equipment for PAP operations shall be in accordance with 409. Fuel oil, kerosene, or other solvents shall not be transported in open containers on any equipment at any time. Cleaning of equipment and tools shall not be accomplished on the pavement or paved shoulder areas.
- B. Mix the aggregate and asphalt binder material within the established temperature range until all the materials are coated. Segregation, flushing or bleeding of PAP mixtures will not be permitted. Corrective action shall be taken to prevent the continuation of these conditions. All areas showing an obvious excess or deficiency of asphalt materials shall be removed and replaced. All mixture that becomes loose and broken, mixed with dirt, or is in any way obviously defective shall be removed and replaced.

- C. Surfaces on which a PAP mixture is to be placed shall be open graded free draining aggregate and free from objectionable or foreign materials at the time of placement. Contact surfaces of curbing, gutters, manholes, and other structures shall be tack coated in accordance with 406. Protect the mixture at all times from contamination by soil or other fine material during placement. Erosion controls and maintenance will be by others.
- D. Do not place the mixture during weather conditions that would cause its degradation, segregation, or contamination.
- E. The PAP layers will be placed in lifts with a minimum of 2 inches and a maximum of 4 inches. The mixture shall be placed upon an approved surface by means of a suitable asphalt paver. If hand work is required keep it to a minimum. Spread the mixture in a method that produces a smooth, uniform layer before compacting. Do not haul over the mixture.
- F. Longitudinal joints on roads and streets shall be offset from lane lines a distance of 6 inches whenever possible. Transverse joints shall be constructed by exposing a near vertical full depth face of the previous course.
- G. The PAP mixture shall be compacted with equipment in accordance with 409.03(d) immediately after the mixture has been spread and finished. Rollers shall not cause undue displacement, cracking, or shoving.
- H. Compact the mixture using a minimum of two (2) passes with a 10 ton static tandem steel wheel roller (do not use the roller in a vibratory mode), completely seating the aggregate particles. Do not over compact resulting in crushed or broken aggregate. Complete rolling before mix temperatures has dropped below 250 degrees F.
- I. Traffic should be restricted for 24 hours after rolling.
- J. Thickness Tolerance; Ensure the placed PAP conforms to the specified thickness by randomly checking the thickness during construction. Surface Tolerance; Ensure that the finished surface is uniform and varies no more than +or- 1/2 inch from a 10-foot straight edge applied longitudinally to the asphalt mat.
- K. Porosity Test will be performed by conducting a water hose test with five gallons per minute minimum. There should be immediate infiltration with no puddles.

PART IV - GUARANTEE/WARRANTY

- 4.01 The pavement and coatings shall be guaranteed against defects in workmanship or quality for a period of one (1) year after final acceptance. The Contractor shall replace, repair, recoat or otherwise make satisfactory to the Owner any unacceptable pavement and or

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coating at no additional cost to the Owner.

END OF SECTION

SECTION 02760
CONCRETE UNIT PAVERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete pavers
- B. Bedding and void opening aggregates
- C. Aggregate Base
- D. Edge Restraints

1.02 RELATED SECTIONS

- A. Not used.

1.03 REFERENCES

- A. American Society of Testing and Materials (ASTM) (latest edition):
 - 1. C 33 Specification for Concrete Aggregates
 - 2. C 136 Method for Sieve Analysis for Fine and Coarse Aggregate.
 - 3. C 140 Sampling and Testing Concrete Masonry Units.
 - 4. C 144 Standard Specifications for Aggregate for Masonry Mortar.
 - 5. C 936 Specifications for Solid Interlocking Concrete Paving Units.
 - 6. C 979 Specification for Pigments for Integrally Colored Concrete.
 - 7. 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.
 - 8. 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.
 - 9. D 2940 Graded Aggregate Material for Bases or Subbases for Highways or Airports.
 - 10. C 29 Bulk Density and Voids in Aggregate Materials.

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1.04 QUALITY ASSURANCE

- A. Installation shall be by a contractor and crew with at least one year of experience installing permeable concrete pavers on projects of similar size.
- B. The Contractor shall conform to all local, state/provincial licensing and bonding requirements.

1.05 SUBMITTALS

- A. Shop or product drawings and product data shall be submitted.
- B. Full size samples of permeable concrete paving units shall be submitted in **Eco-Priora in the Large Square (9.36"x9.36"x3.12") color: Winter Marvel** or approved equal.
- C. Sieve analysis for grading of bedding and joint opening aggregates shall be submitted.
- D. Test results shall be submitted from an independent testing laboratory for compliance of paving unit requirements to ASTM C 936 or other applicable requirements.
- E. The layout, pattern, and relationship of paving joints to fixtures and project formed details shall be indicated.

1.06 MOCK-UPS

- A. A 9 ft. x 9 ft. (2.5m x 2.5m) paver area shall be installed as described in Article 3.02.
- B. This area will be used to determine joint sizes, lines, laying pattern(s), color(s), and texture of the project.
- C. This area shall be the standard from which the work will be judged.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Concrete pavers shall be delivered to the site in steel banded, plastic banded, or plastic wrapped cubes capable of transfer by fork lift or clamp lift. The pavers shall be unloaded at the job site in such a manner that no damage occurs to the product.
- B. Delivery and paving schedules shall be coordinated in order to minimize interference with normal use of buildings adjacent to paving.

1.08 ENVIRONMENTAL CONDITIONS

- A. Do not install bedding aggregates or pavers during heavy rain or snowfall.
- B. Do not install bedding aggregates and pavers over frozen base materials.
- C. Do not install frozen bedding aggregates.

PART 2 MATERIALS

2.01 POROUS PAVEMENT:

- A. Porous pavement system shall be Turfstone[™] Concrete Units as supplied by Unilock, Unilock[®] New England, Uxbridge, Massachusetts; Hanover EcoGrid[®] as supplied by Hanover Architectural Products, Hanover, Pennsylvania; Terraform EcoGrid as supplied by Terraform Enterprises of Vancouver, British Columbia; Checker Block as supplied by Hastings Architectural & Ornamental Concrete Products of Lindehurst, New York; or approved equal.

B.

Product name(s)/shape(s), color(s), overall dimensions, and thickness of the permeable paver(s) specified as follows:

| | |
|-------------------|----------------------------------|
| Product name: | Eco-Prioria Permeable Pavers |
| Product shape(s): | Large Square (9.36"x9.36"x3.12") |
| Product color(s), | Winter Marvel |

Permeable Concrete pavers must have spacer bars on each unit. These spacer bars insure a precise joint spacing between all paving stones. The spacer bars permit the use of mechanical installation equipment for a mechanized installation process.

Pavers shall meet the minimum material and physical properties set forth in ASTM C 936, Standard Specification for Interlocking Concrete Paving Units.

- 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. Resistance to 50 freeze-thaw cycles, when tested according to ASTM C 67, with no breakage greater than 1.0% loss in dry weight of any individual unit. This test method shall be conducted not more than 12 months prior to delivery of units.
- C. Maximum allows breakage of product is 5%.

2.02 GRANULAR SUBBASE

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- A. The granular subbase material shall consist of granular material graded in accordance with ASTM D 2940. The subbase thickness and specific aggregate gradation shall be determined by the Designing Engineer.

2.03 GRANULAR BASE

- A. The granular base material shall be crushed stone conforming to ASTM C 33 No 57, as presented in Table 1. The granular base thickness and specific aggregate gradation shall be determined by the Designing Engineer.

**TABLE 1
GRANULAR BASE
GRADING REQUIREMENTS**

| ASTM C 33 No 57 | |
|------------------------|------------------------|
| Sieve Size | Percent Passing |
| 1 ½ in (37.5 mm) | 100 |
| 1 in (25 mm) | 95 to 100 |
| ½ in (12.5 mm) | 25 to 60 |
| No. 4 (4.75 mm) | 0 to 10 |
| No. 8 (2.36 mm) | 0 to 5 |

2.04 BEDDING AND VOID OPENING AGGREGATES

- A. The granular bedding material shall be graded in accordance with the requirements of ASTM D 33 No 8. The typical bedding thickness is between 1 ½ & 2 inches and the specific aggregate gradation shall be determined by the Designing Engineer.

Note: Aggregate materials used in the construction of permeable pavements shall be clean, have zero plasticity and contain no No. 200 sieve size materials. The aggregate materials must 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.

- B. The bedding and void opening aggregate shall conform to the grading requirements of ASTM C 33 No 8 as shown in Table 2.

**TABLE 2
BEDDING AND VOID OPENING AGREGATE
GRADING REQUIREMENTS**

ASTM C 33 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 |

2.05 EDGE RESTRAINTS

- A. The provision of suitable edge restraints is critical to the satisfactory performance of interlocking concrete block pavement. The pavers must abut tightly against the restraints to prevent rotation under load and any consequent spreading of joints. The restraints must be sufficiently stable that, in addition to providing suitable edge support for the paver units, they are able to withstand the impact of temperature changes, vehicular traffic and/or snow removal equipment.
- Curbs, gutters or curbed gutter, constructed to the dimensions of municipal standards (noting that these standards generally refer to cast-in-place concrete sections), are considered to be acceptable edge restraints for heavy duty installations. Where extremely heavy industrial equipment is involved such as container handling equipment, the flexural strength of the edge restraint should be carefully reviewed, particularly if a section that is flush with the surface is used and may be subjected to high point loading.
- Edge restraints shall be used along all unrestrained paver edges and supported on a minimum of 6 in. (150mm) of aggregate base.

PART 3 EXECUTIONS

3.01 EXAMINATION

- A. Verify that subgrade preparation, compacted density and elevations conform to the specifications.
- B. Verify that geotextiles, if applicable, have been placed according to specifications and drawings.
- C. Verify that aggregate base materials, thickness, compaction, surface tolerances and elevations conform to the specifications.
- Note:** Mechanical tampers (jumping jacks) are recommended for compaction of soil subgrade and aggregate base around lamp standards, utility structures, building edges, curbs, tree wells and other protrusions. Areas not accessible to roller compaction equipment should be compacted to the specified density with mechanical tampers. **CAUTION** - Care shall be taken around the perimeters of excavations,

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buildings, curbs, etc. These areas are especially prone to consolidation and settlement. Wedges of backfill should not be placed in these areas. If possible, backfilling and compacting in these areas particularly should proceed in shallow lifts, parallel to the finished surface.

- D. Verify the proper installation of the concrete curbing, in terms of location, elevation, and adherence to the specifications.
- E. Verify that the base is dry, uniform, even and ready to support bedding course aggregates, pavers and imposed loads.
- F. Beginning of bedding course aggregates and paver installation shall signify acceptance of the base and concrete curb edge restraints.

3.02 SITE PREPARATION

- A. The site must be stripped of all topsoil and other objectionable materials to the grades specified.
- B. All subdrainage of underground services within the pavement area must be completed in conjunction with subgrade preparation and before the commencement of subbase construction.
- C. After trimming to the grades specified, the pavement is to be proof rolled to a percentage of Standard Proctor Maximum Dry Density as specified by the Designing Engineering with soft spots or localized pockets of objectionable material excavated and properly replaced with approved granular material.
- D. The subgrade shall be trimmed to within 0 to 3/8 in. (0 to 10 mm) of the specified grades. The surface of the prepared subgrade shall not deviate by more than 3/8 in. (10 mm) from the bottom edge 39 in. (1 m) straight edge laid in any direction.
- E. The Contractor shall insure that the prepared subgrade is protected from damage from inundation by surface water. No traffic shall be allowed to cross the prepared subgrade. Repair of any damage resulting shall be the responsibility of the Contractor and shall be repaired.
- F. Under no circumstances shall further pavement construction proceed until the subgrade has been inspected by the Owner or the Consultant.

3.03 GRANULAR SUBBASE AND BASE INSTALLATION

- A. After proper construction of the concrete curb edge restraints for the interlocking pavement as per Section 3.4, and upon approval by the Consultant, aggregate subbase (as specified in design) and base shall be placed in uniform lifts not

exceeding 6 in (150 mm) loose thickness and roller compacted according to the AASHTO guidelines for installing open graded aggregates. Because the subbase and base are open graded aggregated materials, a method specification is appropriate for guidance in all aggregate compactive force.

- B. The granular base shall be trimmed to within to within 0 to 3/8 in. (0 to 10 mm) of the specified grade. The surface of the prepared base shall not deviate more than: (an example: 3/8 in. (10 mm) from the bottom edge of a 10 ft. (3 m) straight edge laid in any direction).
- C. Before commencing the placing of bedding aggregate course and the placement of the Unilock[®] permeable concrete pavers, the base shall be inspected by the Owner or the Consultant.

3.04 EDGE RESTRAINTS

- A. Adequate concrete edge restraint shall be provided along the perimeter of all paving as specified. The face of the concrete edge restraint, where it abuts pavers, shall be vertical down to the subbase.
- B. All concrete edge restraints shall be constructed to dimensions and level specified and shall be supported on a compacted subbase not less than 6 in (150 mm) thick.
- C. Concrete used for the construction of the edge restraints shall be air-entrained and have a minimum compressive strength as specified. All concrete shall be in accordance with ASTM C 94 requirements.

3.05 PAVER INSTALLATION

- A. Spread the bedding aggregate evenly over the base course and screed to a nominal 1 ½ in. to 2 in. (28 mm to 51 mm) thickness. The bedding aggregate should not be disturbed. Place sufficient bedding aggregate to stay ahead of the laid pavers. Do not use the bedding aggregate to fill depressions in the base surface.
- B. Initiation of paver placement shall be deemed to represent acceptance of the pavers.
- C. Pavers shall be free of foreign material before installation.
- D. Pavers shall be inspected for color distribution and all chipped, damaged or discolored pavers shall be replaced. Maximum allow breakage as per 2.1, section F.
- E. The pavers shall be laid in pattern(s) as shown on the drawings.
- F. Joints between the pavers shall be maintained according to the spacer bars.

G. Gaps at the edges of the paved area shall be filled with cut pavers.

Note: Units cut no smaller than one-third of a whole paver are recommended along edges subject to vehicular traffic.

H. Pavers to be placed along the edge shall be cut with a masonry saw.

Note: The use of infill concrete or discontinuities in patterns will not be permitted except along the outer pavement boundaries, adjacent to drains and manholes.

I. Upon completion of cutting, the area must be swept clean of all debris to facilitate inspection and to ensure pavers are not damaged during compaction.

J. Low amplitude, high frequency plate compactor shall be used to compact the pavers. Use Table 3 below to select size of compaction equipment:

**TABLE 3
PAVER THICKNESS AND REQUIRED MINIMUM
COMPACTION FORCE**

| Paver Thickness | Compaction Force |
|-------------------|------------------|
| 3 1/8 in. (80 mm) | 5000 lbs [22 kN] |

Note: Use of a urethane plate compactor pad is recommended to minimize any scuffing of the paving stone surface.

K. The pavers shall be compacted and the bedding aggregates shall be swept into all joints and void openings until they are full. This will require at least two or three passes with the compactor. Do not compact within 3 ft. (1 m) of the unrestrained edges of the paving units.

L. All work to within 3 ft. (1 m) of the laying face must be left fully compacted at the completion of each day.

M. Excess surface bedding and void opening aggregates shall be swept off when the job is complete.

N. The final surface elevations shall not deviate, as an example, more than 3/8 in. (10 mm) under a 10 ft. (3 m) long straight edge. Acceptable surface elevation deviations shall be specified by the Designing Engineer.

O. The surface elevation of pavers shall be 1/8 to 1/4 in. (3 to 6 mm) above adjacent drainage inlets, concrete collars or channels.

3.06 FIELD QUALITY CONTROL

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- A. Final elevations shall be checked for conformance to the drawings after removal of excess jointing aggregate.

END OF SECTION

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**02760-9
CONCRETE UNIT PAVERS**

SECTION 02765
THERMOPLASTIC PAVEMENT MARKINGS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including the General and Supplementary Conditions and Division 0 – Bidding Documents, Contract Forms, and Conditions of the Contract and Division 1 – General Requirements, apply to the work of this Section.
- B. Carefully examine all the Contract Documents for requirements which affect the work of this Section. The exact scope of this Section can not be determined without a thorough review of all specification sections and other Contract Documents.

1.02 GENERAL

- A. This Section specifies the requirements for bituminous concrete roadway, temporary trench, and driveway pavements.
- B. The work includes:
 - 1. Preparation of bituminous concrete paving.
 - 2. Thermoplastic pavement markings.
- C. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this trade.
 - 1. Section 02755 – Bituminous Concrete

1.03 REFERENCES

- A. References herein are made in accordance with the following abbreviations and all work under this Section shall conform to the latest editions as applicable:

MHD Standard Specs. – latest edition of Massachusetts Highway Department
Standard Specifications for Highways and Bridges

1.04 WEATHER LIMITATIONS

- A. Ambient air temperature for thermoplastic application is to be a minimum of 45 degrees F and rising at the time of marking operations. If work has started and air

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temperatures fall below 45 degrees and continuous cooling is indicated, work will be stopped.

1.05 QUALITY ASSURANCE

- A. Materials and methods of construction shall comply with the following standards:
 - 1. Standard Specifications: The Commonwealth of Massachusetts, Department of Public Works, Standard Specifications for Highways and Bridges, 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
 - 4. F.S.: Federal Specifications
 - 5. C.P.S.C.: U.S. Consumer Product Safety Commission

1.06 SUBMITTALS

- A. Manufacturers Cutsheets: Submit materials information from the material producer.
- C. Prior to installation of all striping, fabricate mockup, using materials indicated for project work. Build mockup not less than 4 feet in length. Obtain Landscape Architect's acceptance of visual qualities of mockup before start of concrete paving work. Retain mockup until work is completed, then remove from site. Mockup is not to become part of finished work.

1.07 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver, handle and store material at the job site in such manner as to prevent damage. Keep packaged material in original containers with seals unbroken and labels intact until time of use. Remove all damaged or otherwise unsuitable material from job site.

1.08 EXAMINATION OF CONDITIONS

- A. The Contractor shall fully inform himself of existing conditions of the site before submitting his bid, and shall be fully responsible for carrying out all site work required to fully and properly execute the work of the Contract, regardless of the conditions encountered in the actual work. No claim for extra compensation or extension of time will be allowed on account of actual conditions inconsistent with those assumed.

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- B. Plans, surveys, measurements, and dimensions under which the work is to be performed are believed to be correct to the best of the Landscape Architect's knowledge, but the Contractor shall have examined them for himself during the bidding period, as no allowance will be made for errors or inaccuracies that may be found herein.

1.09 ACCESSIBILITY CODES

- A. From time to time there are changes made in the federal, state or local accessibility codes. Such changes may occur during the course of that construction of this project. If changes become necessary to meet codes a change order will be issued to cover statutory requirements.

PART 2 - PRODUCTS

2.01 PAVEMENT MARKINGS

- A. Pavement markings shall be laid according to the contract drawings.
- B. Pavement markings shall conform to the requirements of MHD 860.62.
- C. The mixture of the marking material shall be within the composition limits for pavement markings as described in the MHD Specifications as follows:
 - 1. White Thermoplastic Reflectorized Pavement Markings M7.01.03
 - 2. Yellow Thermoplastic Reflectorized Pavement Markings M7.01.04.

PART 3 - EXECUTION

3.01 GENERAL

- A. Equipment: All equipment used for the application of pavement markings shall be of standard commercial manufacture and be operated at the speed and in accordance with other requirements of the manufacturer.
- B. No thinners shall be used for pavement marking applications except in accordance with the manufacturer's specifications.

3.02 PREPARATION

- A. Bituminous concrete pavements shall have been in place for 48 hours prior to the application of pavement markings except preformed permanent plastic pavement markings which can be applied immediately..

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- B. The surface shall be dry and free of sand, grease, oil, or other foreign substances prior to the application.

3.03 APPLICATION

- A. The materials must be applied at a temperature between 400-425 degrees F. The contractor shall follow manufacturer's application instructions.

3.04 PAVEMENT MARKINGS

- A. All existing traffic striping disturbed within the areas of the Contractors operations shall be replaced with fast drying traffic paint over the Base and Binder Course pavement and with thermo-plastic reflectorized traffic striping over the final pavement. New striping shall conform to Mass Highway Standard Specifications and materials used shall exactly match the existing striping and new striping as shown on contract drawings. The work shall include but not be limited to multiple centerlines, sidelines, intersecting layouts including cross walks and traffic warning signs.
- B. New striping shall be installed by a Contractor possessing the capability necessary to perform the work in an acceptable manner. New striping shall be placed on any temporary pavement that will be in place over a winter season as well as on the final pavement.

- END OF SECTION -

SECTION 02773

CURBING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Fabricate, furnish and install pre-cast concrete and granite curbing, as indicated on the Drawings and as specified.

1.02 RELATED SECTIONS

- A. Section 02220 - DEMOLITION
- B. Section 02350 – EXCAVATION, BORROW & BACKFILL
- C. Section 02755 - BITUMINOUS CONCRETE PAVEMENT.
- D. Section 03300 - CAST-IN-PLACE CONCRETE

1.03 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01420 - REFERENCES.
 - 1. ASTM C 131 - Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
 - 2. Commonwealth of Massachusetts Highway Department (MHD): Standard Specifications for Highway and Bridges

1.04 SUBMITTALS

- A. Submit the following under provisions of these specifications:
 - 1. Submit complete shop drawings of each curb type and size for Architect's approval.

1.05 QUALITY ASSURANCE

- A. Unless otherwise indicated, concrete curb materials and construction shall conform to the applicable portions of MHD's Standard Specifications Section 500, "Curb and Edging."

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Curb units shall be delivered to the job adequately protected from damage during transit.

- B. Curb shall be protected against staining, chipping, and other damage. Cracked, badly chipped, or stained units will be rejected and shall not be employed in the work.

PART 2 - PRODUCTS

2.01 PRECAST CONCRETE CURBS

- A. Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
 - 1. Field Concrete Pipe, Wauregan CT.
 - 2. Durastone Company, Lincoln RI.
 - 3. Precast Specialties Corporation, Braintree MA.
 - 4. Or Approved Equal.
- B. Concrete mix for curbs shall meet the following criteria:
 - 1. Portland Cement, type I or III conforming to Standard Specifications, Section M4.
 - 2. Maximum aggregate size: 3/4 inch.
 - 3. Air entrainment: Greater than 3 percent by volume and less than 6 percent.
 - 4. Water reducing agent as recommended by fabricator.
 - 5. Minimum compressive strength (28 day strength): 5000 pounds per square inch.
- C. Forms used for casting curbs shall be steel or wood having a 'smooth- form' surface.
- D. Cast curbs in fabricators standard lengths, but not less than 3 feet. Curved curbing shall be employed on a radii up to 150 feet. Curb units shall be true to line, plane, and dimensions.
- E. Provide custom sized and dimensioned units matching profiles indicated on the Drawings.
- F. Finish shall be uniform, smooth texture, free from cracks and other defects. Color of units shall be uniform. Provide a smooth, light sandblasted finish, on all exposed-to-view surfaces as installed, with the surface texture resembling limestone.

2.02 GRANITE CURB

- A. Granite for vertical curb, radius curb, corners, curb inlet and transition curb shall be engineering grade structural granite conforming to ASTM C615 requirements. Sizing of curb and comers shall be as shown on the Drawings. Granite curb shall be Type V A4 as per the "Standard Specification."

- B. Granite shall be of smooth splitting character and free from seams which impair its structural integrity. Natural variations characteristic of the deposit will be permitted. Granite shall come from an approved quarry.
- C. Cement mortar shall meet requirements of Section M4, Paragraph M4.02.15 of the Standard Specifications. Color shall be "natural" to match color of curb.
- D. Concrete shall be 4,000 psi concrete as specified under Section 03300 CONCRETE, herein.
- E. Processed gravel fill as specified under Section 02355 GRAVEL BORROW, herein.

PART 3 - EXECUTION

3.01 INSTALLATION - CONCRETE CURBS

- A. Trench an area to 18 inches wide and 6 inches below bottom of installed curb. Place aggregate fill and compact as defined in Section 02350 to a compacted thickness 6 inches.
- B. Curb shall be set in a concrete cradle, level with elevation required and alignment. Vertical face of curb shall be plumb. Butt ends of curbs, with a maximum joint of 1/8 inch. Mortar all joints.
- C. Do not field cut units without obtaining prior permission from the Architect.
- D. Expansion joints:
 - 1. Expansion joints shall be 1/2 inch wide, provided with preformed joint filler.
 - 2. Provide expansions joints every 30 feet on center.
 - 3. Provide expansion joints where pre-cast curbing meets cast-in-place curbs, granite curb, handicap ramps, and existing concrete.
- E. Backfill with aggregate fill, with no stones larger than 1-1/2 inches. Backfill against curbs with taking care to maintain alignment and position. Curbs sections disturbed during backfilling or otherwise shall be reset to line and grade and properly backfilled.

3.02 GRANITE CURBS

- A. Furnish and install new granite curb and reset existing granite curb removed and stockpiled for reuse, herein. Curb shall be set straight, plumb and as shown on the Drawings.
- B. Curb shall be set in a concrete cradle in a trench excavated to a width of twenty-four inches (24"). The subgrade of the trench shall be at a depth below proposed finish grade of the curb equal to six inches (6") plus the depth of the curb stone. Base course shall then be filled with processed

gravel fill to proper level to support curb at final grade and thoroughly tamped.

- C. Place curb units in accurate line, each piece butting the next with joint spacing no larger than one-quarter inch (1/4). Final points shall be joined by closure pieces made to order. No curb shall be cut in the field. After alignment, the curb shall be carefully backfilled as shown on the Drawings. Extreme care shall be taken not to disturb alignment.
- D. Patch street pavement as required.

END OF SECTION

SECTION 02790

SYNTHETIC GRASS INFILL SYSTEM

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Provide all labor, materials, equipment and tools necessary for the complete installation of Synthetic Grass Infill System over a graded stone base as outlined in these specifications and in strict accordance with the manufacturer's written specifications with a specially formulated resilient infill of rounded sand and ambiently recycled rubber.
- 1) Excavation and placement of graded stone sub-base.
 - 2) A drainage system consisting of a flat drains and collector piping.

Base Bid

- 3) A synthetic grass system with 2.5" long 100% polyethylene fibers, tufted on a 3/8" tufting machine with a minimum of 46 ounces of yarn per square yard. The system shall include a single, dimensionally stable, three-component backing, and have a minimum of 20 ounces of urethane secondary backing per square yard and a total weight of 74 ounces per square yard. The finished product shall also include perforations (1/4" holes on 4" centers) to ensure maximum drainage. Systems that are tufted on 5/8" or 3/4" gauge tufting machines, are not perforated or include any type of nylon fiber "thatch zone" shall not be acceptable.
- 4) A resilient infill system, consisting of a coarse, rounded, uniformly sized silica sand and graded ambient SBR crumb rubber.
- 5) Or approved equivalent system by Field Turf, Shaw Sportex or approved equal.

1.02 QUALIFICATIONS AND SUBMITTALS

- A. Prospective Bidders and / or installers of the turf shall be required to comply with the following:
- 1) The successful turf contractor must be a member of the Synthetic Turf Council (STC) and Sports Turf Managers Association (STMA).
 - 2) The turf contractor and / or the turf manufacturer must be experienced in

the manufacture and installation of this specific type of sand and rubber infill synthetic grass system with the rubber base pad, for at least five (5) years and provide references of ten (10) specific installations in the last five (5) years.

- 3) The turf contractor must provide competent workmen skilled in this specific type of synthetic grass installation. The designated supervisory personnel on the project must be certified in writing by the turf manufacturer as competent in the installation of this material, including the gluing of seams and the proper installation of the infill mixture. The manufacturer shall have a representative on site to certify the installation and warranty compliance.
- 4) All designs, marking, layouts, materials shall conform to current National High School Federation / NCAA rules and other standards that may be applicable to this type of synthetic grass installation.

B. All bidders of the turf contract must submit to the Architect the following information:

- 1) The Contractor shall submit to the Architect, prior to the bid, a 1' x 1' minimum sample of the exact synthetic turf and infill system that is specified for this project. A sample of the Resilient Performance Base material shall also be submitted.
- 2) The turf contractor / manufacturer shall submit with the bid, a sample copy of the material warranty demonstrating compliance with the warranty requirements.
- 3) The turf contractor shall provide evidence - direct from the turf manufacturer - that the installer is certified by the manufacturer to install this type of synthetic grass installation.
- 4) Certified copies of independent (third-party) laboratory reports on ASTM tests as follows:
 - a) Pile Height, Face or Pile Weight & Total Fabric Weight, ASTM D418 or D5848
 - b) Primary & Secondary Backing Weights, ASTM D418 and D5848
 - c) Tuft Bind, ASTM D1335
 - d) Grab Tear Strength, ASTM D1682 or D5034
- 5) List of five (5) similar existing monofilament installations that have been installed in the United States including, Owner representative and telephone number(s).

- 6) The Turf Contractor and Turf Manufacturer (if different from the company) shall provide evidence that their turf system does not violate any other manufacturer's patents, patents allowed or patents pending.
 - 7) The Turf Contractor and Turf Manufacturer (if different from the company) shall provide a sample copy of insured, non-pro-rated warranty and NON-CANCELABLE warranty insurance policy with a policy minimum claim limits of at least \$350,000 and annual aggregate limit of at least \$10,000,000 in order to fully cover the full replacement of the turf system in the event of total failure.
 - 8) Letter stating the products anticipated lifespan.
 - 9) A letter and specifications sheet certifying that the products in this section meet or exceed specified requirements including certification from the turf manufacturer that lead or lead chromate are not used in the manufacturing of the specified system.
 - 10) Warranty must cover full 100% of replacement value of total square footage installed. Minimum \$9.00 per square foot.
- C. The General/Site Contractor shall have a minimum of five (5) years experience in the construction and establishment of artificial turf subbase / stone base / drainage systems and shall provide references of ten (10) specific installations in the last five (5) years.

1.03 SHOCK ATTENUATION EVALUATION:

- A. Near the completion of the turf, hire an independent testing laboratory to perform ten (10) in place G max tests in compliance with ASTM F1936 and F355. If any test results exceed 125, modify the infill material ratios as necessary to achieve satisfactory results. Perform additional testing to verify the results as required by the Architect.
- B. Guarantee: During the eight (8) year guarantee period, the G max rating shall remain less than 180. Hire an independent testing laboratory to perform three (3) in place G max tests each on site during the first, third, fifth, seventh and ninth years. If any test results meet or exceed 180, modify the infill material ratios as necessary to achieve satisfactory results. Perform additional testing to verify the results as required by the Architect. If the G max rating exceeds 165 after three attempts to repair the high rating, replace the field within 90 calendar days at no cost to the Owner.

1.04 PRE-INSTALLATION MEETING

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Waltham, Massachusetts**

A. Convene One (1) Week After Bid Opening:

1. An interview shall take place at a time and date to be determined by the Architect at the district office of Millbrook Central School District. Present at this meeting shall be the Architect, Engineer, Owner's Representative(s), the Project Manager and Site Superintendent for the Prime Contractor and the Project Manager and Project Foreman for the Turf Installer. The purpose of this meeting will be to review turf product and installation means and methods, to interview and ascertain the experience and competence of the Turf Installer, as well as, the onsite Project Foreman for this project and to review the project schedule. The basis of choosing this particular product shall be in part due to the results of this interview process. Contractor shall submit all required submittals before this meeting.

B. Convene One (1) Week Prior to Stone Blanket Completion:

1. A second meeting shall take place at a time and date to be determined by the Architect at the district office of Millbrook Central School District. Present at this meeting shall be the Architect, Landscape Architect, Owner's Representative(s), and the Project Manager for the Site Contractor. The purpose of this meeting shall be to review and confirm schedule. (with particular attention on the turf installation) and to confirm that the turf product has been ordered by way of notarized copies of the original confirmed Purchase Order and guaranteed delivery date.

1.05 DELIVERY, STORAGE, AND PROTECTION

- A. Deliver products to project site in wrapped condition.
- B. Store products under cover and elevated above grade.
- C. Protect all products and installation area from vandalism, theft, other construction, etc.

1.06 WARRANTIES

- A. The Turf Manufacturer shall provide a Warranty to the Owner that covers defects in materials and workmanship of the turf for a period of eight (8) years from the date of Substantial Completion. The turf manufacturer must verify that their onsite representative has inspected the installation and that the work conforms to the manufacturer's requirements. The turf fabric shall not lose more than an average 2% per year. The manufacturer shall guarantee the availability of replacement material for the synthetic turf system installed for the life of the warranty.

- B. The Manufacturer's Warranty shall include general wear and damage caused from UV degradation. The warranty shall specifically exclude vandalism, and acts of God beyond the control of the Owner or the manufacturer.
- C. The Turf Manufacturer's Warranty must be supported by an insurance policy of the full eight (8) year period.
- D. The Turf Contractor shall provide a Warranty to the Owner that covers defects in the installation workmanship, and further warrant that the installation was done in accordance with both the Manufactures' recommendations and any written directives of the Manufacturer's onsite representative.
- E. The synthetic grass turf must maintain an ASTM F355 and ASTM F1936 G-max between 125-165 for the life of the Warranty. Refer to 1.5, D.
- F. Any repairs or service to the field requested by the Owner or Owner's representative shall be addressed within 14 days from the date of written notification.

1.07 MAINTENANCE SERVICE

- A. The Turf Contractor will train the Owner's facility maintenance staff in the use of the specified maintenance attachments and equipment to routinely groom and sweep the field. Equipment shall be in good working condition.

1.08 ADA HANDICAP ACCESSIBLE

- A. Synthetic turf system shall be approved as ADA compliant as determined by Test-Method ASTM 1951-99.
- B. Proof of passing must be submitted for approval.

PART 2 - PRODUCTS

2.01 BASE STONE AND DRAINAGE SYSTEM

| | | | |
|--------|-------------------|-------------------|-----------------|
| Sieves | Base Stone-Type 1 | Base Stone-Type 2 | Finishing Stone |
|--------|-------------------|-------------------|-----------------|

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| | | | |
|--------|--------|--------|--------|
| 3" | | | |
| 2" | 100 | | |
| 1 ½" | 90-100 | | |
| 1" | 75-100 | 100 | |
| ¾" | 65-95 | 90-100 | |
| ½" | 55-85 | 80-100 | 100 |
| ⅜" | 40-75 | 70-100 | 85-100 |
| ¼" | 25-65 | 60-90 | 75-100 |
| US#4 | 15-60 | 50-85 | 60-90 |
| US#8 | 0-40 | 30-65 | 35-75 |
| US#16 | 0-20 | 10-50 | 10-55 |
| US#30 | 0-10 | 0-35 | 0-40 |
| US#60 | 0-8 | 0-15 | 0-15 |
| US#100 | 0-6 | 0-8 | 0-8 |
| US#200 | 0-5 | 0-2 | 0-2 |

PLEASE NOTE THAT THE BASE STONE AND DRAINAGE STONE SYSTEM IS A SPECIAL MANUFACTURED PRODUCT AND ANY DEVIATION FROM THIS MATERIAL SHALL REQUIRE WRITTEN APPROVAL FROM THE TURF MANUFACTURER'S CORPORATE HEADQUARTERS.

RESTRICTIONS:

- To ensure structural stability: $D_{60}/D_{10} > 5$ and $1 < \frac{D_{30}^2}{D_{10} D_{60}} < 3$
Fragmentation must be 100%.
- To ensure separation of both stones: $\frac{D_{85} \text{ of finishing stone}}{D_{15} \text{ of base stone}} > 2$
and $3 < \frac{D_{50} \text{ of base stone}}{D_{50} \text{ of finishing stone}} < 6$
- To ensure proper drainage: Permeability of base stone > 50 in/hr (3.5×10^{-2} cm/sec)
Permeability of finishing stone > 10 in/hr (7.0×10^{-3} cm/sec)
Porosity of both stones $> 25\%$
(When stone is saturated and compacted to 95% Proctor.)
- Perimeter Edge: Concrete curb (see Contract Drawings).
- Underdrain System
 - ADS AdvanEdge

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- a. 1 inch by 12 inch flat drain.
- b. ADS AdvanEdge end connector with 4 inch ADS pipe.
- c. 6 inch diameter perforated collector drain pipe.
- d. 6 inch diameter solid wall HDPE cleanout with 8 inch by 8 inch by 8 gauge aluminum plate with synthetic surface glued directly to plate.

2. Approved equivalent.

6. Perimeter Edge: Concrete curb (see Contract Drawings).

2.02 SYNTHETIC GRASS INFILL SYSTEM MATERIALS

A. Manufacturer: Subject to compliance with all specified requirements,

THE CONTRACTOR SHALL PROVIDE WITH HIS BID, IN THE BID FORM, THE SYNTHETIC GRASS INFILL SYSTEM MANUFACTURER AND SYSTEM HIS/HER BID IS BASED ON.

B. The Synthetic Grass Material and resilient infill shall be in strict accordance with the following:

- 1) The fiber shall be an 8000 denier, 100 micron thickness 100% polyethylene, low-friction fiber, measuring not less than 2.5 inches high, as manufactured by Bonar Yarns & Fabrics or TC Thiolon. The low friction fiber shall be specifically designed to virtually eliminate abrasion.
- 2) The tufted fiber weight shall not be less than 46 ounces per square yard. The fiber shall be tufted on a 3/8" tufting machine at a rate of 10 stitches per every 3". The overall product weight must not be less than 74 ounces per square yard. The low friction non-abrasive fiber shall be 100% polyethylene, treated with a UV inhibitor. Systems that use polyethylene/polypropylene blended fibers and systems that include any type of nylon fibers are unacceptable.
- 3) The primary backing shall consist of a one part, three component polyester/polypropylene backing (TAC Thiobac PRO) with a minimum weight of 8 ounces per square yard. The secondary backing shall consist of an application of porous polyurethane (minimum of 20 ounces per square yard), heat activated to permanently lock fiber tufts in place. Products using latex based secondary backings will not be acceptable. The synthetic grass system shall be perforated with 1/4" holes every four (4") inches in both directions to provide for maximum drainage. Complete synthetic grass system (including base pad) shall drain in excess of 20" per hour. Non-perforated turf systems shall not be acceptable alternates for purposes of this specification.

- 4) The carpet shall be delivered in 15' wide rolls. The rolls shall be of sufficient length to go from edge of track to edge of track. Head seams will not be acceptable.
- 5) All field lines, numbers and markings indicated on the plans shall be permanently inlaid.
- 6) The fiber shall be Verde green in color to simulate natural grass as closely as possible and treated with UV inhibitor, guaranteed a minimum of eight (8) years.
- 7) The infill system shall consist of a non-compacting mixture of specifically graded, coarse, rounded, uniformly sized silica sand and coarse, ambiently recycled SBR crumb rubber.

Typ. Part. Size Distr.
*Mesh (ASTM E-11)

| | |
|-----|-------|
| 8 | ----- |
| 12 | 0.3% |
| 16 | 57.8% |
| 20 | 32.6% |
| 30 | 5.1% |
| 40 | ----- |
| 50 | ----- |
| PAN | 0.4% |

Typ. Part. Size Distr.
*Mesh (ASTM E-11)

| | |
|-----|-------|
| 8 | ----- |
| 10 | Trace |
| 12 | 20% |
| 16 | 80% |
| 20 | 100% |
| PAN | 0% |

*Represents the typical mean percentage (%) retained on individual sieves

- 8) Pads beneath the turf are not allowed.

A. TURF DATA

| | |
|------------------------|-------------------------------------|
| Pile Weight: | 45 oz/sy |
| Face Yarn Type: | 100% Polyethylene |
| Yarn Size: | 8,000 Denier (100 Micron Thickness) |
| Pile Height (Finished) | 2.5" |
| Color: | Field Green |
| Construction: | Broadloom Tufted |
| Stitch Rate: | 10/3" |
| Tufting Gauge: | 3/8" |
| Primary Backing: | Woven and non-woven, fiber |

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| | | |
|---|--|------|
| reinforced component system) | backing | (two |
| Secondary Backing: | 20 oz/sy Urethane | |
| Total Product Weight: | 73 oz/sy (± 2 oz) | |
| Finished Roll Width: | 15' | |
| Finished Roll Length: | Up to 220' | |
| Perforation (Outdoors): (approximate) | 3/16" Holes on Staggered 4" Center | |
| Permeability: 20" ± Per Hour | | |
| Infill Composition: Sand and Mixture (70% rubber / weight) | Rounded, Uniformly-Sized Silica Ambient SBR Rubber 30% sand by | |
| Field Lines & Markings: | Tufted, Inlaid and Painted | |

- 9) Or an approved equivalent.

2.05 TURF GROOMER

- A. The Contractor shall provide a turf grooming system, which consists of spiked wheels designed to penetrate the infill in order to loosen the infill without damaging the grass fibers and light raking tines attached to the rear of the unit designed to groom the exposed grass fibers to keep them from matting down excessively. This equipment shall be approved by the turf manufacturer and the Owner to be used by the Owner as directed by the Manufacturer. No additional payment will be made for providing the equipment, but the costs for providing the equipment shall be included in the price bid for synthetic turf. Standard of quality shall be FieldSpec Groom-All as manufactured by Sportsfield Specialties, Inc. or an approved equivalent.

PART 3 - INSTALLATION

3.01 SUBGRADE / SUBBASE APPROVALS

- A. Prior to the installation of the Synthetic Grass Infill System, the General/Site Contractor shall provide written certification that all subgrade, subbase, leveling course and slopes and elevations are in compliance with the Contract Documents and meets or exceeds all manufacturer requirements. This certification shall be

prepared by an approved Installer. The finished grade of the subbase shall not vary more than 3/16" in ten (10) feet. A laser grader must be used to meet the requirements. The General/Site Contractor shall also provide an as-built survey of the finished subgrade and also finished leveling course with spot grades every 25 feet on center each way for approval.

3.02 SYNTHETIC GRASS INFILL SYSTEM

- A. Verification of Conditions (by Installer): Examine conditions under which synthetic grass surfacing is to be installed in coordination with Installer of materials and components specified in this Section and notify affected Prime Contractors and Architect in writing of any conditions detrimental to proper and timely installation. Do not proceed with installation until unsatisfactory conditions have been corrected in a manner acceptable to Installer.
- 1) When Installer confirms conditions as acceptable to ensure proper and timely installation and to ensure requirements for applicable warranty or guarantee can be satisfied, submit to Architect written confirmation from applicable Installer. Failure to submit written confirmation and subsequent installation will be assumed to indicate conditions are acceptable to Installer.
 - 2) Synthetic Grass Infill System: Provide manufacturer's inspection and certification that surface to receive synthetic turf is ready for installation of synthetic turf system, is perfectly clean in accordance with manufacturer's standards, and will be maintained in acceptable clean condition throughout installation.
- B. Installation: Install in strict accordance with manufacturer's written specifications and recommendations.
- 1) Unless otherwise recommended by turf and base manufacturer, lay turf loosely across field, stretched, and attached to perimeter edge detail with sufficient length to permit full cross-field installation without head or cross-seams. **(Head and cross-seams shall not be permitted)**
 - 2) Unless otherwise recommended by the turf and base manufacturer, this shall be a 100% glued installation. (Sewing of seams shall not be permitted). A 15" strip of coated cordura tape shall be used to seam the rolls of material. The specified glue shall be a one part urethane adhesive (34D-2 or 34N-2) as manufactured by Synthetic Surfaces, Inc., Scotch Plains, NJ (980-233-6803).
 - 3) Provide Infill material properly mixed on site and applied/spread evenly with a large fertilizer type spreader (minimum six (6) foot wide) in strict

accordance with manufacturer recommendations. Between each application of infill. The field area shall be brushed with a motorized rotary nylon broom. Minimum infill depth shall be 1.75 inches. Comply with manufacturer's recommendations regarding environmental requirements for installation such as dryness and absence of moisture.

- 4) Field markings: Apply and install fixed markings as indicated herein and in accordance with the Contract Drawings.
 - a) Football: All lines/markings shall be inlaid white.
 - b) Soccer: All lines/markings shall be inlaid yellow.
 - c) Men's Lacrosse: All lines/markings shall be inlaid red.
 - d) Women's Lacrosse: All lines/markings shall be inlaid blue.
- 5) Provide final cleaning of synthetic grass surfacing installations and maintain area clean and free from debris during installation. Clean surfaces, recesses, enclosures, and similar areas as required to leave area of installation in clean, immaculate condition ready for immediate occupancy and use by Owner.
- 6) Protect installed synthetic grass from subsequent construction operations. Do not permit traffic over unprotected surfacing.
- 7) The turf manufacturer shall provide training for the Owner's facility maintenance staff in use of grooming equipment recommended by the manufacturer.

3.03 MAINTENANCE AND WARRANTY

A. The turf installer and/or the turf manufacturer must provide the following:

- 1) The turf manufacturer shall provide a warranty to the Owner that covers defects in materials and workmanship of the turf for a period of eight years from the date of Substantial Completion. The turf manufacturer must verify that their on-site representative has inspected the installation and that the work conforms to the manufacturer's requirements. The polyethylene yarn manufacturer shall provide an eight (8) year "UV stabilization" warranty.
- 2) The manufacturer's warranty shall include general wear and damage caused from UV degradation. The warranty shall specifically exclude vandalism, acts of War and acts of God beyond the control of the Owner of the manufacturer.
- 3) The turf contractor shall provide a warranty to the owner that covers

defects in the installation workmanship, and further warrant the installation was done in accordance with both the manufacturer's recommendations and any written directives of the manufacturer's on site representative.

- 4) All turf warranties shall be limited to repair or replacement of the affected areas and shall include all necessary materials, labor, transportation costs, etc. to complete said repairs. All warranties are contingent on the full payment by the Owner of all pertinent invoices.

END OF SECTION

SECTION 02820

BLACK VINYL CLAD CHAIN LINK FENCE

PART I - GENERAL

1.01 SCOPE OF WORK

- A. The work under this Section consists of furnishing and installing vinyl coated chain link fence fabric and hardware and framework of various heights as shown on the Contract Drawings and as specified herein including all labor, materials and equipment necessary to finish the work complete in place.

1.02 REFERENCE STANDARDS

- B. References herein to any technical society, organization, group or body is made in accordance with the following abbreviations:
 - 1. ASTM American Society for Testing Materials
 - 2. AWS American Welding Society

1.03 QUALITY ASSURANCE

- A. All fencing shall conform to the specifications of the Chain Link Fence Manufacturer's Institute and as specified herein.

1.04 SUBMITTALS

Per Section SPECIAL CONDITIONS of these Specifications, submit:

- A. Three (3) samples, approximately 3" long or 6" square of fabric material, post sections and typical accessories.
- B. Shop drawings or catalog cuts including details illustrating fence height, fence post spacing, and sizes of posts, rails, braces, footings, gates and all accessories.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver material in manufacturer's original packaging with all tags and labels intact and legible. Handle and store material in such a manner as to avoid damage.

PART II - MATERIALS

2.01 VINYL CLAD STEEL POSTS, RAILS AND BRACES

A. General

1. All fence pipe for posts, rails, and all braces and appurtenances shall be vinyl clad, schedule 40 round, seamless hot dip galvanized pipe conforming to ASTM-A-120-1, or approved equal.
2. All structural shapes shall be vinyl clad, and galvanized in conformance with ASTM Designation A123.
3. All vinyl clad materials shall be fusion bonded in accordance with ASTM-F668 Class 2B.

B. End, Corner and Pull Posts

1. Fence up to and including 5'-0" in height: 2.375" O.D. pipe, 3.65 lbs. per linear foot.
2. Fence over 5'-0" in height: 2.875" O.D. pipe, 5.79 lbs. per linear foot.
3. Fence over 10'-0" in height: 4.00" O.D. pipe, 9.11 lbs. per linear foot.
4. Maximum Spacing 10'-0" on Center.

C. Line Posts (10'-0" Maximum Spacing)

1. Fence up to 5'-0" in height: 1.90" O.D. pipe, 2.28 lbs. per linear foot.
2. Fence over 5'-0" in height: 2.375" O.D. pipe, 3.12 lbs. per linear foot.
3. Fence over 10'-0" in height: 2.875" O.D. pipe, 5.79 lbs per linear foot.

D. Gate Posts

1. Gate posts for single leaf gates six (6) feet or less in width: 2.875" O.D. pipe, 4.64 lbs. per foot min.
2. Gate posts for single leaf gates six (6) to twelve (12) feet in width: 4.00" O.D. pipe, 6.56 lbs. per foot.

E. Rails

1. All rails shall be 1.66" O.D. pipe weighing 2.27 lbs. per linear foot furnished in manufacturer's standard lengths of approximately 21'-0" with

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outside sleeve type couplings, at least six (6) inches long for each joint – one (1) coupling in each five (5) to have expansion spring. Provide means for attaching rails securely to each corner, pull and end post. Rails shall form continuous brace from end to end of each run of fence.

F. Post Bracing Assembly

1. 1.66" O.D. pipe weighing 2.27 lbs. per linear foot (for horizontal braces). Provide at each side of corner and pull posts and at end posts for fence six (6) feet or higher.

2.02 CHAIN LINK FABRIC (VINYL CLAD)

- A. Chain Link fence fabric shall be factory coated 6 gauge core wire (or 9 gauge in certain circumstances as indicated on the details) with a min .02 inch thick coating of plasticized polyvinyl-chloride applied by the fusion method over a thermoset plastic bonding agent. The bond shall exhibit equal or greater strength than the cohesive strength of the vinyl. All cut ends shall be coated with vinyl at the factory. Fabric shall be 2" mesh and black in color.
- B. Top and bottom of fabric shall have knuckled selvage, both sides.

2.03 FITTINGS AND ACCESSORIES (VINYL CLAD)

- A. All accessories shall be vinyl clad in accordance with paragraph 2.01 above, and galvanized in conformance with ASTM Designation A153.

B. Post Caps

Furnish and install tight fitting pressed steel or malleable iron caps, designed as a weather tight closure cap. Provide one (1) pass-through looped cap for each line post, and one (1) acorn style cape for each end or corner post. Where top rail is used, provide looped cap tops to permit passage of top rail.

C. Tension Bars

1. One (1) piece lengths equal to full height of fabric with minimum cross section of 3/16" x 3/4", conforming to ASTM Designation A123. Provide one (1) stretcher bar for each end post and two (2) for each corner and pull post.
2. Tension bands and brace bands, if utilized, shall be 7/8" x 12 gauge beveled, galvanized, sized to fit pipe sizes and furnished with galvanized fasteners. Galvanizing shall conform with ASTM Designations A123 or A153 as they pertain.

D. Rail Clamps

1. Rail clamps shall be standard clamps (boulevard clamps) furnished complete with fasteners with ASTM Designation A153.

E. Fabric Bands for Tying Fabric

1. Fabric shall be attached using a BAND-IT band and buckle system
2. Bands shall be 0.020" thickness, 200/300 series stainless steel ½" wide bands, with a minimum breaking strength of 850 lbs., ½" band capacity ear-loct design buckles to be manufactured with 0.050" thick material, 201/301 series stainless steel.

- F. Fittings, lugs, clamps and other accessories shall be steel conforming to ASTM Designation F626 and galvanized in conformance with ASTM Designation A153.

2.04 ANCHORING CEMENT

- A. Cement for anchoring posts in sleeves embedded in concrete walls shall be "POR-ROK", as manufactured by Hallemite (Lehn and Fink Industrial Products, Division of Sterling Drugs, Inc.), Montage, New Jersey, or approved equal.
- B. "Sika Cola-Due" by the Sika Co.
- C. "Five Star Grout" the Five Star Co.

2.05 CEMENT CONCRETE

- A. Cement concrete for post footings shall conform to Section 03300 of these Specifications.

PART III - EXECUTION

3.01 POST INSTALLATION

- A. Install new vinyl coated chain link fence in the location(s) shown on the Contract Drawings, and as approved by the Landscape Architect.
- B. Excavation for post footings as herein before specified in Section 02300 of these Specifications, shall be in firm undisturbed or compacted soil. Post footing diameters vary according to post sizes required and are in accordance with attached details. Excavate hole depths six (6) inches lower than post bottom with bottom of posts set not less than thirty-six (36) inches below surface when in firm, undisturbed soil. Where ledge is encountered, the Contractor shall notify the

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Landscape Architect to determine method of installation. Payment for any additional work required when installations are in ledge shall be in accordance with methods described in SPECIAL CONDITIONS of these Specifications.

- C. Place concrete around posts in a continuous pour, tamp for consolidation. Check each post for vertical and top alignment and hold in position during placement and finishing operation. Crown the top of the concrete footings to pitch water away from posts.
- D. Under bituminous pavements, tops of footings are to be finished smooth and are to pitch one (1) inch from the posts to the outside edge of the foundation.
- E. In mower strip locations, form top twelve (12) inches square and finish to match mower strip with 1/4" pitch away from posts.
 - 1. If applicable, top of fence footings at players' benches and cement concrete mower strips shall terminate six (6) inches below pavement finish grade.

3.02 FENCE ERECTION

A. Top and Bottom Rails

- 1. Top and bottom rails shall form a continuous brace from end to end of each fence run. In addition, all end and corner posts shall be braced to the nearest line post with center brace rails. Outside sleeve type top rail coupling shall be placed a maximum of twelve (12) inches from line posts.

B. Middle Rails

- 1. All chain link fencing ten (10) feet or more in height shall have a continuous middle rail.

C. Brace Assemblies

- 1. Furnish and install braces and appurtenances so posts are plumb when diagonal rod is under proper tension. All "tension" assemblies shall conform to ASTM 567 and the MASS DPW Standard Specifications Section M.8.09

D. Fabric

- 1. The fabric shall be installed on the "public" or "sports field" side of the fence.

2. All fabric shall be aligned so that the top row of the fabric mesh is tied to the top rail, and so that the bottom selvage of fabric mesh stands one (1) inches above the finish grade of the lawns, pavements or concrete wall grade and that the bottom row of the fabric mesh is tied to the bottom rail.
3. Fabric shall be properly stretched and securely fastened to the posts and rails, and between posts the top and bottom of the fabric shall be fastened to the horizontal braces as herein specified, and approved by the Landscape Architect. Fabric shall be stretched uniformly taut and as tight as possible, true to line and grade and complete in all details. Install tension bars at corners.
4. The fabric shall be fastened to end and corner posts with tension bars and stretcher bar bands spaced at one (1) foot intervals.

E. Stretcher Bars

1. Thread through fabric and secure to posts with approved metal bands spaced not over twelve (12) inches O.C.

F. Fabric Bands

1. Fabric Bands shall be placed at the intervals indicated on the details and securely fastened to all fence posts.
2. All bands shall be pulled tight and raw ends of steel bands shall be secured in buckle by folding ear tabs around steel bands as per manufacturer's recommended installation procedure. No sharp edges shall protrude from band-it buckles. When applicable, band will be PVC coated, color to match fabric and framework.

G. Fasteners

1. Install nuts for tension band and hardware bolts on side of fence opposite fabric side unless directed otherwise by the Landscape Architect.

3.03 GATE FRAMES (WHERE APPLICABLE)

- A. Gate frames shall be galvanized steel 1.90" O.D. standard weight pipe, 2.72 pounds per linear foot. Gates shall be fabricated using welded construction with all welds ground smooth and coated with 3.0 mil. thickness of cold galvanizing compound. Gates must be properly braced to eliminate any possible sagging condition. For gates over eight (8) feet in height, provide additional horizontal and vertical interior members to ensure proper strength.
- B. Fabric shall be installed with hookbolts and tension bars on all four (4) sides and attached to gate frame at twelve (12) inches on center.

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- C. Hardware materials shall be hot dipped galvanized steel. All moveable parts (e.g., hinges, latch, keeper, and drop bar) shall be field coated with PVC touch-up paint, provided by the manufacturer.
- D. Hinges shall be of sufficient structural strength and design to support gate leaf and to permit easy and trouble free operation. Non-lift-off type hinge design shall permit the gate to swing 180 degrees inward or outward in accordance with the Contract Drawings
- E. All gates shall be equipped with a positive type latching device capable of retaining the gate in a closed position and have provision for padlock. Latches shall permit operation from either side of gate and must be approved by the Landscape Architect prior to the installation. Refer to details for latch device.
- F. Gate keepers shall be provided for each gate leaf over five (5) feet wide. Gate keeper shall consist of mechanical device for securing free end of gate when in full open position.
- G. Double gates: Provide drop rod to hold inactive leaf. Provide gate stop pipe to engage center drop rod. Provide locking device and padlock eyes as an integral part of the latch, requiring one padlock for locking both gate leaves.
- H. Gate Installation
 - 1. Check gate posts for vertical alignment and maintain in position during placement and finishing operations.
 - 2. Set keeper, stops, sleeves into concrete.
 - 3. Install gates plumb, level and secure for full opening without interference.
 - 4. Attach hardware by means which will prevent unauthorized removal.
 - 5. Adjust hardware for smooth operation.

3.03 FINISH PROTECTION

- A. During the fence installation, care shall be taken to avoid damaging the vinyl clad or galvanized surfaces of the fence components. All scratches and abrasions shall be thoroughly corrected in a manner satisfactory to the Landscape Architect before final acceptance.

`END OF SECTION

SECTION 02821

GALVANIZED CHAIN LINK FENCE AND GATES

PART I - GENERAL

1.01 SCOPE OF WORK

- A. The work under this Section consists of furnishing and installing chain link fencing with aluminum coated fabric as shown on the Contract Drawings, as specified herein and as necessary to make the work complete and safe, including all labor, materials and equipment necessary to finish the work complete in place.

1.02 REFERENCE STANDARDS

- A. References herein to any technical society, organization, group or body are made in accordance with the following abbreviations:
 - 1. ASTM - American Society for Testing Materials
 - 2. AWS - American Welding Society

1.03 QUALITY ASSURANCE

- A. All fencing shall conform to the specifications of the Chain Link Fence Manufacturer's Institute and as specified herein.

1.04 SAMPLES

- A. Samples shall be submitted for approval for all fence materials to be furnished under this Section prior to the start of construction.
- B. Samples shall also be submitted, in factory-sealed containers, of the cold galvanizing compound and the anchoring cement.

1.05 SHOP DRAWINGS

- A. Shop drawings or catalog cuts including details illustrating fence height, fence post spacing, and sizes of posts, rails, braces, footings, gates and all accessories.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver material in manufacturer's original packaging with all tags and labels intact and legible. Handle and store material in such a manner as to avoid damage.

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PART II - MATERIALS

2.01 POSTS, RAILS AND BRACES

A. Pipe

1. All fence pipe shall be cold formed steel, Type SS40, as manufactured by the Allied Tube and Conduit Corporation of Harvey, Illinois, Schedule 40, pipe conforming to ASTM-A-1201, or approved equal.

B. Fence Posts and Rails

1. Line posts five (5) feet or less shall be 1-7/8" OD pipe, 2.72 lbs. per linear foot.
2. Line posts over five (5) feet high shall be 2-3/8" OD pipe, 3.65 lbs. linear per foot.
3. Line posts over ten (10) feet high shall be 2.875" OD pipe, 5.79 lbs. per linear foot.
4. End and corner posts five (5) feet or less shall be 2.375" OD pipe, 3.65 lbs. per linear foot.
5. End and corner posts over five (5) feet high shall be 2.875" OD pipe, 5.79 lbs. per linear foot.
6. End and corner posts over ten (10) feet high shall be 4.00" OD pipe, 9.11 lbs. per linear foot.
7. Rails: All rails shall be 1.66" OD, 2.27lbs per linear foot. Rails shall be furnished in manufacturer's standard lengths of approximately 21'-0" with outside sleeve type couplings, at least six (6) inches long for each joint – one (1) coupling in each five (5) to have expansion spring. Provide means for attaching rails securely to each corner, pull and end post. Rails shall form continuous brace from end to end of each run of fence.

2.02 FENCE FABRIC

- A. The fabric shall be woven aluminum coated steel chain link conforming to ASTM-A491-63T in its entirety.
- B. All fabric shall be six (6) gauge (0.192") prior to application of the galvanizing, two (2) inch mesh.

**Falzone Memorial Park & Nipper Maher Park
Waltham, Massachusetts**

**02821-2
GALVANIZED CHAIN LINK FENCE AND GATES**

- C. All fabric shall be furnished with top and bottom selvage knuckled.
- D. After fabrication, the fabric shall be thoroughly cleaned and given a clean organic coating by the complete immersion process. The galvanized coating shall be a minimum of 0.40 ounces per square foot of wire fabric with the weight of coating determined by the strip test specified in ASTM designation A428-58T.

2.03 FENCE ACCESSORIES

A. Tension Bars and Bands

- 1. Tension bars shall be three-sixteenth (3/16) inch by three-quarter (3/4) inch galvanized steel conforming to ASTM Designation A123.
- 2. Tension bands and brace bands, if utilized, shall be seven-eighth (7/8) inch by twelve (12) gauge beveled, galvanized, sized to fit pipe sizes and furnished with galvanized fasteners.

B. Fittings, Rail Clamps and Fabric Bands

- 1. Fittings shall be steel conforming to ASTM Designation A307 and galvanized in conformance with ASTM Designation A153.
- 2. Rail clamps shall be standard clamps (boulevard clamps) furnished complete with fasteners, all conforming to the same requirements as for fittings above.
- 3. Fabric shall be attached using the page clip or Band-It system or approved equal.

C. Post Caps

- 1. Furnish and install tight fitting pressed steel or malleable iron caps, designed as a weather tight closure cap. Provide one (1) pass-through looped cap for each line post, and one (1) acorn style cap for each end or corner post. Where top rail is used, provide looped cap tops to permit passage of top rail.

D. Mesh Shade Screen

- 1. The contractor shall furnish and install dark green closed mesh screening fabric on the existing outfield fence. The material shall be 60' in length and 6' high (same height) as the fence.

2. The mesh shall have 92% density, bound on all four sides with 1 1/4" black tape and brass #1 grommets placed every foot on all sides and in the corners.
3. Mesh shall be provided by WWW.NJPSPORTS.COM 548 W. Arden Ave. Glendale Ca 91203, 800-773-4657 or 818-247-3914 or approved equal.

2.04 COLD GALVANIZING COMPOUND

- A. Cold galvanizing compound shall be a single component zinc rich compound yielding a dry film of at least eighty-five percent (85%) pure zinc. Galvanizing compound shall meet or exceed the requirements of Federal Specifications MIL-P-21035, TT-P-641d primer for zinc rich compounds.

2.05 ANCHORING CEMENT

- A. Cement for anchoring posts in sleeves embedded in concrete walls shall be "POR-ROK", as manufactured by Hallemite (Lehn and Fink Industrial Products, Division of Sterling Drugs, Inc.), Montage, New Jersey, or approved equal.
- B. "Sika Cola-Due" by the Sika Co.
- C. "Five Star Grout" the Five Star Co.

2.06 CEMENT CONCRETE

- A. Cement concrete for post footings shall conform to Section 03300 of these Specifications.

PART III – EXECUTION

3.01 GENERAL POST INSTALLATION

- A. Excavation for post footing, as herein before specified in Section 2.04, shall be in firm undisturbed or compacted soil. Excavate the holes to the lines and grades shown on the drawings with a six (6) inch minimum clearance between the bottom of the hole and the bottom of the fence post in its final location. Where ledge is encountered, the Contractor shall notify the Landscape Architect to determine method of installation. Payment for any additional work required when installations are in ledge shall be in accordance with Section 01025 of these Specifications.
- B. Place concrete around posts in a continuous pour; tamp for consolidation. Check each post for vertical and top alignment and hold in position during placement and finishing operation. Crown the top of the concrete footings to pitch water

away from posts.

- C. Under bituminous pavements, tops of footings are to be finished smooth and are to pitch one (1) inch from the posts to the outside edge of the foundation.
- D. In mower strip locations, form top twelve (12) inches square and finish to match mower strip with 1/4" pitch away from posts.
 - 1. If applicable, top of fence footings at players' benches, and cement concrete mower strips shall terminate six (6) inches below pavement finish grade.

3.02 FENCE ERECTION

A. Top and Bottom Rails

- 1. Top and bottom rails shall form a continuous brace from end to end of each fence run. In addition, all terminal and corner posts shall be braced to the nearest line post with center brace rails. Outside sleeve type top rail coupling shall be placed a maximum of twelve (12) inches from line posts.

B. Middle Rails

- 1. All chain link fencing ten (10) feet or more in height shall have a continuous middle rail.

C. Brace Assemblies

- 1. Furnish and install braces and appurtenances so posts are plumb when diagonal rod is under proper tension. All "tension" assemblies shall conform to ASTM 567 and the MASS DPW Standard Specifications Section M.8.09.

D. Fabric

- 1. The fabric shall be installed on the "public" side of the fence.
- 2. All fabric shall be aligned so that the top row of the fabric mesh is tied to the top rail, and so that the bottom selvage of fabric mesh stands one and one-half (1-1/2) inches above the finish grade of the lawns, pavements or concrete wall grade and that the bottom row of the fabric mesh is tied to the bottom rail.

3. Fabric shall be properly stretched and securely fastened to the posts and rails, and between posts the top and bottom of the fabric shall be fastened to the horizontal braces as herein specified, and approved by the Landscape Architect.
4. The fabric shall be fastened to end and corner posts with tension bars and stretcher bar bands spaced at one (1) foot intervals.

E. Stretcher Bars

1. Thread through fabric and secure to posts with approved metal bands spaced not over twelve (12) inches O.C.

F. Fabric Bands

1. Fabric Bands shall be placed at the intervals indicated on the details and securely fastened to all fence posts.

G. Fasteners

1. Install nuts for tension band and hardware bolts on side of fence opposite fabric side unless directed otherwise by the Landscape Architect.

3.03 GATE FRAMES

- A. Gate frames shall be galvanized steel 1.90" OD standard weight pipe, 2.72 pounds per linear foot. Gates shall be fabricated using welded construction with all welds ground smooth and coated with 3.0 mil. thickness of cold galvanizing compound. Gates must be properly braced to eliminate any possible sagging condition. For gates over eight (8) feet in height, provide additional horizontal and vertical interior members to ensure proper strength.
- B. Fabric shall be installed with bands and buckles, as previously specified, on all four (4) sides and attached to gate frame at twelve (12) inches on center.
- C. Hardware materials shall be hot dipped galvanized steel. All moveable parts (e.g., hinges, latch, keeper, and drop bar) shall be field coated with cold galvanizing compound.
- D. Hinges shall be of sufficient structural strength and design to support gate leaf and to permit easy and trouble free operation. Non-lift-off type hinge design shall permit the gate to swing 180 degrees inward or outward in accordance with the Contract Drawings

- E. All gates shall be equipped with a positive type latching device capable of retaining the gate in a closed position and have provision for padlock. Latches shall permit operation from either side of gate and must be approved by the Landscape Architect prior to the installation.
- F. Gatekeepers shall be provided for each gate leaf over five (5) feet wide. Gatekeeper shall consist of mechanical device for securing free end of gate when in full open position.
- G. Double gates: Provide drop rod to hold inactive leaf. Provide gate stop pipe to engage center drop rod. Provide locking device and padlock eyes as an integral part of the latch, requiring one padlock for locking both gate leaves.
- H. Gate Installation
 - 1. Check gate posts for vertical alignment and maintain in position during placement and finishing operations.
 - 2. Set keeper, stops, sleeves into concrete.
 - 3. Install gates plumb, level and secure for full opening without interference.
 - 4. Attach hardware by means that will prevent unauthorized removal.
 - 5. Adjust hardware for smooth operation.

3.03 FINISH PROTECTION

- A. During the fence installation, care shall be taken to avoid damaging the aluminized and galvanized surfaces of the fence components. All scratches and abrasions shall be thoroughly corrected in a manner satisfactory to the Landscape Architect before final acceptance.

END OF SECTION

SECTION 02846

WOOD GUARDRAILS & BOLLARDS

PART I - GENERAL

1.01 SCOPE OF WORK

- A. Under this Section the Contractor shall furnish all labor, materials, equipment and transportation required to furnish and install wood guardrails & wood bollards as located and detailed in the Contract Drawings and as specified herein.
- B. All wood guardrail & wood bollard locations shall be marked out in the field for review and approval by the City Representative prior to installations.

1.02 REFERENCE STANDARDS AND SPECIFICATIONS

- A. Reference to the standards, specifications and test of technical societies, organizations, and governmental bodies as made in the contract documents.
 - 1. "Standard Grading Rules for West Coast Lumber".
 - 2. AASHTO M 133: Preservatives and Pressure Treatment Processes for Timber
 - 3. AASHTO M 168: Wood Products
 - 4. AASHTO Standard Specifications for Highways and Bridges
 - 5. American Wood-Preservers' Association (AWPA) Book of Standards
 - 6. Western Wood Products Association (WWPA) Standard Grading Rules

1.03 SHOP DRAWINGS

- A. Shop drawings or manufacturer's specifications shall be submitted in accordance with the provisions of the SPECIAL CONDITIONS.
- B. Submittals shall be made for all work furnished in this Section.

1.04 SAMPLES

- A. Submit the following samples in accordance with the provisions of the SPECIAL CONDITIONS.
 - 1. Submit samples and descriptive literature of all items specified by the Engineer.

PART II - MATERIALS

**Falzone Memorial Park & Nipper Maher Park
Waltham, Massachusetts**

2.01 WOOD GUARDRAILS

- A. All timber shall be Southern Yellow Pine, and shall be of the finest structural appearance. No planer chips are allowed in dressing. To minimize slivering, timbers of this grade must be free of wave, and edges must be eased with 1/2" bevel 45° radius (square edges are not allowed). Except as otherwise noted, characteristics and limiting provisions are in accordance with paragraph 131-A, Standard Grading Rules for West Coast Lumber. Timbers shall be of the sizes indicated on the drawings.
- B. After all fabrication processes are complete; each wood member will be treated with an ACQ pressure preservative treatment in compliance with industry standards for structural wood specified for exterior use. Only preservatives deemed suitable by USEPA for skin contact may be used in the wood members.
- C. All hardware shall be hot-dipped galvanized in accordance with ASTM-A153.
- D. An "ASSOCIATION INSPECTION CERTIFICATE" shall be furnished by the Contractor, at his own expense, certifying that the grade and quality is fully in accordance with the requirements of the specifications. This certificate shall be issued by the association whose grading rules govern this particular class of wood. Wood that is "GRADE MARKED" by an accredited association will be accepted in lieu of the "ASSOCIATION INSPECTION CERTIFICATE".

PART III - EXECUTION

3.01 WOOD GUARDRAILS & WOOD BOLLARDS

- A. The installation of the wood guardrails shall be in accordance with the dimensions and details indicated on the Contract Drawings and with these Specifications. All cuts made in the field shall be painted with two (2) brush coats of the wood preservative as specified.
- B. Prior to installation, the contractor shall field locate limits of the wood guardrail and wood bollards. Once the Owner has approved the location, the contractor shall install the wood guardrail and wood bollards.
- C. Posts shall be set plumb, in hand or mechanically dug holes. Post holes shall be backfilled with approved materials placed in layers no greater than 12 inches and compacted to 95% density.
- D. Rails shall be installed as shown in details.
- E. All hardware shall conform to ASTM A307 requirements and shall be galvanized per

ASTM 153.

PART IV - GUARANTEE AND ACCEPTANCE

- A. Any defective elements shall be replaced in part or whole by the Contractor at no cost to the Owner.

- - - END OF SECTION - - -

SECTION 02829

STEEL BARRIER GATE

PART 1 – GENERAL

1.01 WORK INCLUDED:

- A. This section of the specification covers the steel barrier gate complete as indicated on the drawings and as herein specified.

1.02 RELATED WORK:

- A. Section 03302, FIELD CONCRETE.

1.03 SYSTEM DESCRIPTION:

- A. The barrier gate shall be a **double leaf gate** as shown on the drawings.

PART 2 – PRODUCTS

2.01 MATERIALS:

- A. The posts shall be made of schedule 40 galvanized steel.
- B. The bar gate shall be made of scheduled 40 galvanized steel.
- C. The s diagonal brace shall be made of schedule 40 galvanized steel.
- D. Posts, bar gate and diagonal brace diameters shall be as shown on the drawings.

PART 3 – EXECUTION

3.01 INSTALLTION:

- A. The gate components shall be assembled as shown on the drawings, welded all sides and ground smooth.
- B. The posts shall be encased in concrete foundations as shown on the drawings.
- C. A padlock shall be furnished to the Owner, and if applicable, keyed to the Owner's standard requirements.

END OF SECTION

SECTION 02870

SITE FURNISHINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The General Documents, as listed in the Table of Contents, and applicable parts of Division 1, General Requirements shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this trade.

1.02 SCOPE OF WORK

- A. The work of this Section consist of all site improvements and related items as indicated on the Drawings and/or as specified herein and includes, but is not limited to, the following:
 - 1. Trash Receptacles
 - 2. Benches
 - 3. Picnic Tables
 - 4. Park Sign

1.03 RELATED WORK UNDER OTHER SECTIONS

- A. The following items of related work are specified and included in other Sections of the Specifications:
 - 1. SECTION 02350 – EXCAVATION, BORROW AND BACKFILL
 - 2. SECTION 03300 – CEMENT CONCRETE

1.04 EXAMINATION OF CONDITIONS

- A. The Contractor shall fully inform himself of existing conditions of the site before submitting his bid, and shall be fully responsible for carrying out all site work required to fully and properly execute the work of the Contract, regardless of the conditions encountered in the actual work. No claim for extra compensation or extension of time will be allowed on account of actual conditions inconsistent with those assumed.
- B. Plans, surveys, measurements and dimensions under which the work is to be performed are believed to be correct to the best of the Landscape Architect's knowledge, but the Contractor shall have examined them for himself during the bidding period, as no allowance will be made for any errors or inaccuracies that may be found therein.

1.05 SCHEDULING

**Falzone Memorial Park & Nipper Maher Park
Waltham, Massachusetts**

- A. The Contractor shall submit to the Landscape Architect, for approval by the Owner, a progress schedule for all work as specified herein.

1.06 QUALITY ASSURANCE

- A. Materials and methods of construction shall comply with the following standards:
 - 1. ASTM: American Society for Testing and Materials
 - 2. ANSI: American National Standards Institute
 - 3. FS: Federal Specifications
 - 4. IMI: International Masonry Institute
 - 5. PCA: Portland Cement Association
- B. Qualifications of Workers: Use adequate numbers of skilled workers who are trained in the necessary crafts and who are completely familiar with the specified requirements and methods needed for the proper performance of the work of this Section.
- C. Layout: After staking out the work, and before beginning final construction, obtain the Landscape Architect's approval for layout. Contractor shall make adjustments as determined by the Landscape Architect. Landscape Architect may make adjustments to layout as is required to meet existing and proposed conditions without additional cost to the contract price.

1.07 SUBMITTALS

- A. Shop Drawings: Submit shop drawings in accordance with Division 1 requirements.
 - 1. Trash Receptacles
 - 2. Benches
 - 3. Picnic Tables
 - 4. Park Sign
- B. Product Information: Provide manufacturer's data showing installation and limitations in use. Supply Certificates of Compliance for all materials required for fabrication and installation, certifying that each material item complies with, or exceeds, specific requirements. Work includes but is not limited to:
 - 1. Trash Receptacles
 - 2. Benches
 - 3. Picnic Tables
 - 4. Park Sign

PART 2 – PRODUCTS

**Falzone Memorial Park & Nipper Maher Park
Waltham, Massachusetts**

All furnishings under this Section shall be as manufactured by Dumor, as supplied by M.E. O'Brien & Sons, Inc., 266 Main Street, Medfield, MA, or approved equal, as follows:

All benches and trash receptacles shall be assembled in accordance with the manufacturer's instructions. Components that are chipped, dented, scratched or otherwise damaged shall not be accepted and must be repaired or replaced in a manner acceptable to the City Representative.

2.01 TRASH RECEPTACLES

Trash receptacles shall be Model No. LRD32, each furnished with an in-ground post package Model No. 10056 and plastic liner Model No. RPL32 for direct embedment into concrete footings.

2.02 BENCHES

Benches shall be Model 185, Recycled Plastic bench with backrest, suitable for in-ground installation. Furnish in the quantity indicated on the drawings.

2.03 PICNIC TABLES

Picnic Tables shall be Model 100-80PL and model #100-68-1PL, recycled plastic, suitable for in-ground installation. Furnish in the quantity indicated on the drawings.

2.04 PARK SIGN

Park Sign shall be furnished and installed as shown on the details. City of Waltham to provide approval on final sign layout.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The installer shall examine previous work, related work, and conditions under which this work is to be performed and notify the Contractor in writing of all deficiencies and conditions detrimental to the proper completion of this work. Beginning work means installer accepts substrates, subgrades, previous work, and conditions.

3.03 TRASH RECEPTACLE, BENCHES, PICNIC TABLES

- A. Install trash receptacles, benches, and picnic tables in accordance with the Drawings and the manufacturer's instructions.
- C. The Contractor shall be responsible for timing the delivery of trash receptacles, benches, and picnic tables so as to minimize on-site storage time prior to installation. All stored materials must be protected from weather, careless handling and vandalism.

END OF SECTION

SECTION 02884

BLEACHERS

PART I - GENERAL

1.01 SCOPE OF WORK

- A. The work under this Section consists of furnishing and installing an all aluminum bleachers on a concrete pad as detailed and indicated on the drawings. The Contractor shall provide all labor, materials, equipment and transportation to finish the work complete in place as shown in the Contract Drawings and as specified herein.

1.02 REFERENCE STANDARDS AND SPECIFICATIONS

A. Manufacturer:

- A. National Recreation Systems, Inc., 5120 Investment Drive Fort Wayne IN 46808; phone 888-568-9064, fax 260-482-7449, e-mail sales@bleachers.net
- B. All Star Bleachers Inc., 6550 New Tampa Hwy, Lakeland FL 33815; phone 800-875-3141, fax 813-628-4254, e-mail salesdept@allstarbleachers.com
- C. Dant Clayton Corporation, 1500 Bernheim Lane, Louisville KY 40210-7408; phone 800-626-2177, fax 502-637-9983 e-mail info@dantclayton.com or approved equal.

1.03 SHOP DRAWINGS

- A. Within two (2) weeks after the award of the contract and before ordering any materials or equipment, the Contractor shall submit to the Landscape Architect for approval, a complete list in six (6) copies, of all materials and equipment proposed for use indicating manufacturers' names and addresses, identifying data and expected delivery dates. No consideration will be given to partial lists submitted from time to time. Intention of using specified materials and equipment shall not relieve the Contractor from submitting the above list, nor shall submission of the list relieve him from submission of shop drawings. Any item of material or of equipment not submitted for approval on the list will not be approved unless of the exact make and characteristics specified. If the material or equipment is installed before it is approved, the Contractor shall be liable for the removal and replacement at no extra charge to the Owner, if, in the opinion of the Landscape Architect, the material or equipment does not meet the intent of the Contract Documents.
- B. The Contractor shall submit the following information with all equipment shop drawings:
 - 1. Manufacturer's certified scale drawings, cuts or catalogs, including

installation details.

2. Manufacturer's specifications, including certified performance characteristics and capacity ratings.
- C. The Contractor shall submit complete shop drawings in accordance with the provisions of the GENERAL CONDITIONS. The Landscape Architect, however, reserves the right to require submittal of shop drawings on any other material or equipment to be installed under this section.

1.04 SAMPLES

- A. The Contractor shall submit the following samples in accordance with the provisions of the GENERAL CONDITIONS.
 1. Any samples requested by the Landscape Architect. Samples accepted will be returned to the Contractor and may be incorporated into the work. Samples not accepted will be returned for disposition by the Contractor.

1.05 QUALITY ASSURANCE

- A. Manufacturer must have a minimum of ten years experience in the design and manufacture of bleachers.
- B. Welders must conform to AWS standards.
- C. Source of Quality Control: Mill Test Certification.
- D. Codes and Standards: 2003 International Building Code and State, Local Building Codes.
- E. Latest Edition of Accessibility Requirements (ADA)
- F. The same manufacturer shall supply the Bleachers and Press Boxes.

1.06 WARRANTY

- A. Bleachers shall be free from defect in materials and workmanship for a period of one (1) year. Warranty period shall begin on date of acceptance and shall cover bleachers erected/assembled by Contractor or Manufacturer and inspected by manufacturer.
- B. Anodized finish of seat plank extrusions shall be covered by a 5 year warranty against loss of structural strength or finish deterioration due to exposure to weather conditions or UV rays.

PART II - MATERIALS

**Falzone Memorial Park & Nipper Maher Park
Waltham, Massachusetts**

**02884-2
BLEACHERS**

2.01 STEEL & ALUMINUM BLEACHER

- A. Products to be furnished and installed, in accordance with the plans and details, and shall be coordinated with other layout and materials items and/or their future revisions.
- B. Design Requirements:
 - 1. Applicable Codes: 2003 International Building Code and State.
 - 2. Bleacher unit (when fully assembled, including ground sill) overall design and dimensions **shall meet** the requirements of all applicable Codes and Standards that **do or do not** require guardrails, aisles or risers.
 - 3. Design Loads:
 - Live Loads: Uniform loading - Structure = 100 psf
 - Uniform loading - Seat and Foot plank = 120 plf
 - Sway Loads: Perpendicular to seats = 10 plf
 - Parallel to seats = 24 plf
 - Uniform horizontal load = 50 plf
 - Concentrated horizontal load = 200 pounds
 - Wind Loads: Per Code and Standard requirements.
 - 4. Framework: Galvanized steel angle spaced at a maximum of 6' - 0" intervals, framework joined by means of angle cross bracing,
 - 5. Rise and Depth Dimensions:
 - a. Vertical rise and horizontal depth per row: 6 inches by 24 inches.
 - b. Seat above its respective tread: 16 inches (first seat is 12 inches above grade).
 - 6. Seat plank: Single continuous unit of extruded aluminum, 2 inches x 12 inches cross-section (nominal size), 21 feet long.
 - 7. Foot Plank: Single continuous unit of extruded aluminum, 2 inches x 10 inches cross-section (nominal size), 21 feet long.
 - 8. Each seat and foot plank shall be attached to framework (minimum of two anchor points per framework) with hold down clip assemblies that allow for adjustments and replacement of seats and foot planks.
- C. Materials and Finishes.
 - 1. Framework:
 - Galvanized Steel: Structural fabrication with ASTM A-36 steel galvanized finish. Each frame shall be unit-welded, using metal inert gas method, under guidelines by the American Welding Society. After fabrication all steel is hot dipped galvanized to ASTM A-123 specifications. All cross bracing and horizontal bracing shall be aluminum angle 6061-T6 mill finish or galvanized steel.

2. Seat plank:
 Aluminum alloy 6063-T6, clear anodized finish 204R1, AA-M10C22A31, Class II.
3. Tread plank:
 Aluminum alloy 6063-T6, mill finish.
 - a. Channel End Caps:
 Aluminum alloy 6063-T6, clear anodized 204R1, AA-M10C22A31, Class II.
 - b. Hardware:
 Bolts and Nuts shall be hot dipped galvanized.
6. Hold-Down Clip Assembly:
 Aluminum alloy 6063-T6, mill finish.
7. Ground Sills:
 Minimum 2 inches x 6 inches (nominal size) pressure treated (for ground contact) lumber, mounting hardware, pre-drilled for field bolting, provide one per framework.
8. Ground Anchors:
 Type and quantity, size and length to meet designed wind speed.

D. Bleachers shall be in as indicated on the drawings and detailed on the details.

2.02 PROCESSED GRAVEL

A. Processed gravel shall be as specified in Section 02350 of these Specifications.

2.03 CEMENT CONCRETE-CAST IN PLACE

A. Cement concrete cast in place and reinforcing shall be as specified in Section 03300 of these Specifications.

2.04 ANCHOR BOLTS

A. Anchor bolts shall be hot dipped galvanized steel 3/8" OD x 8" long

PART III- EXECUTION

3.01 EXCAVATION

A. The excavation for the concrete base shall be brought to line and grade as shown in the contract drawings and as specified in Section 02300 of these Specifications.

**Falzone Memorial Park & Nipper Maher Park
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BLEACHERS**

The excavation shall be brought to the proper depth to provide for the detailed amount of processed gravel base.

3.02 PROCESSED GRAVEL BASE

- A. The processed gravel base shall be installed and compacted, as specified in Section 02350 of these Specifications and as shown on the Contract Drawings.

3.03 BASE PAD

- A. The base pad shall be formed as specified in Section 03300 of these Specifications and to the line and grade shown on the contract drawings.
- B. The base pad shall be cement concrete-cast in place, finished and cured as specified in Section 03300 of these Specifications and to the line and grade shown on the contract drawings. There shall be four anchor bolts (two on each side) cast in the proper location in the pour.
- C. Provide positive pitch away from pad for drainage.

3.04 INSTALLATION OF BLEACHER UNITS

- A. The bleachers shall be set over the anchor bolts and securely bolted down. The ends of the bolts shall be cut off one-eighth (1/8) inch above the bolts and then carefully peened over the nut.

- - - END OF SECTION - - -

SECTION 02885

WATER SPRAY FEATURES AND WATER CONTROL

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Under this Section, the Contractor shall be responsible for the installation of a series of water play features, water piping and wiring, and below ground equipment vault associated with the construction of the “Water Play Area” control enclosure. All work shall be performed as indicated on the Contract Drawings and Specifications and include every aspect of work as obvious or implied and necessary to make the work complete and fully operational.
- B. The water play features and equipment vault with mechanical and electrical equipment and controls shall be as manufactured by Vortex 1 877 5vortex, or approved equal. **Note that the vault shall be furnished without the pre-packaged backflow preventer.** The backflow preventer shall be furnished and installed as stipulated in Sections 02510 and Section 02515 of the Contract Documents.
- C. The Contractor shall be required to install all of the manufactured equipment and water play features, all water piping and wiring connecting the below ground vault and the independent features, and all footings/foundations associated with the work.
- D. The Contractor performing all of the plumbing related work of this Section shall be a MA. Licensed Master Plumber.
- E. **Note that the system Controller shall be furnished and installed in an-above ground location (electrical cabinet) and not within the underground equipment vault.**
- F. Contractor shall laminate a system start-up and shutdown control instruction sheet and mount inside the door of the controller cabinet.

1.02 RELATED WORK

- A. As specified under Section 02510 of these Specifications, the Contractor shall be responsible for the installation of an extended 2” or 3” water services to be connected to the equipment vault referenced above.
- B. The Contractor shall also be responsible for the installation of electric conduit and wiring from locations designated on the plans to the equipment vault. The work shall be as described under Section 16000 of these Specifications.

- C. For the requirements of the above ground backflow cabinet, refer to Section 4.03 of these Specifications.

PART II - MATERIALS

2.01 WATER SPRAY MATERIALS

A. Manufactured Equipment and Features

The following items shall be as manufactured by Vortex Aquatic Structures International, Inc. of Montreal, Quebec, Canada, Telephone #1-514-948-0096, or approved equal. Vortex is represented locally by O'Brien & Sons, Inc. at Telephone #1-508-359-4200.

| | |
|---------------|--|
| VOR-7510 | Magic Mist No. 1 |
| VOR-564 | Flower |
| VOR-305 | Directional Water Jet |
| VOR-309 | Water Tunnel No. 2 |
| VOR-307 | Cylinder Spray |
| VOR-606 | Foot Activator |
| VOR-1001.4000 | Playsafe Drain No.1 |
| VOR-1750.000 | Vortex 5 Valve Above Ground Command Center |
| VOR-710-6000 | Vortex 10 Output Smartflow 2 Controller |

B. Piping

1. PVC pipe shall be as sized on the drawings and details, Class 200, SDR 21, solvent weld PVC, ASTM No. D1784 as manufactured by Cresline or approved equal.

C. Fittings

1. Fittings for all PVC piping shall be Schedule 40 solvent weld PVC as manufactured by Dura, Lasco, or approved equal.

D. Solvent

1. PVC 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.

E. Cement Concrete

1. Cement concrete for use in water play feature foundations and footings shall conform to Section 9.01 of the Contract Specifications.
- F. Sand
1. Sand Borrow shall conform to Section 02350 of the Contract Specifications.
- G. Thrust Blocks
1. Concrete thrust blocks shall be installed in locations as indicated or as ordered by the Engineer. Installation of thrust blocks shall include furnishing and placing the concrete and any additional excavation as required. Straps in conjunction with thrust blocks shall be furnished and installed where shown on the plans or directed by the Engineer.

2.02 IRRIGATION CONTROLLER ENCLOSURE

- A. The enclosure shall be vandal and weather resistant in nature manufactured entirely of cold rolled steel. The housing shall be louvered on the sides and equipped with a removable predrilled backboard. Filter screens shall cover all louvers.
- B. The enclosure shall be a NEMA 3R Rainproof Enclosure as listed by Underwriters Laboratories, Inc.
- C. Controller enclosure shall be 18 inches wide x 12 inches deep x 36 inches tall, as manufactured by Strong Box, model SB-18CR or approved equal. Controller enclosure shall be powder coated in a pale earth green color.

PART III - EXECUTION

3.01 PIPE AND FITTINGS

- A. The installation and backfilling of all pipe, fittings and other related items shall be installed and tested in conformance with the requirements set forth in these specifications. Pipe shall be set with a minimum cover of 24" above the invert of the pipe. All pipe shall be pitched to drain by gravity back to the equipment vault.
- B. Pour all concrete foundations and footings to the dimensions indicated on the attached manufacturer's details and in conformance with Section 9.01 of these Specifications.
- C. Install all manufactured items in strict conformance with the requirements of the manufacturer and as directed by the City Representative.

- D. The installation of the primary water service and electrical service to the equipment vault shall be performed in strict conformance with Specifications.

3.02 TRAINING

- A. Representatives of the water pay equipment manufacturer shall be required to present a one half day seminar to City representatives for the purposes of explaining operation, maintenance and troubleshooting techniques.
- B. At project completion, provide complete operations and maintenance manuals for all water spray components to the City Representative.
- C. The Contractor is responsible for laminating and mounting a start-up and shutdown instructions sheet for all controls inside the control cabinet.

3.03 SYSTEM START-UP AND SHUT DOWN

- A. The General Contractor shall be responsible for the start-up and shut down of the water spray park system during the calendar years 2008 through 2009. To this end, the system must be successfully started up during the summer of 2008 (upon completion of the work of this contract) and then again during the spring of 2009 and for summer operation. Any items not functioning properly shall be repaired or replaced to the satisfaction of the City. The Contractor shall also be responsible for the complete winterization of the system during the later summer of 2008 and 2009.

3.04 IRRIGATION CONTROLLER INSTALLATION

- A. Contractor to install controller in enclosure, generally where shown on the drawings. Contractor to wire valves and rain sensor into controller and set proper program.
- B. Wire controller to 120-volt electrical supply connection as shown on electrical drawings.
- C. Controller Enclosure shall be mounted on Concrete Pad. Keys shall be turned over to Owner's Representative.

END OF SECTION

SECTION 02886

PLAY EQUIPMENT

PART I - GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all labor, materials, equipment and transportation required to disassemble, relocate and reassemble the play equipment as located, described and set forth in the contract plans, specifications and details and in accordance with manufacturer's requirements and recommendations, and as specified herein.

1.02 REFERENCE STANDARDS AND SPECIFICATIONS

- A. Playground equipment design, layout, and installation shall comply with the following standards and guidelines as applicable.
 - 1. CPSC - Consumer Product Safety Commission Guidelines for Playground Safety, latest edition.
 - 2. ASTM - American Society for Testing and Materials, Designation: F 1487, Standard Consumer Safety Performance Specification for Playground Equipment for Public Use, latest edition.
 - 3. ANSI - American National Standards Institute.
 - 4. AASHTO - American Association of State Highway and Transportation Officials (tests of specifications).
 - 5. Mass. Standard Specs. - Latest edition of the Standard Specifications for Highways, Bridges and Waterways, 1988 edition, the Commonwealth of Massachusetts, Department of Public Works, hereinafter referred to as "the Massachusetts Standard Specifications".
 - 6. MAAB - Massachusetts Architectural Access Board

- B. Requirements not specifically set forth herein, but required by the agencies listed in above shall be understood to be a requirement of this contract since these standards of quality and safety are established as the industry standard(s). Any conflicts between the agency standards and the contract documents shall be brought to the attention of the Engineer, and unless otherwise directed in writing, the agency standards shall be the minimum requirement to be followed.

1.03 SHOP DRAWINGS

- A. Prior to disassembling the play equipment as required by the Contract Documents, the following shall be submitted to the Project Representative for review and approval:
 - 1. Shop drawings showing all important details of construction and dimensions showing the equipment, arrangement, footing spacing and lengths. Shop drawings shall stipulate and certify to compliance with all CPSC and ASTM standards and guidelines as applicable.

1.04 QUALIFICATIONS

- A. Installer shall have a minimum of five (5) years experience with a minimum of fifteen (15) playground installations. References will be required.

PART II - MATERIALS

2.01 PLAY EQUIPMENT

- A. All play structures to be installed exist on site and are to be surveyed, documented, disassembled, relocated and reassembled as shown on the contract documents.
- B. The play structures shall also comply with the technical specifications included within this Specification section.

2.02 RESILIENT SAFETY SURFACE

- A. The resilient safety surface shall meet the requirements as specified in Section 02887 of the Specifications.

2.03 CASTS IN PLACE CONCRETE

- A. Concrete for the footings will be cast in place cement concrete as specified in Section 03300 of the Specifications. Top of concrete footings shall be twelve (12) inches minimum below finished grade.

2.04 MAINTENANCE KIT

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- A. The Contractor shall provide the City with a maintenance kit that is to include twenty (20) replacement hardware covers / caps for each play structure, one (1) gallon of graffiti removal / cleaning solutions as recommended by the manufacturer, a manual that includes all installation and maintenance instruction provided by the manufacturer.
- B. The Contractor shall provide 10 spare pieces of each type of hardware / fastener used on the structure and the appropriate tools delivered to Franey Road Maintenance Yard.

PART III - EXECUTION

- 3.01 The Contractor shall assemble the specified equipment under the supervision of an approved Supervisor according to the manufacturer's instructions, the contract drawings and these Specifications.
- 3.02 The Contractor shall locate the structures to the lines and grades specified in the drawings in these Specifications and according to the specifications of the manufacturer of the equipment. Adjust all equipment to suit site gradients; no sloping platforms, tracks, or members intended to be horizontal shall be accepted.
- 3.03 The excavation for the footings shall be done as specified in Section 02350 of these Specifications and according to the Contract Drawing details.
- 3.04 The equipment shall be located and brought to the heights as shown in the drawings and as recommended by the manufacturer with vertical and horizontal members set plumb and then braced to be held in place.
- 3.05 The concrete shall be poured around the supporting pieces of the equipment to the grades detailed. The concrete shall be poured and cured according to Section 03300 of these Specifications. Slope tops of footings to drain; set bottom of vertical members into gravel base to ensure drainage; do not encase bottom in concrete.
- 3.06 After the specified cure period of the concrete has passed the bracing may be removed.
- 3.07 The fills and surfaces shall then be placed and brought to the grades shown in the Contract Drawings and in accordance with Section 02350 of these Specifications.

PART IV - GUARANTEE AND ACCEPTANCE/LIABILITY

- 4.01 All operating parts and structural elements of the play equipment and safety surface shall be guaranteed against failure or defect during normal use and operation for the entire warrantee period as established by the manufacturer.
- 4.02 Any defective elements shall be replaced in part or whole by the Contractor at no cost to

the Owner.

- 4.03 The Contractor and the manufacturer shall hold the Owner and Engineer harmless from any and all damages or liability resulting from negligent acts and omissions on the part of the Contractor or manufacturer, or resulting from defective parts, or improperly assembled equipment. Contractor shall provide secure storage for all equipment on job site.
- 4.04 The Contractor is responsible for securing a Certified Playground Safety Inspector to ensure ASTM and SPSC compliance. A certificate of compliance will be issued to the Owner prior to final inspection.

- - - END OF SECTION - - -

SECTION 02887

WOOD MULCH AND POURED IN PLACE SAFETY SURFACING

PART I - GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all labor, materials, equipment and transportation required for the placement and compaction of wood mulch safety surfacing and poured-in-place play surfacing at children's play lots. The surfacing shall be placed at all locations identified on the Contract Drawings to the indicated grades.

1.02 SUBMITTALS

- A. In accordance with Section 01330 of these Specifications submit manufacturer's specification and detail sheets for all materials to be utilized under this section.
- B. Provide samples as directed by the Engineer.

1.03 QUALIFICATIONS

- A. For installation of the poured-in-place play surface the contractor shall provide evidence of successful completion of two (2) like surfaces installed during the past three (3) years with names of clients and phone numbers.

PART II - MATERIALS

2.01 WOOD MULCH SAFETY SURFACE

- A. The wood mulch safety surfacing shall be "Woodcarpet" as manufactured by Zeager Brothers, Inc., or approved equal. The material used to manufacture the wood mulch safety surfacing shall consist of No. American Hardwoods such as Oak, Maple, Ash, Poplar, Hickory, Beech, Birch, Locust.

All woods shall be debarked and free of soil, leaves and twig material and other contaminates which hasten decomposition. No chemical treatment or additives are permitted. Wood mulch shall be randomly sized, approximately ten (10) times longer than wide, and shall meet the gradation requirements of ASTM C 136:

| <u>Sieve Size</u> | <u>Percent Passing Passing by Weight</u> |
|-------------------|--|
| 3/4 in. | 100 |
| 3/8 in. | 75 |

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| | |
|---------|----|
| No. 4 | 45 |
| No. 10 | 15 |
| No. 60 | 1 |
| No. 200 | 1 |

Ninety-eight percent (98%) of wood mulch dimensions shall not exceed 4.00 centimeters in length, 1.30 centimeters in width and 3.25 centimeters in depth.

PERMEABILITY: Coefficient of permeability shall be greater than 0.6 cm/sec ASTM D 2434.

Moisture absorption of wood mulch safety surface shall be no greater than one hundred fifty percent (150%) by weight.

2.02 POURED-IN-PLACE-PLAY SURFACE

- A. Poured-in-place play surface shall be "Playbound" by Surface America, or approved equal. Play surface shall meet or exceed current Consumer Product Safety Commission (CPSC) guidelines issued in 'A Handbook for Public Playground Safety' (latest edition) for the minimum potential fall height of the play equipment, current Disabilities Act Guidelines (ADA) and current American Society for Testing Materials (ASTM) F-1292-91 requirements.
 1. The Base Mat shall be a monolithic poured-in-place cushioned pad, made from a blend of recycled styrene butyrene rubber (SBR) and a polyurethane binder or approved equal. The depth of the SBR mat shall be such that in conjunction with the specified top-wearing course the total resilient surface system shall provide the required absorbency for the maximum potential fall from the specified play equipment. (Refer to Section 8.01.) SBR shall be mixed with the binder in a ratio of 88% SBR to 12% binder by weight to achieve maximum resilience.
 2. The Top Surface shall be a monolithic poured-in-place top surface made from a blend of ethylene propylene diene monomer (EPDM) colored rubber particles measuring 1 to 3 mm and a polyurethane binder. EPDM shall be mixed with the binder in a ratio of 82% EPDM to 18% binder to achieve maximum wearability and resilience. The final color shall be determined, although it shall include a standard combination equal to the Berries or Confetti combinations indicated in manufacturers brochures. Top surface shall have a tensile strength of two hundred (200) psi. The urethane binder shall be an aliphatic non-yellowing type.
 3. Poured-in-place surfacing shall be placed in the limited areas designated on the plans.

4. Prefabricated shock pads will not be considered equal.

2.03 FILTER CLOTH/FABRIC

- A. A drainage type filter cloth shall be used in conjunction with the wood mulch safety surfacing and shall conform to the requirements specified below.

| PROPERTY | TEST PROCEDURE | DRAINAGE TYPE |
|-------------------------------------|---------------------|---------------|
| Weight, oz./sq. yd. | ASTM D-1910 | 4.1 |
| Thickness, mils | ASTM D-1777 | 40 |
| Tensile Strength, lbs. | ASTM D-1682 | 115 |
| Elongation, % | ASTM D-1682 | 65 |
| Puncture Strength, lbs. | ASTM D-751 Modified | 75 |
| Mullen Burst Strength, psi | ASTM D-751 | 260 |
| Coefficient of Permeability, m/sec. | Constant Head | 0.10 |

2.04 BASE MATERIALS

- A. Gravel borrow and crushed stone materials shall be as specified under Section 02350 of these Specifications, or as otherwise indicated on the details.

2.05 CEMENT CONCRETE

- A. Cement concrete for use below the Poured-in-Place Play Surface shall be as specified under Section 03300 of the Specifications and constructed as indicated on the related details.

PART III - EXECUTION

3.01 PROCEDURES

- A. The Contractor shall deliver, spread and compact or place safety surfaces to conform to the lines and grades shown on the Contract Drawings. All work shall be done in accordance with the manufacturer's installation recommendations for wood mulch or Poured-in-Place Play Surfaces.
- B. Compaction of wood mulch shall continue until the surface is true to the proposed lines and grades indicated on the Plans and the material consists of a minimum compacted depth of twelve (12) inches.
- C. The Base Mat for the Poured-in-Place Play Surface shall be installed in accordance with the manufacturer's instructions. The Base Mat shall exhibit a minimum installed thickness necessary to provide the required absorbency for the maximum potential fall from the proposed play equipment. At playlot edges, place a board between the end of the poured-in-place base pour and the concrete

edge and remove the board after the base has sufficiently cured. Pour the top course of poured-in-place surfacing and allow material to fill the void created by the board.

- D. The Top Surface shall be installed following installation of the cushion course, in accordance with the manufacturer's instructions. The minimum installed thickness of the top wearing course shall be as recommended by the manufacturer. The contractor is responsible for insuring that no foot traffic is allowed on the surface before the curing is complete.
- E. Bevel all pathway edges and feature (slides etc.) exit landing areas in accordance with manufacturer's recommendations.
- F. Any tests of materials, and/or compaction shall be as ordered by the Engineer, and paid for by the Contractor regardless of results.
- G. WARRANTY: Safety surfacing shall be free of defects due to workmanship or material for a minimum of two (2) years from date of installation.

END OF SECTION

SECTION 02888

SHADE SHELTERS

PART I - GENERAL

1.01 SCOPE OF WORK

- A. Under this Section the Contractor shall furnish all labor, materials, equipment and transportation required to furnish and install metal and polyethylene fabric shade shelters in the locations indicated in the Contract Drawings, in accordance with the manufacturer's recommendations, and as specified herein.

1.02 REFERENCE STANDARDS AND SPECIFICATIONS

- A. Reference to the standards, specifications and tests of technical societies, organizations and governmental bodies as made in the contract documents.
 - 1. ANSI - American National Standards Institute.
 - 2. AASHTO (AASHO) - American Association of State Highway and Transportation Officials (tests of specifications).
 - 3. ASTM - American Society for Testing and Materials.
 - 4. Mass. Standard Specs. - Latest edition of the Standard Specifications for Highways, Bridges and Waterways, the Commonwealth of Massachusetts, Department of Public Works, hereinafter referred to as "the Massachusetts Standard Specifications".
 - 5. AISI - American Iron and Steel Institute
 - 6. AISC - American Institute of Steel Construction.
 - 7. AWS – American Welding Society
- B. Requirements not specifically set forth herein, but required by the agencies listed above shall apply to this contract since these are established as the industry standards for quality and safety. Any conflicts between the agency standards and the contract documents shall be brought to the attention of the Landscape Architect, and unless otherwise directed in writing, the agency standards shall be the minimum requirement to be followed.

1.03 SHOP DRAWINGS

- A. Shop drawings or manufacturer's specifications shall be submitted in accordance with the provisions of the GENERAL CONDITIONS. The specifications provide for "or equal" provision by other manufacturers than specified. However, the equipment shall be equal to, or better than, the specified material, with equal dimensions in order to be considered.
- B. Submittals shall be required for all elements to be furnished under this Section. Drawings may be viewed at the offices of the manufacturer or the Landscape Architect.

1.04 SAMPLES

- A. Submit the following samples in accordance with the provisions of the GENERAL CONDITIONS.
 - 1. Submit samples and/or descriptive literature of all items specified in this Section, including treatments, finishes, colors, and test information.

PART II - MATERIALS

2.01 SHADE SHELTERS

- A. The required shade shelters (see plans for number of shelters and locations) shall be as manufactured by Shade America of Dallas, TX and represented locally by O'Brien & Sons of Medfield, MA, (Tel: 508-359-4200) or approved equal. The size of the Shade Shelters shall be verified in the field. Custom sizes will be required to accommodate the existing bleachers if required. The shade shelters will need to be sized according to the existing on site bleachers. Shade Shelters shall be as follows:

Bleacher SSA: 12' x 45' x 13' height, Extended Hip, Model No. R104512

- B. Shade shelters framing and supports shall be constructed entirely of steel. Roofing shall be polyethylene fabric treated to prevent UV degradation. Steel components shall be galvanized and powder coated.

2.02 FINISH PAINTING

- A. All metal components shall receive the Allied Flo-Coat Process that includes the applications of pure zinc, conversion, clear polymer and powder coatings.
- B. The shade shelter shall be factory primed and factory finish painted in accordance with manufacturer's specifications, subject to the approval of the Landscape

Architect.

- C. The paint color(s) shall be selected by the Landscape Architect at the time the product is ordered.
- D. Any priming or finish paint damage shall be repaired to the satisfaction of the Landscape Architect in a manner approved by the Landscape Architect.

2.03 CEMENT CONCRETE - CAST IN PLACE

- A. Concrete for footings will be cast in place cement concrete as set forth in Section 03300 of these Specifications.
- B. Footings shall be a minimum of twenty four (24) inches diameter and 4'-6" in depth. Top of footings shall be kept below finished grades to allow for installation of proposed pavements above all footings/foundations.
- C. Anchoring methods shall be as specified by the manufacturer subject to the approval of the Landscape Architect.

PART III - EXECUTION

- 3.01 The Contractor shall assemble the specified shelter under the supervision of an approved Supervisor according to the manufacturer's instructions, the contract drawings and these Specifications.
- 3.02 The Contractor shall locate the shelter to the lines and grades specified in the drawings, Specifications and according to the specifications of the manufacturer.
- 3.03 The excavation for the footings shall be done as specified in Section 02350 of these Specifications and according to the Contract Drawing details.
- 3.04 The concrete footings shall be poured to the grades specified. The concrete shall be poured and cured according to Section 03300 of these Specifications.

PART IV - GUARANTEE AND ACCEPTANCE/LIABILITY

- 4.01 All elements of the shade shelter shall be guaranteed against failure for a period of one (1) year.
- 4.02 Any defective elements shall be replaced in part or whole by the Contractor, at no cost to the Owner.

END OF SECTION

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SHADE SHELTER**

SECTION 02900

HYDROMULCH SEEDING

PART I - GENERAL

1.01 SCOPE OF WORK

- A. Under this Section, the Contractor shall furnish all labor, materials, equipment and transportation required to seed and maintain the lawn areas as shown on the plans and as specified under this Section.

1.02 SAMPLES

- A. Submit the following samples in accordance with the provisions of the GENERAL CONDITIONS:
 - 1. Suitable reusable topsoil or Loam Borrow as directed by the Landscape Architect.

1.03 STANDARDS

- A. Soil analysis in accordance with the current "Standards of the Association of Official Agricultural Chemists".

1.04 QUALIFICATIONS

- A. Fine grading and installation shall be done under the supervision of a qualified foreman acceptable to the Landscape Architect.

1.05 SUBMITTALS

- A. Provide affidavits from manufacturers and/or suppliers where required by these Specifications.
- B. Provide watering and fertilizing schedule to Landscape Architect for approval.

PART II - MATERIALS

2.01 LIME

- A. Lime shall be standard commercial ground limestone containing at least fifty percent (50%) total oxides (calcium oxide and magnesium oxide) and fifty percent (50%) of the material must pass through a #100 mesh sieve, with ninety-eight percent (98%) passing a #20 mesh sieve.

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HYDROMULCH SEEDING**

2.02 FERTILIZER

- A. Fertilizer shall be commercial fertilizer, 10-6-4 U.F. Fertilizer mixture containing at least sixty percent (60%) of organic material or type determined by chemical soil analysis as tested by an approved laboratory. It shall be delivered at the site in the original sealed containers with contents clearly described.
- B. All fertilizer shall be uniformly spread by a mechanical spreader at the rate of fifteen (15) pounds per one thousand (1,000) square feet. At slopes exceeding twenty-five (25%) in gradient, the fertilizer shall be applied manually in an approved manner.

2.03 SEED

- A. Seed shall be of an approved perennial variety mixture, the previous year's crop, clean, and high in germinating value. Weed seed content shall be less than 0.5 percent and include no noxious weeds. Seed shall be obtained from a reliable seed company and shall be accompanied by certificates of compliance relative to mixture purity and germinating value. Seed shall be furnished and delivered in new, clean, sealed and properly labeled containers. All seed shall comply with applicable State and Federal laws. Seed that has become wet, moldy or otherwise damaged shall not be accepted.
- B. Grass seed for lawn areas shall conform to the following requirements:

| Botanical and Common Names | Proportion by Weight | Germination Rate | Purity Minimum |
|---|-------------------------|---------------------|-------------------|
| Chewing's Fescue (Festuca rubra commutata) | 30% | 70% | 97% |
| 'Kentucky 31' Tall Fescue (Festuca arundinacea 'Kentucky 31') | 30% | 90% | 98% |
| Kentucky Bluegrass (Poa pratensis) | 20% | 80% | 85% |
| Perennial Ryegrass (Lolium perenne) | 20% | 90% | 98% |

2.04 MULCH

- A. Mulch material shall be a manufactured product of natural wood cellulose fibers
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with a non-toxic green marking dye incorporated to insure uniform distribution. Material shall be International Paper Company's "Turfiber"; Weyerhaeuser Company's "Silva-Fiber", or approved equal and clearly packed in original containers, sealed and clearly labeled with brand name and manufacturer. It shall have a delivered moisture content of not over twelve percent (12%).

2.05 SUPERPHOSPHATE

- A. Superphosphate shall be composed of finely ground phosphate rock as commonly used for agricultural purposes containing not less than eighteen percent (18%) available phosphoric acid.
- B. Superphosphate application rate shall be based on laboratory soil analysis test recommendation.
- C. At least four (4) days shall lapse after the application of lime and/or fertilizer before hydroseeding shall begin.

PART III - EXECUTION

3.01 All areas to be seeded shall be hydromulched in accordance with the following construction methods:

- A. The liming, fertilizing and seeding to be accomplished under this Section shall be done during a period of time to be approved by the Landscape Architect. The Contractor shall notify the Landscape Architect thirty (30) days prior to the time that he intends to begin this work. No seeding shall be permitted prior to approval in writing by the Landscape Architect.
- B. After all surfaces to be seeded have been brought to finished grade, the Contractor shall furnish and apply limestone as herein specified.
- C. Limestone shall be applied at a rate up to a maximum of one hundred (100) pounds per one thousand (1000) square feet, or as determined by the results of laboratory tests conducted by an approved testing laboratory at the Contractor's expense. A minimum of four (4) sub-samples, taken to the proposed depth of topsoil, shall be taken per acre of area to be limed. These samples shall be placed in a suitable container obtained from the testing laboratory and marked so as to clearly indicate the acre area from which they were taken.
- D. The sample shall be delivered by the Contractor to the testing laboratory for chemical and mechanical analysis. The testing laboratory shall be directed by the Contractor to furnish test results and recommendations for liming and fertilizing to the Landscape Architect for approval.

- E. Lime shall be mechanically spread in two applications up to fifty (50) lbs. per one thousand (1000) square feet, on all areas. The lime shall be distributed uniformly and worked into the top four (4) inches minimum of the topsoil and uniformly blended by discing or rototilling.
- F. Fertilizer shall be mechanically spread and rotatilled into four (4) inch depth topsoil and uniformly blended by discing or raking so as to obtain up to a minimum sown fertilizer coverage yield of sixteen (16) pounds per one thousand (1000) square feet. The actual amounts and type of fertilizer applied shall be as determined by the results of laboratory tests conducted above.
- G. Seed shall be incorporated with the mulching material so as to obtain a minimum sown coverage of two hundred (200) pounds of the specified mix per acre. Seed substitutions may require rate adjustments as recommended by the seed suppliers, if approved by the Landscape Architect.
- H. At areas to be seeded by hydromulching, all stones over one (1) inch in size or other unsuitable material shall be manually raked out with garden rakes to a three (3) inch depth. The Contractor shall remove and dispose of all such excess and unsuitable material of the site or in approved filling areas adjacent to the work. During the process of raking, the areas shall be graded to achieve finished grades after the compaction which shall be obtained by rolling, dragging, or by an approved method which obtains an equivalent compaction to that produced by a hand roller weighing from 75 to 100 pounds per foot of width. All depressions caused by settlement or rolling shall be filled with additional topsoil and regraded and prepared as specified above until it presents a reasonable smooth and even finish at the required finish grade.
- I. After the fine grading and preparations for hydromulch seeding are approved by the Landscape Architect, the Contractor shall seed the area indicated, as specified herein. The seed shall be incorporated with mulching materials composed of wood cellulose fibers that will readily disperse in water to form a uniform and homogeneous mixture when agitated.
- J. The slurry so formed shall be of such consistency that it can be sprayed upon the prepared soil surfaces from a hydroseed gun or through at least two hundred (200) feet of one and one-half (1 1/2) inch diameter canvas hose. The mulching material shall be used at the rate of one thousand (1000) pounds per acre on flat surfaces and fourteen hundred (1400) pounds per acre on slopes exceeding four percent (4%).
- K. Spraying equipment shall consist of a mobile mulching and seeding unit with an approved tank capacity. Unit shall be Bowie "Hydro-Mulcher", Finn "Hydro-Seeder", Reinco "Aquamulcher", or approved equivalent.

3.02 Maintenance of Seeded areas shall be the sole responsibility of the Contractor as described below:

- A. The Contractor shall maintain the entire seeded areas until final acceptance at the completion of the contract or for ninety (90) days, whichever is longer. Maintenance shall include watering as specified, weeding, removal of stones which may appear and regular cuttings of the grass no closer than ten (10) days apart. The first cutting shall be accomplished when the grass is from 2-1/2 to 3 inches high. Weekly watering shall provide the seeded areas with the equivalent of one (1) inch of rainfall per week. If the seeded areas are watered by normal rainfall or the normal watering is inadequate due to weather, the Contractor may at his discretion eliminate or increase respectively, the watering during a given week. However, such action by the Contractor shall in no way waive the Contractor's responsibility or the growth and health of the grass until final acceptance. The Contractor shall furnish all temporary pipe and connections for sprinkling. Water for sprinkling will be furnished by the Owner at a service connection without charge to the Contractor. The Contractor is cautioned to ascertain the locations and suitability of existing water supplies prior to the time of seeding. The Owner accepts no responsibility for the inadequacy or failure of any water control, to furnish the Contractor with necessary water. In the event of a lack of available water, the Contractor shall furnish all required water at no expense to the Owner. Garden hose and hand sprinkling shall be permitted only in special instances by the Landscape Architect.
- B. All bare spots which become apparent as the grass germinates shall be reseeded by the Contractor at his own expense as many times as necessary to secure a good growth and the entire area shall be maintained and cut until all work under this Contract has been completed and accepted. Reseeding may be accomplished by hydromulching or by mechanical means as determined by the area of reseeding to be accomplished.
- C. At all areas to be seeded where hydromulching cannot be accomplished, i.e., adjacent to narrow or irregularly shaped areas, perform the work manually and protect the seeded areas with chopped hay, straw, or wood fiber mulch sprinkled to cover the area.
- D. The Contractor shall take whatever measures are necessary to protect the grass while it is germinating. These measures shall include furnishing of warning signs, barriers, temporary fence or any other necessary measures of protection.
- E. The Contractor shall furnish, erect, and maintain all temporary barriers until final acceptance of the seeded areas by the Owner and shall remove them upon such final acceptance. The barriers shall remain the property of the Contractor at all times.

- F. Six (6) weeks after the grass is established, the Contractor shall apply fertilizer to the surface of seeded areas at one-half the rate recommended by initial laboratory tests as indicated herein.

END OF SECTION

SECTION 02910

SCREENED LOAM BORROW AND TOPSOIL RE-USED

PART I - GENERAL

1.01 SCOPE OF WORK

- A. Under this Section, the Contractor shall furnish all labor, materials, equipment and transportation required to furnish and place ½" Screened Loam Borrow as shown on the drawings and as specified. Where proposed tree and shrub planting mix and/or sod or seed is noted on the drawings, it shall be composed of Loam Borrow, or Topsoil Reused in compliance with this specification.
- B. Prospective bidders are advised that significant quantities of topsoil are present at the property and presumably available for reuse if compatible with the requirements of this specification. The Contractor shall be responsible for amending topsoil, as required to comply with this specification.

1.02 SAMPLES/TESTS

- A. The Contractor shall furnish a Certified Laboratory Report showing the soils classification and nutrient analysis of representative samples of the Loam that is proposed to be used, including the extent of lime and fertilizer required. Samples submitted for approval must be representative of the total volume to be furnished, taken in the presence of the Engineer, and delivered to a certified laboratory by the Contractor; all costs for such shall be borne by the Contractor.
- B. At least ten (10) days prior to shipment/delivery of materials, the Contractor shall submit to the Owner a one (1) cubic foot representative sample, certifications, certified test results for materials as specified below. The Contractor shall provide a listing of the addresses (locations) identifying the origin of the soil to be delivered. If the origin is from multiple locations, all locations shall be provided at the time of submission of required information specified above. No materials shall be ordered or delivered until the required submittals have been reviewed and approved by the Owner. Delivered materials shall closely match the approved samples. Approval shall not constitute final acceptance. The Owner shall reserve the right to reject, on or after delivery, any material that does not meet these Specifications.
- C. If the material does not conform to the above requirements it shall be rejected and additional sources shall be found. Sampling and testing shall be accomplished as specified herein until an approved material is found, all at the Contractor's expense.

- D. To assure that materials fulfill specified requirements regarding textural analysis, organic matter content, pH, and fertility testing may be undertaken:
1. Prior to site delivery; at source;
 2. At time of delivery; on-site; and/or
 3. Immediately following spreading on site. Soil sampling shall also indicate if specified soil was supplied uniformly to the minimum specified depth.

1.03 STANDARDS

- A. ASTM - American Society for Testing and Materials.

1.04 NOTIFICATION

- A. The Contractor shall notify the Owner in writing at least ten (10) days in advance of the time he intends furnishing Screened Loam Borrow stating the location and amount of such deposit, the name and address of the supplier and also shall furnish such facilities, transportation and assistance as the Owner may require for collecting and forwarding samples.

PART II - MATERIALS

2.01 LOAM BORROW

- A. In accordance with the specific requirements of this project, existing on-site soil may be re-used as Loam Borrow only if it meets this Specification. Existing topsoil that does not meet this Specification may be re-used only up to the subgrade elevation within the limits of areas to receive new Loam Borrow. The Contractor shall furnish all required Loam Borrow, from off site sources, as necessary, to complete the project.
- B. Screened Loam shall be “fine sandy loam” or “sandy loam” determined by mechanical analysis (ASTM D-422) and based on the “USDA” Classification System”. Screened Loam has the following mechanical analysis:

| <u>Textural Class</u> | <u>Percentage of Total Weight</u> | <u>Average Percentage</u> |
|--------------------------|-----------------------------------|---------------------------|
| Sand (0.05 – 2.0mm) | 45 – 75 | 60 |
| Silt (0.002 – 0.05mm) | 15 – 35 | 25 |

| | | |
|-----------------------------|--------|----|
| Clay (Less than 0.002mm) | 5 – 20 | 15 |
|-----------------------------|--------|----|

- C. Screened Loam shall be a natural product consisting primarily of natural topsoil, free from subsoil, and obtained from an area that has never been stripped, as noted above, the location of the source of the loam must be submitted to the Owner. Screened Loam shall not contain less than five percent (5%) nor more than ten percent (10%) organic matter as determined by the loss on ignition of oven-dried samples, at $100^{\circ}\text{C} \pm 5^{\circ}\text{C}$. To adjust organic matter content, the soil may be amended, prior to site delivery, by the addition of composted leaf mold or peat moss. Use of organic amendments is accepted only if random soil sampling indicates a through incorporation of these materials. No mixing or amending of Loam will be permitted on site. The Loam shall not be delivered when in a wet or frozen condition.
- D. Screened Loam shall consist of fertile, friable, natural loam capable of sustaining vigorous plant growth. Loam shall be without admixture of subsoil, and refuse, resulting in a homogeneous material free of stones greater than ½” in the longest dimension, be free of lumps, plants, glass, roots, sticks, excessive stone content, debris, and extraneous matter as determined by the Owner. Screened Loam shall be within the pH range of 6.0 to 6.5 except as where noted on plans and details. It shall be uncontaminated by salt water, foreign matter and substances harmful to plant growth. The maximum soluble salt index shall be 100. Screened Loam shall not have levels of aluminum great than 200 parts per million.
- E. If limestone is required to amend the screened loam to bring it within a pH range of 6.0 to 6.5 no more than 200 pounds of limestone per 1,000 square feet of loam, incorporated into the soil, or 50 pounds of limestone per 1,000 square feet of loam, surface application, within a single season.
- F. The Landscape Architect will reject any material delivered to the site that does not meet these Specifications after post-delivery testing. If the delivered screened loam does not meet the specifications stated in this document, the delivered screened loam will be removed by the Contractor at the Contractor’s expense and at the time of rejection.
- G. The topsoil shall not be handled or moved when in a wet or frozen condition.
- H. Topsoil structure shall not be destroyed through excessive and unnecessary handling or compaction. Inappropriate handling leading to the compaction or deterioration of soil structure will result in rejection of topsoil for use.
- I. At no time should equipment or material rest on the soil.

- J. Loam Borrow shall be free of plants and their roots, debris and other extraneous matter. It shall be uncontaminated by salt water, foreign matter and substances harmful to plant growth. The electrical conductivity (EC2) of a 1:2 soil-water suspension shall be equal to, or less than, 1.0 millimhos/cm. (test material passing #4 sieve).

2.02 REUSE OF EXISTING TOPSOIL

- A. The reuse of topsoil that does not meet the specifications for use as loam borrow may only be permitted for use as a general fill material to subgrade elevations at the limits of proposed fields, lawn and planting areas.
- B. Care shall be taken not to overwork the soil, causing it to break down, utilizing only agricultural equipment such as plows, discs, or harrows and portable quarry sieves, screens, or blenders.

PART III - EXECUTION

3.01 PLACEMENT

- A. The Contractor shall furnish and spread Loam Borrow to the depths shown on the contract drawings, which depth shall be the minimum required depth after settlement. No compaction shall be required beyond that extent necessary to place sod or to plant trees and shrubs to ensure against unevenness or settling below accepted growth lines.

3.02 ADDITIVES

- A. The Contractor shall apply all necessary fertilizer and lime to the soil in accordance with the manufacturer's and laboratory's recommendations and as required by the sodding, seeding and/or planting specifications referenced elsewhere. Refer to the laboratory test attached herein at the end of this section.

3.03 AMEND EXISTING SOILS IN-PLACE

- A. Apply a 1-inch deep layer of compost and a 1.5" deep layer of sand to the existing soil. Retain copies of receipts for compost delivered to the site, as they may be used during inspection to verify the soil requirements have been met. Amend the topsoil per the recommendation contained in the analysis attached herein at the end of this section.
- B. Rototill or disc harrow compost and sand into the soil to a depth of at least 8-inches. Note that tilling to this depth will require repeated passes with a large machine, such as a tractor-mounted or heavy reartine rototiller.

- C. Under no circumstances will loaded rubber tired vehicles in excess of 1 ton be allowed on the repair area prior to, during or after the spreading of the root zone mix. operation should be conducted with low ground pressure (lgp) vehicles with a maximum effective ground pressure of 5.0 psi.
- D. Finish grades shall be verified by the Contractor using laser operation survey instruments with a tolerance of +/- 1/4 inch.

END OF SECTION

SECTION 02930

TREES, SHRUBS, GROUNDCOVERS, AND LANDSCAPING

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This Section includes furnishing all labor, materials, equipment, plants, and incidental materials necessary to perform all operations related to the planting of all trees, shrubs, vines, herbaceous plants, ground covers, and for all appurtenant work, complete in place, maintained, and accepted, in accordance with the Contract Drawings and Specifications.
- B. The Contractor shall bear the responsibility and cost of furnishing and applying water or any other substances, as necessary to ensure the sustainability of plant materials, as part of the work of this contract.

1.02 RELATED WORK:

- A. Section 02910, LOAM BORROW

1.03 SUBMITTALS:

In accordance with requirements of the general specifications, the Contractor shall submit the following:

- A. Prior to planting, State nursery inspection certificates for all plant materials shall be submitted to the Engineer for review.
- B. Samples and six copies of the manufacturer's product data, as applicable, shall be submitted to the Engineer for review and approval for the following materials:
 - 1. Limestone.
 - 2. Fertilizer.
 - 3. Sphagnum Peat Moss.
 - 4. Humus.
 - 5. Organic Compost.
 - 6. Manure.
 - 7. Mulch.

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8. Guying and Staking Apparatus.
9. Crepe Wrapping for tree trunks.
10. Anti-transpirant/Anti-desiccant.
11. Insecticides.
12. Herbicides.
13. Fungicides.

PART 2 - PRODUCTS

2.01 PLANT MATERIALS:

- A. The Contractor shall furnish and plant all plant materials as shown on the plans and in the quantities and sizes listed thereon. No substitutions shall be permitted without the written approval of the Engineer.
- B. Plants larger than those specified in the Plant List may be used if approved by the Engineer. However, use of such oversized plants shall not be considered grounds for any increase in the contract price. If the use of larger plants is approved, the required spread of roots or ball of earth shall be increased in proportion to the size of the plant and plant pits shall be increased as necessary.
- C. All plants shall be certified to have passed all required Federal and State inspection laws requiring ensuring freedom from plant diseases and insect infestations. The Contractor shall obtain clearance from applicable governing agencies, as required by law, before planting any plants delivered from outside the state in which they are to be planted.
- D. All plants shall be nursery-grown under climatic conditions and environmental stresses similar to those in the locality of the project. All plants shall originate from nurseries that are no more than one Hardiness Zone higher (as established by the Arnold Arboretum, Jamaica Plain, MA) than where the plant is to be installed. Plants also shall conform to the botanical names and standards of size, culture, and quality for the highest grades and standards as adopted by the American Association of Nurserymen, Inc. in the American Standard for Nursery Stock, ANSI-Z60.1, latest edition. All plants shall be legibly tagged with their proper botanical name.
- E. **All groundcovers, perennials and vines are to be -inchcontract grown-inch by a local nursery.** A contract growing agreement is being used on this project in order to obtain the quantities of perennials, groundcovers and vines that may exceed the general market demand for a particular species. All units should be grown in either 4-inch pots

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or plug trays, Each plant should also be inoculated with mycorrhizae to enhance native restoration capacity. In order to use this method of plant production contact with potential nurseries is imperative immediately upon the Contractor's notice to proceed from the City.

- F. No heeled-in plants or plants from cold storage shall be used. All plants shall be typical of their species or variety and shall have a normal habit of growth. Plants shall be sound, healthy, and vigorous, well branched and densely foliated when in leaf; shall be free of disease, insects, eggs or larvae; and shall have healthy, well-developed root systems. All parts of the plant shall be moist and shall show active green cambium when cut.
- G. All nursery plants shall be balled and burlapped or container-grown and shall have been acclimatized for at least one growing season. Container-grown stock shall have been grown in a container long enough for the root system to have developed sufficiently to hold its soil together, firm and whole, after removal from the container. No plants shall be loose in the container. Container-grown plants shall have no girdling roots and shall not be in a root-bound condition. Plants shall remain in their container until planted.
- H. Care shall be exercised in digging and preparing field-grown plants for shipment and planting. Balled and burlapped materials shall have solid unbroken balls of earth of sufficient size to encompass all fibrous feeding roots necessary to ensure successful recovery and development of the plants. Balls shall be firmly wrapped in untreated biodegradable burlap and tied securely with wire cages and/or jute twine. Roots or balls of plants shall be adequately protected at all times from sun and drying winds. No plant shall be accepted when the ball of earth surrounding its roots has been badly cracked or broken preparatory to or during planting, or after the burlap, staves, wire cage, rope, or platform in connection with its transplanting have been removed. Soil characteristics (i.e., composition, texture, pH, etc.) of all field-grown plants shall closely match those of the soil where plant materials are to be planted.
- I. The height of the trees, measured from the crown of the roots to the top of the top branch, shall not be less than the minimum size designated in the Plant List in the Drawings. The branching height for deciduous trees installed adjacent to or within walks shall be 7 feet minimum, having been pruned to this height at least 1 year prior to transplanting. Except when a clump is designated, the trunk of each tree shall be a single trunk growing from a single, unmutated crown of roots. No part of the trunk shall be conspicuously crooked as compared with normal trees of the same variety. The trunk shall be free from sunscald, frost cracks, or wounds resulting from abrasions, fire, or other causes. All pruning cuts shall comply with acceptable horticultural practices. No pruning wounds having a diameter of more than 1½---inches shall be present. Any such wounds must show vigorous bark growth on all edges. Evergreen trees shall be branched to within 1 foot of the ground. No tree that has had its leader cut or die shall be accepted.

- J. Caliper measurements for tree trunks shall be taken 6 --inches above ground for trees up to and including 4--inch caliper size and at 12 --inches above ground for larger sizes.
- K. Shrubs shall meet the requirements for spread and/or height stated in the Plant List on the Drawings. The measures for height are to be taken from the crown or root flare to the average height of the top of the shrub mass (not the longest branch). The fullness of each shrub shall correspond to the trade classification -inchNo. 1-inch. Single stemmed or thin plants will not be accepted. The side branches must be generous, well-twigged and the plant as a whole must be well-bushed to the ground. The plants must be in a moist, vigorous condition, free from dead wood, bruises or other root or branch injuries.
- L. Herbaceous plants, vines and groundcovers shall be of the size, age and/or condition designated in the Plant List on the Drawings.
- M. Plants shall be delivered only after preparations for planting have been completed. Plants shall be handled and packed in a horticulturally approved manner and all necessary precautions shall be taken to ensure that plants arrive on-site in a healthy vigorous condition. Trucks used for transporting plants shall be equipped with covers to protect plants from windburn, desiccation, and overheating during transport. Plants that have not been thoroughly watered shall not be accepted at the planting site. Any plants delivered to the site in a dry or wilted condition shall be rejected and replaced at no expense to the Owner. All plant materials shall be protected, watered and otherwise maintained prior to, during, and upon delivery to the site.
- N. Plants shall be subject to inspection and tagging by the Engineer at the place of growth, for conformity to specification requirements as to quality, size, variety, and condition. Inspection and selection of plants before digging shall be at the option of the Engineer. The Contractor, or his representative, shall be present, if requested by the Engineer, for inspection of plants and tagging at the Nursery. Such approval shall not impair the right of inspection and rejection upon delivery at the site or during the progress of work, for size and condition of balls and roots, disease, insects and latent defects or injuries. Rejected plants shall be removed immediately from the site. Certificates of inspection of plant materials shall be furnished as may be required by Federal, State and other authorities to accompany shipments.

2.02 LOAM BORROW:

Loam Borrow shall be as specified in Section 02329, LOAM BORROW.

2.03 SOIL ADDITIVES AND AMENDMENTS:

A. LIMESTONE:

Lime shall be an approved agricultural limestone containing at least 50 percent total oxides (calcium oxide and magnesium oxide). The material will be ground such that 50 percent of the material will pass through a No. 100 mesh sieve and 98 percent will pass

a No. 2 mesh sieve. Lime shall be uniform in composition, dry and free-flowing and shall be delivered to the site in the original sealed containers, each bearing the manufacturer's guaranteed analysis.

B. FERTILIZER:

1. Fertilizer shall be a complete, standard commercial fertilizer, homogeneous and uniform in composition, dry and free-flowing, and shall be delivered to the site in the manufacturer's original sealed containers, each bearing the manufacturer's guaranteed analysis and marketed in compliance with State and Federal Laws. All fertilizer shall be used in accordance with the manufacturer's recommendations.

2. Fertilizer for tree, shrub and groundcover plantings shall contain all major plant nutrients and minor trace elements essential to sustain plant growth and shall have the following analysis:

| | | |
|--------------|-----------------|---------------|
| Nitrogen (N) | Phosphorous (P) | Potassium (K) |
| 10% | 10% | 10% |

3. As approved by the Engineer, a slow release root contact fertilizer installed at the time of planting, may be used in place of the above, at the discretion of the Contractor.

C. Organic Compost shall be a standard commercial product comprised of fully decomposed, 100 percent plant-derived, natural organic matter. Its composition shall furnish ample water holding capacity and cation exchange capacity for the retention of plant nutrients. Compost shall be free of sticks, stones, weed seeds, roots, mineral or other foreign matter and delivered air dry. It shall be free from excessive soluble salts, heavy metals, phytotoxic compounds, and/or substances harmful to plant growth and viability. Organic compost shall have an acidity range of 4.5 to 7.0 pH.

D. Sphagnum Peat Moss shall be a standard commercial product. Its composition shall furnish ample water holding capacity and cation exchange capacity for the retention of plant nutrients. Peat moss shall be free of sticks, stones, weeds or weed seeds, roots, mineral or other foreign matter. It shall be free from toxic substances and/or compounds harmful to plant growth and viability. It shall be delivered air dry in standard bales and shall have an acidity range of 3.5 to 5.5 pH.

E. Humus shall be natural humus, reed peat, or sedge peat. Its composition shall furnish ample water holding capacity and cation exchange capacity for the retention of plant nutrients. Humus shall be free of sticks, stones, weeds, roots, mineral or other foreign matter and/or toxic substances harmful to plant growth and viability. It shall be low in wood content, free from hard lumps and excessive amounts of zinc and delivered air dry in a shredded or granular form. The acidity range for humus shall be 5.5 to 7.5 pH, and

the organic matter content shall be not less than 85 percent, as determined by loss on ignition. The minimum water holding capacity shall be 200 percent by weight on an oven-dry basis.

- F. Manure shall be well-rotted, leached, cow manure not less than 8 months or more than 2 years old. It shall be free of sawdust, shavings, or refuse of any kind and shall not contain more than 25 percent straw. It shall contain no substances harmful to plant growth. The Contractor shall furnish information regarding chemical disinfectants, if any, that may have been used in storage of the manure.

2.04 PLANTING MIXTURE:

Planting mix shall consist of 7 parts loam borrow and 1 part organic compost, humus, sphagnum peat moss, or manure, thoroughly blended.

2.05 WATER:

Water shall be furnished by the Contractor, unless otherwise specified, and shall be suitable for irrigation and free from ingredients harmful to plant growth and viability. The delivery and distribution equipment required for the application of water shall be furnished by the Contractor, at no additional cost to the Owner.

2.06 MULCH:

Mulch shall be fibrous pliable shredded softbark mulch, not exceeding ½ --inch in width. It shall be 98 percent organic matter with a pH range between 3.5 and 4.5 and a moisture content not to exceed 35 percent. It shall be free of weeds, weed seeds, debris, and other materials harmful to plant growth and viability. Organic mulch shall be aged no longer than 2 years. Mulch shall be dark in color, no red mulch will be accepted. Sample must be approved by Owner's Representative prior to ordering and installation.

2.07 MATERIALS FOR STAKING, GUYING, AND WRAPPING:

- A. Tree stakes shall be sound, untreated 2 x 3 (nominal) x 8-foot length Douglas Fir reasonably free of knots. No paint or stain shall be used in conjunction with tree stakes. Tying material shall be flexible braided nylon webbing, ¾ -inch wide and have a tensile strength of 900 pounds. Webbing shall be 'ArborTie', or approved equal.
- B. Drive anchors and guy wire assemblies shall be suitable for protecting trees and shall be sized in accordance with the manufacturer's recommendations. No materials shall be used for guying that will girdle, chafe, or otherwise injure trees.
- C. Tree wrap shall be duplex, waterproof kraft paper crinkled to 33-1/3 percent stretch, 4 to 6--inch wide strips. Tying materials shall be jute twine, 2-ply for shrubs and trees less than 3--inch caliper; 3-ply for larger plants.

2.08 TREE PAINT:

Tree paint shall not be used.

2.09 ANTI-TRANSPIRANT/ANTI-DESICCANT:

Anti-transpirant or anti-desiccant shall be 'Wilt-Pruf', as manufactured by Nursery Specialty Products, Inc., Groton Falls, NY, or approved equal. It shall be delivered in original sealed manufacturer's containers and used in accordance with the manufacturer's instructions.

2.10 INSECTICIDES:

- A. No insecticides shall be used on-site without the Contractor notifying and obtaining the prior approval of the Engineer.
- B. Insecticides shall be EPA registered and approved for use in public open spaces. All insecticides shall be handled by State licensed applicators only, delivered in the original sealed manufacturer's containers, and used in accordance with the manufacturer's instructions.
- C. Insecticide use shall be limited and selective, only to control specific insect infestations, as identified by the Contractor or the Owner's Representative, that may result in the disfigurement, decline, or death of plant materials.

2.11 HERBICIDES:

- A. No herbicides shall be used on-site without the Contractor notifying and obtaining prior approval of the Engineer and surrounding vegetation to remain to be protected.
- B. Herbicides shall be EPA registered and approved for use in public open spaces. All herbicide shall be handled by State licensed applicators only, delivered in the original sealed manufacturer's containers, and used in accordance with the manufacturer's instructions.
- C. Herbicide for post-emergent application shall be glyphosate contact, 'Roundup', as manufactured by Monsanto, Inc., or approved equal.
- D. Herbicide use shall be limited and selective, only to control specific weed infestations that have been identified by the Contractor or the Owner's Representative.

2.12 FUNGICIDES:

- A. No fungicides shall be used on-site without the Contractor notifying and obtaining prior approval of the Engineer.

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- B. Fungicides shall be EPA registered and approved for use in public open spaces. All fungicides shall be handled by State licensed applicators only, delivered in the original sealed manufacturer's containers, and used in accordance with the manufacturer's instructions.
- C. Fungicide use shall be limited and selective, only to control specific fungal pathogenic disease infestations, as identified by the Contractor or the Owner's Representative, that may result in the disfigurement, decline, or death of plant materials.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. PLEASE NOTE: perennials, vines and groundcovers are to be contract grown and delivered to the site, refer to section 2.01.E. of this specification.
All plants shall be subject to inspection and approval by the Engineer upon delivery to the site. No materials shall be planted until approval is received.
- B. All work shall be performed by skilled workers with a minimum of 2 years planting experience, in accordance with accepted horticultural/nursery practices, under the full-time supervision of a Certified Nurseryman or Arborist.
- C. All balled and burlapped plants that cannot be planted immediately upon delivery shall be set on the ground and the root balls shall be well protected with soil, wet moss, or other acceptable material. All foliage shall be protected and covered with perforated shade materials.
- D. The planting season for evergreen trees and shrubs shall extend from the time the soil becomes workable in the spring until new growth appears, and from September 15 until November 30 in the fall. Deciduous trees and shrubs shall be planted only when dormant, either prior to bud break and/or before leaves appear in the spring, or subsequent to their leaf drop in the fall. Ground covers shall be planted only after the last frost in the spring through mid-May. Planting season periods may be extended if weather and soil conditions permit only with the written approval of the Engineer. Extended or out-of-season planting requirements shall include application of antitranspirant and extra water as needed. Plant guarantee periods shall remain as stated below. Planting shall not be permitted in frozen ground.
- E. All plant locations and outlines for planting beds shall be staked out for review and potential adjustment by the Engineer before any excavation is begun. In the event that rock, underground construction work or obstructions are encountered in any proposed planting pit or bed, the Engineer may select alternate locations. Where locations cannot be changed, the obstruction shall be removed, subject to the Engineer's approval, to a depth of not less than 3 feet below grade and not less than 6---inches below the bottom of the root ball when plant is properly set at the required grade. Removal of boulders or

obstructions greater than 1 cubic yard in size shall be subject to approval and will be paid for by the Owner. No ledge will be removed to create planting pits or beds

- F. All planting pits shall be excavated with sloped walls, wider at the top than at the bottom, and scarified to eliminate glazing. Tree pits shall be at least 2 feet greater in diameter than the root ball of earth or root system. Shrub pits shall be at least 1 foot greater than the diameter of the root ball. Planting pits shall not be deeper than the height of the root ball.
- G. When excavation occurs in areas of heavily compacted earth, stones, concrete chunks or other foreign matter, pits shall be dug at least 3 times the width of the rootball. Excavated material from plant pits shall be disposed of as directed.
- H. Container plants shall be removed from their growing container before planting. If roots are densely matted, the outer root mass shall be scored, sliced vertically, with a sharp knife to separate roots. All herbaceous plants and groundcovers shall be evenly spaced to produce a uniform effect and staggered in rows at intervals designated on the contract drawings.
- I. Shrubs and trees shall be set in the center of planting pits, plumb and straight, and at such a level that after settlement the crown of the roots will be 1--inch above the surrounding finished grade. Root ball masses shall not be loosened, broken or damaged. When balled and burlapped plants are set, planting mixture shall be compacted around bases of balls to fill all voids. All tying materials, twine and rope shall be cut and removed. Biodegradable burlap shall be laid back or cut away from the top half of the ball. If a wire basket is present, the upper 2/3 of the basket shall be cut away and removed. Do not remove the entire basket. Roots or bare root plants shall be properly spread out and planting mixture carefully worked in among them. Broken or frayed roots shall be cleanly cut.
- J. Backfill plant pits with planting mixture in layers of not more than 9 --inches and firmly tamp each layer and water to sufficiently settle the backfilled soil before the next layer is put in place. When the planting pit is 2/3 backfilled, the hole shall be flooded and watered thoroughly so that the water level reaches the top of the planting pit. Allow water to soak in, then complete the backfilling operation. Immediately after planting pit is backfilled, a shallow basin 3 --inches deep and slightly larger than the pit shall be formed with a ridge of soil for water retention. Form a common basin for plant materials throughout mass planting beds. After planting, lightly till the soil in planting beds between planting pits and rake smooth to eliminate compaction of soils.
- K. All planting hole basins shall be flooded with water twice within the first 24 hours of planting, and watered not less than twice per week until final acceptance of the work.
- L. All thin barked deciduous trees shall be wrapped after they are planted and before they are staked. Prior to wrapping, inspect trees for injury to trunks or improper pruning. Take corrective measures as necessary. Wrap trunks of all trees spirally from bottom to

top with tree wrap and secure top and bottom at 2-foot intervals with jute twine. The wrapping shall overlap and entirely cover the trunk from the ground to the height of the second branches and shall be neat and snug. Overlap shall be approximately 2---inches.

- M. Stake trees immediately after planting as detailed. All staking apparatus shall be adequate to hold the tree in a vertical position under severe weather conditions. All staking apparatus and tree trunk wrapping shall be removed and disposed of off-site by the Contractor at the end of 1 growing season.
- N. Immediately after planting and staking operations are complete, all plant pit basins and plant beds shall be covered with approved mulch to the depths designated on the plans. Mulch shall not contact tree bark, cover tree root flares, or shrub crowns. No mulch shall be applied prior to the first watering.
- O. The pruning of trees and shrubs shall only be permitted to remove dead or dying branch limbs and tips, sucker growth, water sprouts, crossing or rubbing branches, broken or damaged branches, diseased or insect infested limbs, and to preserve the natural character of the plant. Plant materials shall be pruned in accordance with American Nurserymen Association Standards and as required by the Engineer. Questionable weak limbs and branch removals that may disfigure the plant shall be left to the discretion of the Engineer. The tree leader shall never be permitted to be cut. Pruning shall be done with clean, sharp tools. All large pruning cuts that are ½ -inch in diameter or larger shall be made along the bark branch ridge. Pruning cuts shall not breach or otherwise interfere with the branch collar. All pruning cuts less than ¼ -inch diameter shall be made with hand pruners as close to the main stem as possible without damaging the cambium or bud. Tree paint shall not be used to cover pruning cuts.
- P. Seasonal bulb plantings shall be completed in the Spring or Fall immediately following the general construction period. Contractor may have to return after substantial completion for bulb planting operations and will do so as required by the Engineer at no additional cost to the Owner.
- Q. As the work proceeds, the Contractor shall remove all debris from the site, including but not limited to branches, rock, paper, and rubbish. All areas shall be kept clean, neat and in an orderly condition at all times. Prior to final acceptance, the Contractor shall cleanup the entire area to the satisfaction of the Engineer.

3.02 MAINTENANCE:

- A. Maintenance shall begin immediately after each plant is planted and shall continue until completion of the guarantee period and final acceptance of the project. Plants shall be watered, pruned, sprayed, fertilized, cultivated and otherwise maintained and protected. Tree guys and stakes shall be tightened and repaired. Defective work shall be corrected as soon as possible after it becomes apparent and weather and season permit.

- B. Settled plants shall be reset to proper grade and position, planting pits and common basins restored, and dead materials removed and replaced. Planting beds and individual basins shall be neat in appearance, maintained to their original layout lines and kept free of weeds. Mulch shall be replaced as required to maintain proper depths.
- C. Contractor shall make arrangements to provide sufficient water to maintain all trees, shrubs and plant materials until final acceptance. Plants shall be sprayed with anti-transpirant or anti-desiccant if required by seasonal conditions or as required by the Engineer.
- D. Planting areas shall be protected against trespass and damage of any kind during the maintenance period. This shall include the furnishing and installation of approved temporary fencing if necessary. If any plants become damaged during the maintenance period, they shall be treated or replaced as required by the Engineer at no additional cost to the Owner.

3.03 INSPECTION AND PRELIMINARY ACCEPTANCE:

- A. Contractor shall provide written notice to the Engineer not less than 10 days before the anticipated date of inspection for preliminary acceptance. The Engineer shall recommend preliminary acceptance of the work of this Section only after completion and re-inspection of all necessary repairs, renewals or replacements.
- B. Inspection and acceptance of plantings may be requested and granted in part, provided the areas for which acceptance is requested are relatively substantial in size, and with clearly definable boundaries. Acceptance and use of these areas by the Owner shall not waive any other provisions of this Contract.

3.04 GUARANTEE:

- A. All plant materials shall be guaranteed for a period of **2 years** after the date of completion of the specified maintenance period and preliminary acceptance of the project by the Owner, in writing.
- B. When the work is accepted in part, the guarantee period shall extend from each partial acceptance to the terminal date of the last guarantee period. All guarantee periods terminate at one time.
- C. Plants shall be healthy, free of pests and disease. Plants shall exhibit vigorous growth, shall bear foliage of normal density, size and color and shall have no less than seventy-five percent (75%) of their branches alive at the end of the guarantee period. If the leader of any single-leader species is dead, the entire plant shall be considered dead.
- D. Any plant required under this Contract that is dead or unsatisfactory, as determined by the Engineer, shall be removed from the site. These shall be replaced as soon as

weather permits during the specified planting season, at no additional cost to the Owner, until the plants live through **2 years**.

- E. All replacements shall be plants of the same kind and size as specified on the Plant List. They shall be furnished and planted as specified above.
- F. The guarantee of all replacement plants shall extend for an additional 2-year period from the date of their acceptance as replacement.
- G. Guarantee shall not apply to the replacement of unacceptable plants resulting from the removal, loss, or damage due to occupancy of the project in any part; vandalism or acts of neglect on the part of others; physical damage by animals, vehicles, etc.; and Acts of God, including but not limited to, catastrophic fire, hurricanes, riots, war, etc.
- H. In the instance of curtailment of water by local water authorities (when supply was to be furnished by the Owner), the Contractor shall furnish all necessary water by water tanker, the cost of which will be approved and paid for by the Owner.

3.05 FINAL INSPECTION AND FINAL ACCEPTANCE:

- A. At the end of the guarantee period, the Contractor shall provide written notice to the Engineer not less than 10 days before the anticipated date of final inspection for final acceptance.
- B. The Engineer shall recommend final acceptance of the work of this Section only after completion and re-inspection of all necessary repairs, renewals or replacements.

END OF SECTION

SECTION 03300

CEMENT CONCRETE – CAST IN PLACE

PART I - GENERAL

1.01 SCOPE OF WORK

- A. The work under this section shall consist of furnishing all labor, materials, equipment, transportation, reinforcing, forming, finishing and curing of cast in place concrete.

1.02 TEST SPECIMENS

- A. Test specimens shall conform to the requirements of Subsection M4.02.13 of the Mass DOT. Standard Specifications.
- B. Standard test cylinders to determine the compressive strength of the concrete as mixed for the work shall be made by the Contractor in the presence of the Engineer at the site. In addition to furnishing the concrete for the test specimens, the Contractor shall furnish approved cylindrical molds (6" x 12") and assist in sampling, fabricating, protecting and curing the specimens. A test cylinder may be ordered from each day's concrete. The Contractor shall include the cost of test cylinders under his base bid.

1.03 REFERENCE STANDARDS AND SPECIFICATIONS

- A. Reference to the standards, specifications and tests of technical societies, organizations, and governmental bodies is made of the Contract Documents.
 - 1. AASHTO - American Association of State Highway And Transportation Officials (tests or specifications).
 - 2. ASTM - American Society of Testing and Materials.
 - 3. M.D.P.W. Standard Specifications - Latest edition of the Standard Specifications for Highways, Bridges and Waterways, The Commonwealth of Massachusetts, Department of Public Works, 1988 Edition.
 - 4. Plate #206.4.0, M.D.P.W., Construction Standards, March 1977, as attached.

1.04.1 JOB CONDITIONS

- A. Examine all surfaces to receive concrete to see that they are in proper condition to receive the work specified. Report to the Engineer in writing all unacceptable surfaces. Starting work in any area shall constitute the Contractor's acceptance of that surface. All defects resulting from use of accepted surfaces shall be corrected by the Contractor at no additional expense to the owner.
- B. Subbase and base preparation, including material shall be of proper approved quality as specified under other sections of these Specifications. Start of work under this SECTION shall constitute acceptance of the foundation conditions to which this work is to be applied. Any defects in work resulting from such conditions shall be corrected under this section at no extra cost to the Owner.
- C. Maintain base in satisfactory condition and properly drained until surface improvement is placed.

PART II - MATERIALS

2.01 GENERAL

- A. Unless otherwise specified, all materials shall conform to the relevant provisions of Section 901, CEMENT CONCRETE MASONRY, and Section M4, CEMENT AND CEMENT CONCRETE MATERIALS, of the Massachusetts Standard Specifications.

2.02 CONCRETE

- A. Cement concrete to be used shall be Class 4,000 PSI according to the classification defined in the Massachusetts Standard Specifications and shall meet the following requirements.

| CLASS MINIMUM 28 DAY COMPRESSIVE STRENGTH | CEMENT CONTENT LBS/CY FOR COURSE AGGREGATE |
|---|---|
| 4,000 PSI | 610 |

AIR-ENTRAINED CONTENT OF 7.0 +/- 1.0%

2.03 FORMWORK

- A. Forms shall be strong enough to resist pressure of the concrete without springing, and tight enough to prevent leakage of mortar. Forms shall be staked, braced, or tied together to maintain their position and shape when concrete is compacted in place. Forms shall be clean and shall produce a smooth, even finish for exposed surfaces.

2.04 REINFORCING (AS REQUIRED)

- A. Welded wire fabric shall be 6" x 6", W1.4 x W1.4 gauge cold-drawn steel wires formed into a mesh and welded together at points of intersection in conformance with ASTM A-185-70. Welded wire fabric shall be furnished in mats and not rolls.
- B. Reinforcing bars shall consist of deformed bars unless otherwise specified. The bars will be rolled from new billet steel conforming to the requirements of AASHTO-M31, Grade 60.
- C. All reinforcement shall be free from imperfections and surface coatings of rust, dirt, oils, paint, grease, and mill scale and shall present a clean, fresh surface when placed in the structure. Rust that occurs in scales or that pits the steel will be considered an imperfection, but the surface shall be brushed to remove loose material.
- D. Dowels for installation at expansion joints, as detailed, shall be #4 smooth steel dowels, paper capped at one end.

2.05 PREFORMED EXPANSION JOINT FILLER

- A. Preformed expansion joint filler shall be of a non-extruding and resilient non-bituminous type conforming to AASHTO-M135

2.06 POLYURETHANE SEALANT

- A. Polyurethane Joint Sealant shall be cold applied, elastomeric joint sealing compound suitable for use on horizontal joint Portland cement concrete surfaces and shall conform to the Commonwealth of Massachusetts, Department of Public Works, Standard Specifications for Highways and Bridges, 1988 Edition, Section M9.14.3, except that only single component sealants shall be utilized.

PART III - EXECUTION

3.01 GRADING AND COMPACTION OF SUBGRADE AND BASE

- A. Do all grading and compaction of subgrade and base in conformance with Section 2.04 of these Specifications.
- B. Bring subbase and base to required grades and sections after final compaction. Tamp traces of trenches. Remove spongy and otherwise unsuitable material and replace with approved material. Loosen exceptionally hard spots and recompact. Take every precaution to obtain a foundation of uniform bearing capacity. In absence of specific requirement, compact subbase and base by such means to provide firm base and insurance against settlement and cracking of superimposed work.

3.02 GENERAL FORMWORK

- A. Forms shall be smooth, free from warp, sufficient in strength to resist springing out of shape, equal in height to the depth of concrete, and free from all dirt or mortar if previously used. The forms shall be rigidly supported, well staked, thoroughly braced and set to the proper lines with the upper edges conforming to the finish grades. Forms shall be coated with non-staining mineral oil prior to placing concrete.
- B. Forms shall not be removed for at least twenty-four (24) hours after the concrete has been placed, or for a longer period if directed by the Engineer. Extreme care shall be taken in removing forms in order to prevent damage to the concrete. Under no conditions shall any bar, pick or other tool be used which depends upon leverage on the concrete for removal of the forms.

3.03 CAST-IN ITEMS

- A. Reinforcing shall be placed as shown on the plans.

3.04 CONCRETE PLACING AND FINISHING

- A. Placing and finishing of cement concrete pavements on grade.
 - 1. The concrete shall be placed in such quantity that after being thoroughly consolidated in place it shall be to the lines, grades and thicknesses indicated. No finishing operation shall be performed until all bleed water and water sheen has left the surface and the concrete has started to stiffen. After water sheen has disappeared, edging operations where required shall be completed. All tool marks shall be eliminated. After edging and jointing operations, the surface shall be floated with aluminum or

magnesium floats. Immediately following floating, the surface shall be steel-troweled. After trowelling, the Contractor shall draw a fine nylon push broom lightly over the surface to produce a non-slip condition. If necessary, tooled joints and edges shall be rerun before and after trowelling to maintain uniformity and all tool marks shall be eliminated by brooming.

B. Placing and finishing of cement concrete walls, curbs, steps and other structures.

1. Concrete placing and finishing shall be in accordance with applicable provisions of Section 9.01 of the Commonwealth of Massachusetts Standard Specifications referenced herein.
2. In conveying the material from the place of mixing to the place of deposit, the operation shall be conducted in such a manner that no cement will be lost, and the concrete shall be so handled that it will be of uniform composition throughout, showing neither excess nor lack of cement in any area.
3. Concrete shall be placed in the forms in an approved manner in order to prevent stone pockets, voids or segregation and to reduce rehandling and flowing in the forms to a minimum. Concrete shall be evenly distributed in the forms. Each layer shall be thoroughly consolidated by rodding and vibrating. The face of the forms shall be carefully spaded to bring a dense mortar to the face in order to produce a good surface finish. Compaction shall be accomplished by applying approved mechanical vibrators to the mass of concrete at the point and time of deposit using care to avoid over vibration. Vibration of forms or reinforcing shall not be permitted and extreme care shall be taken to prevent disturbing previously placed concrete which has become partially set.
4. Within forty-eight (48) hours after forms have been removed, all surfaces shall be finished as follows: Remove all fins, projections and irregularities from surfaces exposed to view. All voids and cavities on all surfaces shall be completely filled with stiff mortar of same composition and air-entrainment as the mortar in the original concrete mix. The same brand and color of cement, and the same kind and color of fine aggregate used in the original concrete mix shall be used in this mortar. The mortar shall be mixed, allowed to set for thirty (30) minutes and then remixed before placing in the work. Carefully remove surface film from these pointed areas before the mortar sets. If surfaces exposed to view do not present a uniformly smooth, clean surface of even texture and appearance when prepared in accordance with the foregoing, they shall be rubbed to obtain a satisfactory finish. Surfaces shall be wetted with clean water and rubbed with a carborundum brick without applying any cement or other

coating until smooth and uniform in appearance.

5. Protection and curing shall be accomplished by one of the applicable methods specified in Section 901 of the MassDOT Specifications.
6. The Contractor shall be responsible for the quality and strength of the concrete. Inferior concrete, including that damaged by frost action, shall be removed and replaced at no additional cost to the Owner.
7. Existing concrete work damaged by the Contractor during operations under this contract shall be restored to the original condition acceptable to the Engineer.

PART IV - GUARANTEES

4.01 WARRANTEE

- A. The Contractor shall be responsible to repair or replace any concrete exhibiting deficient materials or workmanship within one (1) year of final acceptance.

END OF SECTION

SECTION 03370

CEMENT CONCRETE PAVEMENT

PART I - GENERAL

1.01 SCOPE OF WORK

- A. The work under this Section shall include the furnishing and construction of cement concrete walks, gutters and pavement areas to the lines and grades shown on the plans and in accordance with these Specifications.
- B. Cement concrete pavements shall contain haunches, swales or gutters as indicated on the drawings and in general, shall match the widths, lines and cross sections of existing cement concrete walks to be retained.

1.02 REFERENCE STANDARDS AND SPECIFICATIONS

- A. Reference to the standards, specifications and tests of technical societies, organizations, and governmental bodies is made in the Contract Documents.
 - 1. AASHTO - American Association of State Highway and Transportation Officials (tests or specifications).
 - 2. ASTM - American Society for Testing and Materials.
 - 3. Mass. Standard Specs. - Latest edition of the Standard Specifications for Highways, Bridges and Waterways, 1988 Edition, the Commonwealth of Massachusetts, Department of Public Works, hereinafter referred to as "the MDPW Standard Specifications."

PART II - MATERIALS

2.01 GRAVEL BORROW

- A. Gravel Base as specified in Section 02355 of these Specifications.

2.02 CEMENT CONCRETE

- A. Cement Concrete as specified in Section 03300 of these Specifications.

2.03 EXPANSION JOINTS

- A. Premoulded non-extruding resilient non bituminous type filler conforming to AASHTO-M135 per Section 9.01 of these Specifications.

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CEMENT CONCRETE PAVEMENT**

2.04 SEALANT

- A. Clear, matte-finish polyurethane sealant per Section 09980 of these Specifications.

2.05 CURING COMPOUND

- A. Type 2 liquid membrane forming compound for curing concrete ASTM C-309-58.

2.06 REINFORCING

- A. All steel reinforcing and dowels, as required, shall be in conformance with Section 03300 of these Specifications. Dowels shall be incorporated at the intersection of all new and existing cement concrete walkways.

PART III - EXECUTION

3.01 SUBGRADE

- A. The subgrade for the walk shall be shaped to a true surface conforming to the proposed slope of the walk, thoroughly rolled at optimum moisture content and tamped with a power roller weighing not less than one (1) ton and not more than five (5) tons. All depressions occurring shall be filled with suitable material and again rolled or tamped until the surface is smooth and hard.

3.02 BASE

- A. After the subgrade has been prepared as herein before specified, a base of gravel borrow, at optimum moisture content, shall be placed upon it and shall be thoroughly rolled by a power roller and tamped.

3.03 FORMS

- A. The forms for one (1) course sidewalks shall be smooth, free from warp, of sufficient strength to resist springing out of shape, and of depth to conform to the thickness of the proposed walk. All mortar or dirt shall be completely removed from forms that have been previously used. The forms shall be well stacked and thoroughly braced and set to the established lines with their upper edge conforming to the grade of the finished walk, which will have sufficient pitch from the outside to the edge of the walk to provide for surface drainage, but which shall be three-eighths (3/8) inch per one (1) foot unless shown otherwise on the plans or directed by the Supervisor. Before the concrete is placed the subbase shall be thoroughly dampened so that it is moist throughout, but without puddles of water. The concrete shall be placed to as under to the final a position as

practicable with precautions taken not to overwork it while it is still plastic. The concrete shall be thoroughly spaded along the forms or screeded to eliminate voids or honeycombs at the edges.

3.04 EXPANSION JOINTS

- A. Expansion joints shall be located as shown on the plans and details and as directed by the Engineer.

3.05 CONCRETE

- A. On the base specified above, the concrete shall be thoroughly consolidated in place. Concrete shall be placed to the limits and to the depths indicated on the details. Install concrete haunches at all designated locations. In conveying the concrete from the place of mixing to the place of deposit, the operation must be conducted in such a manner so that no mortar will be lost, and the concrete must be so handled that the concrete will be of uniform composition throughout, showing neither excess nor lack of mortar in any one place. The concrete materials shall be mixed to produce a concrete of such consistency that the water will flush to the surface under heavy tamping. Retampering of the concrete will not be permitted. The application of neat cement to the surface in order to hasten hardening is prohibited. Experienced and competent cement finishers approved by the Engineer shall do the finishing of concrete surface.

3.06 FINISH

- A. No finishing operation shall be performed until all bleed water and water sheen has left the surface and the concrete has started to stiffen. After water sheen has left the surface and the concrete has started to stiffen, edging operations where required shall be completed. All tool marks shall be eliminated. After edging and jointing operations, the surface shall be floated with aluminum or magnesium floats. Immediately following floating, the surface shall be steel-troweled. After trowelling, the Contractor shall draw a fine nylon push broom lightly over the surface to produce a non-slip condition. If necessary, tooled joints and edges shall be rerun before and after trowelling to maintain uniformity and all tool marks shall be eliminated by brooming.

3.07 CURING

- A. Type 2 pigmented liquid membrane-forming curing compound shall be applied immediately following final finishing before any marked dehydration of the concrete or surface checking occurs. The compound shall be applied in one or two applications, as directed by the Engineer. When the compound is applied in two applications, the second shall follow the first within thirty (30) minutes. The compound shall be applied in a continuous film by means of power-operated

pressure spraying equipment at a rate not less than one gallon per two hundred (200) square feet of surface. Sufficient pressure shall be applied to the spray machine to force the compound to leave the nozzle as a fine spray. The material shall adhere to the surface and make a tight bond to the concrete but shall have a fugitive dye. The compound shall form a uniform continuous coherent film that will not check, crack, or peel, and be free from pinholes or other imperfections.

- B. Whenever the atmospheric temperature is ninety degrees F (90°F) or more, the Engineer shall have the right to require a second application of compound at no expense to the Town. Any section damaged by rain or in any other way before the compound has dried to a stable coating shall be retreated by the Contractor at no additional expense to the Town.
- C. Concrete surfaces to which the compound has been applied shall be protected for a period of at least three (3) days. All vehicular and pedestrian traffic is considered injurious to the film of the applied compound. Any damage to the film within the three (3) day period shall be promptly repaired by application of the compound. Adequate protection shall be provided where temperatures of forty degrees F (40°F) or lower occur during placing of concrete and during the early curing period. The minimum temperature of fresh concrete after placing and for the first three (3) days shall be maintained above fifty-five degrees F (55°F). In addition to the above requirements, an additional three (3) days of protection from freezing shall be maintained.

END OF SECTION

SECTION 03410

PRE-CAST CONCRETE BLOCK

PART I - GENERAL

1.01 SCOPE OF WORK

- A. The work to be performed under this Section consists of the furnishing of all labor, materials, equipment and transportation required to install precast concrete blocks as shown on the Contract Drawings and as specified, including excavation, removals, subgrade preparation and compaction.

1.02 SUBMITTALS

- A. Submit catalogue cuts or shop drawings of the precast concrete blocks to be furnished under this Section.
- B. Shop drawings shall provide certification of concrete aggregate, air entrainment, and total lineal footage for straight sections plan referenced.

PART II - MATERIALS

2.01 CONCRETE BLOCK

- A. All material shall be new, hard and durable concrete minimum four thousand (4000) psi with air content per ASTM C173 of a quality approved by the Landscape Architect, free from seams, depressions or other imperfections, and shall be of uniform color throughout and shall in lengths of not less than four (4) feet, except where other dimensions are given. Surfaces shall be rubbed with carborundum stone to remove all laitance or imperfections.
- B. Any form mark in excess of one-eighth (1/8) inch shall be removed.
- C. Exterior corners shall be chamfered at a 45 degree angle. Dimensions for chamfer shall be reviewed through the shop drawing process and approved prior to ordering.
- D. Protect blocks until accepted by the Owner.

2.02 MORTAR (AS REQUIRED)

- A. Mortar for joints shall be composed of one (1) part Portland Cement conforming to AASHTO M-85 and two (2) parts sand for cement mortar with sufficient water for forming a workable mixture.

2.03 CONCRETE

- A. Concrete for setting bed and keying the blocking in place shall conform to Section 03300 of these Specifications.

PART III - EXECUTION

3.01 SUBGRADE PREPARATION

- A. The subgrade shall be constructed true to grade and cross section. The subgrade shall be of materials equal in bearing quality to the subgrade under the adjacent roadway, street or open storage areas and shall be placed and compacted to conform to applicable requirements of Section 02350 of these Specifications.
- B. As applicable, the subgrade shall be tested for grade and cross section by means of a template extending the full width including blocks, gutters, and entrances.
- C. The subgrade shall be maintained in smooth compacted condition, in conformity with the required section and established grade. The subgrade shall be in a moist condition when block is set. In cold weather, the subgrade shall be prepared and protected so as to produce a subgrade free from frost when the blocking is set. All subgrade materials shall be compacted to ninety-five percent (95%) dry density per AASHTO-T-180-86 Modified Proctor tests.

3.02 SETTING PRE-CAST BLOCK AND CURB PIECES

- A. Place block sections on prepared bed area. Blocks should be set to grades and horizontal controls indicated on Contract Drawings. Note top and bottom of block spot elevations as reveals may be varied; twelve (12) inch reveal is typical for all terraced seating areas.
- B. Set blocks butt tight to each succeeding piece and no top shall project above the adjoining section by more than one eighth (1/8) inch. Pieces will be reset as required at no extra cost to the Owner.

- - - END OF SECTION - - -

SECTION 06100

ROUGH CARPENTRY

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This Section covers tools, equipment, labor, and materials necessary to perform rough carpentry work complete and miscellaneous carpentry items not specified elsewhere including fasteners and supports.
- B. Nails, screws, bolts, anchors, brackets, and other hardware for fastening and securing items provided under this section of the specification shall be furnished under this section.

1.02 RELATED WORK:

- A. Section 03300, CAST-IN-PLACE CONCRETE

1.03 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

Three sets of certificates of wood treatment upon delivery of treated wood product. Treated wood product shall bear appropriate American Wood Preservers Bureau (AWPB) quality mark.

1.04 DELIVERY:

Lumber, plywood, and other wood material shall be delivered to the job dry, and shall be protected from injury, dirt, dampness, and extreme changes of temperature and humidity at all times.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. LUMBER:

- 1. The grades of all materials under this section shall be defined by the rules of the recognized associations of lumber manufacturers producing the material specified, but the maximum defects and blemishes permissible in any specified grades shall not exceed the limitations of the American Lumber Standards.

2. Lumber shall bear the grade and trademark of the association under whose rules it is produced, and a mark of mill identification. Lumber shall be of sound stock, thoroughly seasoned, kiln dried to a moisture content not exceeding 15 percent.
3. Exposed surfaces of wood which are to be painted shall be free from defects or blemishes that will show after the second coat of paint is applied.
4. All lumber for nailers, furring, and blocking shall be seasoned No. 1 Dimension of Common pine, fir, or spruce, S4S.
5. Framing Lumber for joists, rafters, plates, headers, stair stringers and carriages, and sleepers shall be Spruce-Pine-Fir (SPF) No. 2 or better, unless noted otherwise.
6. Materials not specifically listed shall be of an accepted grade dictated by good practice.

B. WOOD PRESERVATION TREATMENT:

1. All framing exposed to weather shall be pressure treated with a pentachlorophenol preservative solution. The pentachlorophenol shall meet the requirements of the American Wood-Preserver's Association, AWPAs Standard P-8, "Standards for Oil-Borne Preservatives." The solvent carrier shall meet the requirements of AWPAs Standard P-9 "Standard for Hydrocarbon Solvents for Oil-Borne Preservatives." The preservative solution shall be equivalent to five percent of pure pentachlorophenol.
2. The treatment shall be applied in accordance with AWPAs Standard C-2 (lumber, timber, etc.), C-9 (plywood) or C-28 (lumber treated before laminating). Penetration of pentachlorophenol shall be determined using the penta check method, Section 5, AWPAs Standard A-3. Retention of pentachlorophenol shall be a minimum of 0.40 pounds per cubic foot of wood for in ground exposures. The treating company shall furnish a notarized certificate of treatment that indicates all pertinent details of the treatment.
3. Before the preservative treatment is applied, the lumber to be treated shall be sawed to exact lengths required, and bored ready for use in the work so far as practicable, in order to reduce to a minimum cutting or boring of lumber after treatment. Only lumber of the same kind and approximately the same size and seasoning shall be treated in any one charge. All surfaces of treated lumber cut after treatment shall receive two heavy brush coats of pentachlorophenol solution before the lumber is placed in the work.

C. WOOD FIRE RETARDANT TREATMENT:

1. Exposed wood blocking and sheeting shall receive fire-retardant treatment conforming to American Wood Preservers Association, AWPAC Standard C20 for lumber and AWPAC C27 for plywood.
2. Fire retardant treated lumber shall bear UL label and shall have UL Fire-Hazard Classification "FR-S", when tested in accordance with ASTM E84.
3. Material to receive interior grade fire-retardant treatment shall be pressure impregnated with "Dricol" fire-retardant chemicals manufactured by Hickson Corporation, Atlanta, Georgia, in accordance with manufacturer's instructions.

Material to receive interior grade fire retardant treatment shall be as indicated, specified, and as required by Article 9 of Massachusetts State Building Code.

PART 3 - EXECUTION

3.01 CONSTRUCTION:

- A. Work shall be erected plumb, true and square.
- B. Coordinate delivery and erection of prefabricated components. Field applied items shall be installed in accordance with good trade practices. Cutting and carpentry for other trades shall be performed. Cut ends of lumber previously treated with preservative specified shall be brush coated with the same material.
- D. Minimum length of nails shall be twice the thickness of wood being fastened and in accordance with the Massachusetts code requirements for wood frame construction.
- E. Furring, blocking, nailers, and similar items shall be provided wherever required for the support, proper erection, fastening, or installation of carpentry or other materials, and as shown on the drawings.

END OF SECTION

SECTION 06200

FINISH CARPENTRY

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This section of the specification covers furnishing tools, equipment, labor and materials necessary to perform finish carpentry work (exterior) complete, and miscellaneous carpentry items not specified elsewhere including fasteners and supports.
- B. Metal fasteners, plates, brackets, and accessories connected directly into woodwork shall be a part of this section of the specification. Nails, screws, bolts, anchors, brackets, and other similar hardware for fastening and securing woodwork and other items provided under this section of the specification shall be furnished under this section.

1.02 RELATED WORK:

- A. Section 06100, ROUGH CARPENTRY

1.03 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. Six sets of manufacturer's literature of the materials of this section shall be submitted to the Engineer for review.
- B. Three sets of samples of paneling shall be submitted to the Engineer for selection of colors.
- C. Three sets of certificate of wood treatment upon delivery of treated wood product. Treated wood product shall bear appropriate American Wood Preservers Bureau (AWPB) quality mark.

1.04 DELIVERY AND STORAGE:

Finish carpentry material shall be delivered by others to the jobsite. Contractor is responsible for acceptance of delivery and safe storage of all finish carpentry materials until installation. Materials shall be protected from injury, dirt, dampness and extreme changes of temperature and humidity at all times.

PART 2 - PRODUCTS

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FINISH CARPENTRY

2.01 MATERIALS:

- A. The grades of all materials under this section shall be defined by the rules of the recognized associations of lumber manufacturers producing the material specified, but the maximum defects and blemishes permissible in any specified grades shall not exceed the limitations of the American Lumber Standards. Materials not specifically listed shall be of an accepted grade dictated by good practice.
- B. Lumber shall bear the grade and trademark of the association under whose rules it is produced, and a mark of mill identification. Finished woodwork shall be of sound stock, thoroughly seasoned, kiln dried to a moisture content not exceeding 12 percent.
- C. Finish carpentry and millwork, in general, shall comply with the following sections, as applicable, of the Architectural Woodwork Quality Standards, Guide Specifications and Quality Certification Program as published by the Architectural Woodwork Institutes for Material and Work of "Custom Grade":

| | |
|--------------|--|
| Section 100 | Lumber |
| Section 200 | Plywood |
| Section 300 | Trim |
| Section 400B | Architectural Cabinets (Laminate Clad) |
| Section 400C | Architectural Cabinets (Tops) |
| Section 600 | Shelving |

- D. Wood trim shall be solid stock, in commercial long lengths.
- E. Wood Decking refer to Section XXXX

PART 3 - EXECUTION

3.01 CONSTRUCTION:

- A. Work shall be erected plumb, true and square. Finish work shall be accurately mitered or butted to meet in straight hairline joints, in accordance with the best commercial practice.
- B. All exterior wood trim shall be fully back primed prior to installation. Prime cut edges after installation and prior to application of additional wood members.
- C. Finish nails shall be used on all exposed trim. Stainless steel pre-drilled screws shall be used on all exterior finish decking. Screw and nail patterns shall be consistent and evenly spaced throughout.

- D. Minimum length of nails shall be twice the thickness of wood being fastened. Nail heads in finished work shall be sunk neatly with a nail set and the resulting hole filled with putty. Fasteners in items such as mouldings shall be concealed.
- E. Exposed surfaces of woodwork shall be machine sanded to an even, smooth surface, free of defects, blemishes, machine or tool marks, abrasions, dirt, smudges, or raised grain. Adequate protection shall be provided as necessary to prevent damage or staining of carpentry items.
- F. Woodwork abutting masonry or other finish materials shall be scribed and fitted as tightly to abutting material as is possible without damaging it.

END OF SECTION

SECTION 16000

ELECTRICAL

PART I – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions, apply to work of this section.
- B. The Contractor must be familiar with all other Sections of this specifications and the associated Drawings, which affect the scope of work. The General Conditions, all Supplementary and Special Conditions, and all other sections of this specification shall be adhered to, as they apply to this Section. Where paragraphs of this Section conflict with similar paragraphs elsewhere, the more stringent requirements shall prevail.

1.02 DESCRIPTION OF WORK

- A. The Contractor shall furnish a complete finished product, which meets all applicable codes and standards, and the intent and specific requirements of the Drawings and specifications for this project. It is the intent of these specifications that the electrical system shall be suitable in every way for the service (and use) required. All materials and all work, which may be reasonably implied as being incidental to the work of this Section, shall be furnished at no extra cost to the Owner.
- B. As used in this Section, “*provide*” means “furnish and install”, “*furnish*” means “to purchase and deliver to the project site complete with every necessary appurtenance and support”, and “*install*” means “to unload at the delivery point at the site and perform every operation necessary to establish secure mounting and correct operation at the proper location in the project”.
- C. Perform work and provide (furnish and install) material and equipment as shown on Drawings and as specified, or indicated, in this Section of the specifications. Completely coordinate work of this Section with work of other trades and provide a complete and fully functional installation. Drawings and specifications form complimentary requirements; provide work specified and not shown, and work shown and not specified as though explicitly required by both. Although work is not specifically shown or specified, provide supplementary or miscellaneous items, appurtenances, devices and materials obviously necessary for a sound, secure and complete installation.
- D. Remove all debris caused by Contractors’ work.

- E. Provide demolition and relocation of existing electrical items as shown on the drawings.
- F. The work under this section shall require that the Contractor provide all labor, materials, equipment, tools, supplies and transportation involved in the installation of electrical equipment as specified.
- G. The work to be done under this contract generally includes, but is not limited to the following:

Electrical Demolition

1. Remove and dispose existing utility poles with overhead wires and accessories.

Electrical System

2. Provide new Electrical Cabinet for splash pad controls on new cast-in-place concrete foundation at Nipper Maher Park. Foundation to include reinforcement, conduit stubs and grounding, per local and NEC requirements. Provide 1P/20A feed from existing panelboard to splash pad controller. Install splash pad controller per manufacturer's instructions.
3. Provide 1-3" conduit for future electric and cable for 200A, 1-phase, 3-wire service to proposed concrete pad for future building (by others) at Falzone Park. Provide 1-2" conduit for underground telephone line.
4. Provide all necessary grounding, including one ground rod at electrical cabinet location as required by utility company and NEC.
5. Provide startup services for splash pad system.
6. Provide other associated electrical equipment necessary for a complete system, shown, or implied in these Specifications and on Contract Drawings.
7. Coordinate with the local electric utility (NStar Electric) for new underground service to site, installation of new conduit, secondary service, pole removal and metering requirements. Coordinate with Verizon for underground relocation of telephone cable and pole removal.

1.03 SITE VISIT

- A. Each bidder shall visit the site of the proposed work and fully acquaint himself with the conditions there relating to construction and labor, and should fully inform himself as to the facilities involved, and the difficulties and restrictions attending the performance of the Contract. The Bidder should thoroughly examine and familiarize himself with Drawings, Technical Specifications and all other Bid and Contract Documents. The Contractor, by the execution of the Contract, shall in no way be relieved of any obligation under it due to his failure to receive or examine any form or legal document or to visit the site and acquaint himself with the conditions there existing and the Owner will be justified in rejecting any claim thereof.

1.04 AS-BUILT DRAWINGS:

- A. After completion of the electrical installation, the Contractor shall furnish an "as-built" drawings showing all conduits, cables, cabinets, transformers, light poles, etc. to scale with dimensions where required. Instruction sheets and parts lists covering all operating equipment will be bound into a folder and furnished to the Owner in duplicate.

1.05 INSTRUCTIONS:

- A. Within 10 days, after completion and testing of the system, the Contractor will instruct the Owner's personnel in the proper operations and maintenance of the system, in a 2 hour training session.

1.06 GUARANTEE

- A. Guarantee work of this Section in writing for one year from date of Owner's acceptance. Repair or replace defective materials, equipment, workmanship and installation that develop within this period, promptly and to Owner's satisfaction and correct damage caused in making necessary repairs or replacements under guarantee with no extra cost to Owner. Contractor shall transfer all equipment warranties for lighting and other systems to Owner.

1.07 REFERENCE STANDARDS AND SPECIFICATIONS

- A. Perform work strictly as required by rules, regulations, standards, codes, ordinances, and laws of local, state, and federal government, and other authorities that have lawful jurisdiction.
- B. All materials and installations shall be in accordance with the latest edition of the Massachusetts Electrical Code, and all applicable local codes and ordinances. Materials and equipment shall be listed by Underwriters Laboratories (UL). Special Attention shall be paid to the latest edition of the following standards:

| | |
|---|------|
| American National Standards Institute | ANSI |
| American Society for Testing & Materials | ASTM |
| Illuminating Engineering Society | IES |
| Institute of Electrical & Electronics Engineers | IEEE |
| Insulated Cable Engineers' Association | ICEA |
| National Electrical Code | NEC |
| National Electrical Manufacturer's Association | NEMA |
| National Electrical Safety Code | NESC |
| InterNational Electrical Testing Association | NETA |
| National Fire Protection Association | NFPA |
| Occupational Safety & Health Administration | OSHA |
| Underwriter's Laboratories, Inc. | UL |

- C. The above listed codes and standards are referenced to establish minimum requirements and wherever this Section requires higher grades of materials and workmanship than required by the listed codes and standards, this Section shall apply. In the event a conflict occurs between the above listed codes and standards and this Section, the more stringent requirement shall govern.

1.08 SUBMITTALS

- A. Within 10 days after Award of General Contract, submit shop drawings and product data on below listed items for approval. Submit copies as requested.
- B. Check, stamp and mark with project name shop drawings and product data before submitting for approval. Specifically indicate on shop drawing transmittal form, or by separate letter any deviations from Contract Documents because of standard shop practice or other reason. Rectify with no extra cost to Owner, deviations which escape Engineer's scrutiny and have not been indicated on shop drawings.
- C. List of materials and equipment requiring shop drawings shall include:
1. Conduits and Wiring
 2. Service Cabinets and Equipment
 3. Circuit Breakers
 4. Handholes & Manholes
- 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.

- E. The Contractor shall furnish at least two (2) complete sets of operating and instruction manuals for the equipment provided under this Contract. These manuals shall detail the operation, testing, and maintenance of the electrical equipment and systems. Manuals shall be provided upon Engineer's request or upon project completion, whichever comes first.

1.09 INSPECTIONS AND FEES

- A. Obtain all necessary permits and licenses, file necessary plans 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 NStar Electric. Contractor is responsible for coordinating Work Order process with local utility and obtaining all utility approvals. Contractor is also responsible for obtaining any site-specific utility requirements for this project prior to the start of construction and notifying local utility for all inspections prior to backfilling, etc.

1.10 INTERPRETATION OF DRAWINGS

- A. Drawings are diagrammatic and indicate general arrangement of systems and work included in Contract. Drawings are not intended to specify or show every offset, fitting or component; however, Contract Documents require components and materials whether or not indicated or specified as necessary to make installation complete and operational.
- B. Any work installed contrary to, or without review by, the Engineer shall be subject to change as directed by the Engineer, and no extra compensation will be allowed for making these changes.
- C. Circuit layouts are not intended to show the number of fittings, or other installation details. Additional circuits shall be installed wherever needed to conform to the specific requirements of the equipment or local codes.
- D. As work progresses and for duration of Contract, maintain complete and separate set of prints of Contract Drawings at job site at all times. Record work completed and all changes from original Contract Drawings clearly and accurately, including work installed as a modification or addition to the original design.

1.11 ELECTRIC UTILITY

- A. The Electric Utility for this project is NStar 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.

1.12 TELEPHONE UTILITY

- B. The Telephone Utility for this project is Verizon. All coordination with the Telephone Utility is the responsibility of the Contractor. All work and materials for the electric service shall be in accordance with the requirements of the Telephone Utility, and are to be met under this Section and included in the bid price of the Contractor.

PART II – MATERIALS & PRODUCTS

2.01 GENERAL

- A. Materials and products furnished shall be designed for the intended use, shall meet all requirements of the latest edition of the National Electric Code (NEC), and all local codes.
- B. Materials shall be manufactured in accordance with the standards indicated in this Section, and typical industry standards and codes for the products specified. Materials and equipment shall be Underwriter's Laboratory (UL) listed.
- C. The materials used shall be new, unused, and of the best quality for the intended use. All equipment shall have the manufacturer's name, address, model or type designation, serial number and all applicable ratings clearly marked thereon in a location which can be readily observed after installation. The required information should be marked on durable nameplates that are permanently fastened to the equipment.
- D. Electrical equipment shall at all times during construction be adequately protected against mechanical injury or damage by water. Electrical equipment shall not be stored outside exposed to the elements. If any equipment or apparatus is damaged, such damage shall be repaired at no additional cost, or replaced at no additional cost as directed by the Engineer.

2.02 RACEWAYS

- A. Rigid Metallic Conduit: UL6 and ANSI C80.1.
- B. Flexible Metallic Conduit: UL1. Liquidtight flexible metal conduit shall be used in wet locations.
- C. Polyvinyl Chloride (PVC) Conduit, electrical, gray, Schedule 40 or Schedule 80 as specified, meeting the requirements of UL 651 and NEMA TC-2. If concrete encasement is required, a minimum of 3,000 psi concrete shall be used. All conduits placed under roadways, and subject to vehicular traffic, shall be concrete-encased Schedule 40 (or Schedule 80 as approved).

- D. Minimum size of conduit shall be 3/4". Unless indicated on Drawings, conduit sizes can be sized in accordance with National Electric Code (NEC). Conduit bends shall not have kinks or flats, and shall not be less than standard radii.
- E. Rigid Galvanized Steel (RGS) conduit shall be used for all power, control signal, and instrumentation wiring, except where noted. Conduit shall be fully threaded at both ends and each length shall be furnished with one threaded coupling. All 90 degree conduit sweeps shall be RGS for all entry and exit into concrete pads and at riser poles, with ground bushings connected to new grounding with minimum #4Awg ground wire for conduit grounding bushings.
- F. Conduits shall be made electrically continuous at coupling and connections to boxes and cabinets by means of joining fasteners or copper bond wires. Conduit shall be connected to grounded structural steel or the ground network. After assembly all conduit locknuts, all EMT coupling fittings, and all bond wire screws shall be set up tight before installation of wiring. Insulated metallic bushings shall be used on all conduits entering panel cabinets, pull-boxes, and wiring gutters, except on branch lighting circuits.
- G. Expansion fittings shall be provided on all conduits as required by the 2008 National Electrical Code, and as required by local and state codes. This includes, but is not limited to, vertical conduit risers coming from below-grade.

2.03 WIRE AND CABLE

- A. Unless otherwise noted, conductors for power, lighting, and grounding *above grade* shall be No. 12 through No. 8 AWG, NEC type THWN/THHN, meeting the requirements of UL 83. Conductors for power and lighting shall be no smaller than No. 12 AWG.
- B. Conductors for power, lighting, grounding, and control *below grade* (and in wet locations) shall be No. 2 AWG and larger, NEC type XHHW (or XHHW-2), meeting the requirements of NEMA WC7 and ICEA S-66-524.
- C. All conductors shall be annealed copper, 98% conductivity, Class B stranded, except conductors used for power and lighting circuits No. 10 AWG and smaller which may be solid. All conductors should be rated for 600 volts or less, with a thermal rating of 90° C.
- D. The outside covering of all wiring for power, lighting, grounding, and control uses shall be color coded to identify polarity as follows:

| | 208Y/120 V. 3 Phase | 240D/120 V 3 Phase | 480Y/277 V 3 Phase |
|---------|------------------------|-----------------------|-----------------------|
| Phase A | Black | Black | Brown |

| | | | |
|---------|-------|--------|--------|
| Phase B | Red | Red | Orange |
| Phase C | Blue | Orange | Yellow |
| Neutral | White | White | Gray |
| Ground | Green | Green | Green |

2.04 WIRE AND CABLE CONNECTORS AND DEVICES

- A. Wire and cable connectors and devices shall meet the requirements of UL 486. Connectors, including miscellaneous nuts, bolts, and washers shall be silicon bronze. Ferrous materials shall not be used.

2.05 BOXES

- A. Outlet and Switch Boxes: NEMA OS 1.
- B. Pull Boxes, Junction Boxes, and Equipment Enclosures: NEMA ICS 6.
- C. Pull boxes, junction boxes, and equipment enclosures shall be of NEMA Type 1 construction for indoor use, and NEMA Type 3R construction for outdoor or wet location use, unless otherwise noted.
- D. Box sizes shall not be less than that required by the Massachusetts Electrical Code.

2.06 WIRING DEVICES

- A. Wiring Devices: NEMA WD 1.
- B. Wiring devices for shall be specification grade, 20 ampere, ivory with Type 302 stainless steel plates. Ground fault current interrupting (GFCI) devices shall be provided where specified and/or required by applicable codes.

2.07 PANELBOARD CIRCUIT BREAKERSS

- A. Panelboard circuit breakers are to match existing type, in new sizes as indicated on Contract Drawings.

2.08 WARNING TAPE

- A. Warning tape shall be six (6) inches wide, polyethylene not less than 3.5 mil thick with a minimum strength of 1,500 psi. Install 8 inches below final grade. Tape shall be red for

electric conduit, and red or yellow for communication conduit. Tape shall have black lettering on two lines as indicated below:

- B. For Electric conduit:

CAUTION CAUTION CAUTION
BURIED ELECTRIC LINE BELOW

- C. For Telephone, Fire Alarm and Communication conduit:

CAUTION CAUTION CAUTION
BURIED COMMUNICATION LINE BELOW

2.09 ELECTRIC HANDHOLES

- A. Electric Handholes are to be strong, lightweight, and non-conductive, and provided in the dimensions as shown on the Contract Drawings. Electric Handholes shall be Ultraviolet (UV) resistant, along with being unaffected by moisture, freezing temperatures, soil, and sub-soil chemicals. Electric Handholes to be fiberglass composite, as approved by Engineer. Minimum handhole size is 24"W x 36"L x 22"D.
- B. Handholes shall be provided with skid-resistant surface covers, with an "Electric" logo. Handholes and Covers shall be design for street-rated, heavy duty applications, meeting the requirements of the either: AASHTO HS-20 or ANSI/SCTE 77-220 Tier 15 loading, with a minimum design load of 22,500 lbs for both the handhole box and cover. . Covers shall include recessed stainless steel captive bolts of a penta-head design. The nuts for the bolts shall be self-centering and corrosion resistant. Handholes shall meet the requirements of the latest edition of the National Electric Code (2008 or later) with regards to structural integrity, installation methods, grounding of the cover and metallic parts, etc. Handholes shall be UL listed for the intended use.
- C. Color of electric handholes and covers to be green in grass areas and gray in sidewalk areas, as approved by Engineer. Handholes to be installed flush with final grade. A layer of 6-inches of crushed rock shall be installed in the bottom of each handhole to assist with drainage, and this compacted gravel base material shall extend out beyond the sidewalls of the handhole. Conduits shall sweep up and be at least 4-inches above top of crushed rock layer.

2.10 ELECTRICAL ENCLOSURE & CABINETS

- A. Provide one (1) outdoor NEMA 3R stainless steel, to contain splash pad controller and associated electrical equipment, etc.
- B. Contractor to size cabinet to coordinate with sizes of equipment to be installed within cabinets, including splash pad controller. Dimensions shown are typical and are for reference only. Cabinet to allow installation and removal of all electrical equipment with

no interference between equipment. All equipment doors shall open 90 degrees. Electrical Cabinet doors to be provided with stay-open door catches. Contractor is responsible for coordinating size of this equipment prior to submitting Electrical Cabinet for approval.

- C. Cabinets to be manufactured from 14 gauge minimum stainless steel with 12 gauge steel back panel, mounted inside. Cabinets to have integral keyed locking mechanism, keyed alike, with provision for pad-lock. Cabinets shall be ventilated type and factory painted black powder-coat.

2.11 CAST-IN-PLACE CONCRETE FOUNDATION

- A. Provide the materials, labor and equipment necessary for the installation of the following cast-in place concrete foundations, in accordance with these Specifications, Contract Drawings, Utility & City requirements and all applicable codes & regulations.
 - 1. Electrical Cabinet Foundation: complete with reinforcing rebar, ground rods, grounding connectors, conduit entrances, etc. as shown and as directed by Owner or Engineer. Contractor responsible for coordinating foundation dimensions to be 6-inches wider than cabinet base dimensions, on all four sides. Cabinet grounding to include a buried loop on all four sides, connected to the two buried ground rods as shown.
- B. Foundations shall be built with 3,000 psi. minimum concrete, on a base of crushed gravel and sand, as shown.
- C. Reinforcing rod to be #3 or #4 (as shown) grade 60 bars and shall conform to ASTM A-615 (latest revision). Reinforcing rods shall not be installed any closer than 2" from the face of the concrete.
- D. Provide grounding in the form of one (1) 5/8" diameter x 8'-0" long copperweld ground rod for each foundation, connected with a loop of #1/0-#4/0 Awg bare copper stranded ground wire (as shown), leaving a 3 foot long tail to ground the enclosure, transformers, etc. Buried loop for Electrical Cabinet to be buried approx. 6-8" below finished grade, offset approximately 12-inches from the edge of concrete foundation on all four sides.

PART III – EXECUTION

3.01 GENERAL

- A. This Section covers the requirements for installation of materials, proper workmanship, testing, cleaning, grounding, and work methods to be followed by the Contractor. This Section also includes specific instructions and to be used in conjunction with the contract Drawings. Any discrepancies noted between the specification, Drawings, and actual installation shall be reported immediately to the Owner, Engineer, and Architect. Failure

on the part of the Contractor to report discrepancies immediately will be considered negligent and Contractor will be responsible for correcting actions at no cost to Owner.

- B. Contractor is responsible for coordinating work with other trades, Owner, and Architect's schedule. Work will be coordinated such that systems can be properly located, and conflicts and delays are avoided. Contractor shall consider commencement of work acceptance of existing conditions.

3.02 MATERIALS AND WORKMANSHIP

- A. Work shall be executed in workmanlike manner and shall present neat, rectilinear and mechanical appearance when completed. Do not run raceway exposed unless shown exposed on Drawings. Material and equipment shall be new and installed according to manufacturer's recommended best practice so that complete installation shall operate safely and efficiently.

3.03 CONTINUITY OF SERVICES

- A. Do not interrupt existing services without Owner's, Utilities, Engineer's and Architect's approvals.

3.04 TESTING, INSPECTION AND CLEANING

- A. Test wiring and connections for continuity and grounds before fixtures are connected; demonstrate insulation resistance by megger test as required at not less than 500 volts. Insulation resistance between conductors and grounds for secondary distribution systems shall meet National Electrical Code (NEC) and interNational Electrical Testing Association (NETA) requirements.
- B. Verify and correct as necessary: voltages, tap settings, trip settings and phasing on equipment from secondary distribution system to point of use. Test secondary voltages at transformers, bus in panelboards, and at other locations on distribution systems as necessary. Test secondary voltages under no-load and full-load conditions.
- C. Test lighting fixtures with specified lamps in place for 100 hours. Replace lamps that fail within 90 days after acceptance by Owner at no extra cost to Owner (no exceptions).
- D. Provide necessary testing equipment and testing services.
- E. Failures or defects in workmanship or materials revealed by tests or inspection shall be corrected promptly and retested. Replace defective material.

- F. Clean panels and other equipment. Panelboard interiors shall be cleaned and vacuumed. Equipment with damage to painted finish shall be repaired to Engineer's or Architect's satisfaction. After completion of project, clean exterior surfaces of electrical equipment.

3.05 WIRING METHODS

- A. Install wire and cables in approved raceways as specified and as approved by authorities that have jurisdiction.
- B. Follow homerun circuit numbers and/or notes as shown on Drawings to connect circuits to panelboards. Where homerun circuit numbers are not shown on Drawings, divide similar types of connected loads among phase buses so that currents are approximately equal in normal usage.
- C. Run concealed conduit in as direct lines as possible with a minimum number of bends of longest possible radius. Run exposed conduit parallel to or at right angles to building/field lines. Bends shall be free from dents or flattening. The exact locations and routing of conduit shall be determined by the Contractor subject to the approval of the Owner and Engineer.
- D. Polarity of all electrical connections shall be observed in order to preserve phase relationship in all feeders and equipment.
- E. Splices shall be made in neat, workmanlike manner using approved mechanical connectors. After splicing, insulation equal to that on the spliced wires shall be applied at each splice. Splices are permitted only in junction boxes, outlet boxes, or other permanently accessible locations. Splices installed in electric handholes shall be weather and waterproof, pre-molded polymer splices. Hand taping of splices below-grade is not acceptable.

3.06 GROUNDING

- A. Bond and ground equipment and systems connected under this Section in accordance with standards of the NEC and other applicable regulations and codes.
- B. Conduit system shall be electrically continuous throughout, grounded at service entrance. Equipment frames, enclosures, boxes, etc. shall be grounded by use of green-jacketed (or bare copper) ground, sized as per Table 250-95 of the NEC.
- C. Green bonding jumper shall be installed in flexible conduits.
- D. Copper fittings for ground connections shall conform to the requirements of ASTM B 30. All bolts, u-bolts, cap screws, nuts, and lock washers for copper fitting shall be of approved corrosion-resisting material. Compression connectors required for all below-

grade grounding connections. Exothermic (cad-weld) connectors are also acceptable for use below grade. The use of bolted grounding and ground rod connectors below grade is not acceptable.

- E. Ground Rods shall be 5/8" diameter and 8' in length, copperweld as required by applicable codes (NEC, NESC). Bonding connections to ground rods shall be permanent, welded or crimped, with copper connectors. All wire used for grounding shall be no smaller than #4 Awg copper, stranded conductor. Contractor shall bond all meter enclosure cabinets, meter sockets, safety disconnects, conduit grounding bushes, etc. .

3.07 EXECUTION – INSTALLATION OF ELECTRICAL EQUIPMENT

- A. Contractor to Furnish and Install the following major electrical components, and all necessary minor and expected accessories.
- B. Contractor to meet with local wiring inspector prior to the start of any work and obtain any local site requirements and restrictions, which must be followed. Contractor shall also meet with local utility, any other Town/City officials, as directed by Owner and wire inspector, prior to the start of work, or ordering of materials. Failure to meet with the local officials and utility prior to ordering materials and start of construction will be considered negligent and all necessary corrections resulting from this failure will be at no cost to Owner.
- C. Provide, furnish and install all products and work outlined in Paragraph 1.02.G of this Specification Section.
- D. Provide all grounding of electrical cabinet installations and Tennis Court lighting. Grounding to be installed per installation details and National Electrical Code.
- E. Balance the lighting, receptacle and electrical load evenly on all circuits and on all phases of each circuit.
- F. Provide new handholes and conduit system for lighting and electrical and irrigation work, in locations as shown on Contract Drawings.
- G. Install all equipment in locations as shown on Contract Drawings. All deviations must be approved, in advance by Town/City, Architect and Engineer.
- H. Install all equipment per manufacturer's instructions.
- I. Clean-up excavated areas, and restore with new loam & seed, as directed by Architect.
- J. Provide complete "As-Built" drawings to Engineer & Owner.

END OF SECTION

City of Waltham, Massachusetts
PARKS & RECREATION DEPARTMENT
James Falzone Memorial Park

901 Trapelo Road

&

Nipper Maher Park Phase 6

65 Dartmouth Street

Improvements

NOVEMBER 2012

PLANS FOR CONSTRUCTION

CONSTRUCTION
DOCUMENTS

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F-PL. 0 PLANTING PLAN

NIPPER MAHER PARK PHASE 6

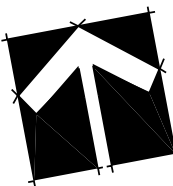
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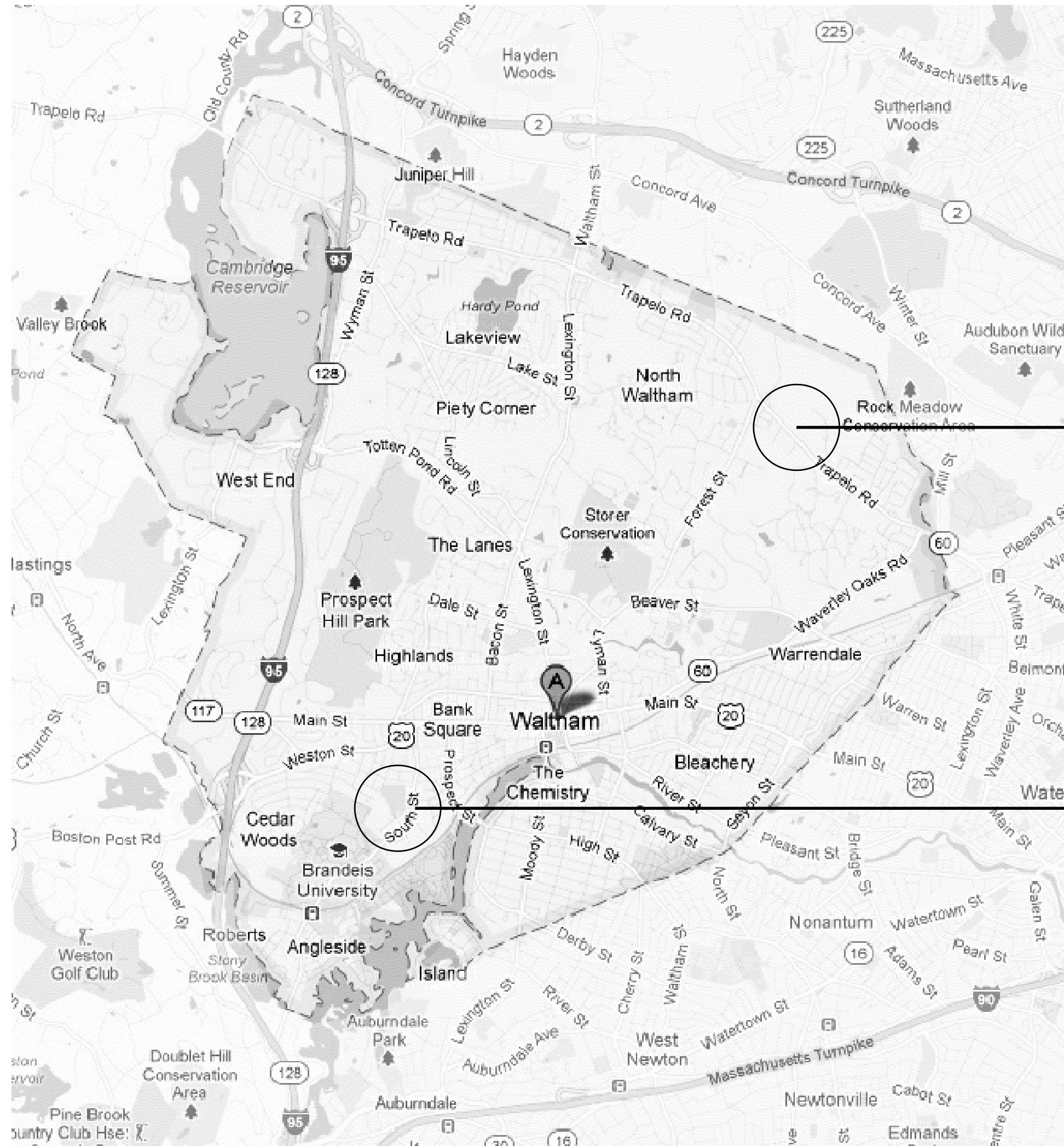
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North



James Falzone Memorial Park

Nipper Maher Park

GENERAL NOTES

- REFER TO INDIVIDUAL PLANS FOR SURVEY NOTES AND LEGENDS.
- LOCATIONS OF ANY UTILITIES SHOWN ON THIS PLAN ARE APPROXIMATE ONLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND PROTECTING ALL EXISTING UTILITIES AND REPAIRING ANY DAMAGE DONE DURING CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON-SITE COORDINATION WITH UTILITY COMPANIES AND PUBLIC AGENCIES AND FOR OBTAINING ALL REQUIRED PERMITS AND PAYING ALL REQUIRED FEES. IN ACCORDANCE WITH M.G.L. CHAPTER 82, SECTION 40, INCLUDING AMENDMENTS, CONTRACTORS SHALL NOTIFY ALL UTILITY COMPANIES AND GOVERNMENT AGENCIES IN WRITING PRIOR TO EXCAVATION. CONTRACTOR SHALL ALSO CALL "DIG SAFE" AT (888) 344-7233 NO LESS THAN 72 HOURS, (EXCLUSIVE OF WEEKENDS AND HOLIDAYS), PRIOR TO SUCH EXCAVATION. DOCUMENTATION OF REQUESTS SHALL BE PROVIDED TO PROJECT REPRESENTATIVE PRIOR TO EXCAVATION WORK.
- CONSULT ALL OF THE DRAWINGS AND SPECIFICATIONS AND COORDINATE REQUIREMENTS BEFORE COMMENCING CONSTRUCTION. CONTRACTOR AND SUB-CONTRACTOR SHALL BE FAMILIAR WITH ALL DRAWINGS PRIOR TO COMMENCING THE CONSTRUCTION.
- CONTRACTOR SHALL BE RESPONSIBLE FOR REVIEWING ALL DRAWINGS AND SPECIFICATIONS TO DETERMINE THE EXTENT OF EXCAVATION AND DEMOLITION REQUIRED TO RECEIVE SITE IMPROVEMENTS.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR VISITING THE SITE AND REVIEWING THE ABOVE NOTED DRAWINGS AND ASSUMES RESPONSIBILITY OF VERIFYING ALL EXISTING CONDITIONS AND MATERIALS SHOWN WITHIN THE PROJECT CONTRACT LIMITS BEFORE BIDDING.
- ANY DISCREPANCIES OR CONFLICTS BETWEEN THE DRAWINGS AND EXISTING CONDITIONS, EXISTING CONDITIONS TO REMAIN, TEMPORARY CONSTRUCTION, PERMANENT CONSTRUCTION AND WORK OF ADJACENT CONTRACTS SHALL BE BROUGHT TO THE ATTENTION OF THE OWNER BEFORE PROCEEDING. ITEMS ENCOUNTERED IN AREAS OF EXCAVATION THAT ARE NOT INDICATED ON THE DRAWINGS, BUT ARE VISIBLE ON SURFACE, SHALL BE THE CONTRACTOR'S RESPONSIBILITY AND SHALL BE REMOVED AT NO ADDITIONAL COST TO THE OWNER.
- ANY ALTERATIONS TO THESE DRAWINGS MADE IN THE FIELD DURING CONSTRUCTION SHALL BE RECORDED BY THE GENERAL CONTRACTOR ON "AS-BUILT" DRAWINGS.
- ALL AREAS DISTURBED BY THE CONTRACTOR'S OPERATIONS OUTSIDE THE PROJECT TERMINI, SHALL BE RESTORED TO THE ORIGINAL CONDITION BY THE CONTRACTOR AT NO ADDITIONAL COST TO AND TO THE SATISFACTION OF THE OWNER.
- THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PROTECT HIS EMPLOYEES, AS WELL AS PUBLIC USERS FROM INJURY DURING THE ENTIRE CONSTRUCTION PERIOD USING ALL NECESSARY SAFEGUARDS, INCLUDING BUT NOT LIMITED TO, THE ERECTION OF TEMPORARY WALKS, STRUCTURES, PROTECTIVE BARRIERS, COVERING, OR FENCES AS NEEDED.
- THE CONTRACTOR SHALL SUPPLY THE OWNER WITH THE NAME OF THE OSHA "COMPETENT PERSON" PRIOR TO CONSTRUCTION.
- FILLING OF EXCAVATED AREAS SHALL NOT TAKE PLACE WITHOUT THE PRESENCE OR PERMISSION OF THE OWNER.
- EXISTING TREES TO REMAIN SHALL BE PROTECTED FROM CONSTRUCTION ACTIVITIES. NO STOCKPILING OF MATERIAL, EQUIPMENT OR VEHICULAR TRAFFIC SHALL BE ALLOWED WITHIN THE DRIP LINE OF TREES TO REMAIN. NO GUYS SHALL BE ATTACHED TO ANY TREE TO REMAIN. WHEN NECESSARY OR AS DIRECTED BY THE ENGINEER, THE CONTRACTOR SHALL ERECT TEMPORARY BARRIERS FOR THE PROTECTION OF EXISTING TREES DURING CONSTRUCTION.
- NO FILLING SHALL OCCUR AROUND EXISTING TREES TO REMAIN WITHOUT THE APPROVAL OF THE OWNER OR OWNER REPRESENTATIVE.
- ANY QUANTITIES SHOWN ON PLANS ARE FOR COMPARATIVE BIDDING PURPOSES ONLY. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VISIT THE PROJECT SITE TO VERIFY ALL QUANTITIES AND CONDITIONS PRIOR TO SUBMITTING BID.
- THE LAYOUT OF ALL NEW WALKWAYS AND THE GRADING OF ALL SLOPES AND CROSS SLOPES SHALL CONFORM TO THE COMMONWEALTH OF MASSACHUSETTS RULES AND REGULATIONS FOR HANDICAP ACCESS CMR 521, AND THE AMERICANS WITH DISABILITIES ACT (ADA), TITLE 3. THE CONTRACTOR SHALL NOTIFY THE OWNER IMMEDIATELY OF ANY DISCREPANCIES BETWEEN ACTUAL CONDITIONS AND THOSE REQUIRED.
- ALL EXISTING DRAINAGE FACILITIES TO REMAIN SHALL BE MAINTAINED FREE OF DEBRIS, SOIL, SEDIMENT, AND FOREIGN MATERIAL AND OPERATIONAL THROUGHOUT THE LIFE OF THE CONTRACT. REMOVE ALL SOIL, SEDIMENT, DEBRIS AND FOREIGN MATERIAL FROM ALL DRAINAGE STRUCTURES, INCLUDING BUT NOT LIMITED TO, DRAINAGE INLETS, MANHOLES AND CATCH BASINS WITHIN THE LIMIT OF WORK AND DRAINAGE STRUCTURES OUTSIDE THE LIMIT OF WORK THAT ARE IMPACTED BY THE WORK FOR THE ENTIRE DURATION OF CONSTRUCTION.
- CONTRACTOR'S STAGING AREA MUST BE WITHIN THE CONTRACT LIMIT LINE. ANY OTHER AREAS THAT THE CONTRACTOR MAY WISH TO USE FOR STAGING MUST BE COORDINATED WITH THE OWNER.
- CONTRACTOR SHALL COORDINATE ALL WORK WITH THE CITY OF WALTHAM'S DEPARTMENT OF RECREATION.

EROSION AND SEDIMENT CONTROL NOTES

- ALL SEDIMENT AND EROSION CONTROL DEVICES SHALL BE PUT INTO PLACE PRIOR TO BEGINNING ANY CONSTRUCTION OR DEMOLITION.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CONTINUAL MAINTENANCE OF ALL CONTROL DEVICES THROUGHOUT THE DURATION OF THE PROJECT AT NO ADDITIONAL COST TO THE OWNER.
- CONTRACTOR SHALL MEET ALL OF THE STATE OF MASSACHUSETTS D.E.P. AND THE CITY OF WALTHAM'S WETLAND ORDINANCE REGULATIONS FOR SEDIMENT AND EROSION CONTROL.
- EXCAVATED MATERIAL STOCKPILED ON THE SITE SHALL BE SURROUNDED BY A RING OF UNBROKEN SEDIMENT AND EROSION CONTROL FENCE. THE LIMITS OF ALL GRADING AND DISTURBANCE SHALL BE KEPT TO A MINIMUM WITHIN THE APPROVED AREA OF CONSTRUCTION. ALL AREAS OUTSIDE OF THE LIMIT OF CONTRACT SHALL REMAIN TOTALLY UNDISTURBED UNLESS OTHERWISE APPROVED BY OWNER'S REPRESENTATIVE.
- ALL CATCH BASINS AND DRAIN GRATES WITHIN LIMIT OF CONTRACT SHALL BE PROTECTED WITH FILTER FABRIC DURING THE ENTIRE DURATION OF CONSTRUCTION.
- EROSION CONTROL BARRIERS TO BE INSTALLED AT THE TOE OF SLOPES. SEE GRADING & DRAINAGE PLANS, NOTES, DETAILS AND SPECIFICATIONS.
- ANY AREA OUTSIDE THE PROJECT LIMIT THAT IS DISTURBED SHALL BE RESTORED TO ITS ORIGINAL CONDITION AT NO COST TO THE OWNER.
- THE CONTRACTOR SHALL PROVIDE DUST CONTROL FOR CONSTRUCTION OPERATIONS AS APPROVED BY OWNER.
- ALL POINTS OF CONSTRUCTION EGRESS OR INGRESS SHALL BE MAINTAINED TO PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC/PRIVATE ROADS.
- SILT FENCE LINES AND L.O.P. LINES ARE SHOWN SEPARATELY GRAPHICALLY FOR CLARITY. IT IS UNDERSTOOD THAT THESE WILL HAPPEN AT THE SAME LOCATION.

DEMOLITION & SITE PREPARATION NOTES

- THE CONTRACTOR SHALL INCLUDE IN THE BID THE COST OF REMOVING ANY EXISTING SITE FEATURES NECESSARY TO ACCOMPLISH THE CONSTRUCTION OF THE PROPOSED SITE IMPROVEMENTS. THE CONTRACTOR SHALL ALSO INCLUDE IN THE BID THE COST NECESSARY TO RESTORE SUCH ITEMS IF THEY ARE SCHEDULED TO REMAIN AS PART OF THE FINAL SITE IMPROVEMENTS. REFER TO PLANS AND DETAILS TO DETERMINE EXCAVATION AND DEMOLITION REQUIRED TO RECEIVE PROPOSED SITE IMPROVEMENTS AND TO DETERMINE THE LOCATION OF PROPOSED SITE IMPROVEMENTS.
- THE OWNER RESERVES THE RIGHT TO REVIEW ALL MATERIALS DESIGNATED FOR REMOVAL AND TO RETAIN OWNERSHIP OF SUCH MATERIALS. IF THE OWNER RETAINS ANY MATERIAL, THE CONTRACTOR SHALL MAKE ARRANGEMENTS WITH THE OWNER TO HAVE THOSE MATERIALS REMOVED OFF SITE AT NO ADDITIONAL COST TO THE OWNER.
- UNLESS SPECIFICALLY NOTED TO BE SAVED OR REUSED, ALL SITE FEATURES CALLED FOR REMOVAL SHALL BE TRANSPORTED FROM THE SITE AND DISPOSED OF IN A LAWFUL MANNER AT AN ACCEPTABLE DISPOSAL SITE. ALL MATERIALS NOT APPROVED OR SCHEDULED FOR REUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF IN A LEGAL MANNER AT NO COST TO THE OWNER.
- ALL EXISTING SITE FEATURES TO REMAIN SHALL BE PROTECTED THROUGHOUT THE CONSTRUCTION PERIOD. ANY FEATURES DAMAGED DURING CONSTRUCTION OPERATIONS SHALL BE REPAIRED OR REPLACED TO THE SATISFACTION OF THE OWNER'S REPRESENTATIVE AT NO ADDITIONAL COST.
- DURING EARTH-WORK OPERATIONS, CONTRACTOR SHALL TAKE CARE TO NOT DISTURB EXISTING MATERIALS TO REMAIN, OUTSIDE THE LIMITS OF EXCAVATION AND BACKFILL AND SHALL TAKE WHATEVER MEASURES NECESSARY, AT THE CONTRACTOR'S EXPENSE, TO PREVENT ANY EXCAVATED MATERIAL FROM COLLAPSING. ALL BACKFILL MATERIALS SHALL BE PLACED AND COMPACTED AS SPECIFIED TO THE SUBGRADE REQUIRED FOR THE INSTALLATION OF THE REMAINDER OF THE CONTRACT WORK.
- IT SHALL BE THE CONTRACTOR'S OPTION, WITH CONCURRENCE OF THE OWNER, TO REUSE EXISTING GRAVEL PAVEMENT BASE COURSE IF IT MEETS THE REQUIREMENTS OF THE SPECIFICATIONS FOR GRAVEL BORROW.
- ALL ITEMS CALLED FOR REMOVAL SHALL BE REMOVED TO FULL DEPTH INCLUDING ALL FOOTINGS, FOUNDATIONS, AND OTHER APPURTENANCES, EXCEPT AS SPECIFICALLY NOTED OTHERWISE.
- CLEAR AND GRUB VEGETATION INDICATED ON PLAN SHALL INCLUDE REMOVAL OF SHRUBS AND UNDERBRUSH, REMOVAL OF ROOTS, ROUGH GRADING, INSTALLATION OF LOAM (IF APPLICABLE), FINE GRADING, SEEDING AND TURF ESTABLISHMENT BY THE CONTRACTOR.
- STRIP & STORE EXISTING TOPSOIL FOR LATER REUSE WHERE APPROPRIATE, AND AS NOTED ON PLAN, WITH APPROPRIATE EROSION AND SEDIMENT CONTROLS IN PLACE.
- LOAM / TOPSOIL DESIGNATED FOR REUSE AS GENERAL FILL SHALL BE BLENDED WITH SUITABLE BORROW MATERIAL.
- TREES DESIGNATED FOR REMOVAL SHALL BE TAGGED BY CONTRACTOR AND APPROVED BY OWNER'S REPRESENTATIVE PRIOR TO COMMENCEMENT OF CONSTRUCTION. THE CONTRACTOR SHALL PROTECT EXISTING TREES TO REMAIN. CONTRACTOR SHALL INSTALL TREE PROTECTION BARRIER AFTER CLEARING UNDERBRUSH AND TAKE DUE CARE TO PREVENT INJURY TO TREES DURING CLEARING OPERATIONS. TREE PROTECTION SHALL BE MAINTAINED IN PLACE TO THE SATISFACTION OF THE OWNER OR OWNER'S REPRESENTATIVE. ROOTS OF EXISTING TREES TO REMAIN SHALL BE PROTECTED & AIR SPADING SHALL BE USED FOR EXCAVATION WITHIN DRIPLINE.
- THE STORAGE OF MATERIALS AND EQUIPMENT WILL BE PERMITTED AT LOCATIONS DESIGNATED BY OWNER OR OWNER'S REPRESENTATIVE. PROTECTION OF STORED MATERIALS AND EQUIPMENT SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
- THE SITE IS TO REMAIN SECURE AT ALL TIMES DURING THE CONSTRUCTION PERIOD. THE CONTRACTOR SHALL INSTALL TEMPORARY CONSTRUCTION FENCING AS NECESSARY TO ENSURE PUBLIC SAFETY, AS DIRECTED BY THE OWNER'S REPRESENTATIVE
- THE CONTRACTOR IS RESPONSIBLE TO REVIEW ALL SITE GRADING, LAYOUT AND IMPROVEMENT DRAWINGS PRIOR TO DEMOLISHING THE ITEMS SHOWN. THE CONTRACTOR IS RESPONSIBLE FOR ALL DEMOLITION AND SITE PREPARATION AS NECESSARY FOR THE INSTALLATION OF SITE IMPROVEMENTS SHOWN HEREIN.
- ALL WORK SHALL CONFORM TO MASSACHUSETTS DEP GUIDELINES FOR HERBICIDAL TREATMENTS, EROSION AND SEDIMENTATION CONTROL, LATEST VERSION. EROSION CONTROL BARRIERS TO BE INSTALLED AT THE TOE OF SLOPES. SEE GRADING & DRAINAGE NOTES, DETAILS AND SPECIFICATIONS.
- PRIOR TO COMMENCING WORK THE CONTRACTOR SHALL ENSURE PROPER PROVISIONS ARE IN PLACE FOR CONTROLLING DUST DURING CONSTRUCTION ACTIVITIES. THIS INCLUDES PROVISIONS FOR ON SITE WATER, WATER TRUCKS, AND ANY OTHER ITEM TO PREVENT DUST MIGRATION AS APPROVED BY THE LANDSCAPE ARCHITECT. NO CALCIUM CHLORIDE SHALL BE PERMITTED.
- THE CONTRACTOR SHALL SAW CUT ALL EXISTING CONCRETE SIDEWALK PAVEMENT ALONG EXISTING STREETS WHERE NOTED PRIOR TO REMOVAL AND DISPOSAL OF ADJACENT PAVEMENTS.
- CONSTRUCTION ACCESS TO THE PROJECT SITE SHALL BE LIMITED TO AN ENTRANCE DESIGNATED BY THE OWNER.
- THE STORAGE OF MATERIALS AND EQUIPMENT WILL BE PERMITTED AT LOCATIONS DESIGNATED BY OWNER OR OWNER'S REPRESENTATIVE. PROTECTION OF STORED MATERIALS AND EQUIPMENT SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. NO REFUELING SHALL OCCUR WITHIN 1200' OF HARDY'S POND.
- CONTRACTOR IS RESPONSIBLE FOR SECURING NECESSARY TRAFFIC CONTROL DETAILS AND MEASURES PER STATE AND LOCAL REQUIREMENTS FOR ANY CONSTRUCTION ACTIVITY IN THE ROAD RIGHT-OF-WAY.

PLANTING NOTES

- REFER TO PLANTING PLANS FOR PLANT SCHEDULES
- COORDINATE ALL PLANTING ACTIVITIES WITH THE SCOPE OF WORK CALLED FOR BY DEMOLITION, GRADING AND UTILITIES PLANS ENCOMPASSED BY THIS CONTRACT. SET, PROTECT AND REPLACE REFERENCE STAKES AS NECESSARY OR AS DIRECTED BY THE OWNER'S REPRESENTATIVE.
- ALL PLANT MATERIAL WILL NEED TO BE APPROVED BY OWNER'S REPRESENTATIVE PRIOR TO INSTALLATION.
- THE CONTRACTOR SHALL IDENTIFY PROPOSED TREE LOCATIONS PRIOR TO PLACEMENT WITH A STAKE AND COORDINATE WITH THE LANDSCAPE ARCHITECT TO MAKE ANY NECESSARY ADJUSTMENTS BEFORE ACTUAL PLACEMENT. THE CONTRACTOR SHALL NOT PLACE NEW TREES DIRECTLY UNDER OVERHEAD WIRES OR ABOVE UTILITY LINES.
- EXISTING TREES TO REMAIN AND BE PROTECTED ARE TO BE PRUNED FOR CROWN CLEANING AND DEADWOOD REMOVAL.
- PLANT LOCATIONS SHOWN ON THIS PLAN ARE APPROXIMATE ONLY AND SHALL BE APPROVED IN THE FIELD BY LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.
- IF NECESSARY THE CONTRACTOR SHALL MAINTAIN TEMPORARY EROSION CONTROL BLANKET DURING GROUND COVER APPLICATION UNTIL AREAS ARE ESTABLISHED.
- GROUND COVER ARE TO BE EQUALLY SPACED WITHIN BED AREAS.
- STAKE ALL PROPOSED TREE PLANTINGS FOR REVIEW AND POTENTIAL ADJUSTMENT BY THE LANDSCAPE ARCHITECT.
- EXISTING TREES TO REMAIN AND BE PROTECTED ARE TO BE PRUNED FOR CROWN CLEANING AND DEADWOOD REMOVAL.
- IF NECESSARY THE CONTRACTOR SHALL MAINTAIN TEMPORARY EROSION CONTROL BLANKET DURING GROUND COVER APPLICATION UNTIL AREAS ARE ESTABLISHED.

LAYOUT AND MATERIALS NOTES

- REFER TO EXISTING CONDITIONS PLANS FOR SURVEY INFORMATION.
 - COORDINATE ALL LAYOUT ACTIVITIES WITH THE SCOPE OF WORK CALLED FOR BY DEMOLITION, GRADING AND UTILITIES OPERATIONS ENCOMPASSED BY THIS CONTRACT. SET, PROTECT AND REPLACE REFERENCE STAKES AS NECESSARY OR AS DIRECTED BY THE OWNER'S REPRESENTATIVE AT NO ADDITIONAL COST TO THE OWNER..
 - TO FACILITATE LAYOUT OF PROPOSED SITE FEATURES AND FACILITIES, LAYOUT INFORMATION FOR CERTAIN FUTURE WORK, WHICH IS NOT INCLUDED WITHIN THE SCOPE OF THIS CONTRACT (E.G., FUTURE COURTS AND APPURTENANCES, PAVING, ETC.), HAS BEEN PROVIDED ON THE LAYOUT AND MATERIALS PLAN FOR INFORMATION ONLY. THE LAYOUT OF SITE AMENITIES AND FENCES MUST BE APPROVED BY THE OWNER'S REPRESENTATIVE PRIOR TO INSTALLATION. SOME ITEMS ARE "NOT IN CONTRACT" AND SHOWN FOR LOCATION REFERENCE ONLY.
 - ALL LINES AND GRADING WORK AS PER DRAWINGS AND SPECIFICATIONS SHALL BE LAID OUT BY A REGISTERED CIVIL ENGINEER OR LICENSED SURVEYOR ENGAGED BY THE GENERAL CONTRACTOR.
 - ALL LAYOUT LINES, OFFSETS, OR REFERENCES TO LOCATING OBJECTS ARE EITHER PARALLEL OR PERPENDICULAR UNLESS OTHERWISE DESIGNATED WITH ANGLE OFFSETS NOTED.
 - ALL PROPOSED SITE FEATURES SHALL BE LAID OUT AND STAKED FOR REVIEW AND APPROVAL BY THE OWNER'S REPRESENTATIVE PRIOR TO COMMENCEMENT OF INSTALLATION. ANY REQUIRED ADJUSTMENTS TO THE LAYOUT SHALL BE UNDERTAKEN AS DIRECTED, AT NO ADDITIONAL COST TO THE OWNER.
 - ALL PATHWAYS AND PAVED AREAS SHALL BE CONSTRUCTED OF ASPHALT EXCEPT AS NOTED OTHERWISE. ALL PAVEMENTS SHALL MEET THE LINE AND GRADE OF EXISTING ADJACENT PAVEMENT SURFACES. HOT MIX ASPHALT PAVEMENTS SHALL BE TREATED WITH AN RS-1 TACK COAT AT POINT OF CONNECTION TO OTHER PAVEMENT EDGES. ALL PATHWAY WIDTHS SHALL BE AS NOTED ON THE LAYOUT AND MATERIALS PLAN.
 - THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND GRADES ON THE GROUND AND REPORT ANY DISCREPANCIES IMMEDIATELY TO THE OWNER.
 - THE CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD MEASUREMENT OF ALL PROPOSED FENCES AND GATES.
 - THE FINAL COMACTED DEPTH OF LOAM BORROW FOR ALL PROPOSED LAWN AREAS SHALL BE 4" MINIMUM. ALL DISTURBED AREAS SHALL BE RESTORED WITH LOAM AND SEED UNLESS OTHERWISE NOTED
 - ALL REFERENCES TO LOAM AND SEED REFER TO HYDROMULCH SEEDED LAWN.
 - LOAM AND SEED ALL DISTURBED AREAS UNLESS OTHERWISE NOTED
 - ALL BENCHES, PICNIC TABLES, TRASH RECEPTACLES, PLAYERS BENCHES, AND BLEACHERS SHALL BE INSTALLED ON CONCRETE PADS AS DETAILED.
 - ANY FENCE CALLED FOR TO BE REMOVE AND RESET, RELOCATED, OR TO HAVE NEW FABRIC SHALL BE INSTALLED IN ACCORDANCE WITH THE FENCE DETAIL AND SPECIFICATIONS. CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD MEASUREMENTS OF ALL PROPOSED FENCES AND GATES. THE LAYOUT OF ALL FENCE POSTS MUST BE APPROVED BY OWNER'S REPRESENTATIVE PRIOR TO INSTALLATION.
 - THE LAYOUT AND LOCATION OF ALL UTILITY CABINETS MUST BE APPROVED BY THE OWNER'S REPRESENTATIVE PRIOR TO INSTALLATION.
 - ALL PROPOSED COLOR CHANGES IN RESILIENT RUBBER SAFETY SURFACING, ASPHALT, PAVERS AND COLOR SEAL COATING SHALL BE LAID OUT IN THE FIELD BY THE CONTRACTOR AND APPROVED BY THE OWNER'S REPRESENTATIVE PRIOR TO INSTALLATION.
 - JOINTS AND DECORATIVE SCORING PATTERNS FOR PROPOSED TERRACED SEATING TREADS WILL BE LAID OUT AND APPROVED BY THE OWNER'S REPRESENTATIVE PRIOR TO INSTALLATION.
- GRADING AND DRAINAGE NOTES


- REFER TO EXISTING CONDITIONS AND DEMOLITION PLAN FOR GENERAL NOTES AND SURVEY LEGEND. SEE LAYOUT AND MATERIALS PLAN FOR SITE IMPROVEMENTS LEGEND.
- ALL PAVED AREAS SHALL BE PITCHED TO DRAIN.
- ALL WORK RELATING TO INSTALLATION, RENOVATION OR MODIFICATION OF WATER, DRAINAGE AND/OR SEWER SERVICES SHALL BE PERFORMED IN ACCORDANCE WITH THE STANDARDS OF THE CITY OF WALTHAM.
- THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND GRADES ON THE GROUND AND REPORT ANY DISCREPANCIES IMMEDIATELY TO THE OWNER.
- ALL GRADING IS TO BE SMOOTH AND CONTINUOUS. WHERE PROPOSED SURFACE MEETS EXISTING SURFACE, BLEND THE TWO PAVEMENTS AND ELIMINATE ROUGH SPOTS AND ABRUPT GRADE CHANGES AND MEET LINE AND GRADE OF EXISTING CONDITIONS WITH NEW IMPROVEMENTS.
- CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE AWAY FROM ALL FEATURES AND STRUCTURES. ALL NEW CONCRETE PADS AND PLANTING BEDS ABUTTING BUILDING FOUNDATIONS SHALL SLOPE AT 1.5% MINIMUM AWAY FROM THE BUILDING.
- ALL NEW WALKWAYS MUST CONFORM TO CURRENT AMERICANS WITH DISABILITIES ACT (ADA) REGULATIONS: WALKWAYS SHALL MAINTAIN A CROSS PITCH OF NOT MORE THAN ONE AND A HALF (1.5%) PERCENT AND THE RUNNING SLOPE (PARALLEL TO THE DIRECTION OF TRAVEL) OF 1:20 OR 5% MAXIMUM.
- MINIMUM SLOPE ON ALL WALKWAYS WILL BE 1:100 OR 1% TO PROVIDE POSITIVE DRAINAGE. ANY DISCREPANCIES NOT ALLOWING THIS TO OCCUR SHALL BE REPORTED TO THE OWNER PRIOR TO CONTINUING WORK.
- ALL UTILITY GRATES, COVERS OR OTHER SURFACE ELEMENTS INTENDED TO BE EXPOSED AT GRADE SHALL BE FLUSH WITH THE ADJACENT FINISHED GRADE AND ADJUSTED TO PROVIDE A SMOOTH TRANSITION AT ALL EDGES UNLESS OTHERWISE INDICATED.
- THE CONTRACTOR SHALL SET SUBGRADE ELEVATIONS TO ALLOW FOR POSITIVE DRAINAGE AND PROVIDE EROSION CONTROL DEVICES, STRUCTURES, MATERIALS AND CONSTRUCTION METHODS TO DIRECT SILT MIGRATION AWAY FROM DRAINAGE AND OTHER UTILITY SYSTEMS, PUBLIC/PRIVATE STREETS AND WORK AREAS. CLEAN BASINS REGULARLY AND AT THE END OF THE PROJECT.
- EXCAVATION REQUIRED WITHIN PROXIMITY OF KNOWN EXISTING UTILITY LINES SHALL BE DONE BY HAND. CONTRACTOR SHALL REPAIR ANY DAMAGE TO EXISTING UTILITY LINES OR STRUCTURES INCURRED DURING CONSTRUCTION OPERATIONS AT NO COST TO THE OWNER.
- WHERE NEW EARTHWORK MEETS EXISTING EARTHWORK, CONTRACTOR SHALL BLEND NEW EARTHWORK SMOOTHLY INTO EXISTING, PROVIDING VERTICAL CURVES OR ROUNDS AT ALL TOP AND BOTTOM OF SLOPES.
- WHERE A SPECIFIC LIMIT OF WORK LINE IS NOT OBVIOUS OR IMPLIED, BLEND GRADES TO EXISTING CONDITIONS WITHIN 5 FEET OF PROPOSED CONTOURS.
- RESTORE ALL DISTURBED AREAS AND LIMITS OF ALL REMOVALS TO LOAM AND SEED UNLESS OTHERWISE NOTED.
- SEE EARTHWORK SECTION OF SPECIFICATIONS FOR SPECIFIC EXCAVATION AND FILLING PROCEDURES.
- INSTALL JUTE MESH ON ALL SLOPES GREATER THAN 4:1.
- ALL WORK RELATING TO INSTALLATION, RENOVATION OR MODIFICATION OF WATER, DRAINAGE AND/OR SEWER SERVICES SHALL BE PERFORMED IN ACCORDANCE WITH THE STANDARDS OF THE CITY OF WALTHAM
- ALL DRAINAGE PIPE SHALL BE HDPE, UNLESS OTHERWISE NOTED.

ABBREVIATIONS

| | |
|--------------|---|
| R & D | REMOVE & DISPOSE OF ALL ELEMENTS, POSTS, CONCRETE PADS, FOOTINGS AND APPURTENANCES, COMPLETE. |
| R & R | REMOVE & RESET IN SAME LOCATION |
| R & S | REMOVE & STORE IN LOCATION AGREED UPON BY OWNER. |
| BLDG. | BUILDING |
| EXIST. OR EX | EXISTING CHAIN LINK |
| C.L.F. | GALV. CHAIN LINK FENCE |
| BVCL | BLACK VINYL CLAD CHAIN LINK FENCE |
| VCP | VITRIFIED CLAY PIPE |
| INV | INVERT |
| TOC | TOP OF CURB |
| TOW | TOP OF WALL |
| BOW | BOTTOM OF WALL |
| BOC | BOTTOM OF CURB |
| CONC | CONCRETE |
| PVMT OR PVT. | PAVEMENT |
| TYP | TYPICAL |
| APPROX. | APPROXIMATE |
| LF | LINEAR FEET |
| PROP OR PR | PROPOSED |
| LP | LIGHT POLE |
| L&S | LOAM & SEED |

Project:
CITY OF WALTHAM

**FALZONE MEMORIAL PARK
AND
NIPPER MAHER PARK
PHASE 6**


100 Foxborough Blvd., S.250 Foxborough, MA
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CONSTRUCTION DOCUMENTS

Date: 11.07.2012

Scale: N.T.S.

Drawn By: MMM

Reviewed By: MSM

Checked By: LFK

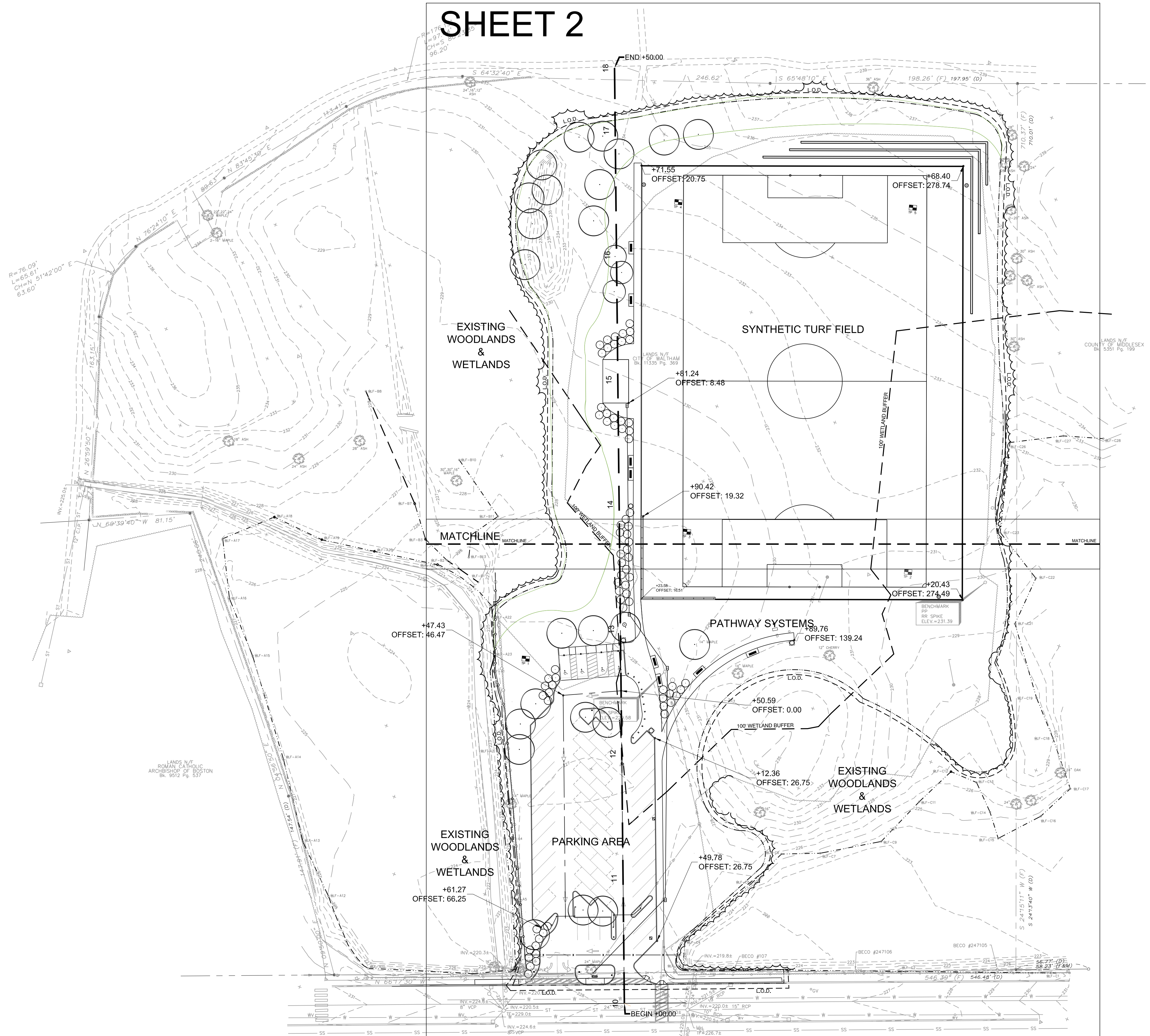
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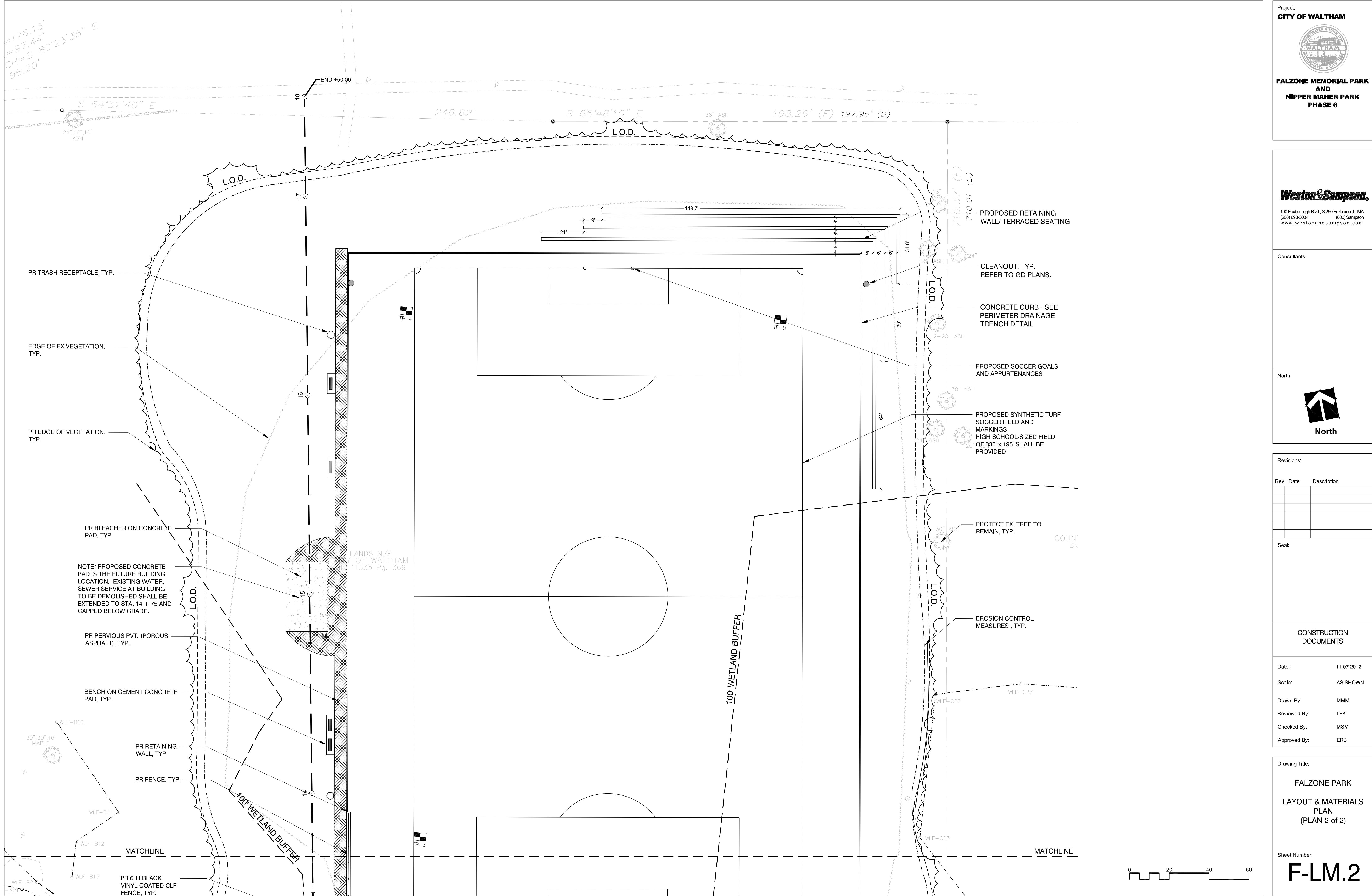
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SHEET 1



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Project:
CITY OF WALTHAM



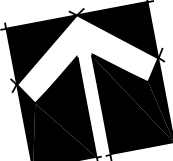
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| Checked By: | MSM |
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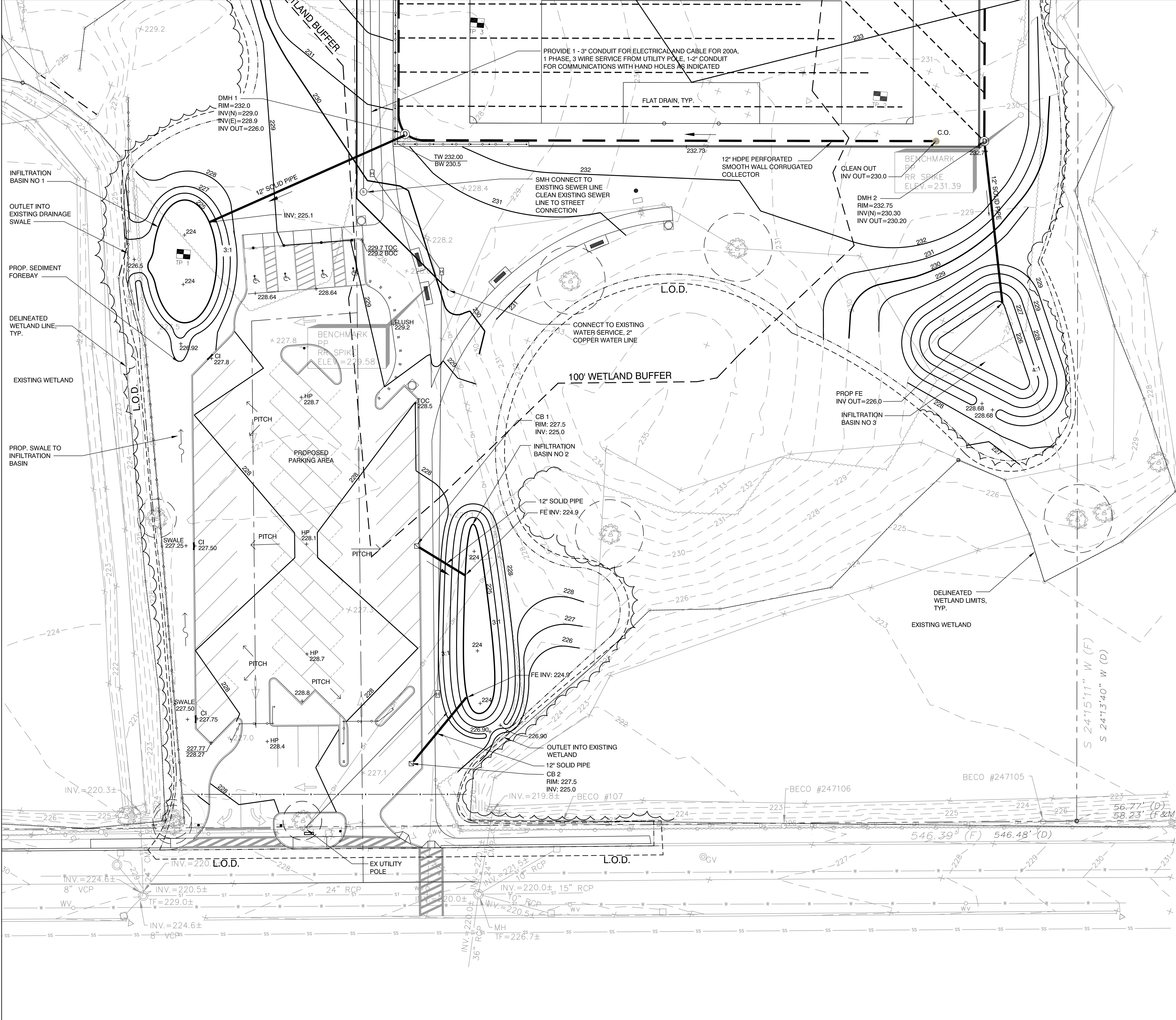
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FALZONE PARK

**LAYOUT & MATERIALS
PLAN
(PLAN 2 of 2)**

Sheet Number:

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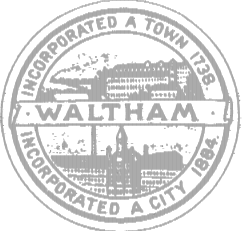
GRADING, DRAINAGE & UTILITY LEGEND

| | |
|-------------------------------|---------------|
| EX CONTOUR | --- |
| PR GRADIENT | 1.5% → |
| PR 1 FT. CONTOUR | 199 |
| PR 5 FT. CONTOUR | 195 |
| PR SPOT ELEVATION | +201.54 HP |
| EX SPOT ELEVATION | +(199.5) |
| PR DRAIN INLET | ⊕ DI |
| PR CATCH BASIN | ▣ CB |
| PR SOLID HDPE DRAIN LINE | 6" SOLID PIPE |
| PR PERFORATED HDPE DRAIN LINE | 6" PERF. PIPE |
| PR FLAT DRAIN | --- |
| PR SWALE | ~→ |
| PR ELECTRICAL SERVICE | --- |
| PR WATER SERVICE | W |
| CURB INLET | ⌋ |
| PR DRAIN MANHOLE | ⓪ DMH |
| PR SEWER MANHOLE | Ⓢ SMH |
| PR CLEANOUT | ● CO |
| PR HAND HOLE AND CONDUIT | ⌈ |



Project:

CITY OF WALTHAM



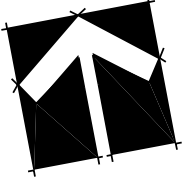
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Drawn By: MMM

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Checked By: MSM

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Drawing Title:

FALZONE PARK

GRADING, DRAINAGE & UTILITY PLAN

(PLAN 1 of 2)

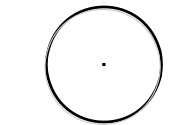
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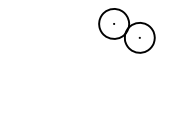
PLANT SCHEDULE

| KEY | QTY | COMMON NAME | BOTANICAL NAME | SIZE |
|-----|------|------------------------|-------------------------------|-------------|
| AU | 350 | BEARBERRY | ARCTOSTAPHYLOS UVA-URSI | PLUGS |
| CC | 3 | WHITE JUDAS TREE | CERCIS CANADENSIS VAR. ALBA | 10'-12' B&B |
| CJ | 3 | KATSURA TREE | CERCIDIPHYLLUM JAPONICUM | 10'-12' B&B |
| CO | 3 | SHAGBARK HICKORY | CARYA OVATA | 3-3.5' CAL. |
| IG | 44 | INKBERRY | ILEX GLABRA | 38" HT. B&B |
| KL | 16 | MINUET MOUNTAIN LAUREL | KALMIA LATIFOLIA 'MINUET' | 36" HT. B&B |
| RM | 12 | SWEETBAY RHODODENDRON | RHODODENDRON MAXIMUM 'ROSEUM' | 36" HT. B&B |
| GT | 8 | HONEY LOCUST | GLEDITIA TRICANTHOS | 3-3.5' CAL. |
| QR | 10 | NORTHERN RED OAK | QUERCUS RUBRA | 8-8.5' CAL. |
| WMM | 5543 | NEW ENGLAND WET MIX | SEE SPEC | SF SEED |

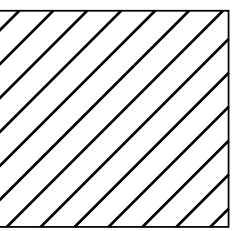
PLANTING LEGEND



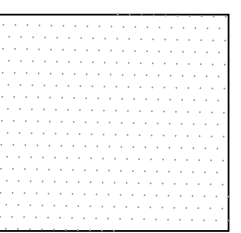
PROPOSED DECIDUOUS TREES



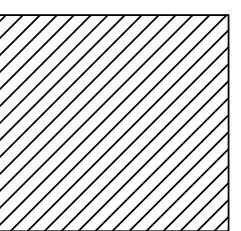
PROPOSED SHRUBS



LOAM AND SEED WITH MEADOW
SEED MIX FOR DETENTION BASINS
(NEW ENGLAND WETLAND SEED MIX)



LOAM AND SEED
SEE SEED MIX
SPECIFICATIONS



LOAM AND SEED WITH MEADOW
SEED MIX
(NEW ENGLAND WILDFLOWER MIX)

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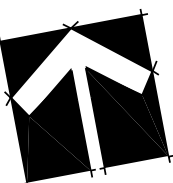
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PLANTING PLAN

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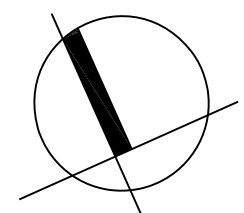
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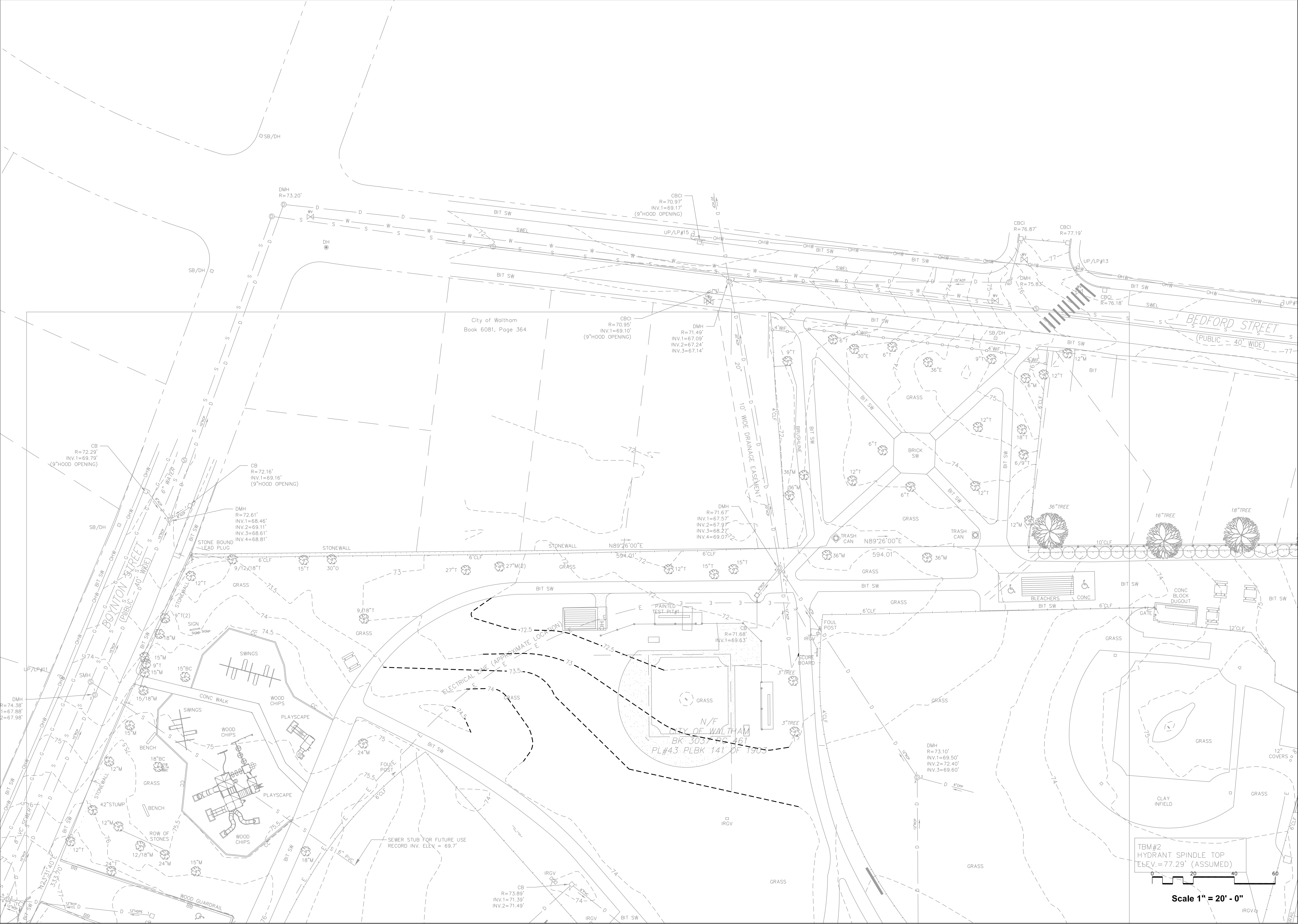
New England Wetmix (Wetland Seed Mix)

| BOTANICAL NAME | COMMON NAME |
|------------------------|------------------------------|
| CAREX VULPINOIDEA | FOX SEDGE |
| CAREX LURIDA | LURID SEDGE |
| CAREX SCOPARIA | BLUNT BROOM SEDGE |
| VERBENA HASTATA | BLUE VERVAIN |
| SCIRPUS ATROVIRENS | GREEN BULRUSH |
| CAREX LUPELUNA | HOP SEDGE |
| BIDENS CERNUA | NODDING BUR MARIGOLD |
| CAREX COMOSA | BRISTLY COSMOS SEDGE |
| CAREX CRINITA | FRINGED SEDGE |
| JUNCUS EFFUSUS | SOFT RUSH |
| SCIRPUS CYPERINUS | WOOL GRASS |
| GLYCERIA GRANDIS | AMERICAN MANNA GRASS |
| EUPATORIUM MACULATUM | SPOTTED JOE PYE WEED |
| EUPATORIUM PERFORIATUM | BONESET |
| ALISMA SUBCORDATUM | MUD PLANTAIN |
| ASTER PUNICEUS | PURPLE STEMMED ASTER |
| GLYCERIA CANADENSIS | RATTLESNAKE GRASS |
| SCIRPUS VALIDUS | SOFT STEM BULRUSH |
| ASCLEPIAS INCARNATA | SWAMP MILKWEED |
| MIMULUS RINGENS | SQUARE STEMMED MONKEY FLOWER |

New England Wildflower Mix

| BOTANICAL NAME | COMMON NAME |
|--------------------------|------------------------------|
| SCHIZACHYRIUM SCOPARIUM | LITTLE BLUESTEM, NY ECOTYPES |
| FESTUCA RUBRA | CREeping RED FESCUE |
| SORGHASTRUM NUTANS | INDIAN GRASS |
| ELYMUS CANADENSIS | CANADA WILD RYE |
| ELYMUS VIRGINICUS | VIRGINIA WILD RYE |
| CHAMAECRISTA FASCICULATA | FARTRIDGE PEA |
| LUPINUS PERENNIS | WILD BLUE LUPINE |
| ASCLEPIAS SYRIACA | COMMON MILKWEED |
| Zizia aurea | GOLDEN ALEXANDERS |
| RUDBECKIA HIRTA | BLACK EYED SUSAN |
| MONARDA PISTULOSA | WILD BERGAMOT |
| ASTER LATIFLORUS | CALICO ASTER |
| ASTER NOVA-ANGLIAE | NEW ENGLAND ASTER |
| OSNOTHERA BIENNIS | EVENING PRIMROSE |
| PENSTEMON DIGITALIS | BEARD TONGUE |
| VERBENA HASTATA | BLUE VERVAIN |
| VERNONIA NOVEBORACENSIS | NEW YORK IRONWEED |
| ASTER LAEVIS | SMOOTH BLUE ASTER |
| EUTHAMIA GRAMINIFOLIA | GRASS LEAVED GOLDENROD |
| SOLIDAGO JUNCEA | EARLY GOLDENROD |





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EXISTING CONDITIONS
PLAN
(PLAN 1 of 3)**

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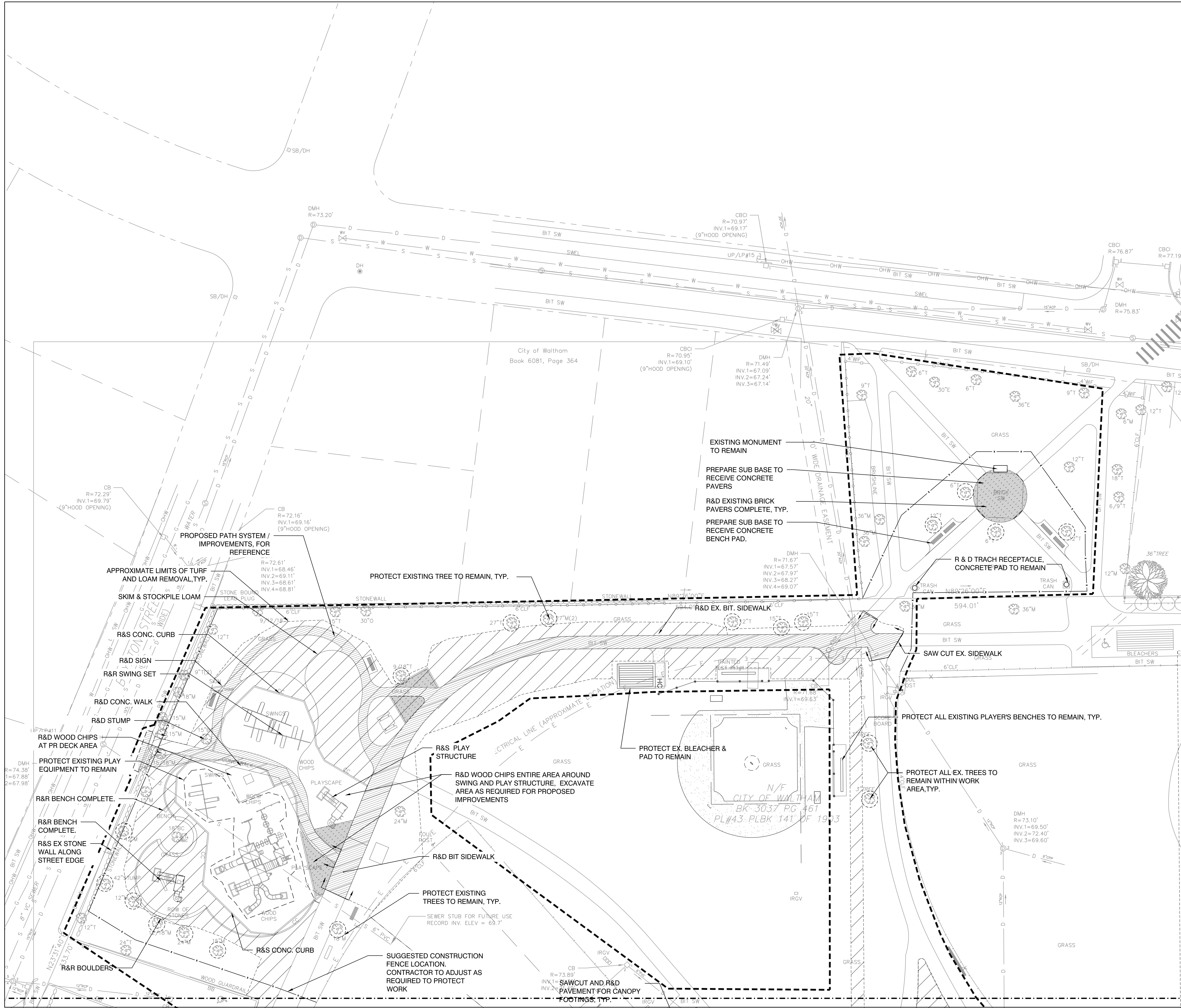
Drawing Title:

NIPPER MAHER PH6

**EXISTING CONDITIONS
PLAN
(PLAN 3 of 3)**

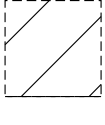
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N-EX.3



SITE PREPARATION LEGEND

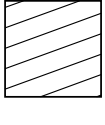
SKIM AND STOCKPILE EX TURF
AND LOAM FOR POTENTIAL
RE-USE



R&D OR RECLAIM EXISTING
BITUMINOUS PAVEMENT



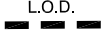
CLEAR AND GRUB UNDERSTORY
VEGETATION, PROTECT EX. SHADE
TREES



EX. TREE TO BE REMOVED



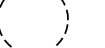
LIMIT OF DISTURBANCE



APPROX. LIMIT OF TURF &
LOAM REMOVAL



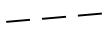
TREE PROTECTION FENCE



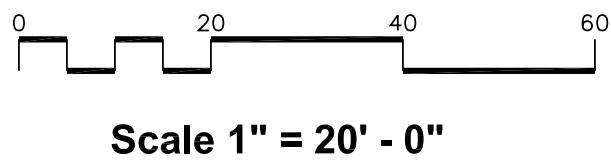
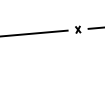
LIMIT OF REMOVAL
(IF PARTIAL REMOVAL
OF ITEM)



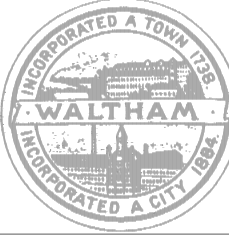
SAWCUT LINE



TEMP. CONSTRUCTION
FENCE



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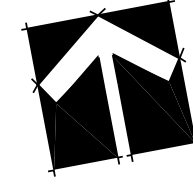
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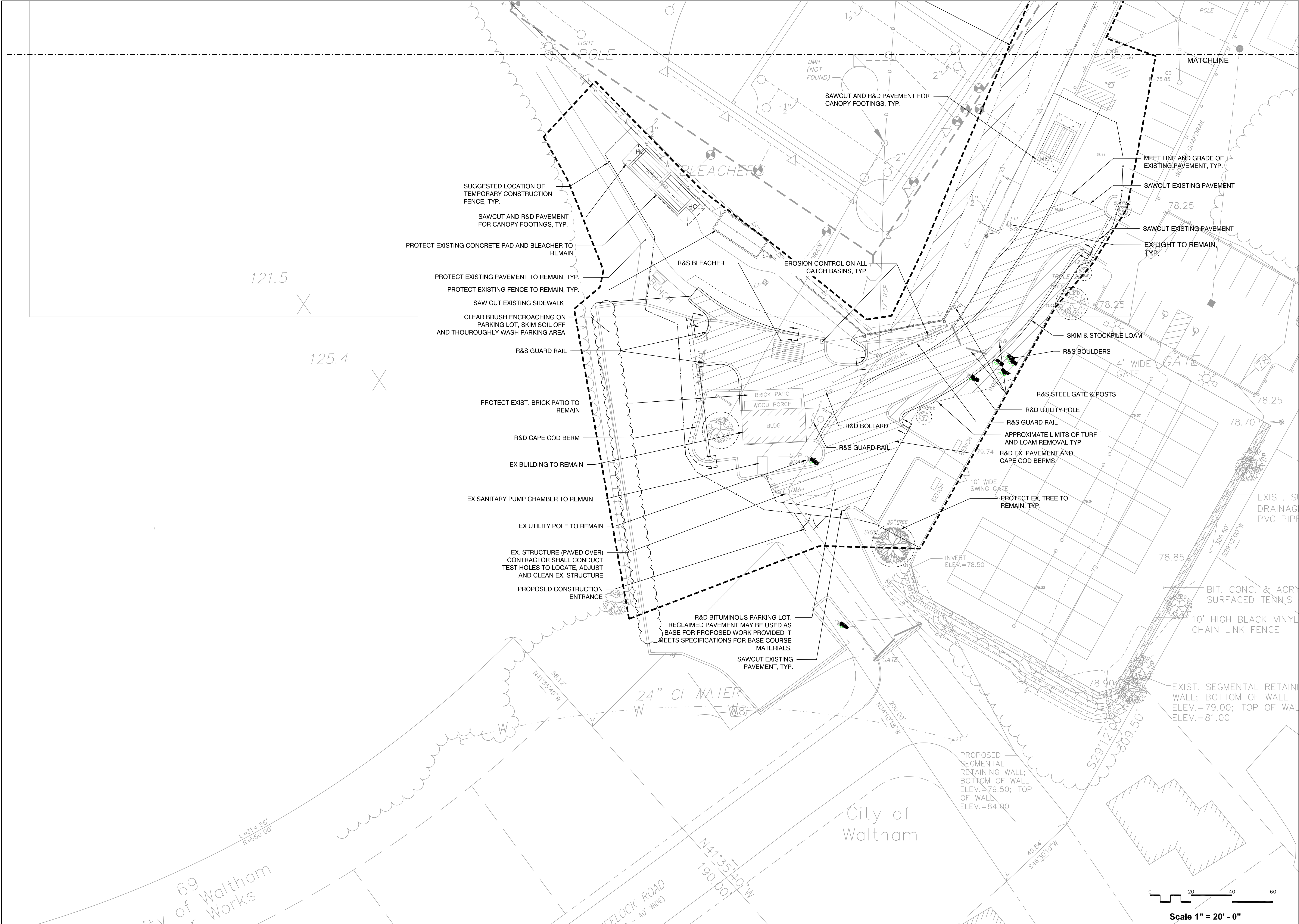
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SITE PREPARATION PLAN
(PLAN 1 of 3)**

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SITE PREPARATION
PLAN
(PLAN 3 of 3)**

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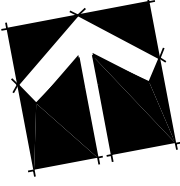
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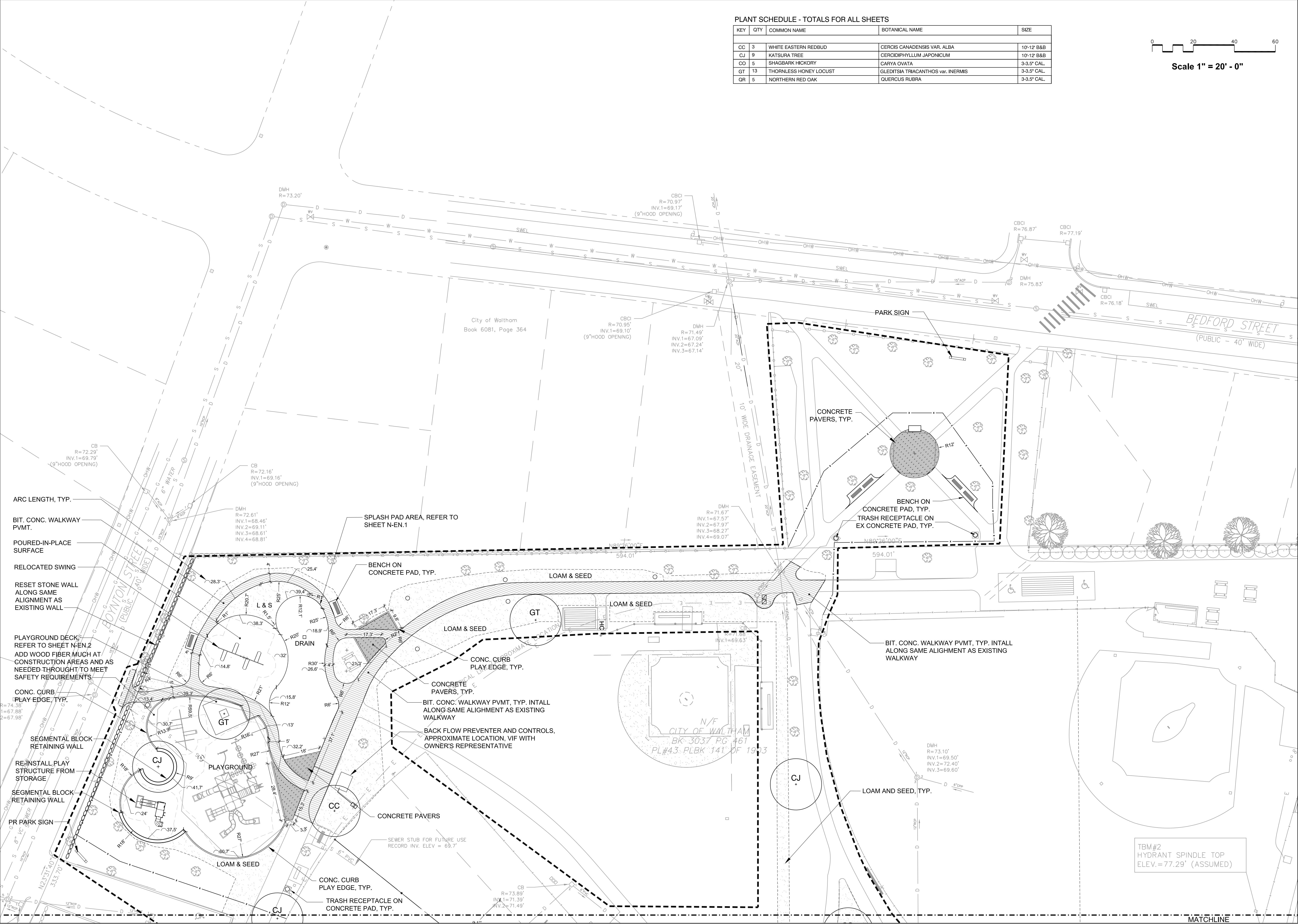
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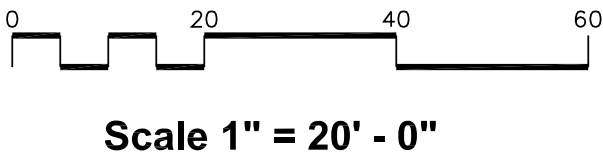
**OVERALL SITE PLAN &
INDEX PLAN**

Sheet Number:

N-LM.0



| PLANT SCHEDULE - TOTALS FOR ALL SHEETS | | | | |
|--|-----|------------------------|------------------------------------|-------------|
| KEY | QTY | COMMON NAME | BOTANICAL NAME | SIZE |
| CC | 3 | WHITE EASTERN REDBUD | CERCIS CANADENSIS VAR. ALBA | 10'-12' B&B |
| CJ | 9 | KATSURA TREE | CERCIDIPHYLLUM JAPONICUM | 10'-12' B&B |
| CO | 5 | SHAGBARK HICKORY | CARYA OVATA | 3-3.5' CAL. |
| GT | 13 | THORNLESS HONEY LOCUST | GLEDITSIA TRIACANTHOS var. INERMIS | 3-3.5' CAL. |
| QR | 5 | NORTHERN RED OAK | QUERCUS RUBRA | 3-3.5' CAL. |



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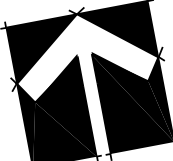

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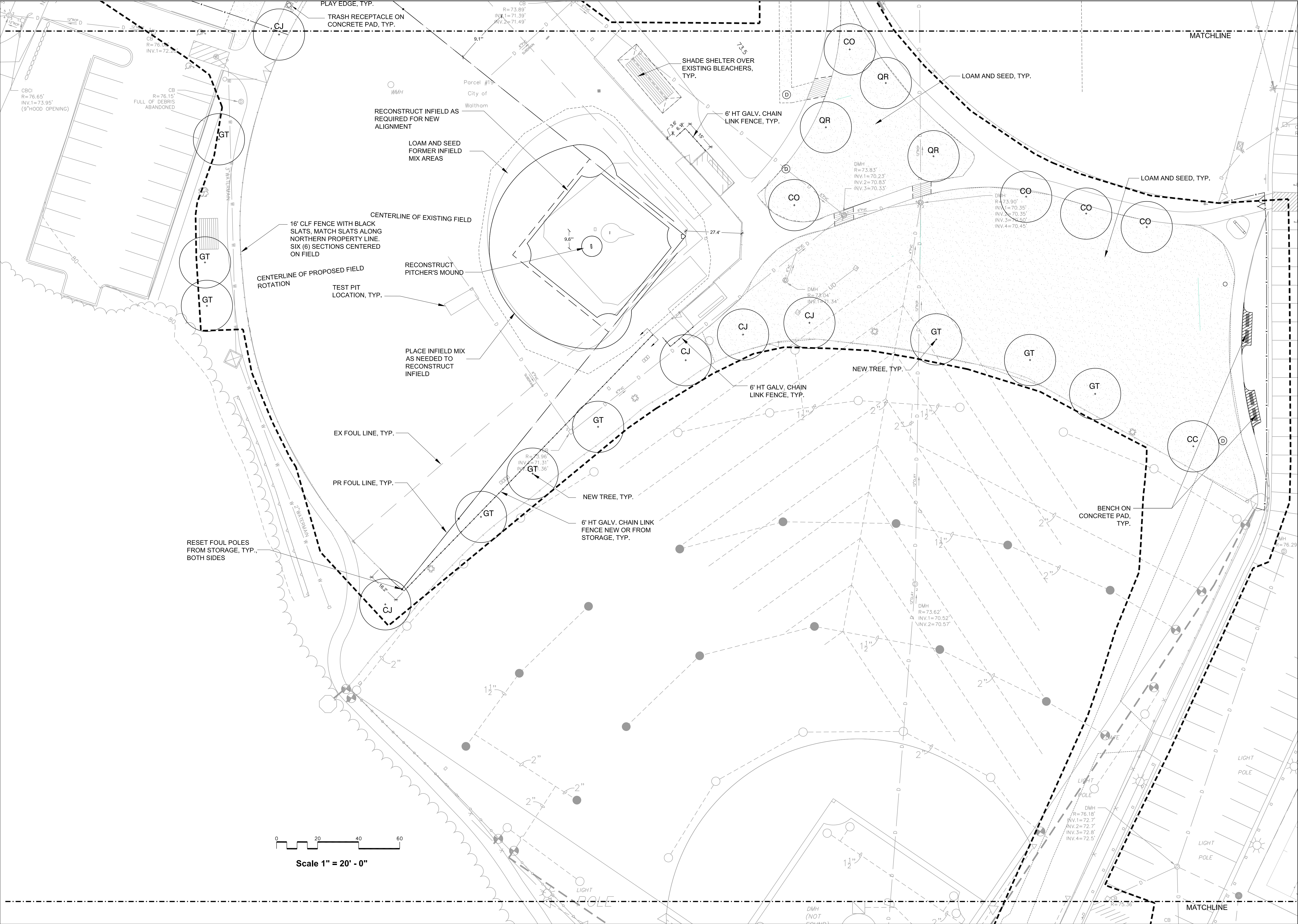
NIPPER MAHER PH6

LAYOUT & MATERIALS PLAN

(PLAN 1 of 3)

Sheet Number:

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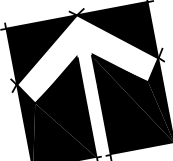
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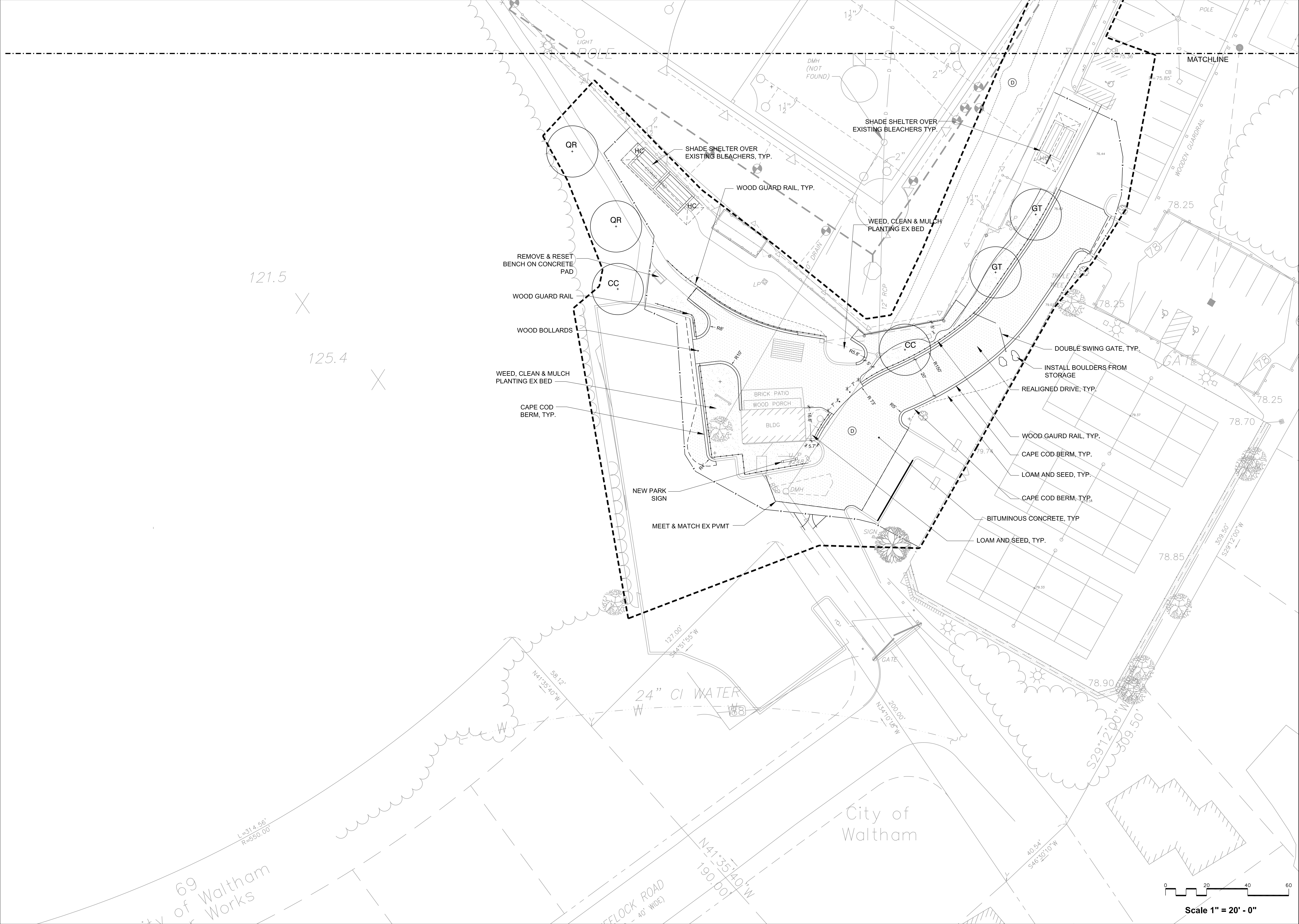
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LAYOUT & MATERIALS
PLAN
(PLAN 2 of 3)**

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N-LM.2



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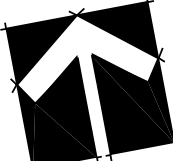
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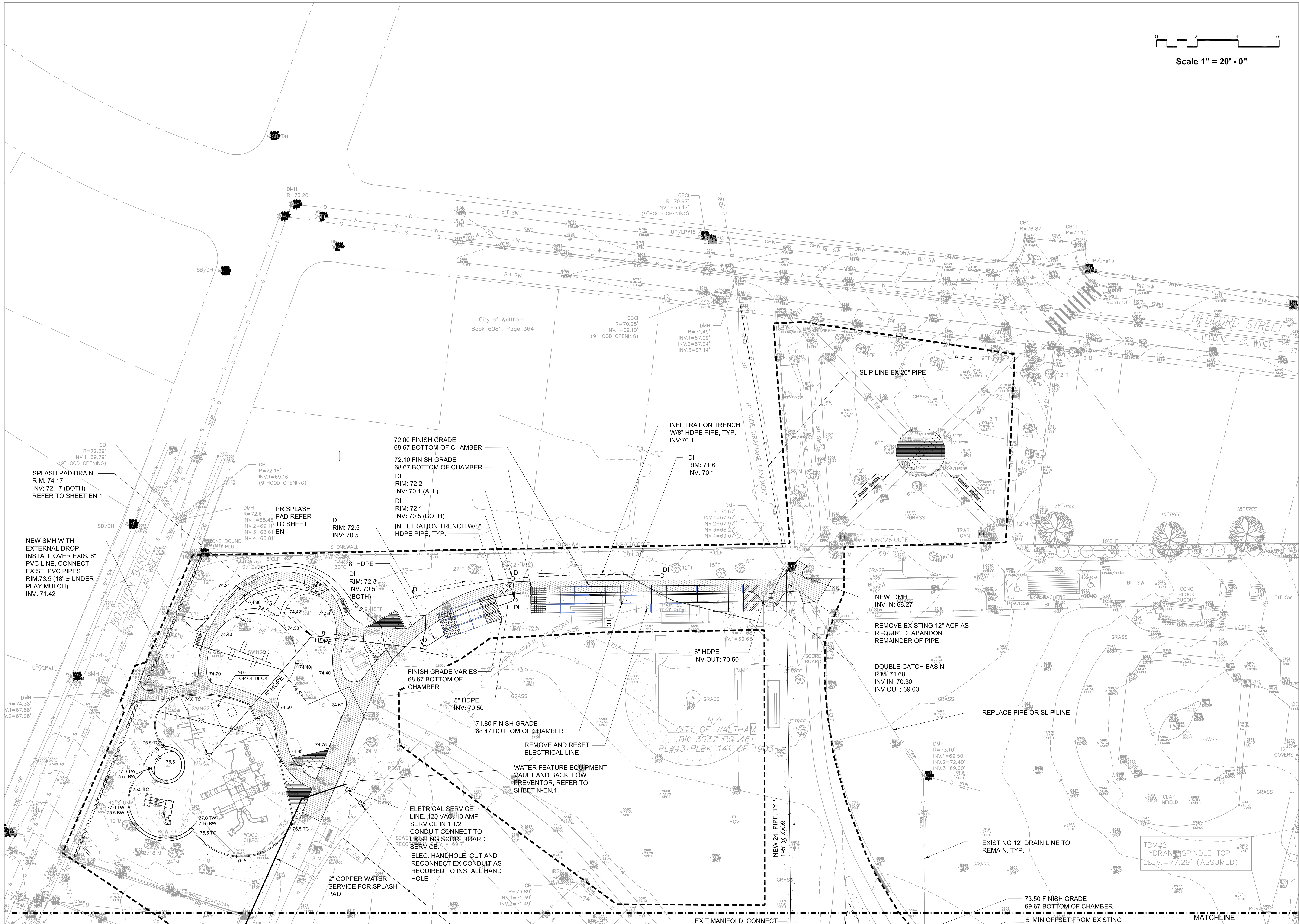
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**LAYOUT & MATERIALS
PLAN
(PLAN 3 of 3)**

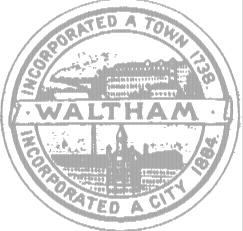
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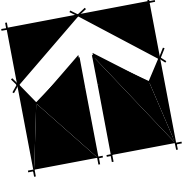
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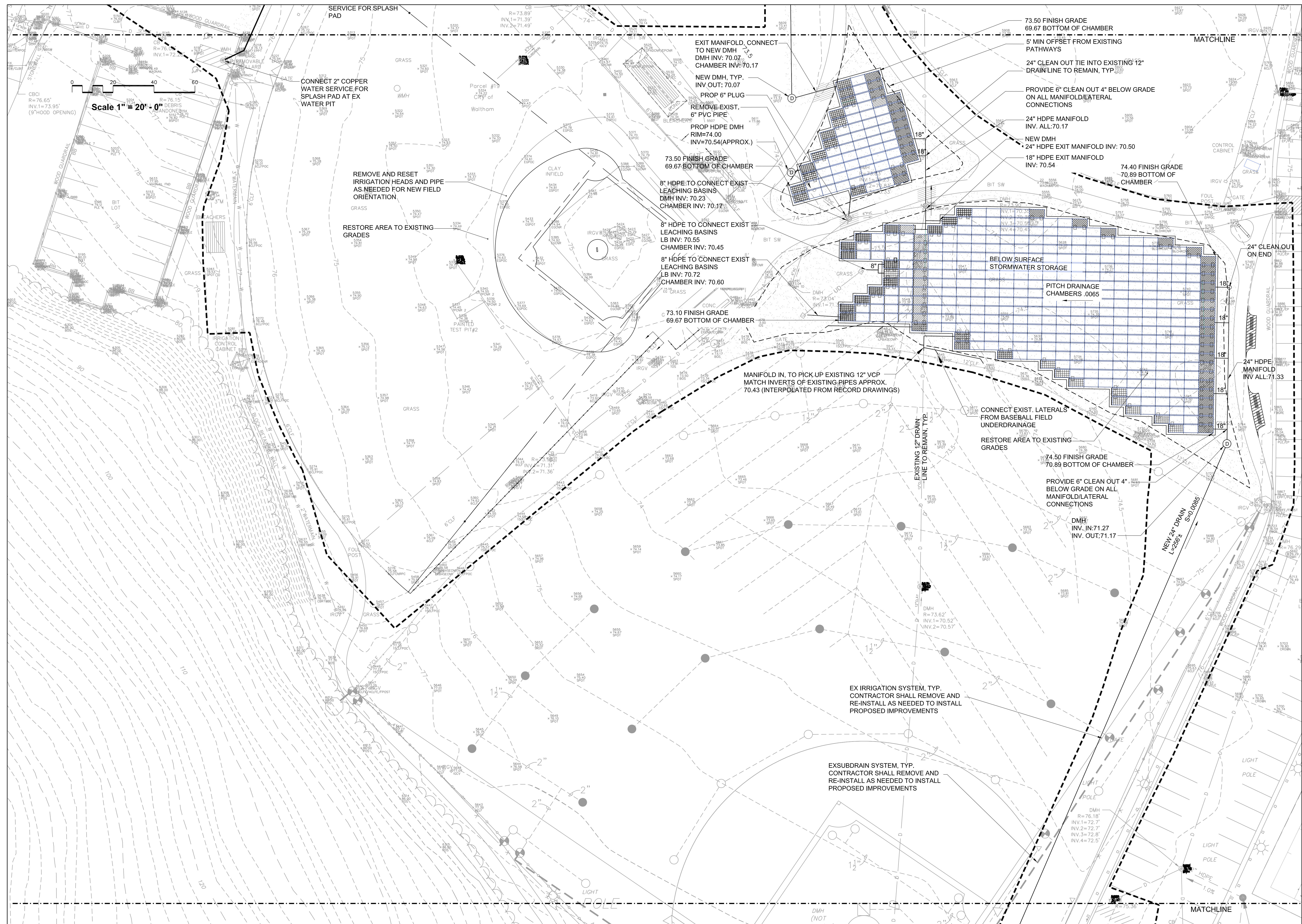
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**NIPPER MAHER PH6
GRADING & DRAINAGE
PLAN
(PLAN 1 of 3)**

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N-GD.1



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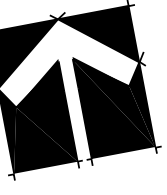


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GRADING & DRAINAGE
PLAN
(PLAN 2 of 3)

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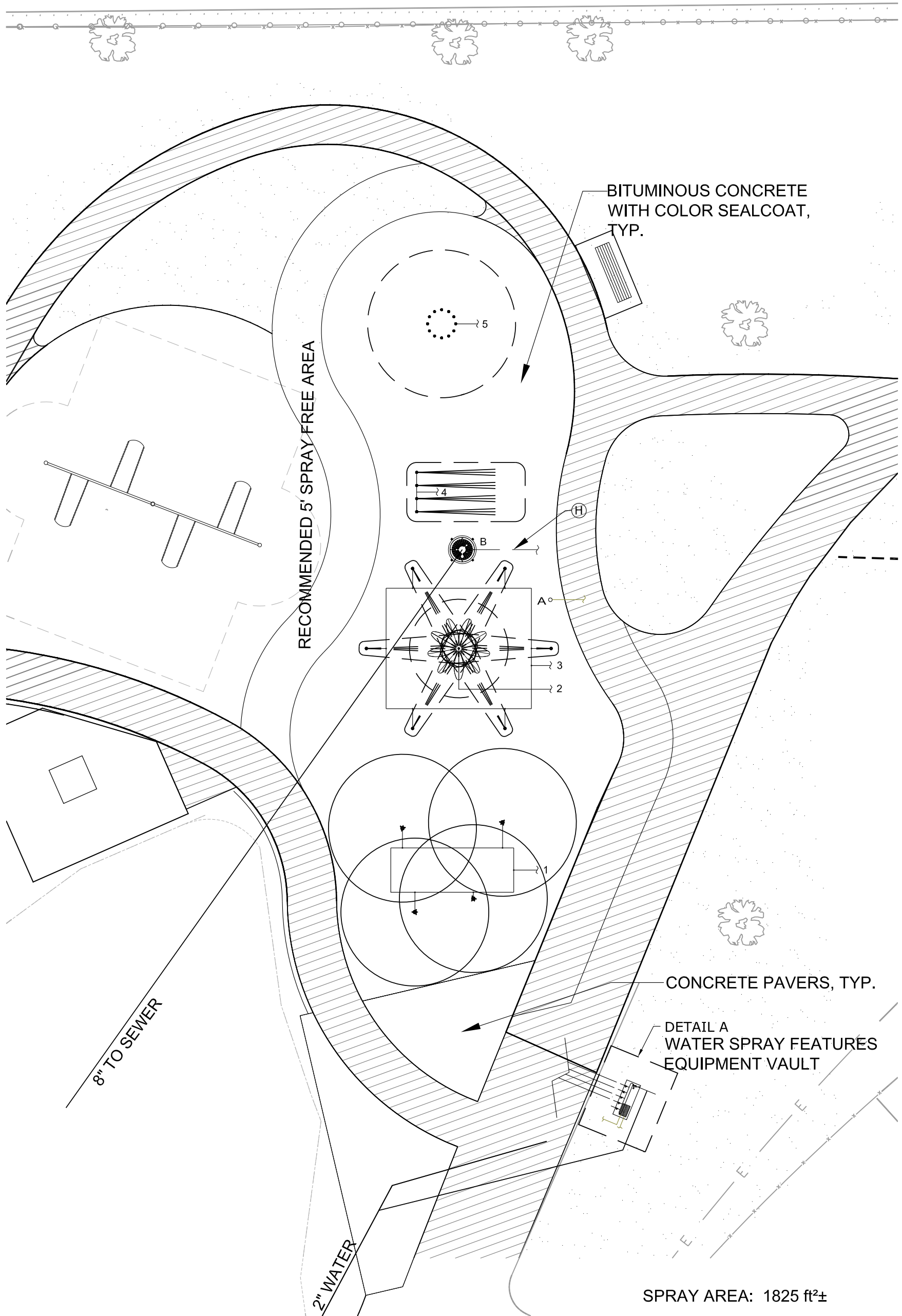
N-GD.2

LEGEND -1

| LINE | PRODUCT | QTY | LINE SIZE | GPM |
|------|----------------------------------|-----|-----------|-----|
| 1 | Magic Mist No1 VOR-7510 | 4 | 1 1/2" | 30 |
| 2 | Flower VOR-564 | 1 | 1 1/2" | 25 |
| 3 | Directional Water Jet VOR-305 | 6 | 1 1/2" | 24 |
| 4 | Water Tunnel No2 VOR-309 | 1 | 1 1/2" | 12 |
| 5 | Cylinder Spray VOR-307 | 1 | 2" | 43 |

LEGEND -2

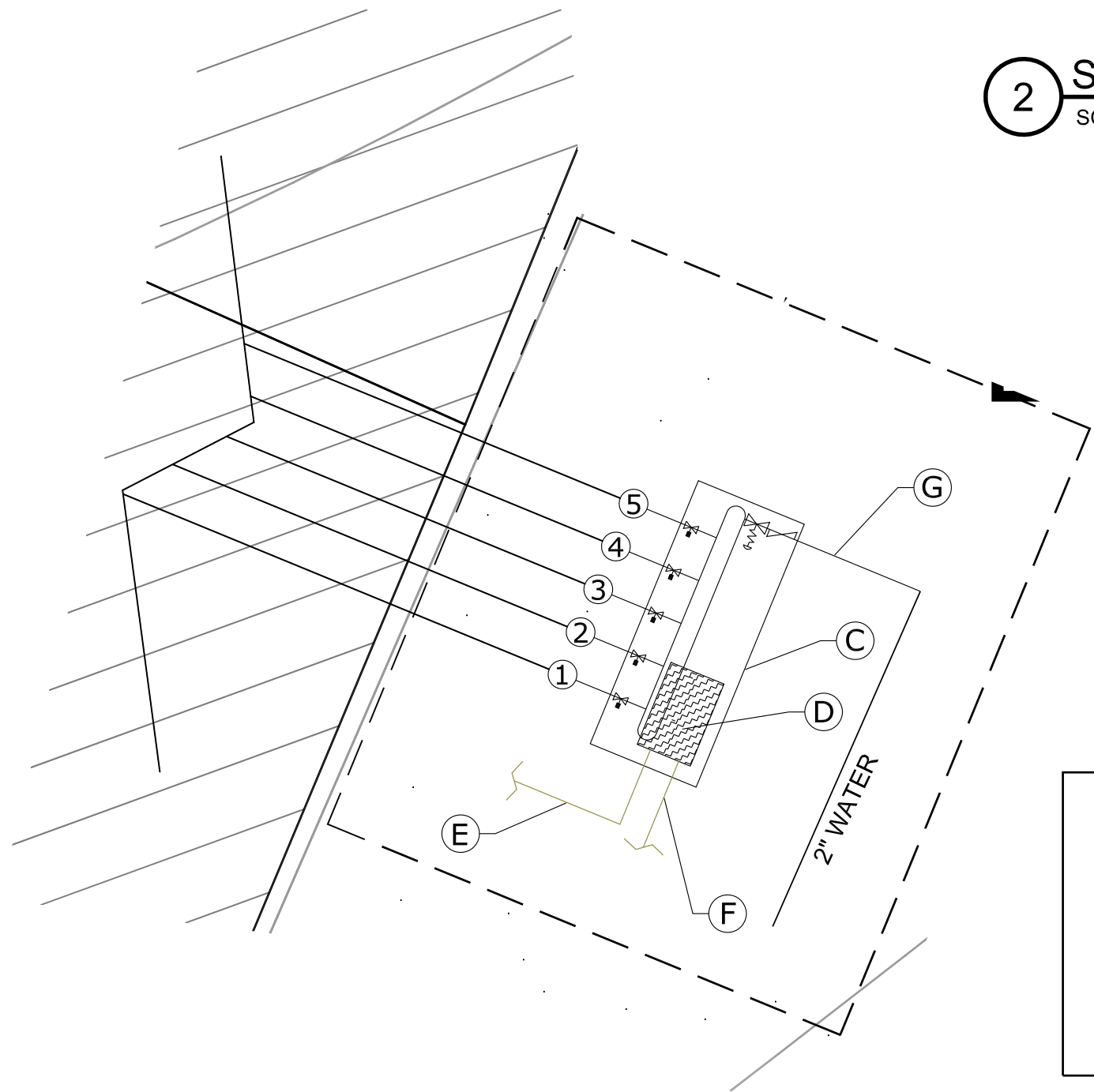
| CODE | PRODUCT | QTY | LINE SIZE |
|------|--|-----|-----------|
| A | Foot Activator VOR-606 | 1 | |
| B | Playsafe Drain No1 VOR-1001.4000 | 1 | 8" |
| C | Vortex 5 Valve Above Ground Command Center vor-1705.0000 | | |
| D | Vortex 10 Output SmartFlow 2 Controller VOR-710.6000 | | |
| E | Electrical Conduit from Controller to Activator; 2 Conductors#14 AWG (by Installer) | | |
| F | | | |
| G | City Water Line (by Installer) | | 2" |
| H | To Municipal Drain (by Installer) | | |
| | Solenoid Valve | 5 | |
| | Pressure Regulator | 1 | |
| | Backflow Preventor | 1 | |



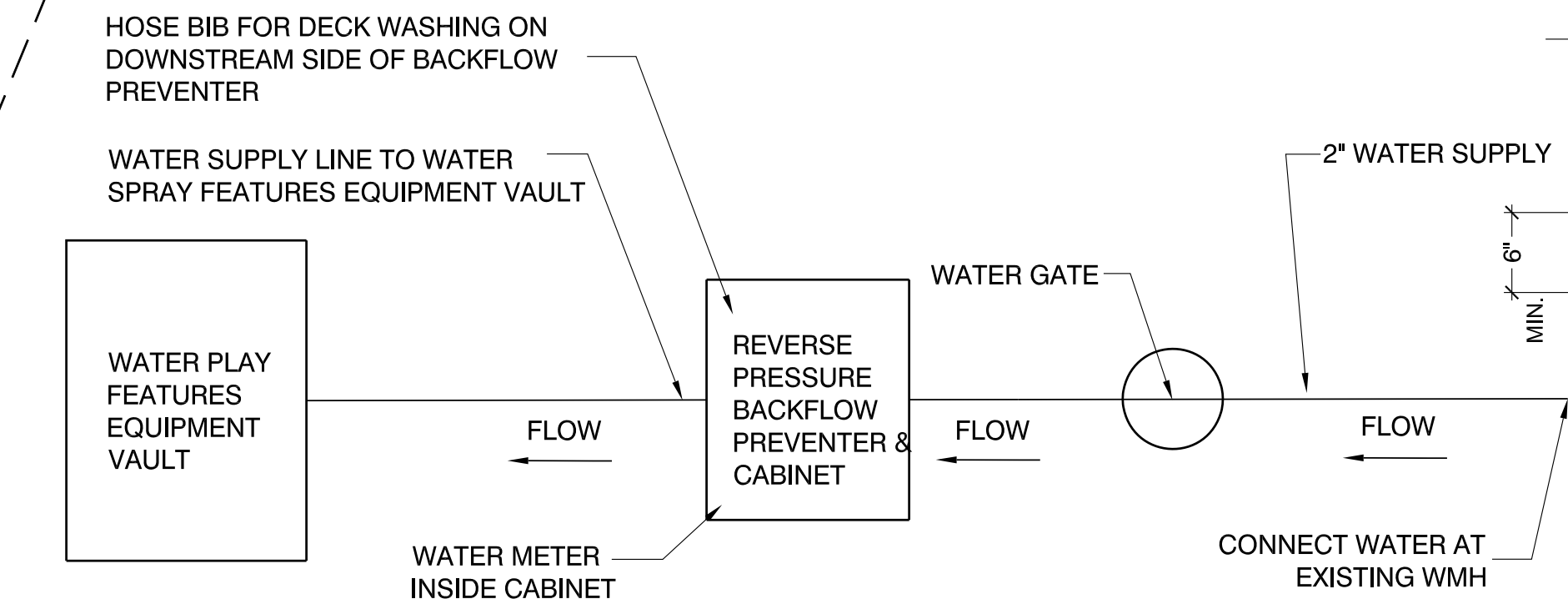
- NOTE:
- REFER TO THE INSTALLATION DRAWING OF EACH PLAY PRODUCT & ABOVE GROUND COMMAND CENTER FOR SPECIFIC INSTALLATION DETAILS.
 - WATER DISTRIBUTION SYSTEM CONFIGURATION IS CONCEPTUAL AND REQUIRES APPROVAL PRIOR TO INSTALLATION.
 - SPLASHPAD ACTIVITY DECK & DRAIN LINES ARE RECOMMENDED TO HAVE A 1-2% SLOPE TO OPTIMIZE DRAINAGE.
 - ALL PIPING TO FEATURES IS RECOMMENDED TO HAVE A 1-2% SLOPE FOR WINTERIZATION.
 - ALL LINE SIZING FROM LEGEND 1 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 MANUFACTURER.
 - ALL PIPING BETWEEN THE PLAY PRODUCTS, PLAY SAFE DRAIN No1 & WATER DISTRIBUTION SYSTEM ARE RECOMMENDED TO BE SCHEDULE 80 PVC.
 - FINAL LOCATION OF PLAYSAFE DRAIN No1 AND LINE ROUTING ARE TO BE DETERMINED BY INSTALLER.
 - LINES FROM PLAYSAFE DRAIN No1 SHALL BE 8". FINAL LINE ROUTING TO BE DETERMINED ON SITE BY INSTALLER.
 - WHEN CONNECTING MULTIPLE PLAY PRODUCTS TO ONE FEEDER LINE, THE JUNCTION POINT (SPLIT OR T) SHALL BE PLACED IN THE MID POINT BETWEEN EACH PLAY PRODUCT. FAILURE TO DO SO MAY RESULT IN UNEQUAL SPRAY EFFECTS BETWEEN PLAY PRODUCTS.
 - WIRING FROM THE CONTROLLER TO EACH ACTIVATOR SHALL BE #14 AWG. A TOTAL OF TWO (2) CONDUCTORS PER ACTIVATOR.
 - ALL CONNECTIONS TO THE CONTROLLER SHALL BE PERFORMED USING AN APPROVED NEMA 4X CONNECTOR.
 - REQUIRED WATER METER ON THE CITY WATER MAIN SHALL BE PROVIDED BY INSTALLER.
 - MINIMUM 50 PSI REQUIRED AT THE INLET OF THE BACKFLOW PREVENTER AND PRESSURE REGULATING DEVICE.
 - VALVE NUMBER 1 IS LOCATED ON THE TOP LEFT WHEN FACING THE CABINET DOOR IN THE CLOSED POSITION.
 - ANY CHANGES TO THE PIPING AND ELECTRICAL SCHEMATIC AFTER FINAL APPROVAL, MAY INCUR ADDITIONAL PROGRAMMING CHARGES.
 - TOTAL COMBINED FLOW CAPACITY OF PLAY PRODUCT IS 137 GPM. MAXIMUM FLOW CAPACITY OF MANIFOLD IS 72 GPM.

ADDITIONAL NOTE:

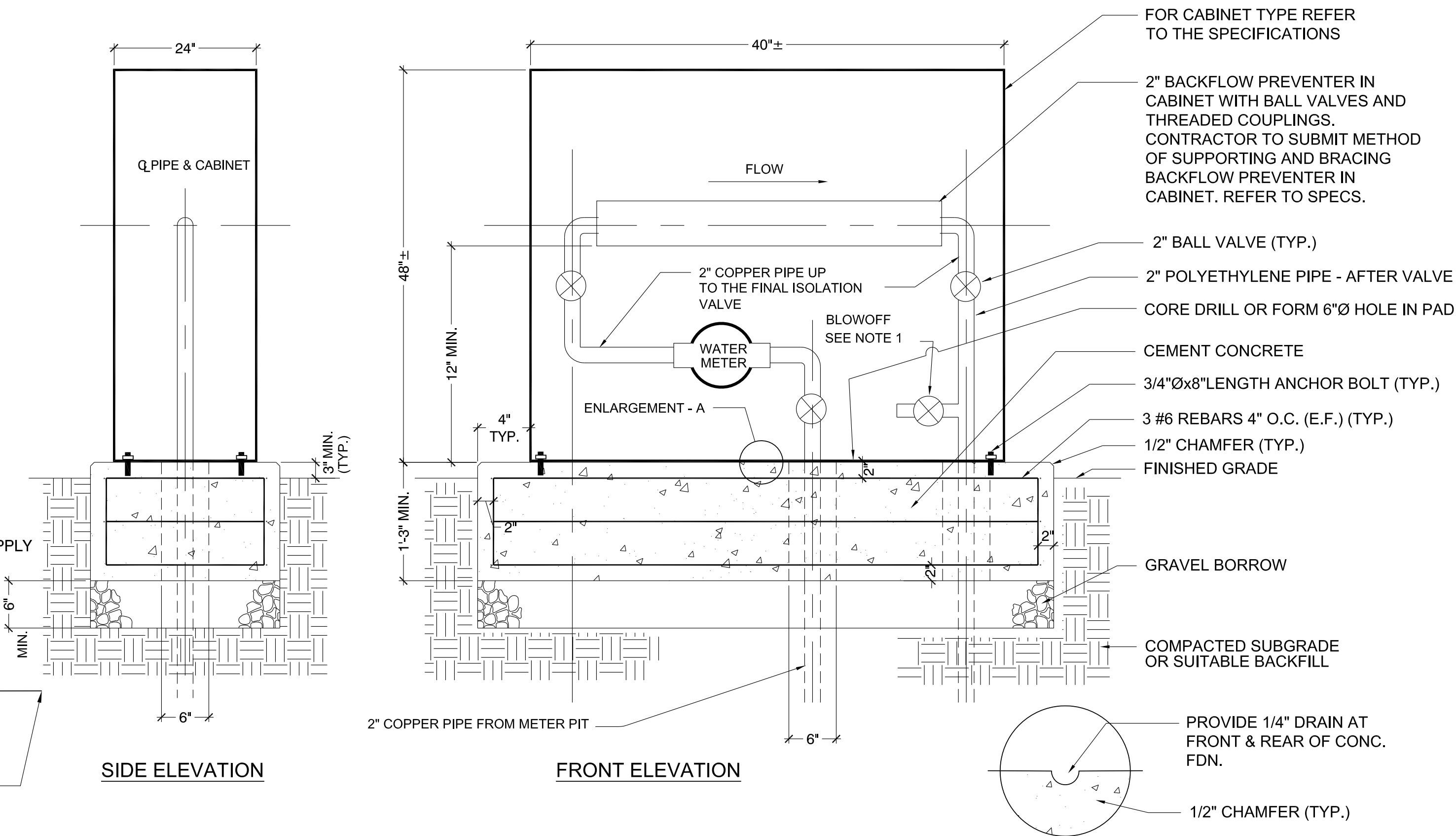
- INSTALL A BRASS BLOWOFF FITTING AND VALVE ON THE OUTFLOW SIDE OF THE BACKFLOW PREVENTION DEVICE TO WINTERIZE THE SYSTEM AS REQUIRED.
- THE BACKFLOW PREVENTER & METER SHALL BE INSTALLED WITH UNIONS, HANGERS, SUPPORTS AND ALL OTHER APPROPRIATE FITTINGS, IN ORDER TO EASILY REMOVE THE DEVICE FOR SERVICE AND TO MEET ALL APPLICABLE PLUMBING CODES.
- CONFIRM LAYOUT AND ALIGNMENT REQUIREMENTS FOR ALL PIPING, FITTINGS, VALVES, METER, AND BACKFLOW PREVENTER WITH WALTHAM WATER DEPARTMENT PRIOR TO INSTALLATION.



2 SPLASH PAD LAYOUT PLAN
SCALE: N.T.S.



4 2" BACKFLOW PREVENTER & WATER METER IN CABINET
SCALE: N.T.S.



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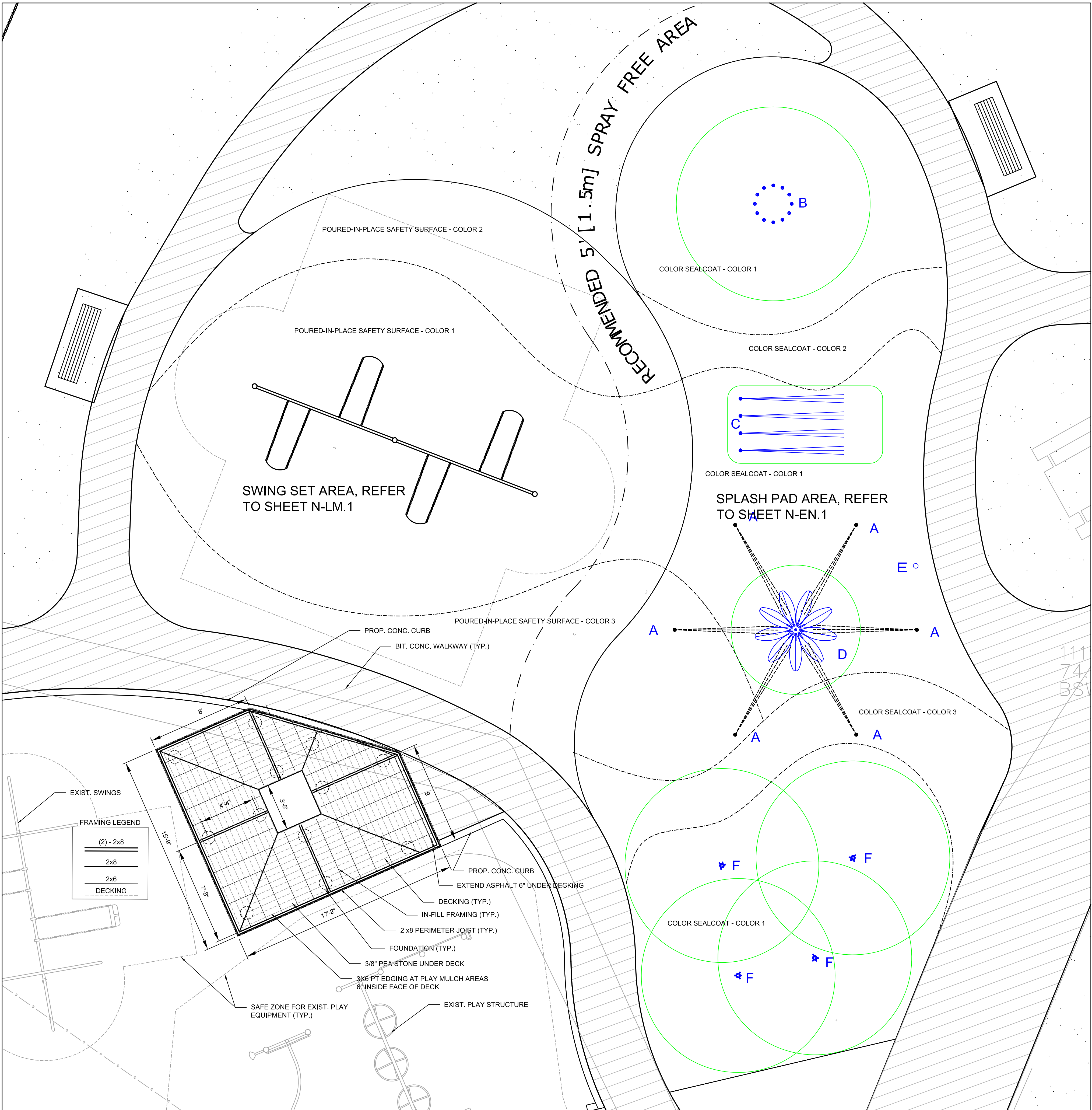
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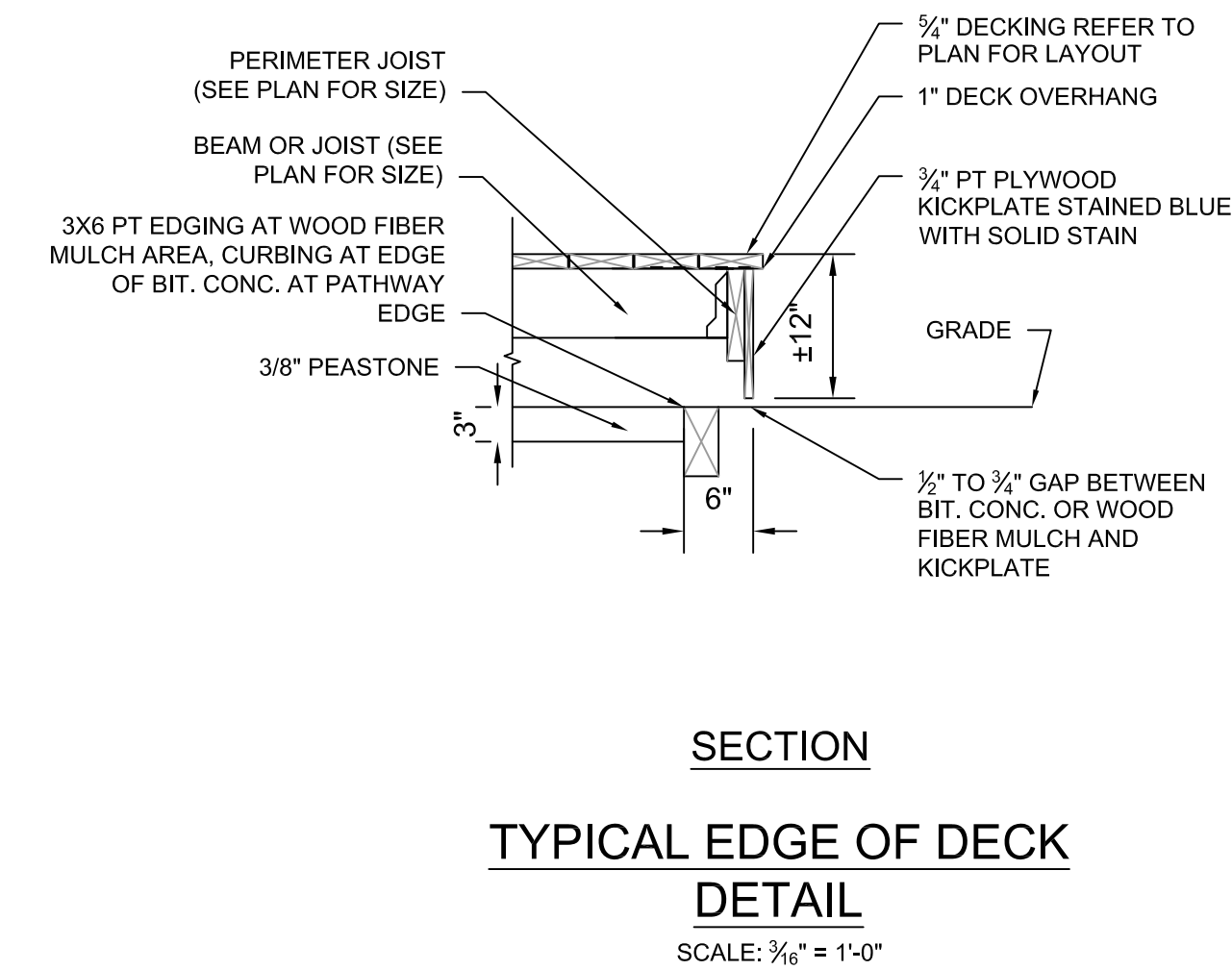
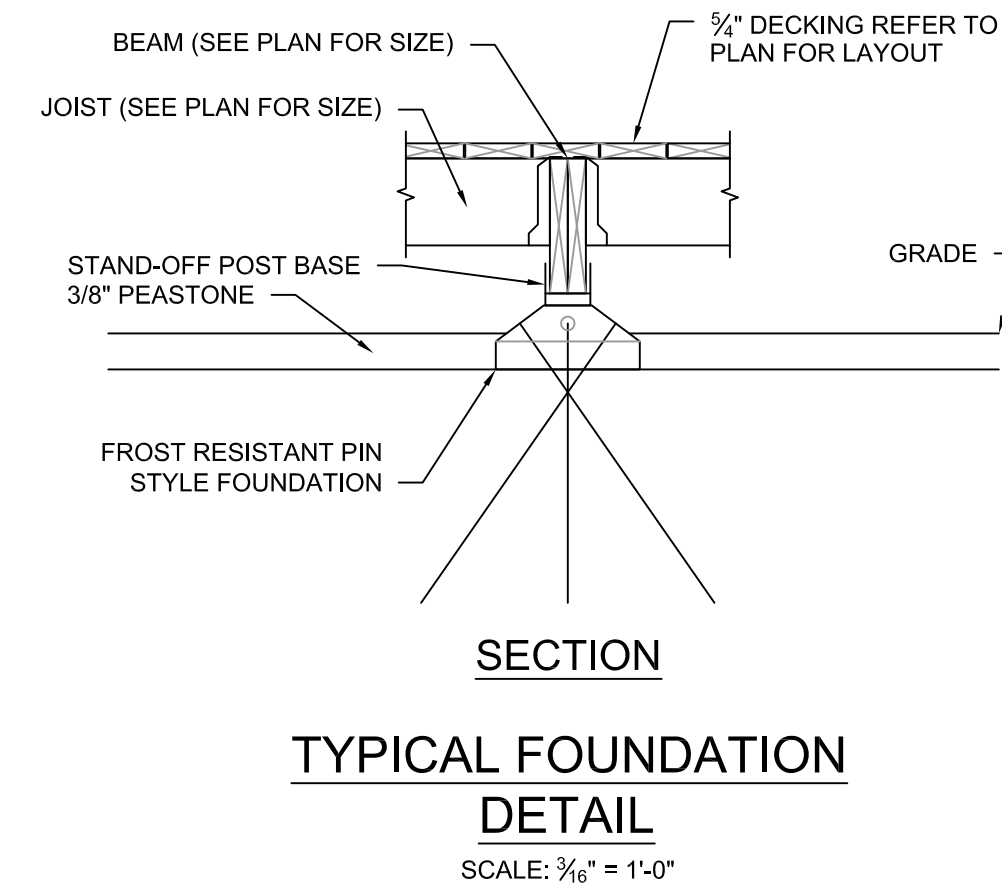
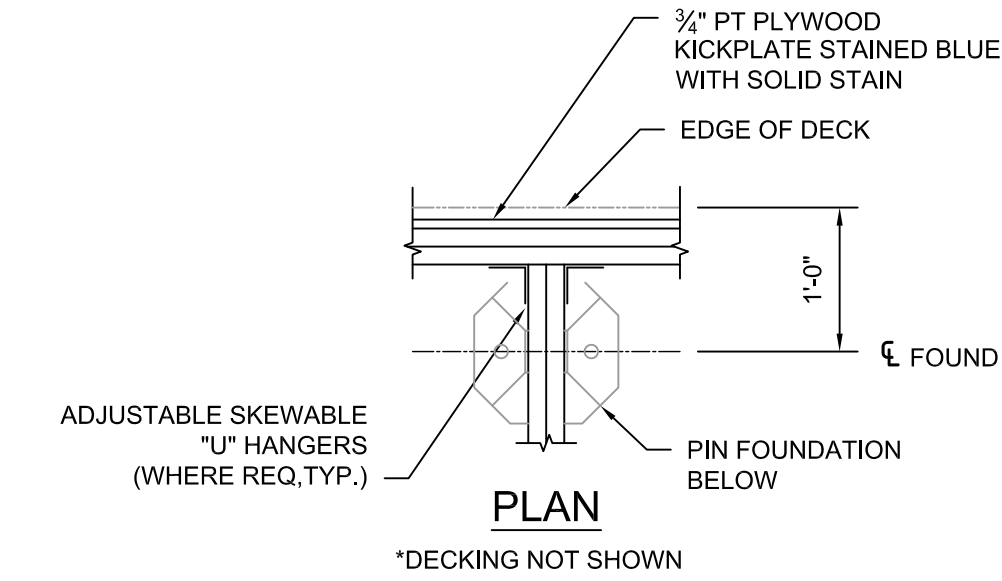
SPLASH PAD
ENLARGEMENT PLAN

Sheet Number:

N-EN.1



1 PLAYGROUND DECK, SWING AREA PIP AND COLOR SEALCOAT LAYOUT - PLAN
SCALE: N.T.S.



DECKING GENERAL NOTES:

- ALL WORK SHALL CONFORM TO MASSACHUSETTS STATE BUILDING CODE AND ITS APPLICABLE REFERENCES.
- DECK PLATFORM ALLOWABLE LIVE LOAD: 85 PSF.
- ALL WOOD USED FOR FRAMING SHALL BE PRESSURE TREATED (P.T.) SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
- CONNECTION HARDWARE SHALL BE GALVANIZED OR STAINLESS STEEL.
- MAXIMUM 3/8-INCH DECK SPAN SHALL BE 16-INCHES ON CENTER, OVERHANGS SHALL NOT EXCEED 6-INCH.
- ALL WOOD SHALL BE S-P-F No. 2 MINIMUM.
- ALL DECKING SHALL BE TREX TRANSCEND DECKING, OR APPROVED EQUAL, COLOR TO BE SELECTED.
- PIN FOUNDATION SHALL SUPPORT A MINIMUM GRAVITY LOAD OF 3,200 LBS PER FOUNDATION AND SHALL BE INSTALLED PER MANUFACTURERS SPECIFICATIONS AND RECOMMENDATIONS.
- ALL CONNECTION HARDWARE SUCH AS BUT NOT LIMITED TO, NAILS, ANCHOR BOLTS, NUTS, WASHERS AND CONNECTION BRACKETS SHALL BE EITHER STAINLESS STEEL OR HOT DIPPED GALVANIZED.
- HANGERS INTENDED FOR USE IN PERPENDICULAR SHALL BE DESIGNED TO HANDLE THE FOLLOWING LOADS:

| | |
|----------------------------|--------|
| 10.1. FOR SINGLE 2x JOISTS | 1000LB |
| 10.2. FOR DOUBLE 2x BEAMS | 2500LB |
| 10.3. SKEWED SINGLE JOIST | 1000LB |
| 10.4. SKEWED DOUBLE BEAM | 1600LB |

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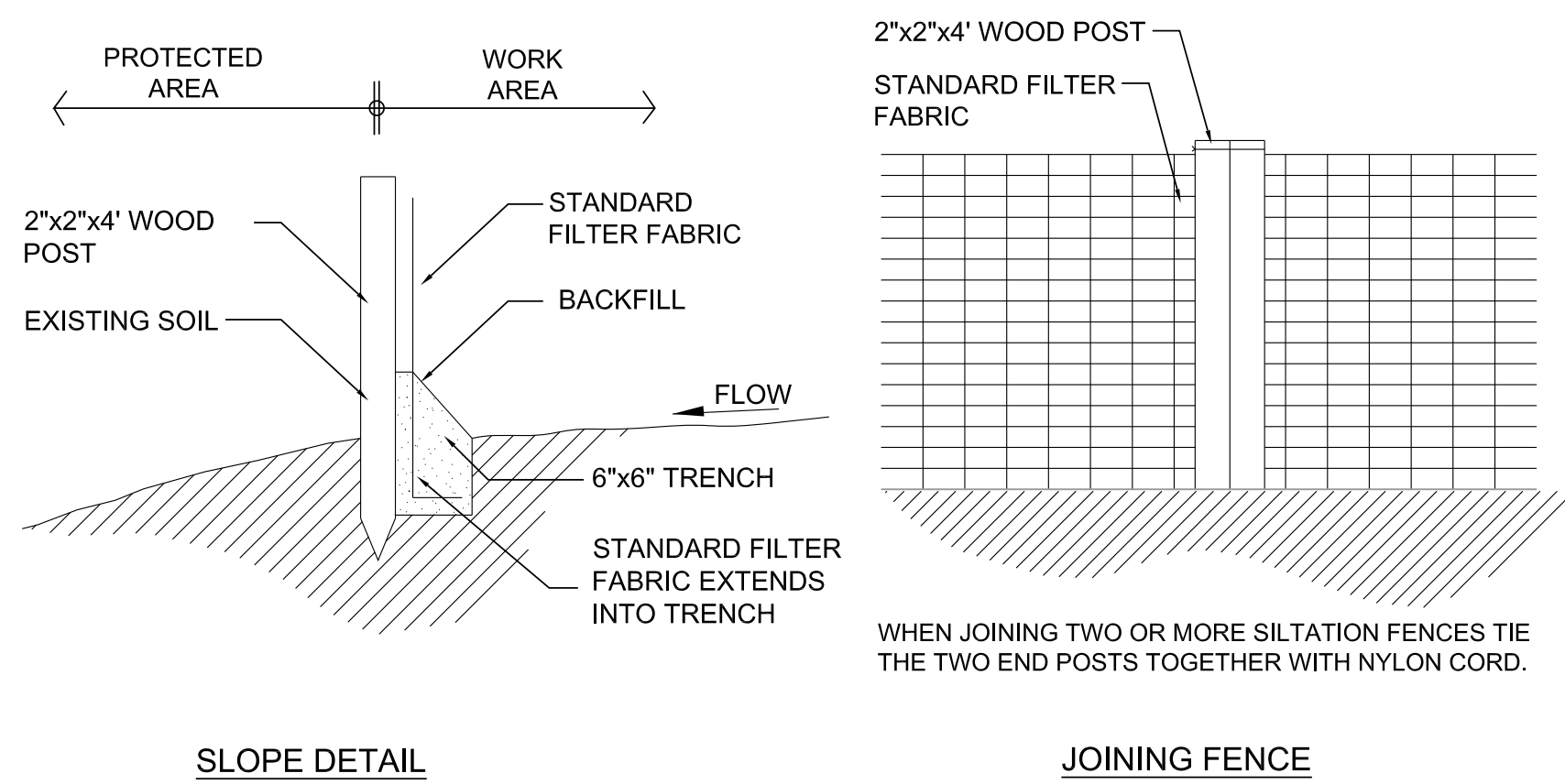
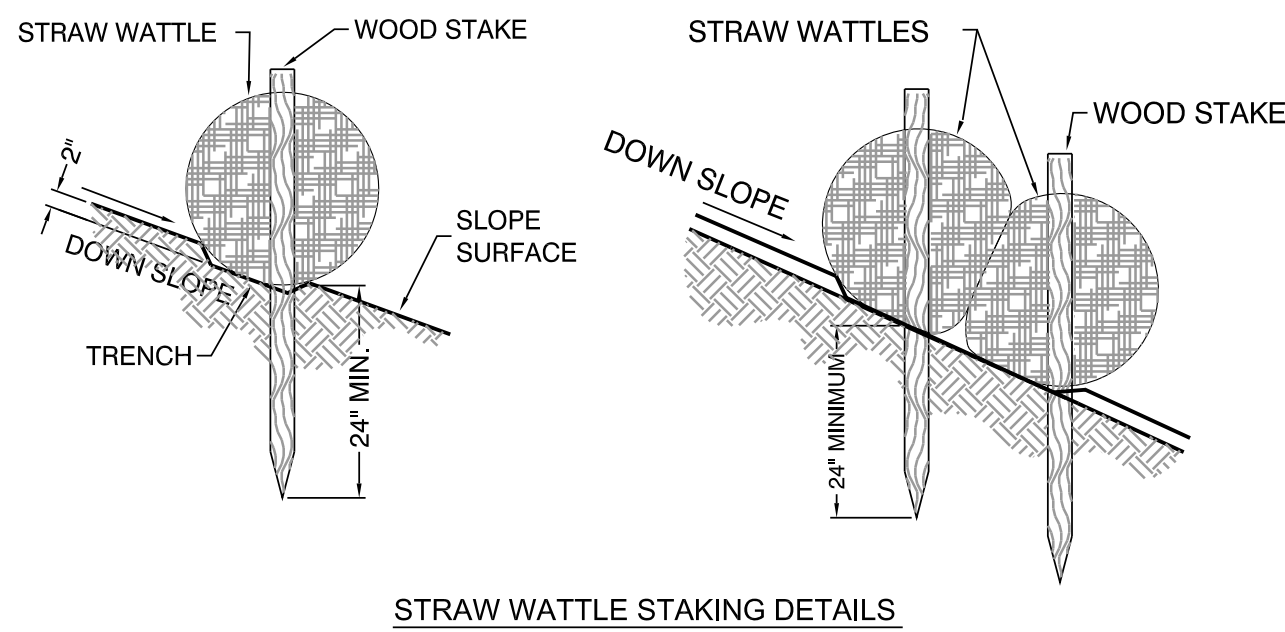
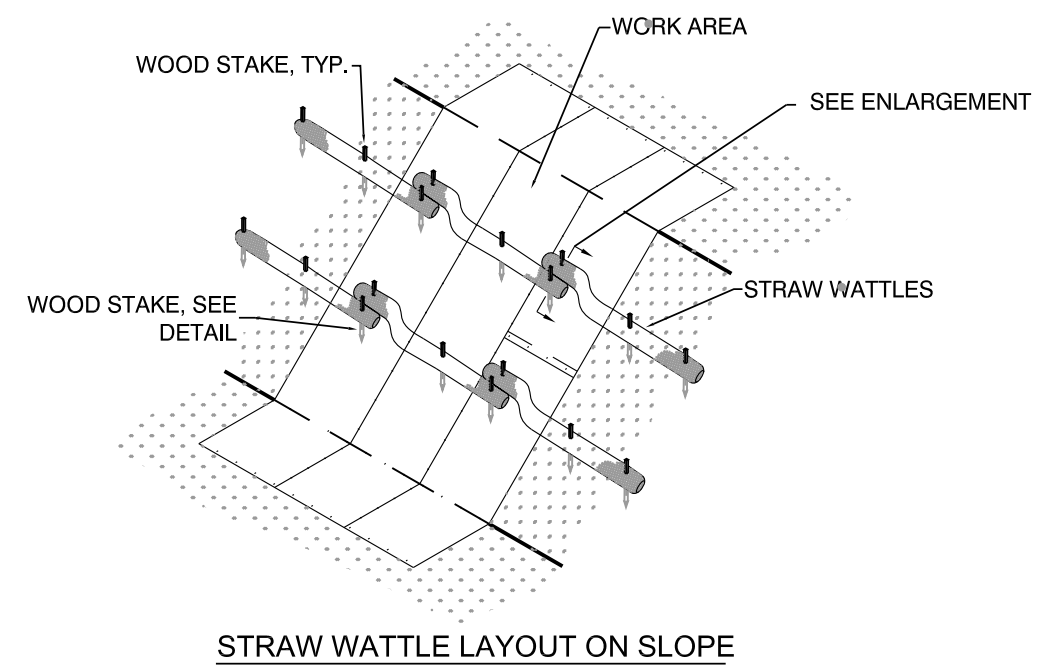
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NIPPER MAHER PH6

**PLAYGROUND DECK
ENLARGEMENT PLAN**

Sheet Number:

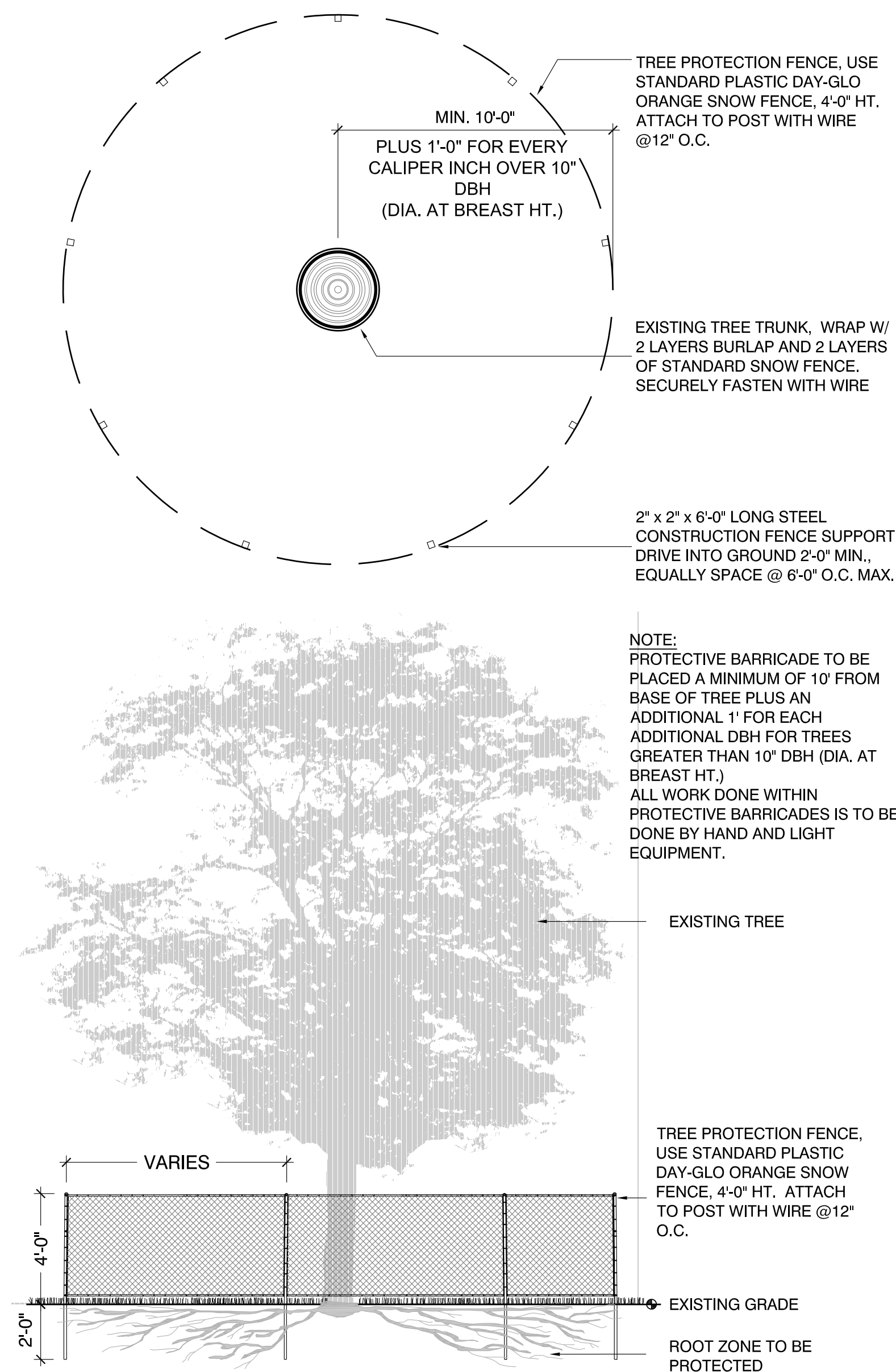
N-EN.2



CONSTRUCTION SPECIFICATIONS ON SILTATION & EROSION CONTROL

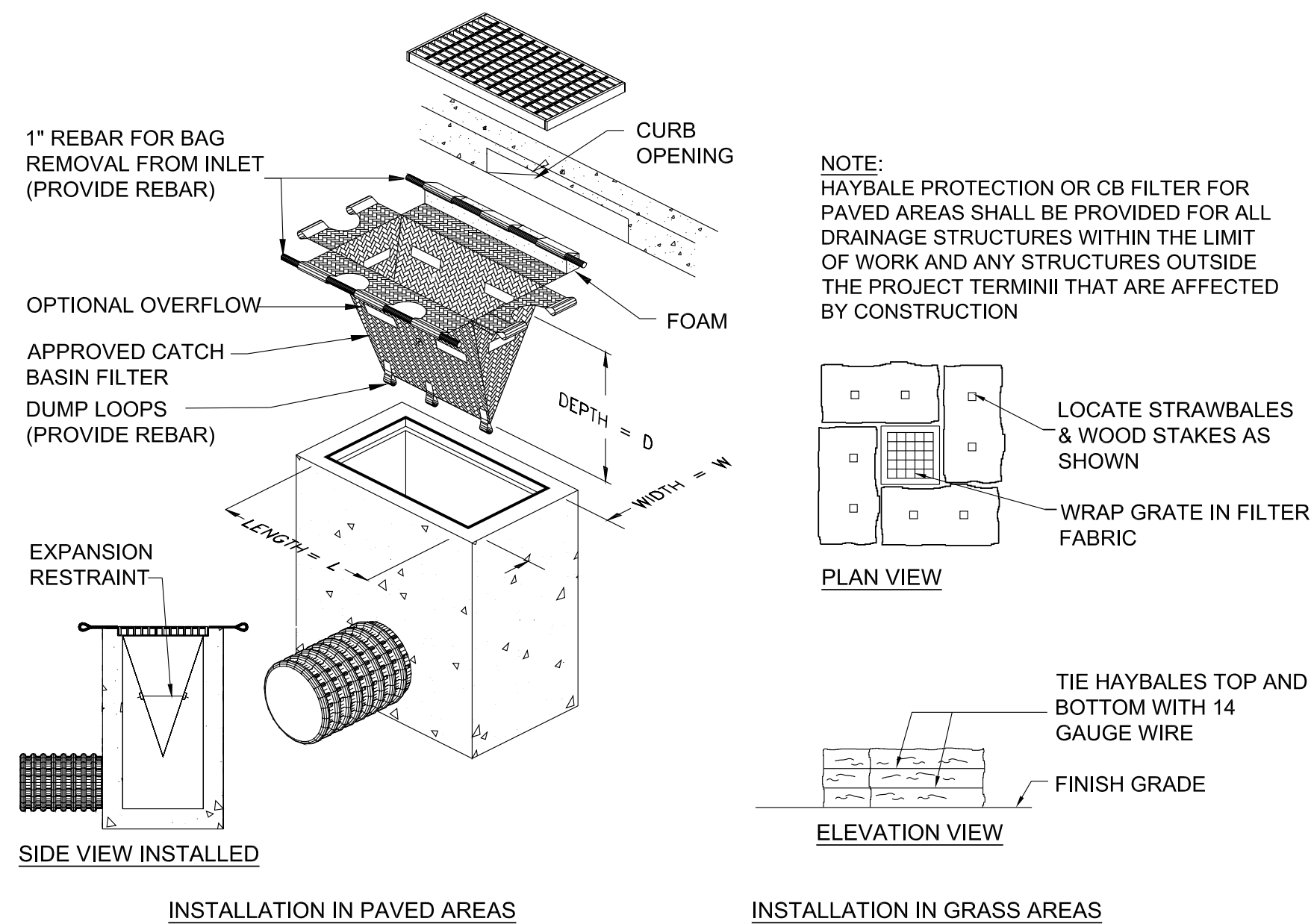
1. EROSION CONTROL MEASURES SHALL BE INCORPORATED IN THE SEQUENCE OF CONSTRUCTION TO PREVENT SEDIMENT LADEN WATER FROM LEAVING THE SITE.
2. AREAS SUBJECT TO EROSION SHALL BE MINIMIZED IN TERMS OF TIME AND AREA.
3. IN GENERAL, WORK REQUIRING EROSION CONTROL INCLUDES EXCAVATIONS, FILLS, DRAINAGE, SWALES AND DITCHES, ROUGH AND FINISH GRADING, AND STOCKPILING OF EARTH.
4. DO NOT DISTURB VEGETATION AND TOPSOIL BEYOND THE PROPOSED LIMIT OF SILT FENCE ACTIVITIES.
5. TEMPORARY SILT FENCE SHALL BE PLACED AS SHOWN ON THE PLAN. PERMANENTLY STABILIZE EACH COMPLETED SEGMENT OF CONSTRUCTION.
6. THE CONTRACTOR SHALL REMOVE TEMPORARY SILT FENCE AND ALL ACCUMULATED SILT AND DEBRIS AFTER COMPLETION OF CONSTRUCTION OPERATIONS.
7. SILT FENCE SHALL BE IN PLACE AT ALL TIMES DURING CONSTRUCTION.
8. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL SILT AND DEBRIS FROM EACH DRAINAGE STRUCTURE UPON COMPLETION OF THE PROJECT.
9. OBJECTS AND/OR AREAS DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED TO THEIR ORIGINAL CONDITION.
10. ALL DISTURBED AREAS SHALL BE RESTORED TO EXISTING GRADE. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE AS NEEDED.
11. SILT FENCE SHALL BE REMOVED UPON THE SATISFACTORY COMPLETION OF ALL WORK SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.

NOTE:
FOR TREES THAT OCCUR IN GROUPS PROVIDE TREE PROTECTION FENCE AROUND ENTIRE AREA. SEE PLAN FOR LOCATIONS.



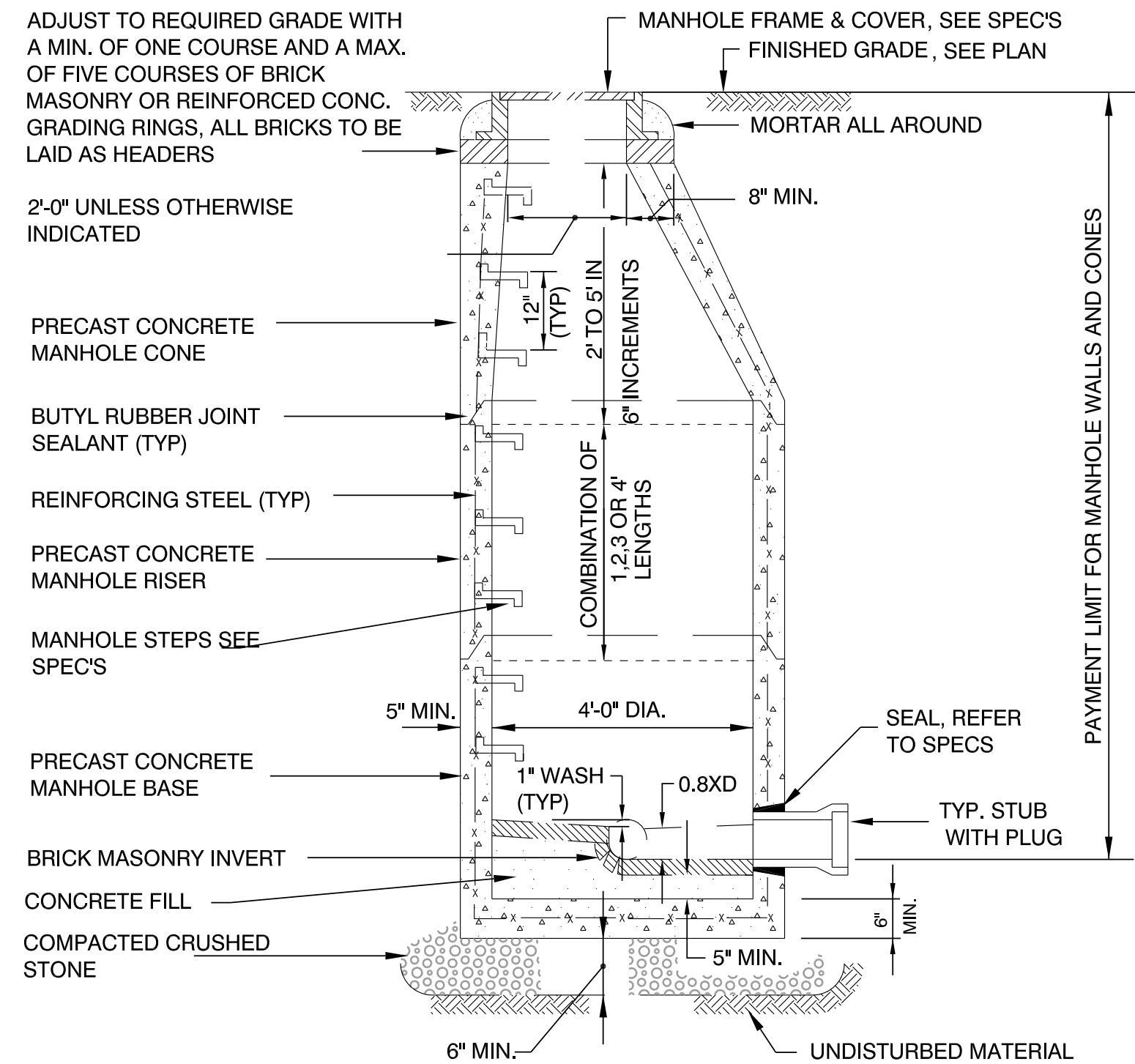
2 TREE PROTECTION DETAIL

SCALE: N.T.S.



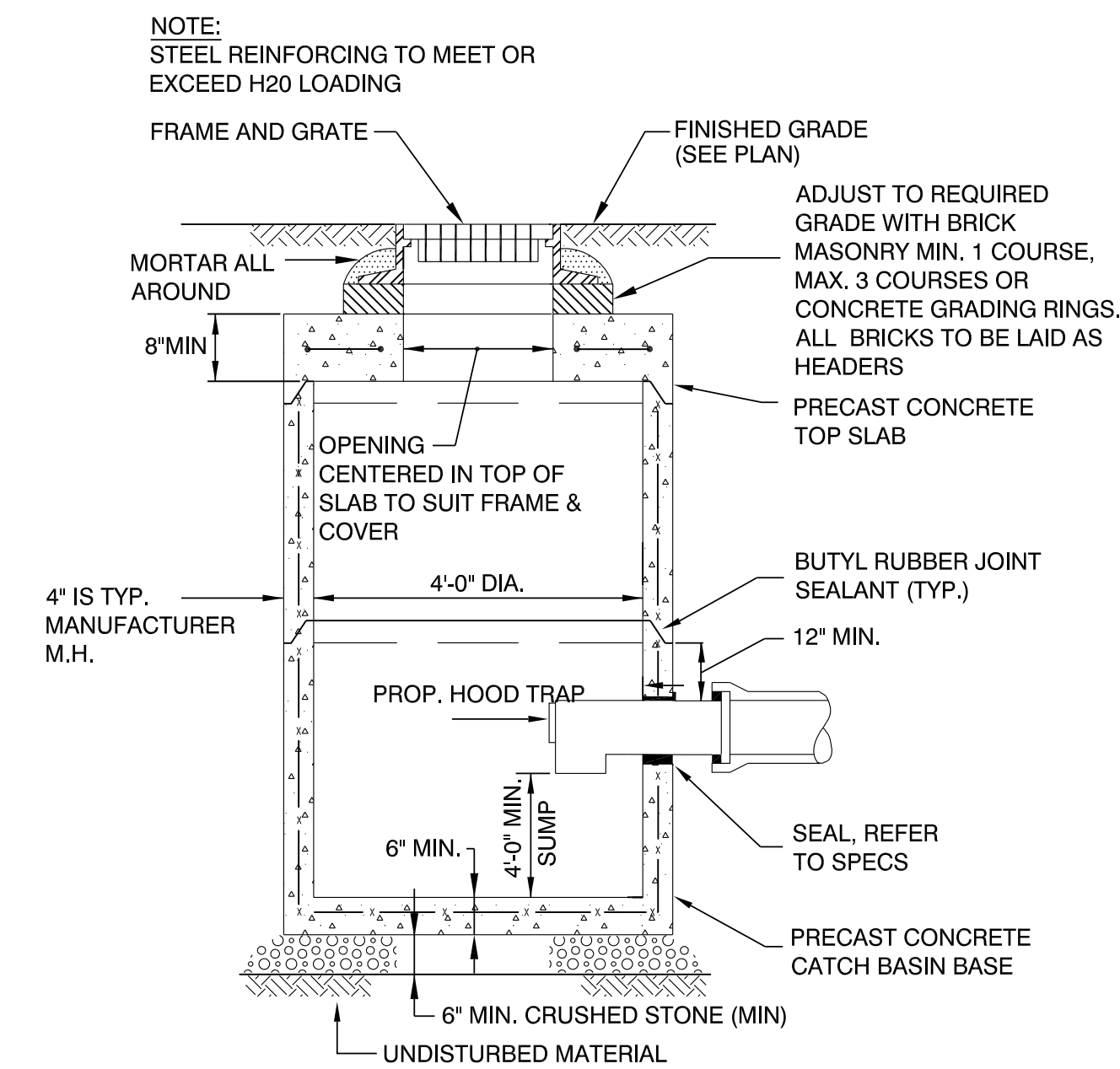
3 INLET SEDIMENT CONTROL

SCALE: N.T.S.



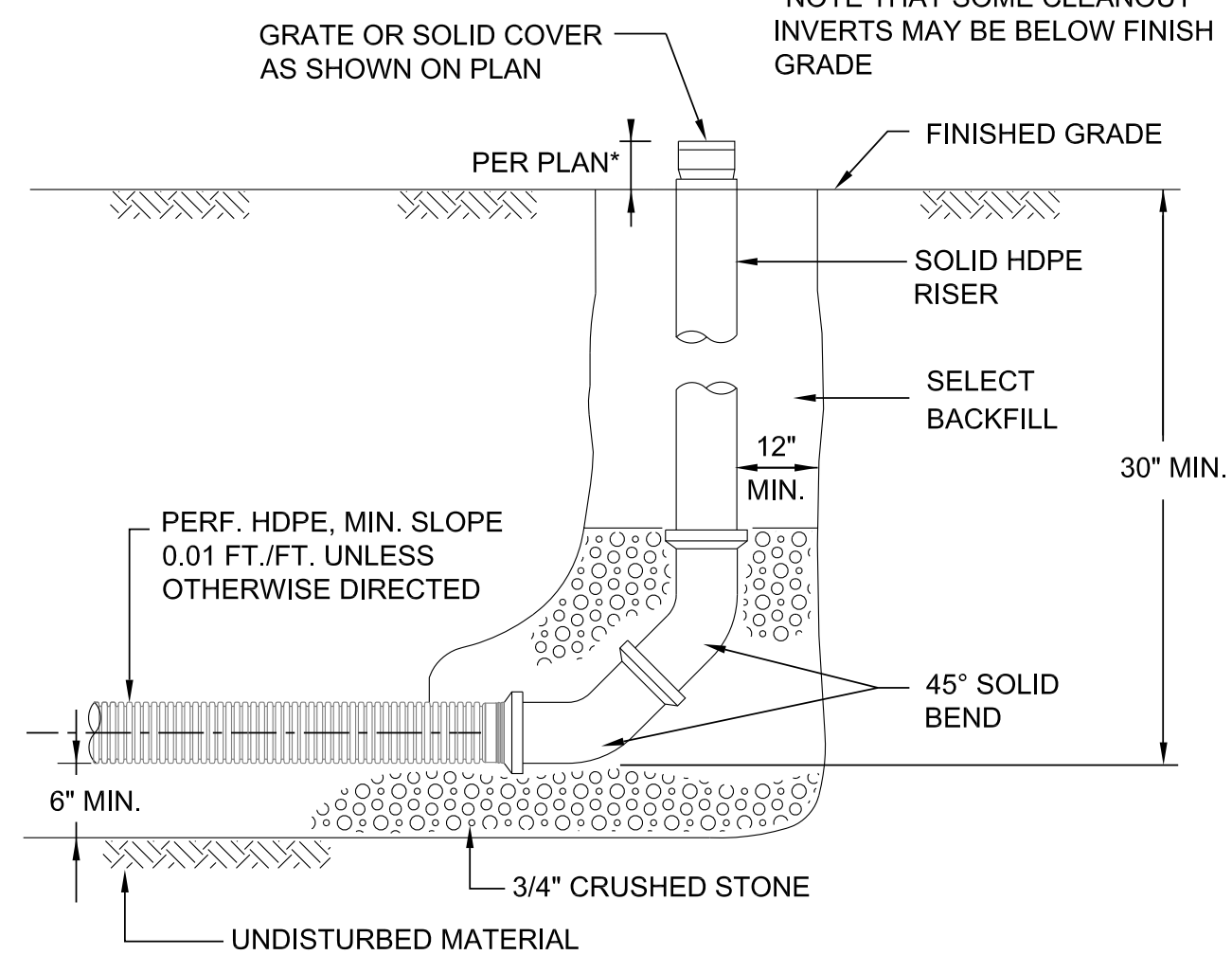
4 DRAIN MANHOLE

SCALE: N.T.S.



5 CATCH BASIN

SCALE: N.T.S.

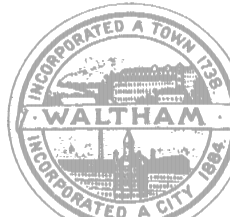


6 CLEANOUT DETAIL

SCALE: N.T.S.

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**SITE CONSTRUCTION
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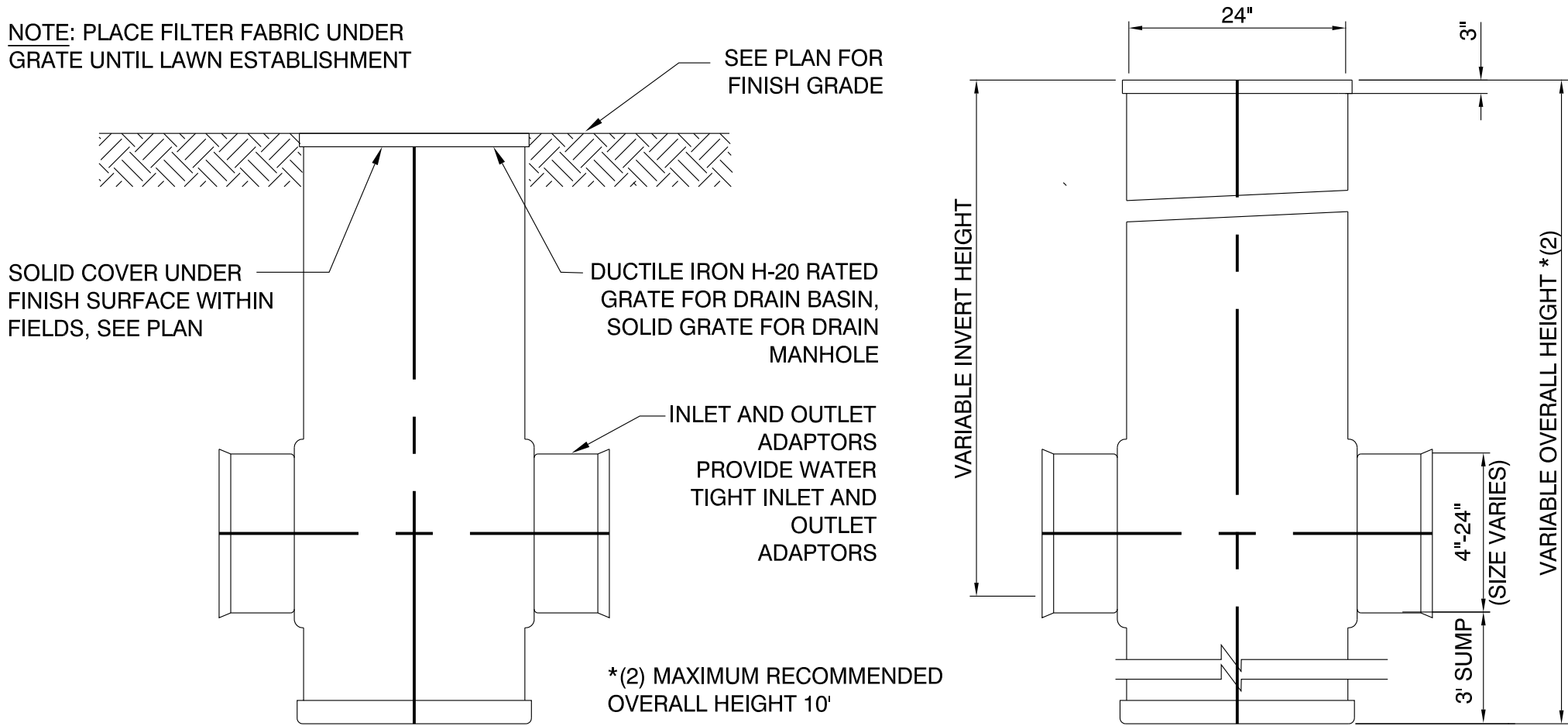
1 SILT FENCE- EROSION CONTROL

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NOTES:

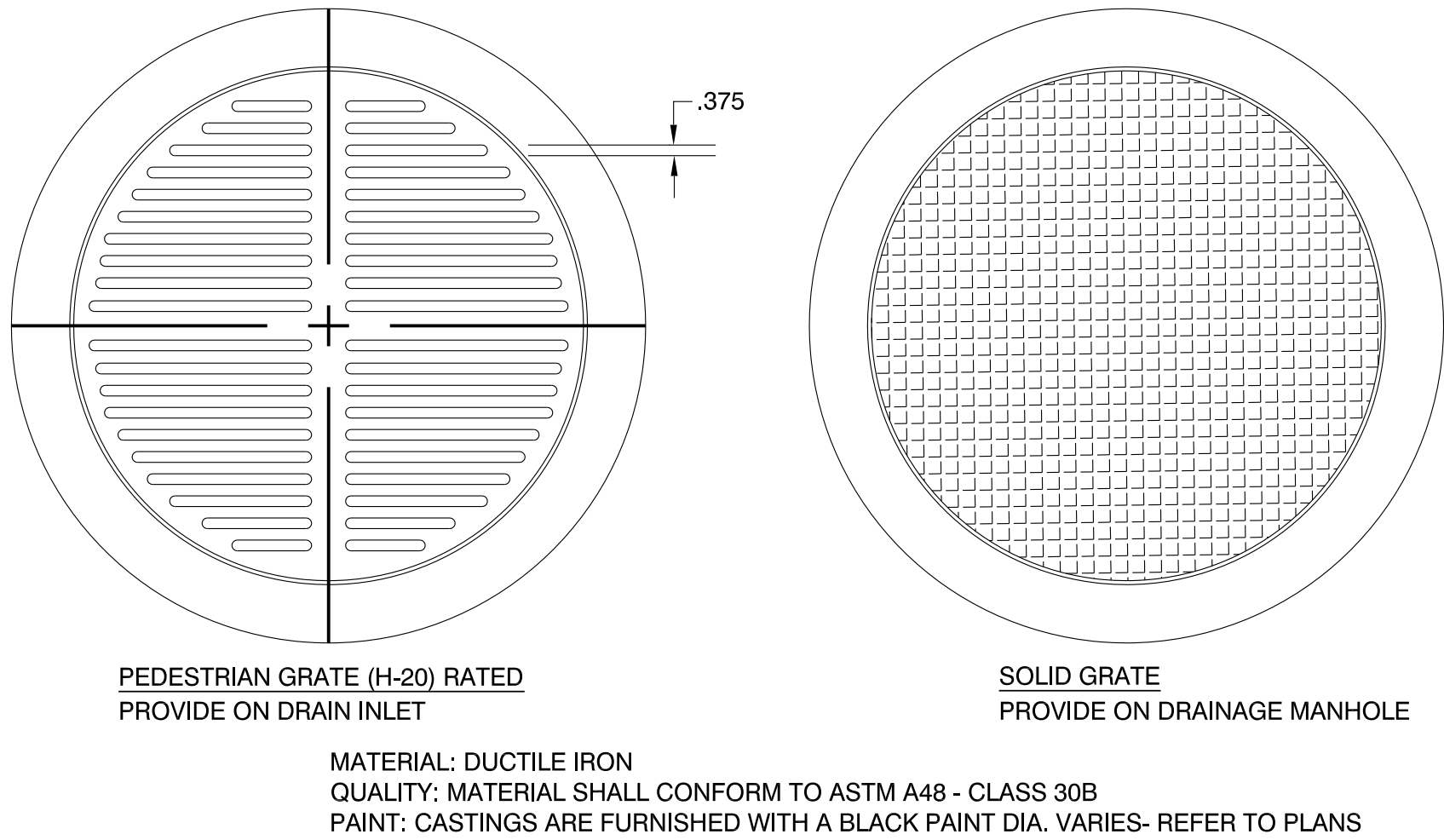
1. INLET DRAINS, BASINS, COVERS AND INCIDENTALS SHALL BE MANUFACTURED BY NYLOPLAST OR APPROVED EQUAL.
2. BACKFILL MATERIAL SHALL BE COMPACTED TO A DENSITY OF 90% AS PER AASH TO T-99.
3. PIPE INSTALLATION INCLUDES ALL BASINS, ADAPTERS, COUPLINGS AND FITTINGS SHALL BE INSTALLED ACCORDING TO ASTM D2321.

NOTE: PLACE FILTER FABRIC UNDER GRATE UNTIL LAWN ESTABLISHMENT



1 24" DRAIN INLET

SCALE: N.T.S.

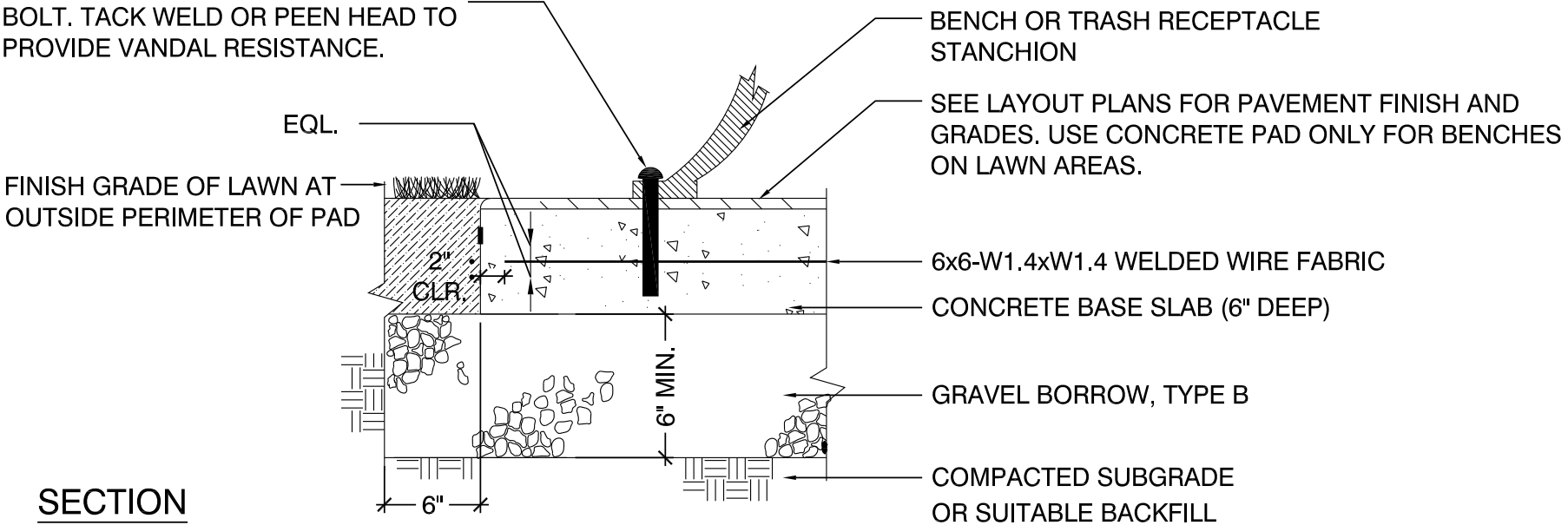


1 DRAIN INLET GRATE & COVER

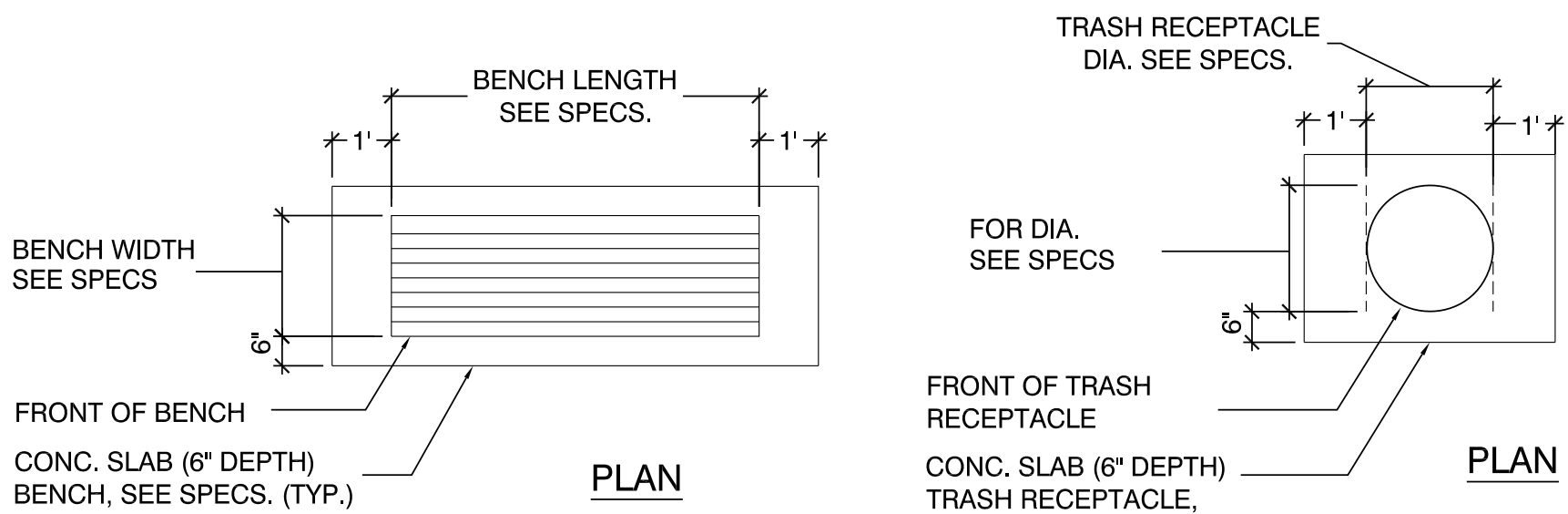
SCALE: N.T.S.

NOTE: MAINTAIN 1' CLEARANCE BETWEEN EDGE OF PAD AND OUTSIDE PERIMETER OF OBJECT ON PAD (SEE PLAN VIEW)

ANCHOR BENCH OR TRASH RECEPTACLE TO CONC. BASE SLAB WITH EXPANSION BOLT. TACK WELD OR PEEN HEAD TO PROVIDE VANDAL RESISTANCE.



SECTION

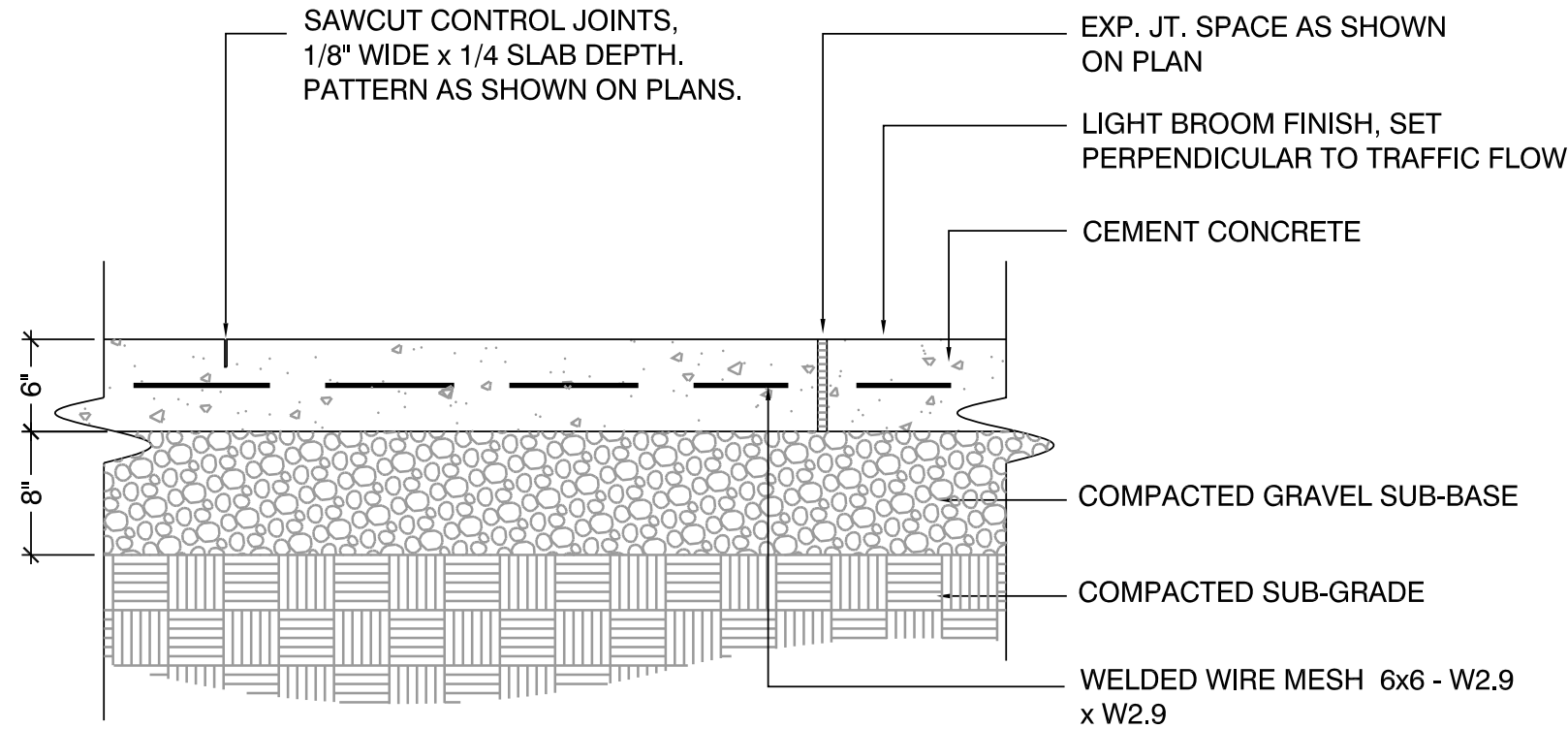


2 CONCRETE PAD FOR BENCH AND TRASH RECEPTACLE

SCALE: N.T.S.

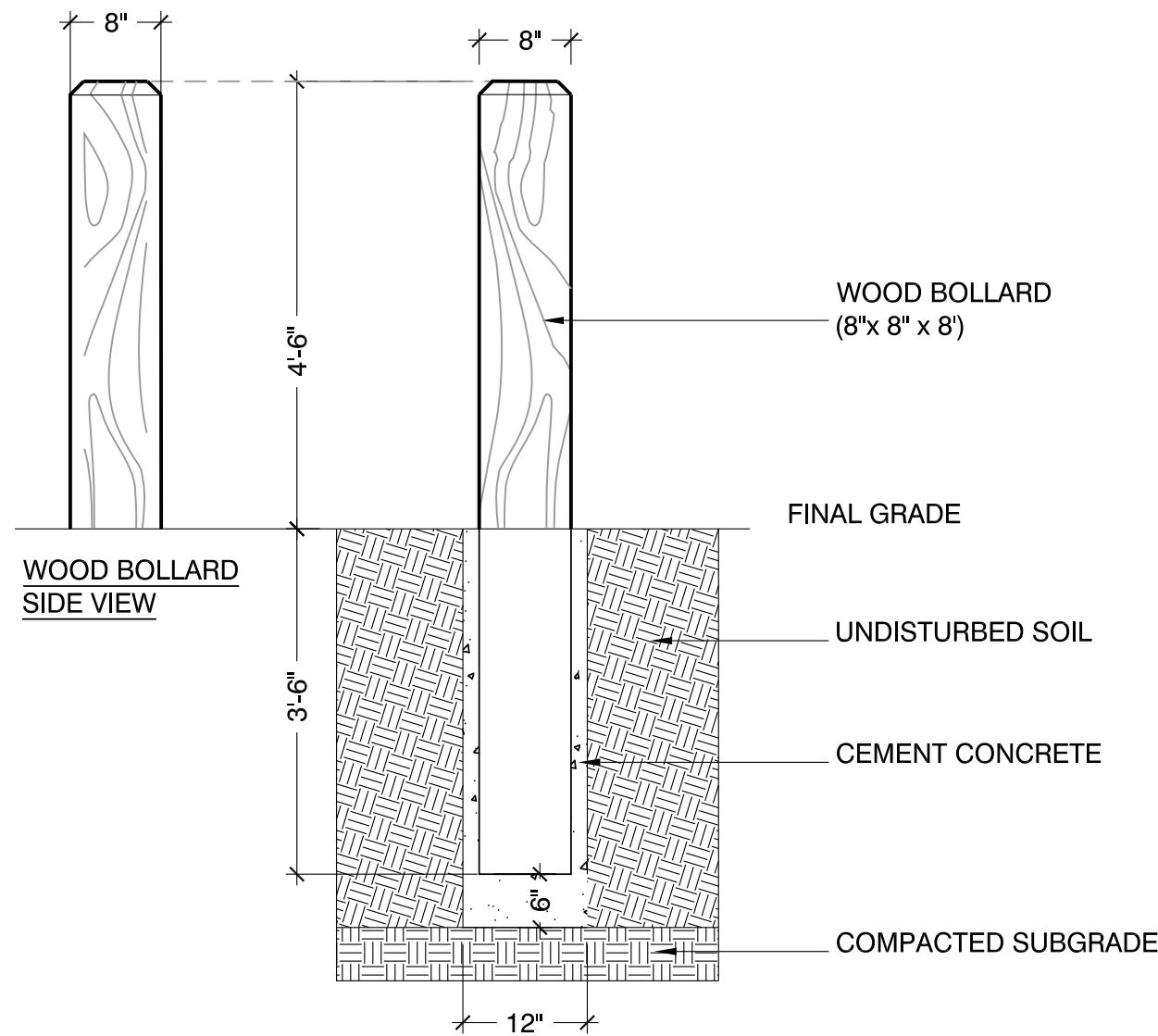
*NOTE:

1. ALL CONCRETE PAVEMENT AREAS USE $\pm 30'$ O.C. EXPANSION JOINTS AND $\pm 5'$ O.C. CONTROL JOINTS (SAWCUT CONTROL JOINTS TO A MIN. DEPTH OF $\frac{1}{4}$ OF THE CONC. SLAB DEPTH).
2. FOR SIDEWALK PAVEMENT, USE BROOM FINISH PERPENDICULAR TO ROUTE OF TRAVEL.



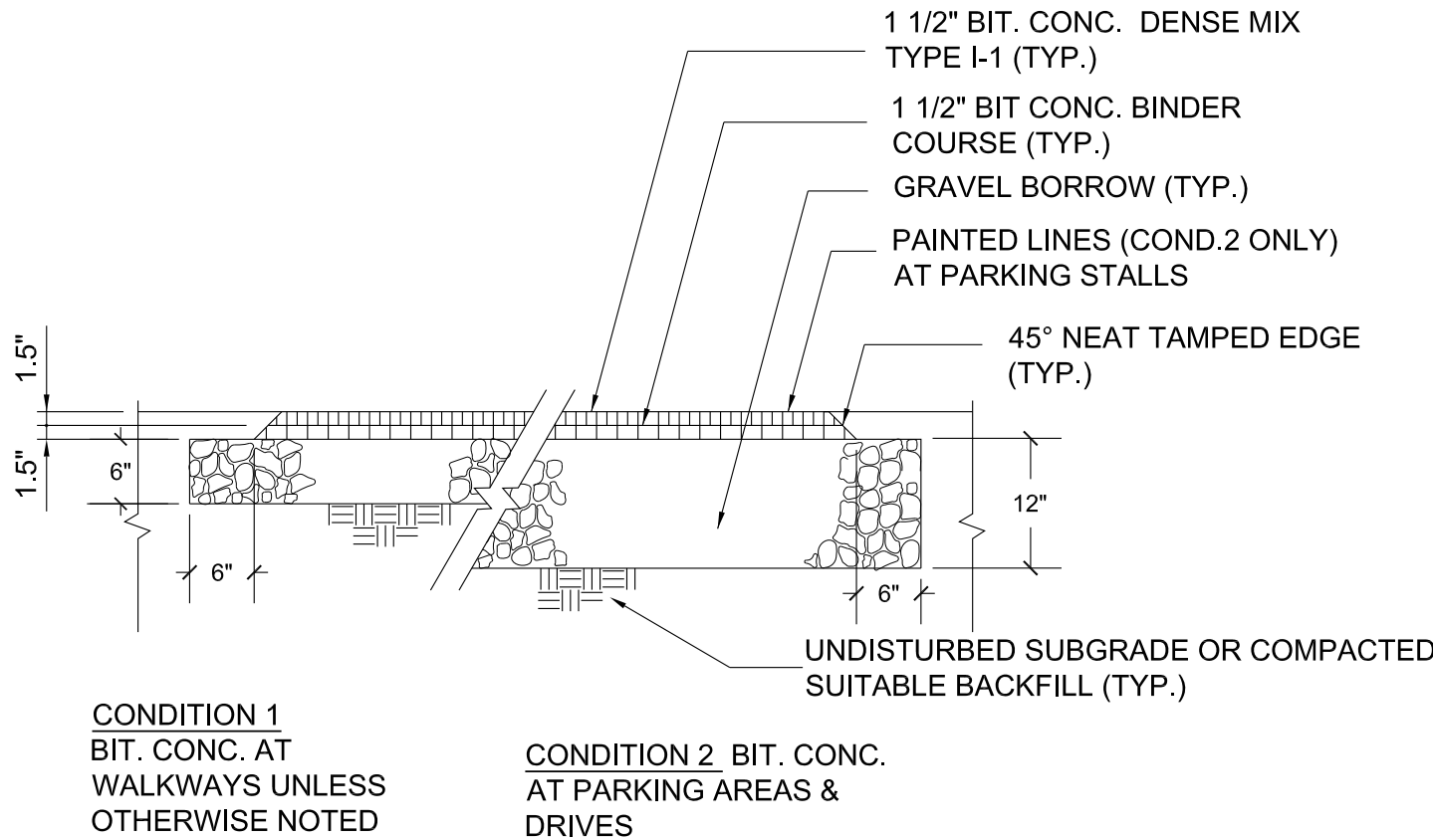
3 CONCRETE PAVEMENT

SCALE: N.T.S.



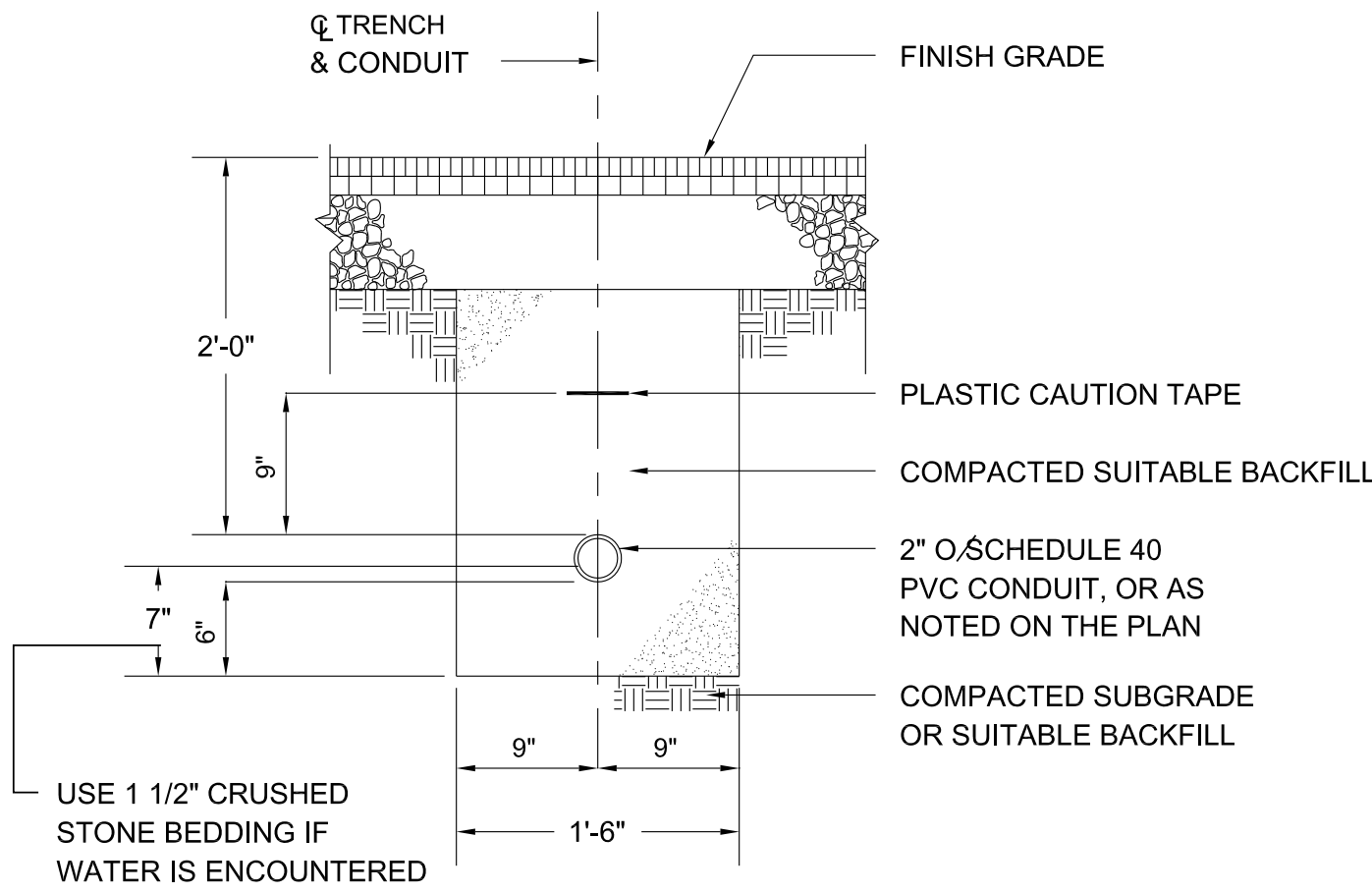
4 WOOD BOLLARD

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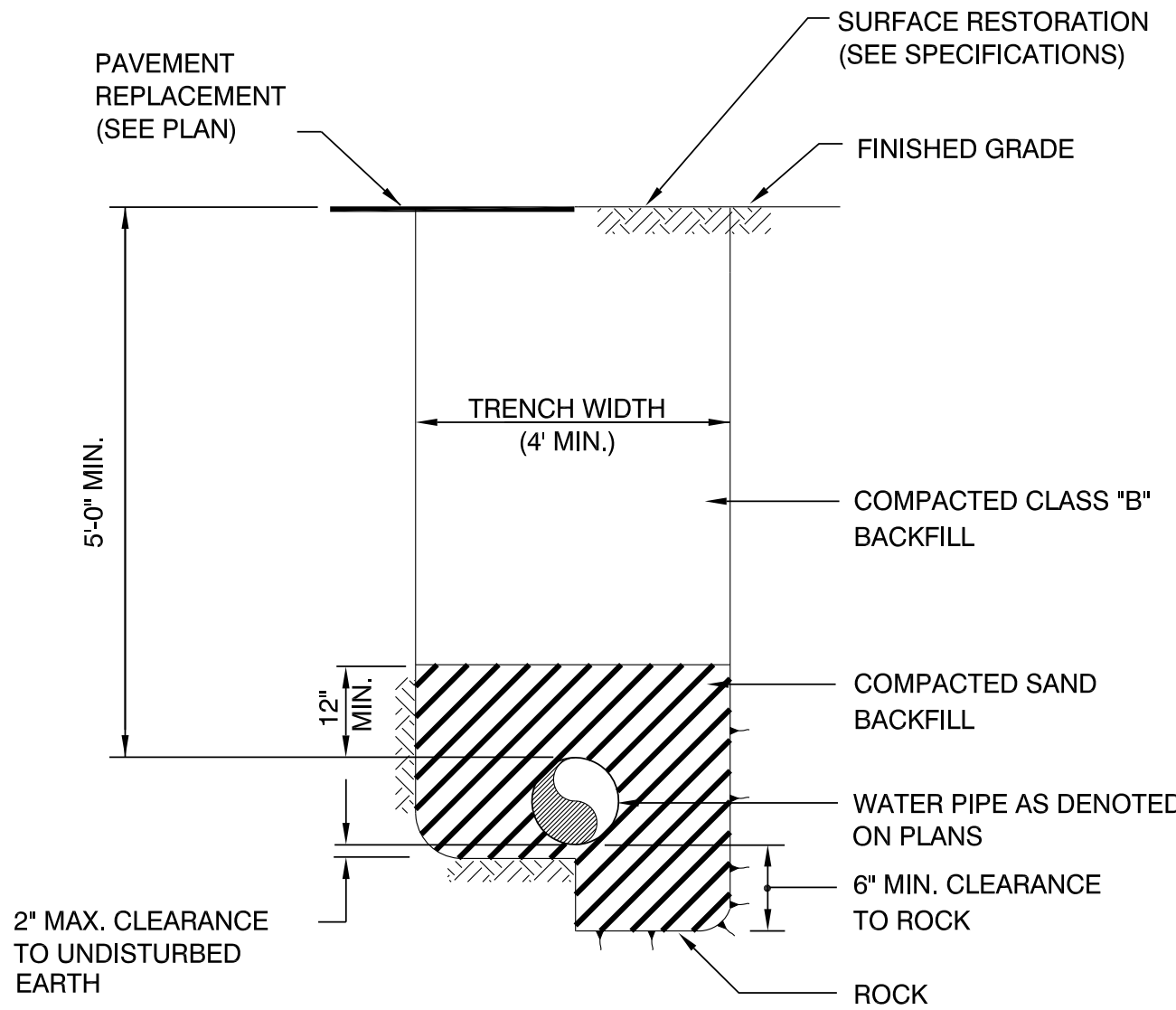
5 BITUMINOUS CONCRETE PAVEMENT- 2 CONDITIONS

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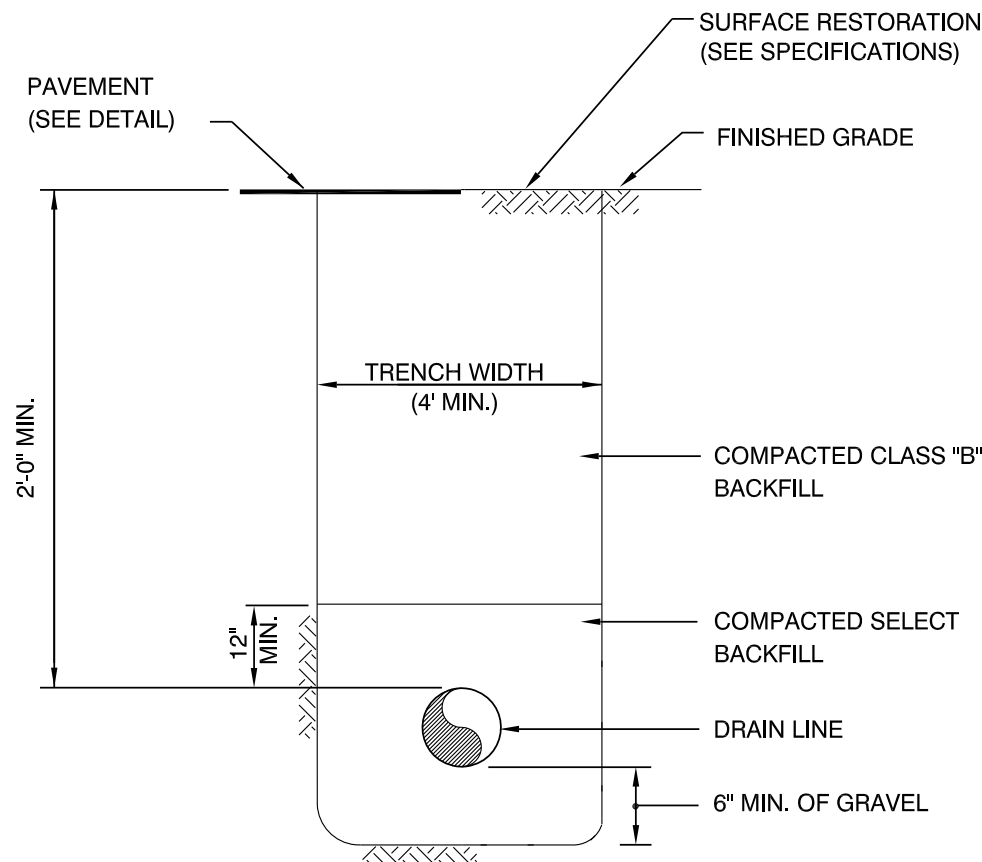
6 ELECTRIC CONDUIT TRENCH

SCALE: N.T.S.



7 WATER PIPE TRENCH DETAIL

SCALE: N.T.S.

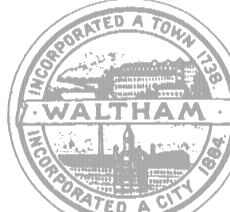


8 DRAIN LINE TRENCH DETAIL

SCALE: N.T.S.

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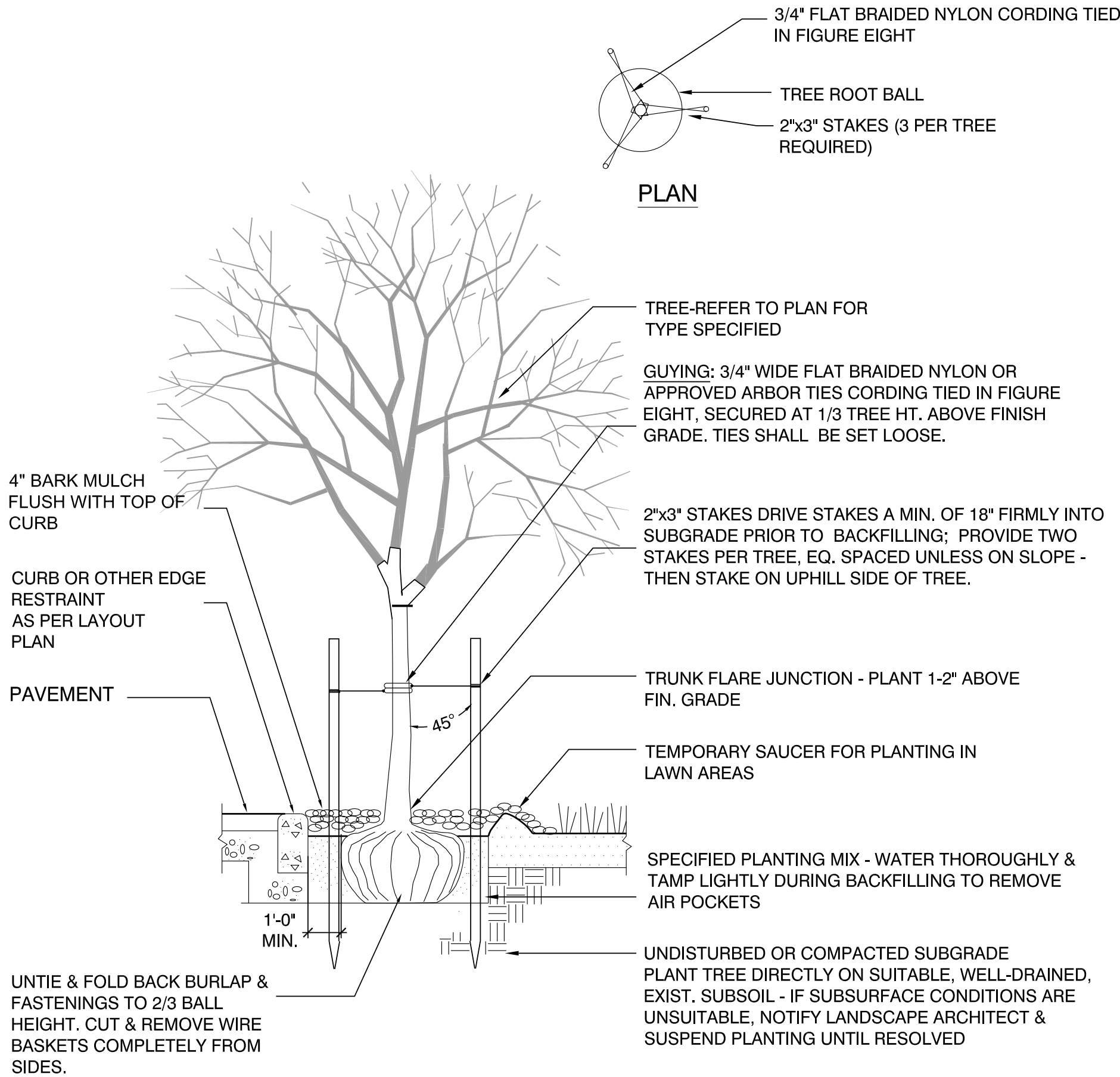
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| Approved By: | ERB |

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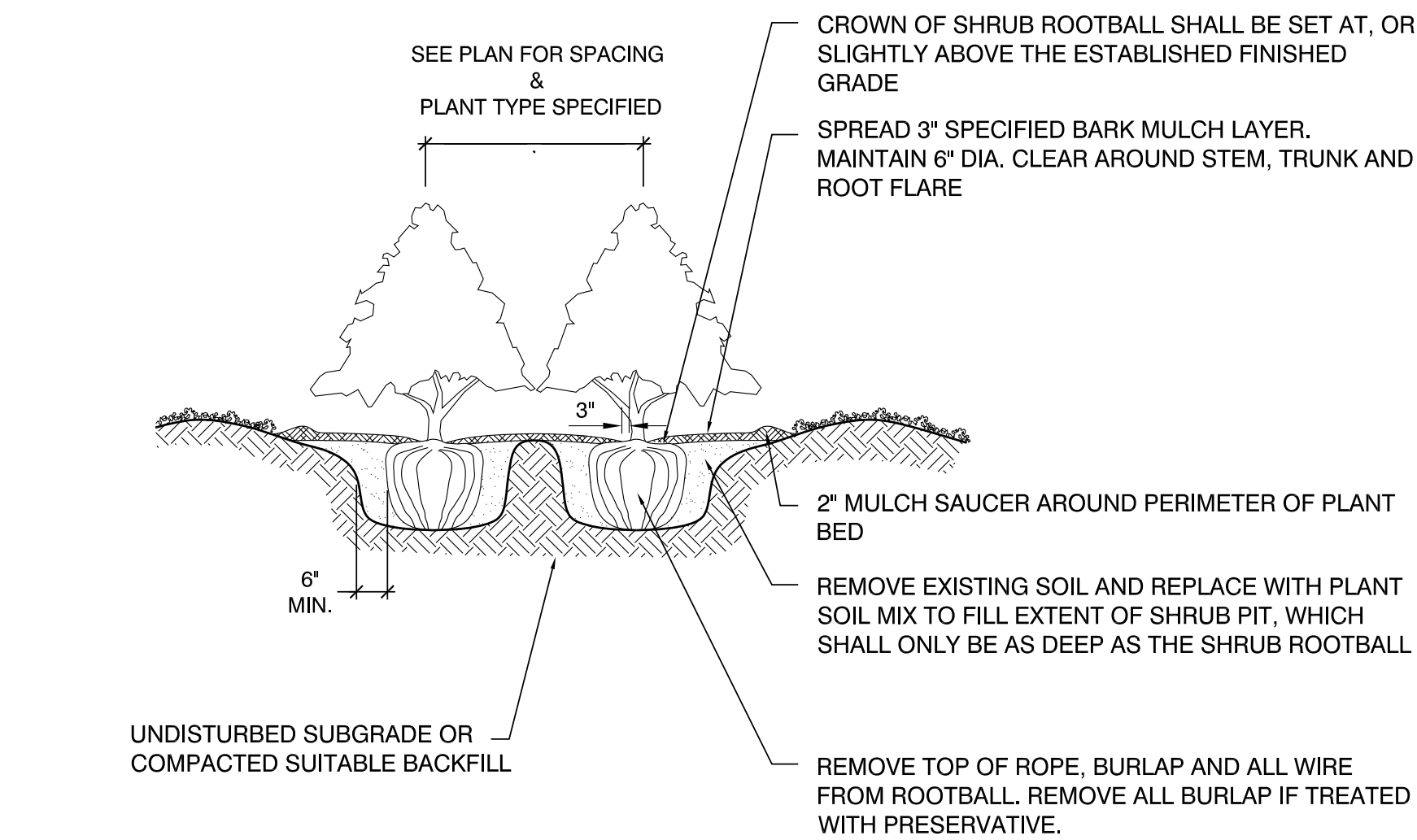


CONDITION A
PLANTING IN PAVED AREAS

CONDITION B
PLANTING IN LAWN AREAS OR PLANTING BEDS

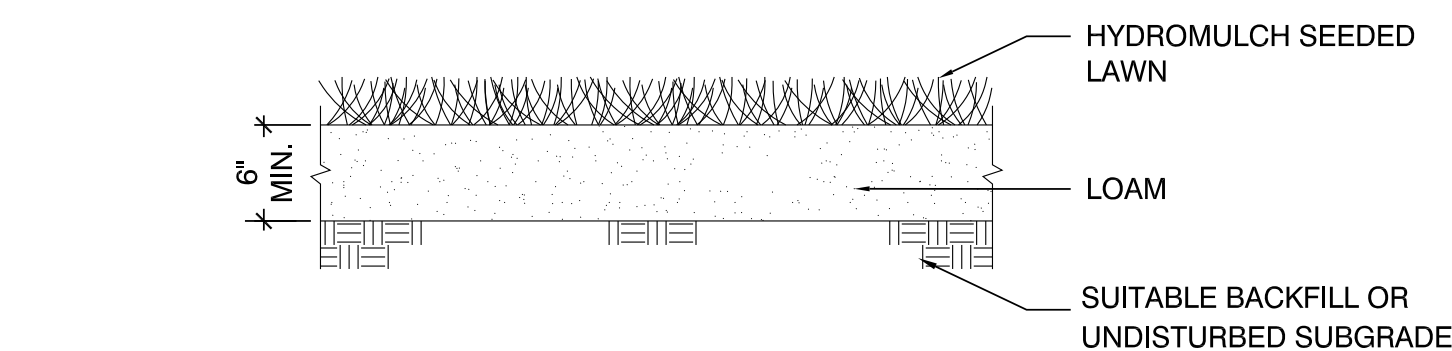
1 TREE STAKING & PLANTING - 2 CONDITIONS

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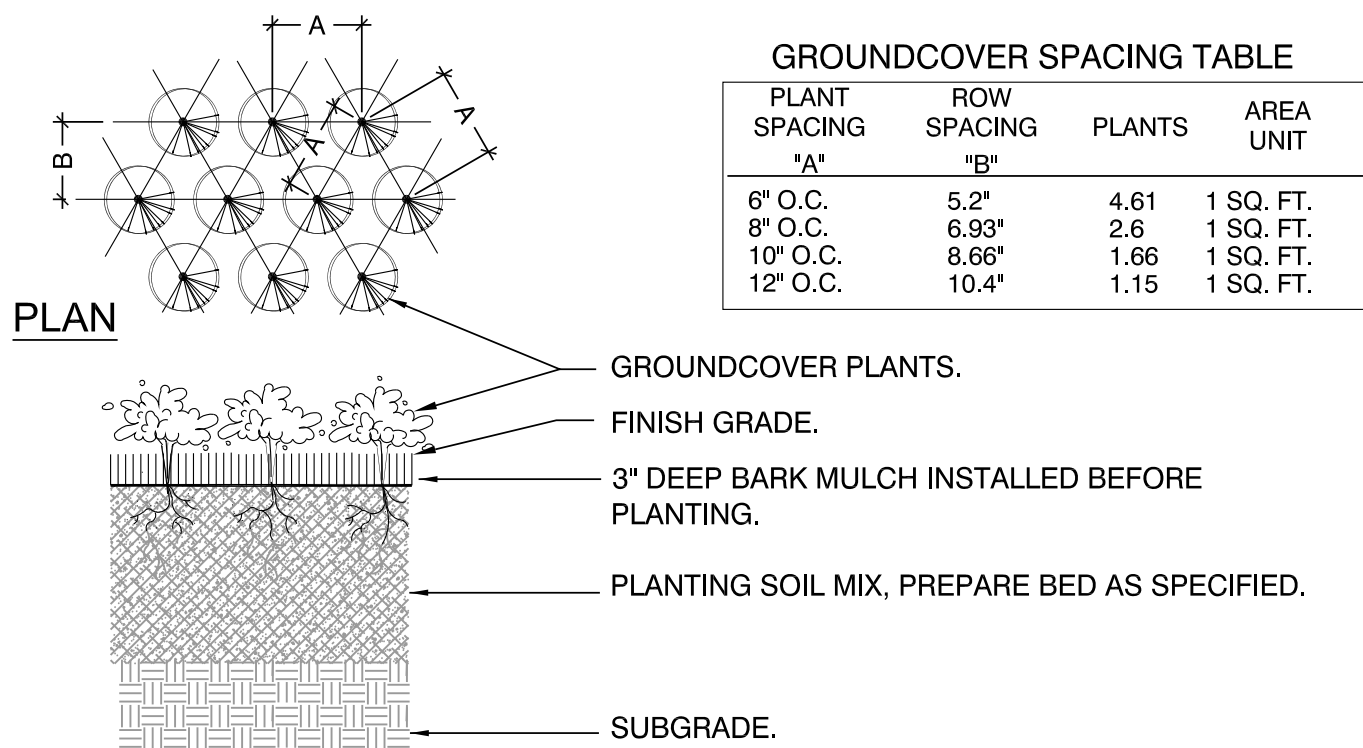
2 SHRUB PLANTING

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3 LOAM & SEED

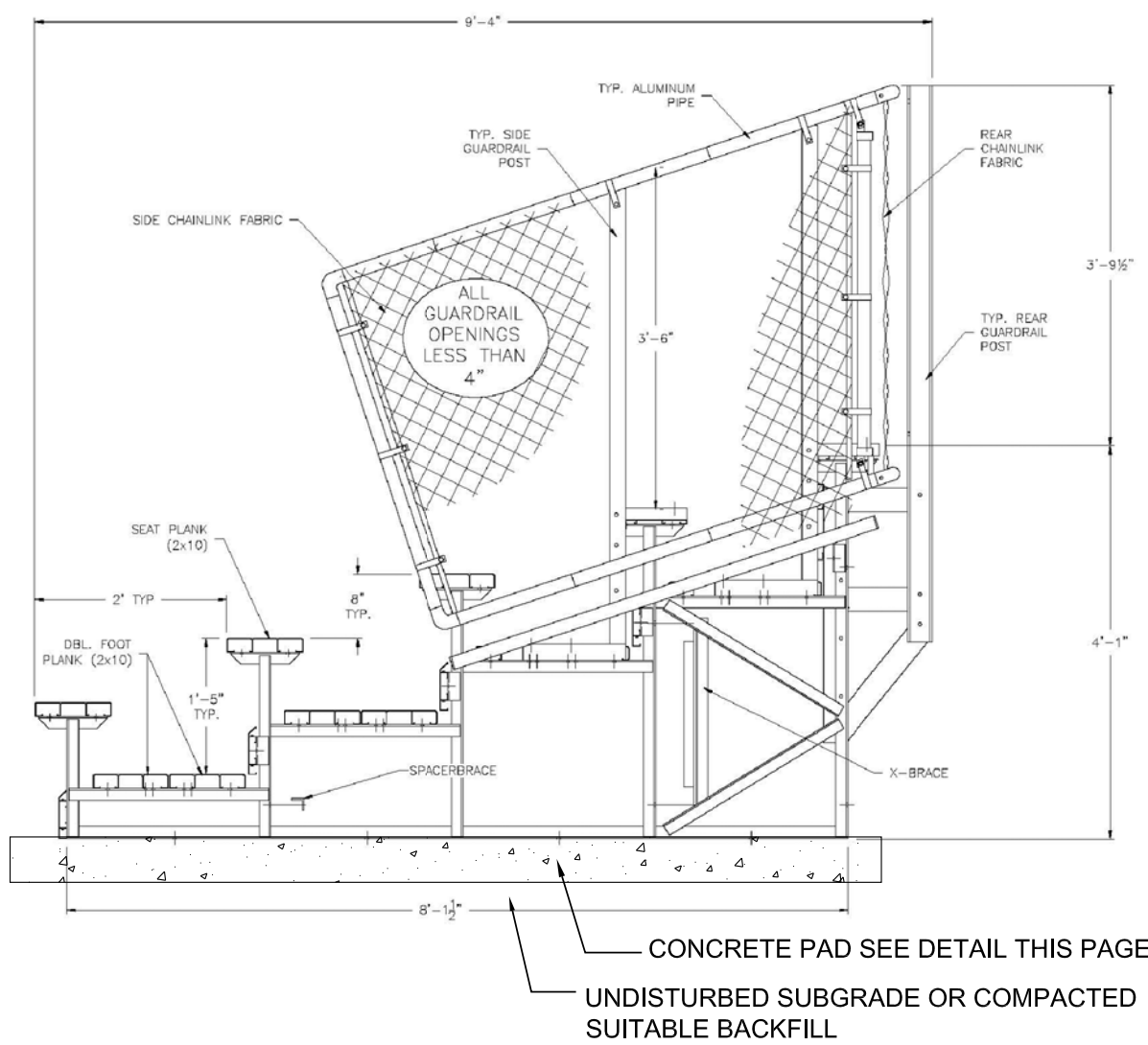
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NOTES:
1. ALL GROUNDCOVER TO BE PLANTED IN TRIANGULAR PATTERN. SEE DETAIL PLAN AND GROUNDCOVER SPACING TABLE.
2. JUTE EROSION CONTROL MAT TO BE USED ON ALL SLOPES GREATER THAN 3:1

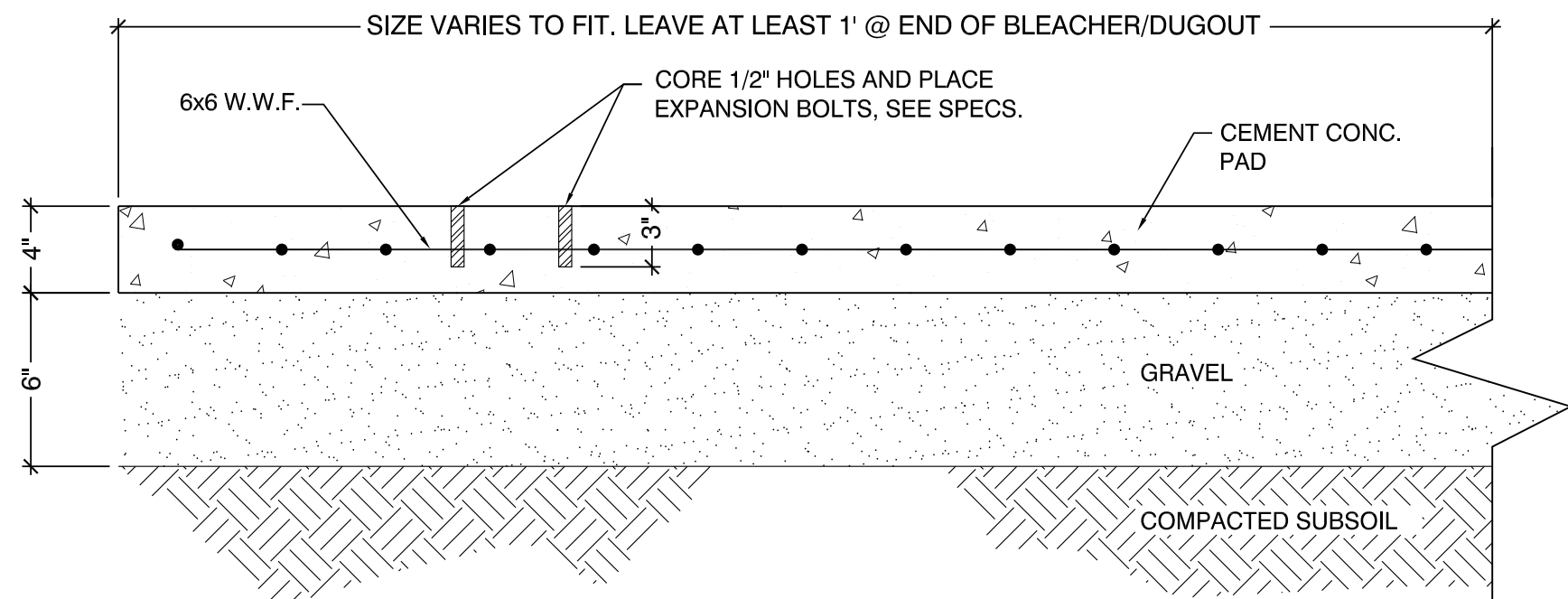
4 GROUNDCOVER PLANTING

SCALE: N.T.S.



5 BLEACHERS SECTION & ELEVATION

SCALE: N.T.S.



6 CONCRETE PAD UNDER BLEACHERS & DUGOUTS

SCALE: N.T.S.

PAVEMENT NOTES

PROPOSED FULL DEPTH PAVEMENT:

SURFACE: 4" HOT MIX ASPHALT PAVEMENT (1 1/2" TOP COURSE MATERIAL OVER 2 1/2" BINDER COURSE MATERIAL)

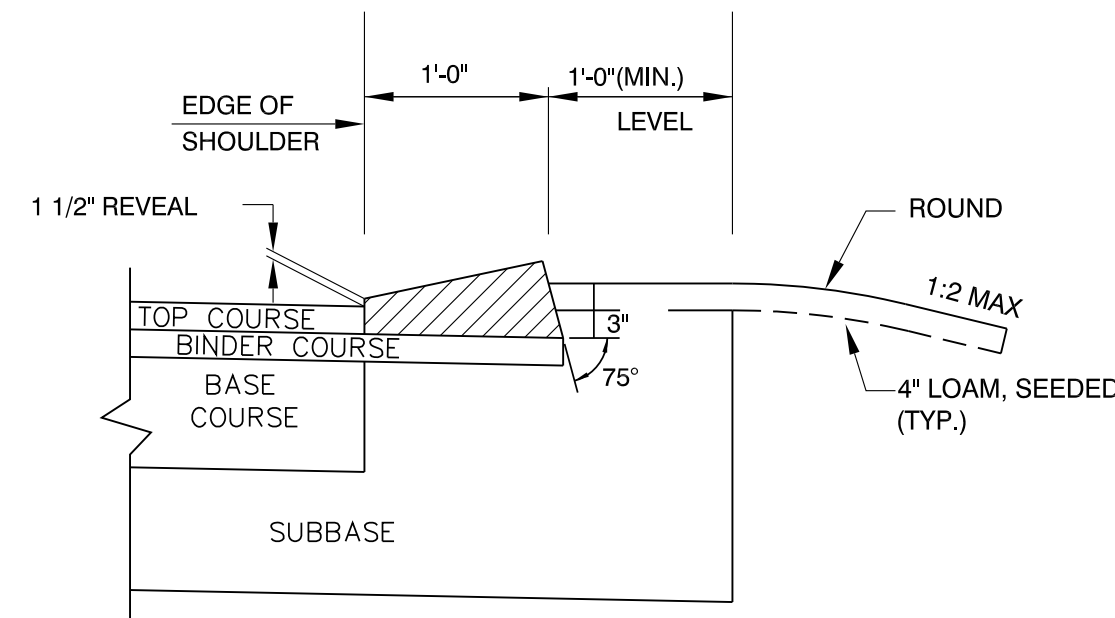
SUBBASE: 4" DENSE GRADED CRUSHED STONE OVER MIN. 8" GRAVEL BORROW, TYPE B

PROPOSED CEMENT CONCRETE WALK:

SURFACE: 4" CEMENT CONCRETE OVER

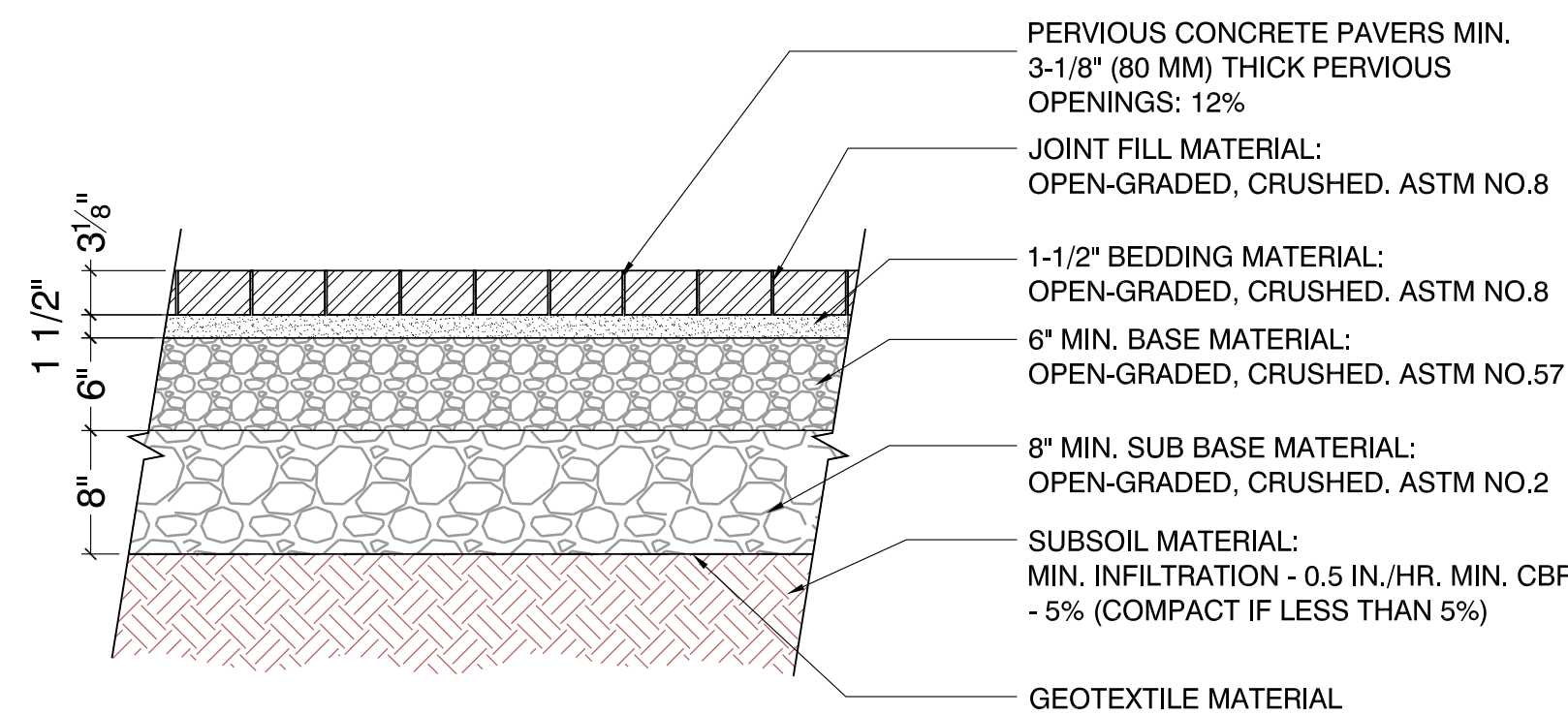
SUBBASE: 8" GRAVEL BORROW, TYPE B

NOTE:
RECYCLED ASPHALT SHALL BE ALLOWED FOR SUB BASE MATERIAL IF PROPER TESTING VERIFIES COMPLIANCE WITH SPECIFICATIONS.



7 CAPE COD BERM

SCALE: N.T.S.



NOTES:
1. ALL AGGREGATE MATERIAL SHALL BE CRUSHED, ANGULAR STONE AND FREE OF FINES.
2. SURFACE SLOPE SHALL BE A MINIMUM OF 1% AND A MAXIMUM OF 5%.
3. INSTALL PVC UNDER DRAIN PIPE WHERE INFILTRATION RATE OF SUBSOIL IS LESS THAN 0.5 IN./HR.
4. MAINTAIN A MINIMUM DISTANCE OF 2' BETWEEN BOTTOM OF PERMEABLE BASE AND WATER TABLE.
5. THE MINIMUM AGGREGATE THICKNESS ARE AFTER COMPACTION.

8 PERVIOUS CONCRETE PAVERS

SECTION

NOT TO SCALE

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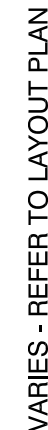
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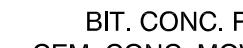
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2 SCALE: N.T.S.

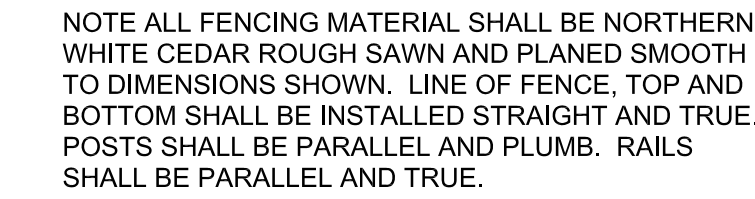


3 SCALE: N.T.S.



1. STEEL PIPE FOR GATES SHALL BE SEAMLESS STEEL PIPE IN ACCORDANCE WITH ASTM 53 TYPE F.
2. ALL HARDWARE SHALL CONFORM TO ASTM A307 REQUIREMENTS AND SHALL BE GALVANIZED PER ASTM A153.
3. WELDING SHALL BE IN CONFORMANCE WITH AWS CODES. ALL CONNECTIONS SHALL BE FORMED WITH FISH-MOUTHED JOINTS FULL SEAM WELDS, GROUNDED SMOOTH AND SANDED.
4. ALL GATES SHALL BE SET PLUMB AND LEVEL. CONCRETE FOOTINGS SHALL BE INSTALLED USING APPROVED FORMWORK AND REBAR SPACING (IF REQUIRED). SUBMIT SHOP DRAWING FOR APPROVAL/REVIEW.
5. GATE MUST BE FREE TO OPEN A MIN. OF 95° FROM CLOSED POSITION. GATES TO ALIGN AT 180° IN CLOSED POSITION.
6. GATE TO BE PRIMED, ENAMELED AND PAINTED. PAINT TYPE TO BE APPROVED BY OWNER. COLOR IS BLACK.

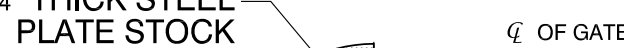
4 SCALE: N.T.S.



SCALE: N.T.S.



TYPICAL PIPE BOLLARD ELEVATION



DETAIL B
STANCHION / SINGLE GATE LOCKING ASSEMBLY

1. STEEL PIPE FOR BOLLARDS SHALL BE SEAMLESS STEEL PIPE IN ACCORDANCE WITH ASTM 53 TYPE F.

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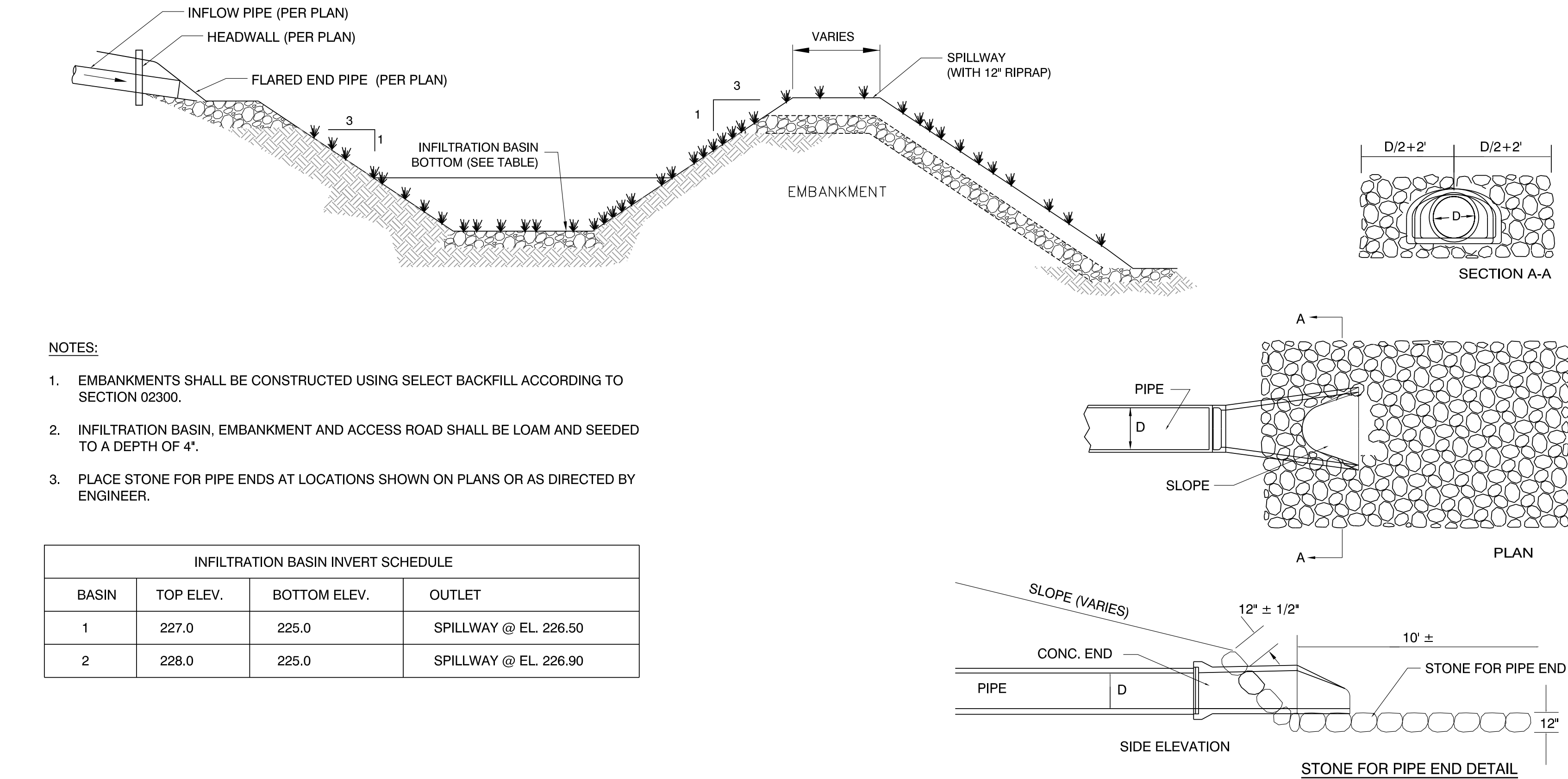
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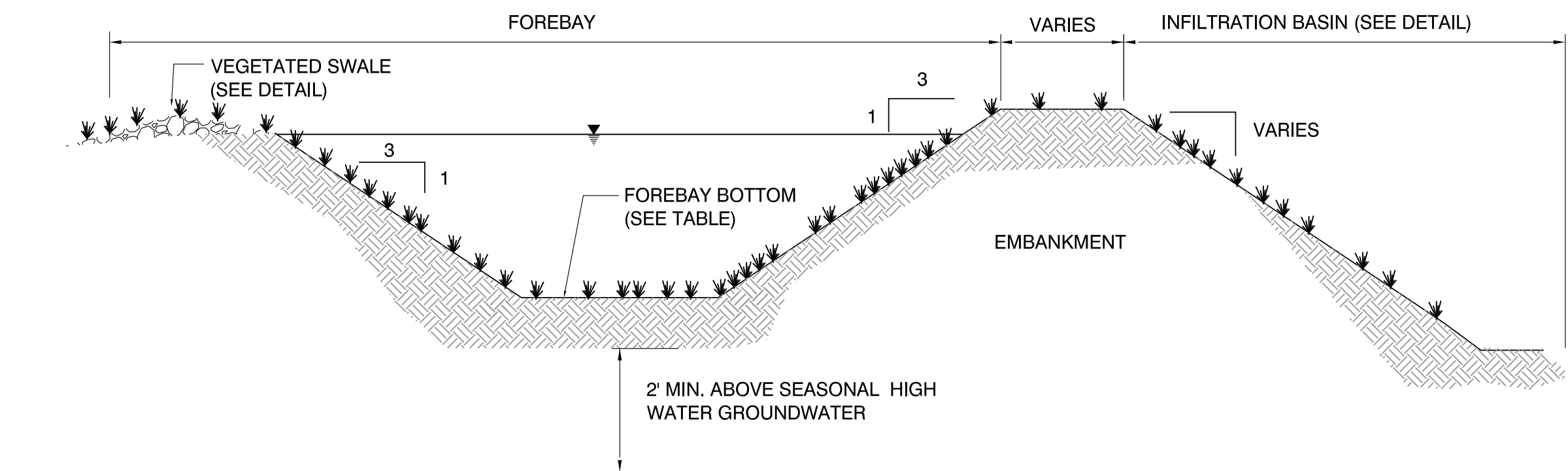


- NOTES:
1. EMBANKMENTS SHALL BE CONSTRUCTED USING SELECT BACKFILL ACCORDING TO SECTION 02300.
 2. INFILTRATION BASIN, EMBANKMENT AND ACCESS ROAD SHALL BE LOAM AND SEEDED TO A DEPTH OF 4".
 3. PLACE STONE FOR PIPE ENDS AT LOCATIONS SHOWN ON PLANS OR AS DIRECTED BY ENGINEER.

| INFILTRATION BASIN INVERT SCHEDULE | | | |
|------------------------------------|-----------|--------------|-----------------------|
| BASIN | TOP ELEV. | BOTTOM ELEV. | OUTLET |
| 1 | 227.0 | 225.0 | SPILLWAY @ EL. 226.50 |
| 2 | 228.0 | 225.0 | SPILLWAY @ EL. 226.90 |

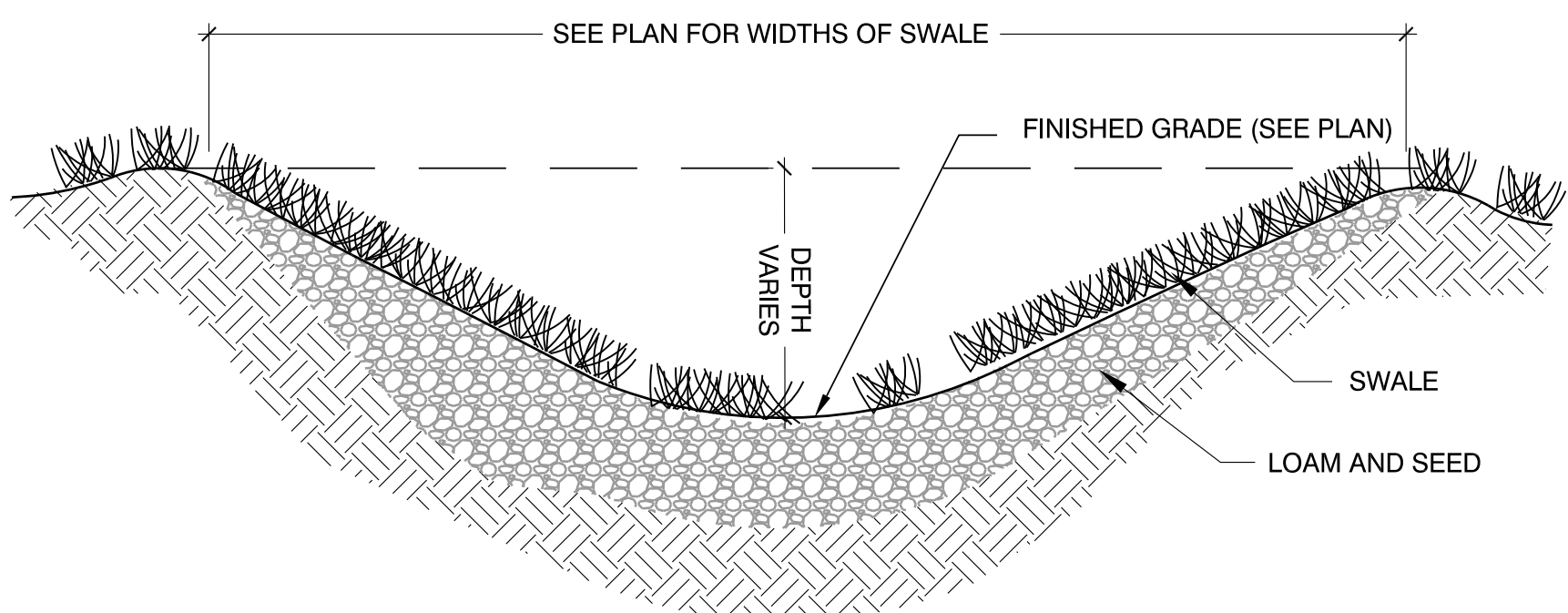
1 INFILTRATION BASIN

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2 FOREBAY

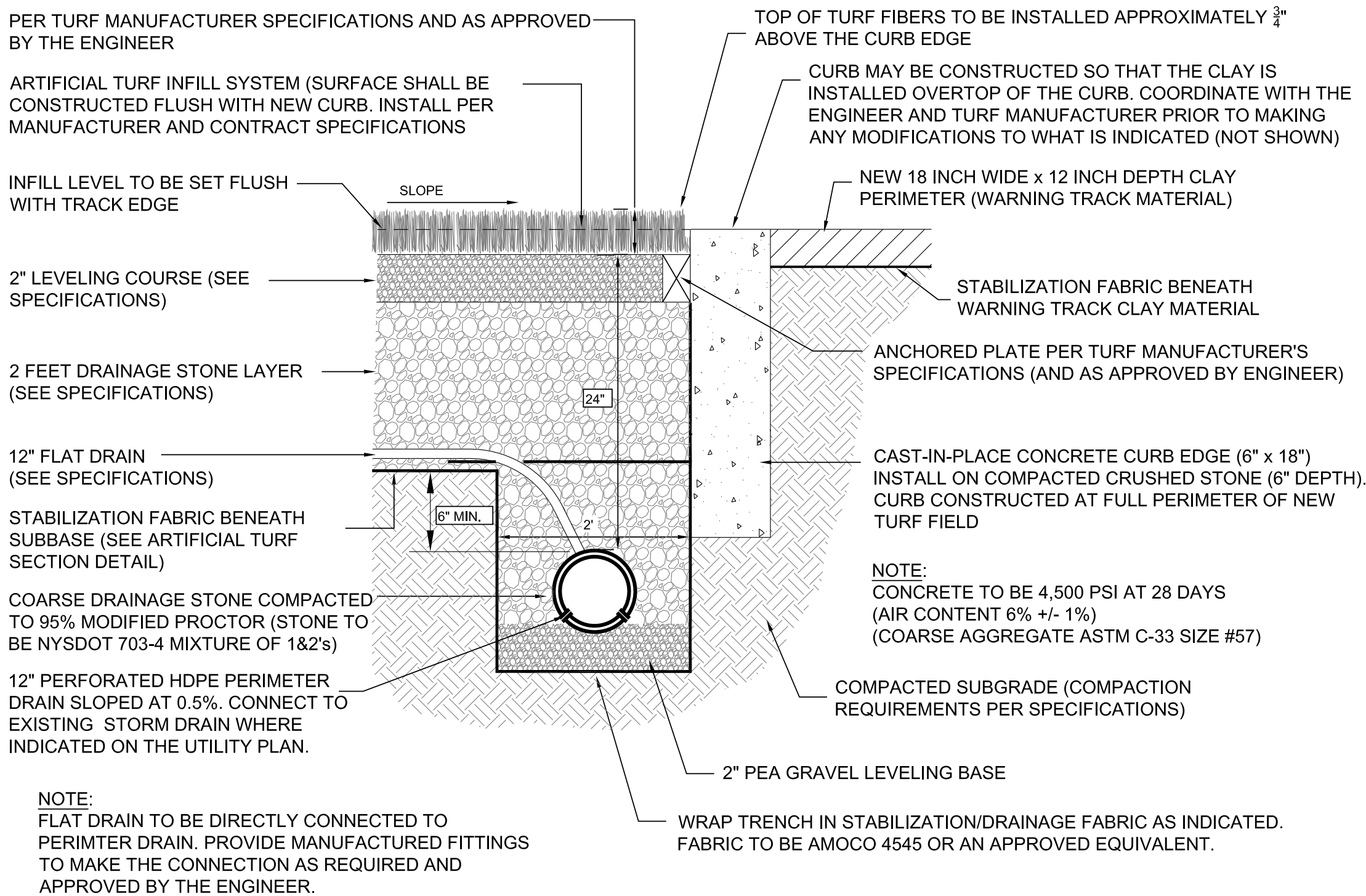
SCALE: N.T.S.



3 VEGETATIVE GRASS SWALE

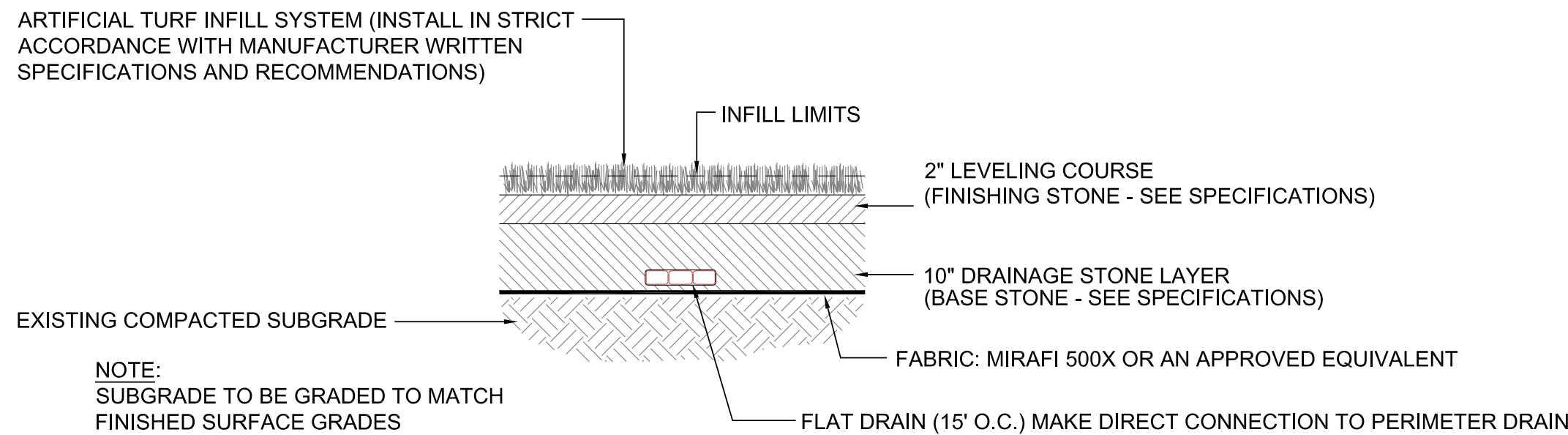
SCALE: N.T.S.

ABSOLUTELY NO SUBSTITUTIONS SHALL BE ALLOWED FOR BOTH THE FINISHING STONE AND BASE STONE WITHOUT A WRITTEN AND SIGNED DOCUMENT DIRECTLY FROM THE ARTIFICIAL TURF MANUFACTURERS CORPORATE HEADQUARTERS THAT STATES THE MATERIAL IS AN ACCEPTABLE MATERIAL TO BE USED DIRECTLY UNDER THEIR TURF FIELD FABRIC AND THAT THE SUBSTITUTION MATERIAL PROVIDES THE SAME CHARACTERISTICS (DRAINAGE, STRUCTURAL INTEGRITY, PLAYABILITY, ETC.) AS THE MATERIALS SPECIFIED. FAILURE TO PROVIDE SUCH A DOCUMENT SHALL BE AT THE RISK AND COST OF THE CONTRACTOR.



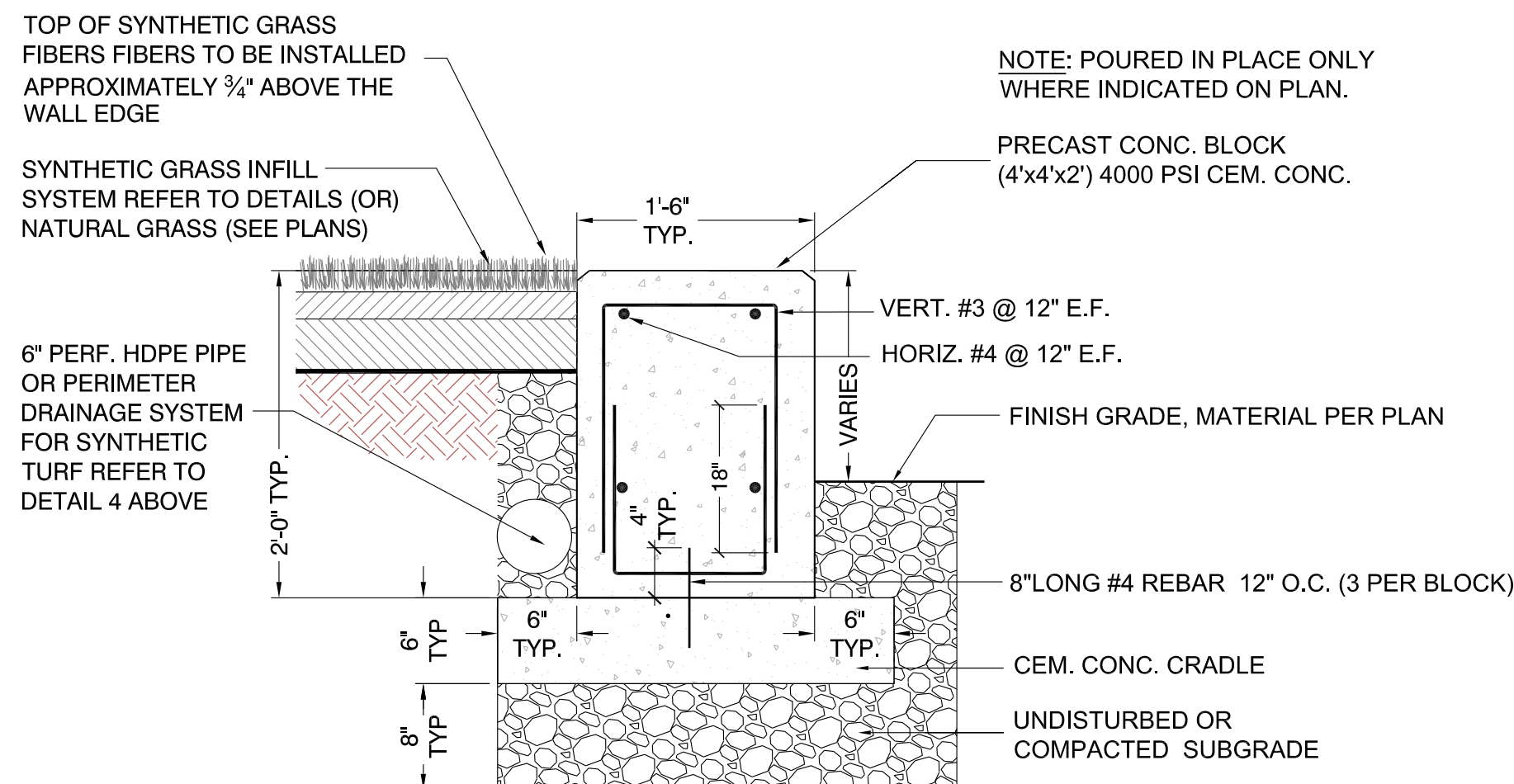
4 PERIMETER DRAINAGE TRENCH DETAIL

SCALE: N.T.S.



7 ARTIFICIAL TURF CROSS-SECTION

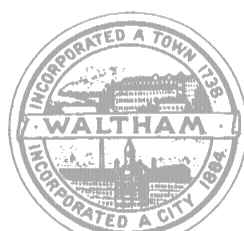
SCALE: N.T.S.



8 CONCRETE BLOCK RETAINING WALL/SEAWALL

SCALE: N.T.S.

Project:
CITY OF WALTHAM



**FALZONE MEMORIAL PARK
AND
NIPPER MAHER PARK
PHASE 6**

Weston&Sampson

100 Foxborough Blvd., S.250 Foxborough, MA
(508) 698-3034 (800) Sampson
www.westonandsampson.com

Consultants:

North

Revisions:

| Rev | Date | Description |
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Seal:

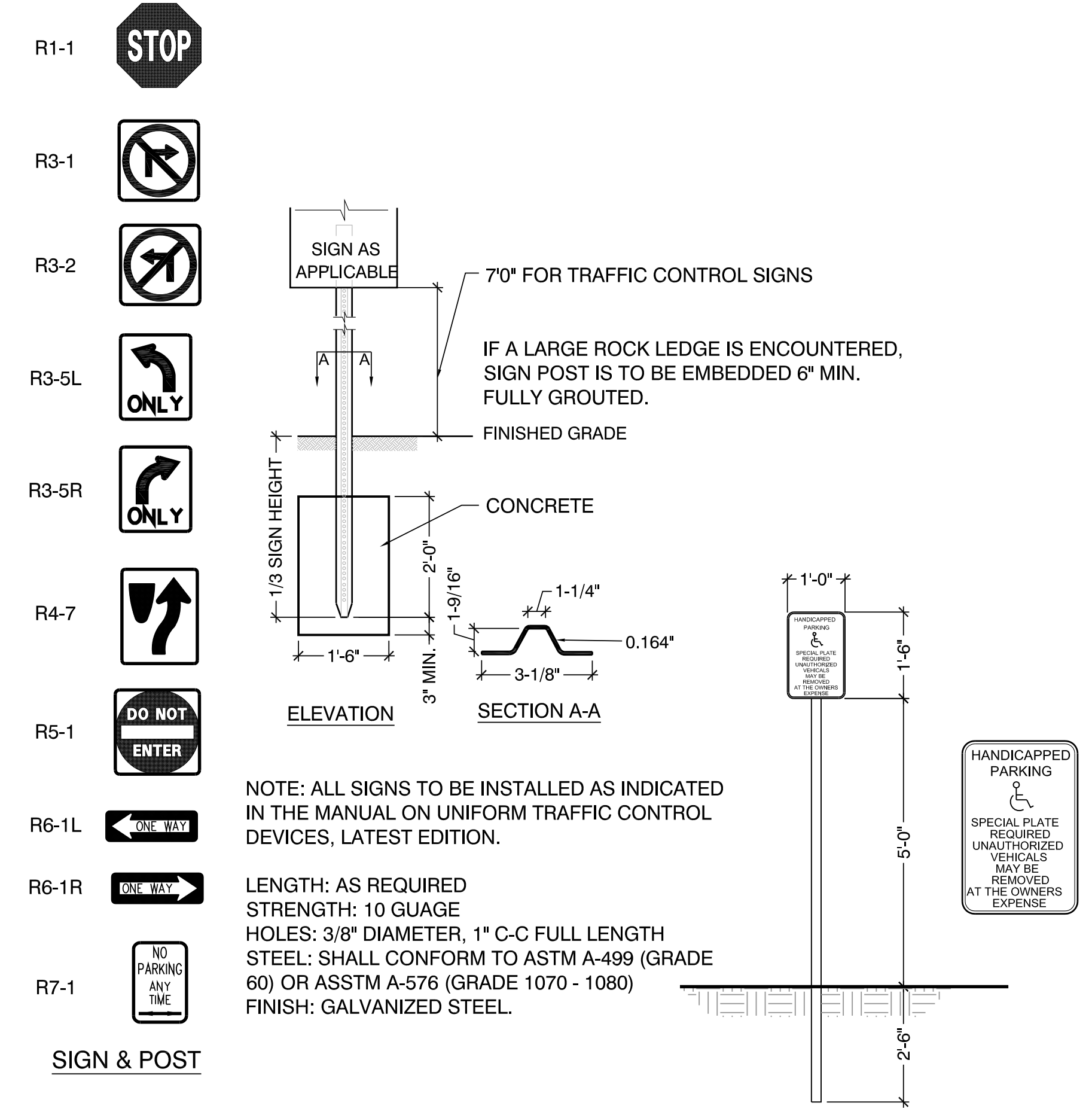
| CONSTRUCTION DOCUMENTS | |
|------------------------|------------|
| Date: | 11.07.2012 |
| Scale: | AS SHOWN |
| Drawn By: | MMM |
| Reviewed By: | MSM |
| Checked By: | LFK |
| Approved By: | ERB |

Drawing Title:

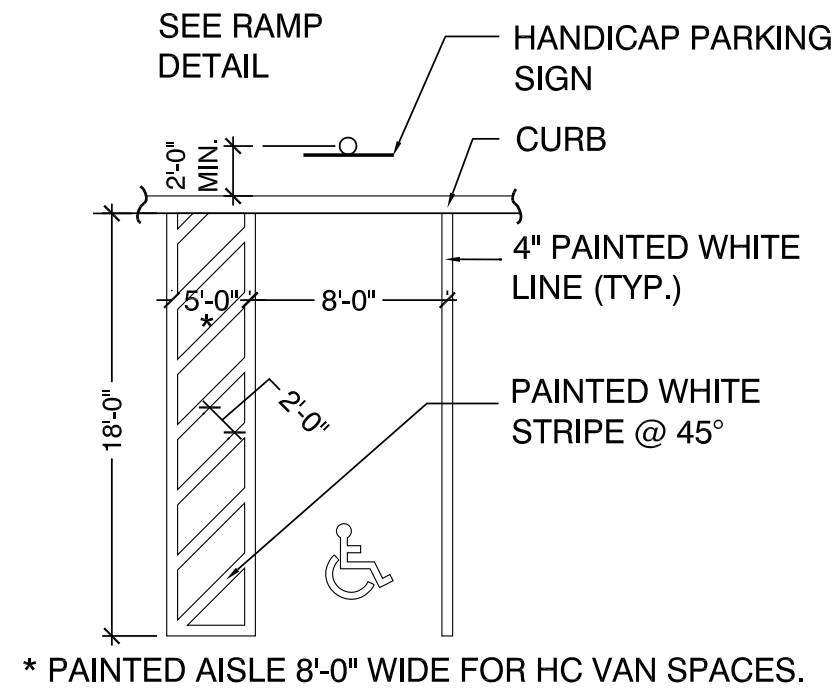
**FALZONE PARK
SPECIFIC
SITE CONSTRUCTION
DETAILS**

Sheet Number:

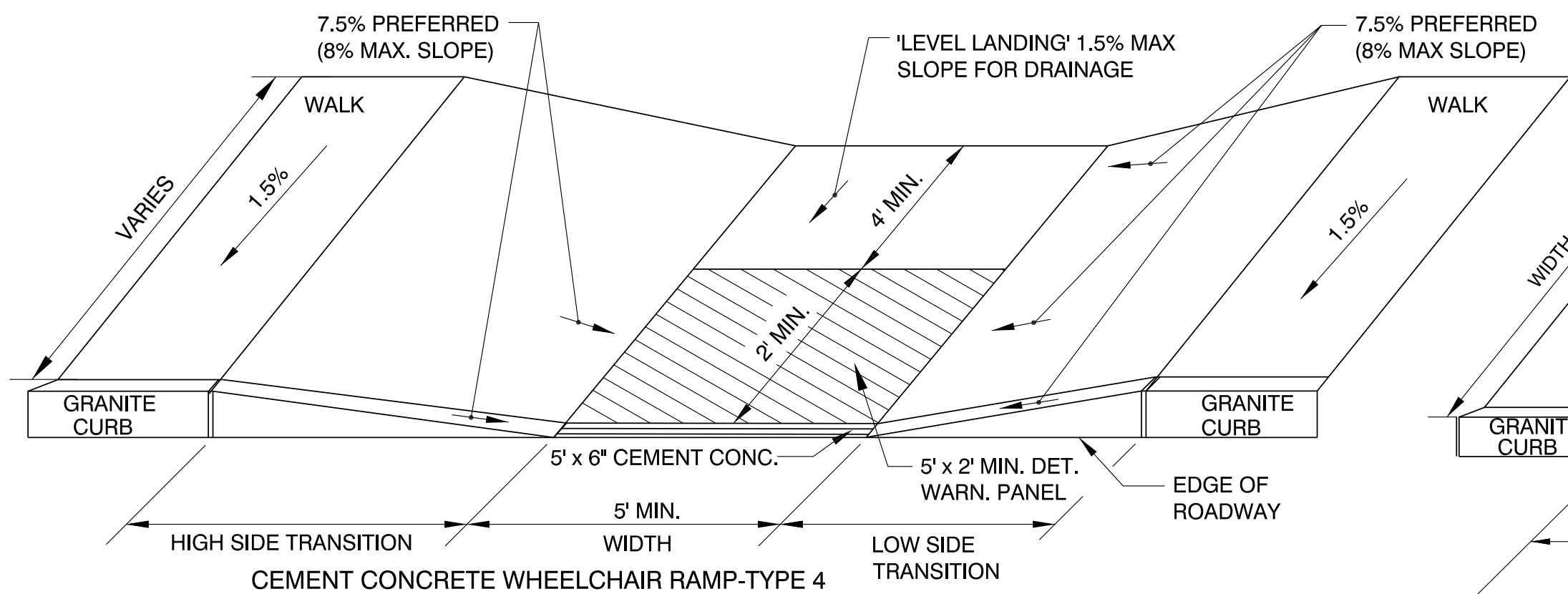
DT.5



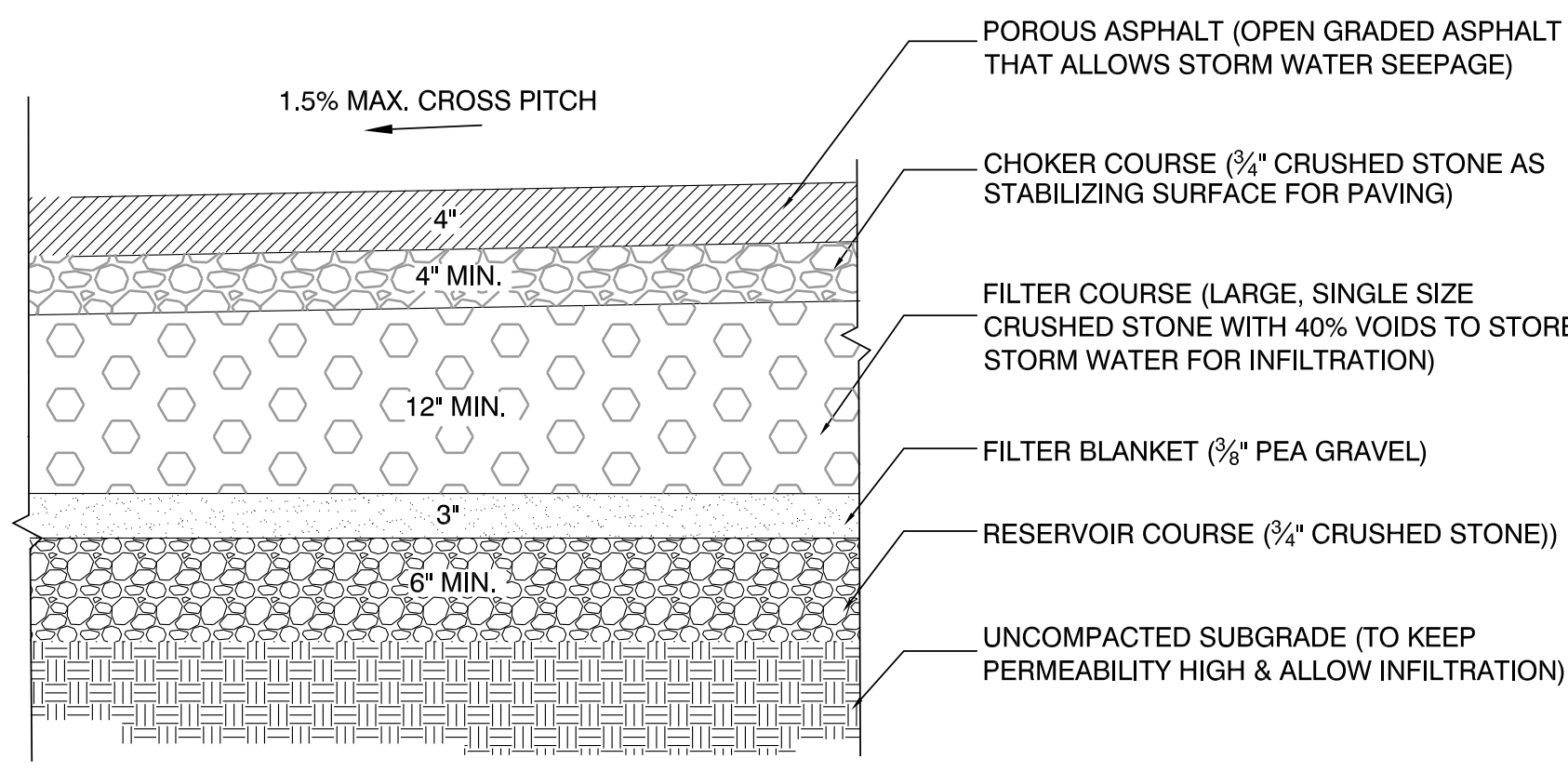
1 SIGNS
SCALE: N.T.S.



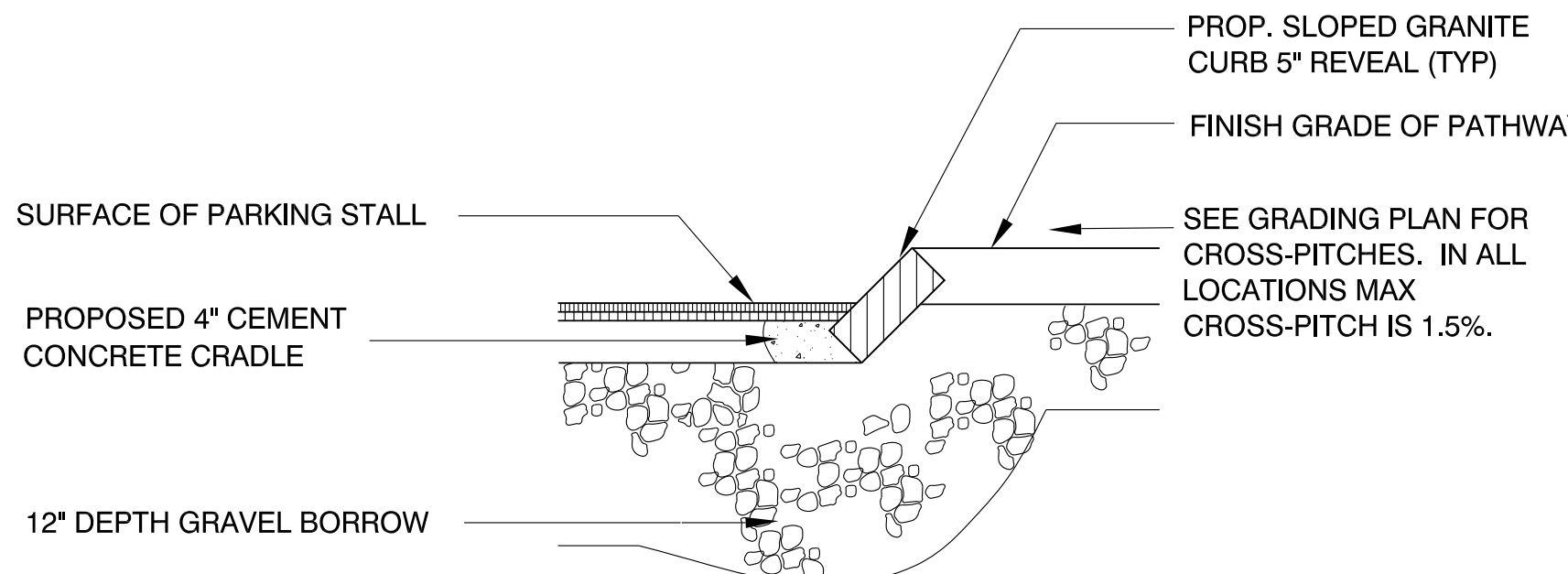
2 HC PARKING SPACE & RAMP
SCALE: N.T.S.



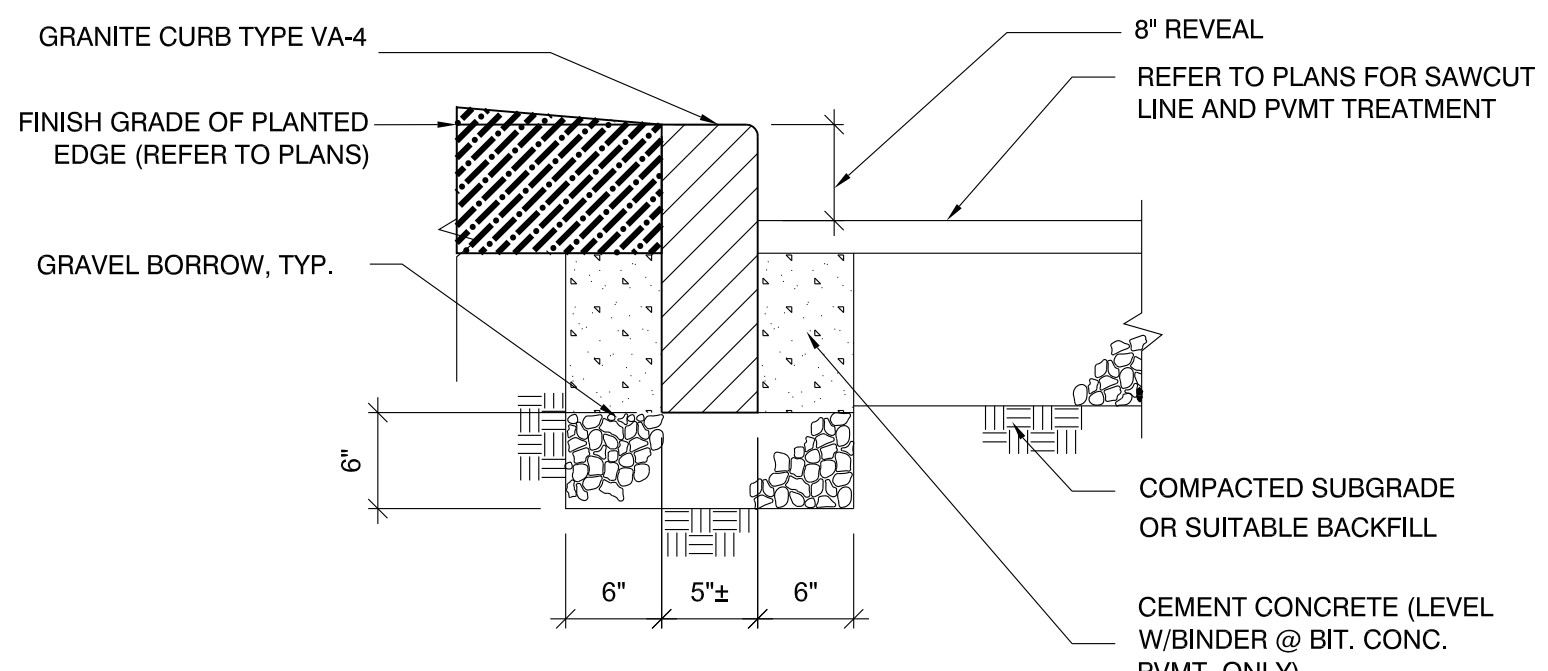
3 CEMENT CONCRETE WHEELCHAIR RAMPS TWO TYPES
SCALE: N.T.S.



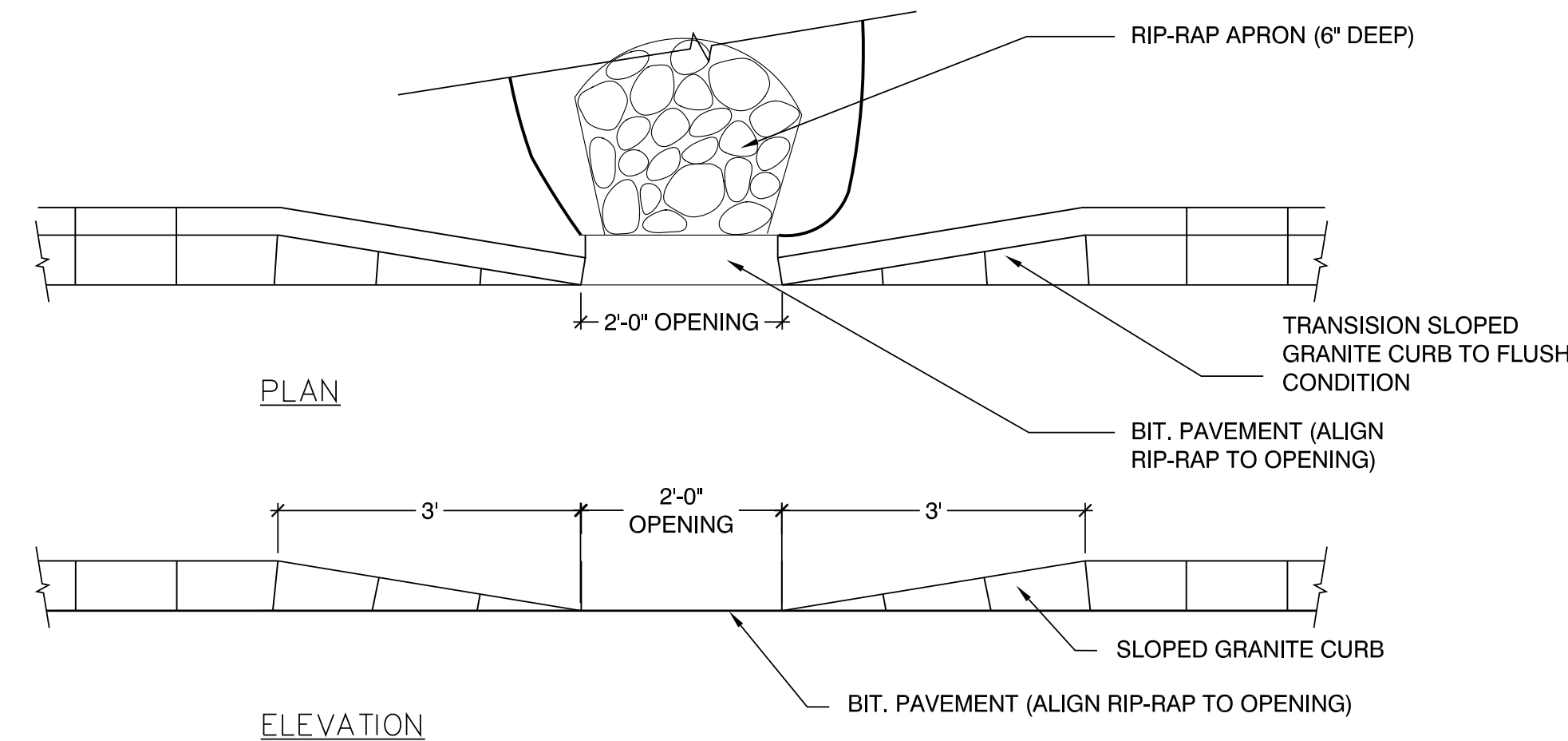
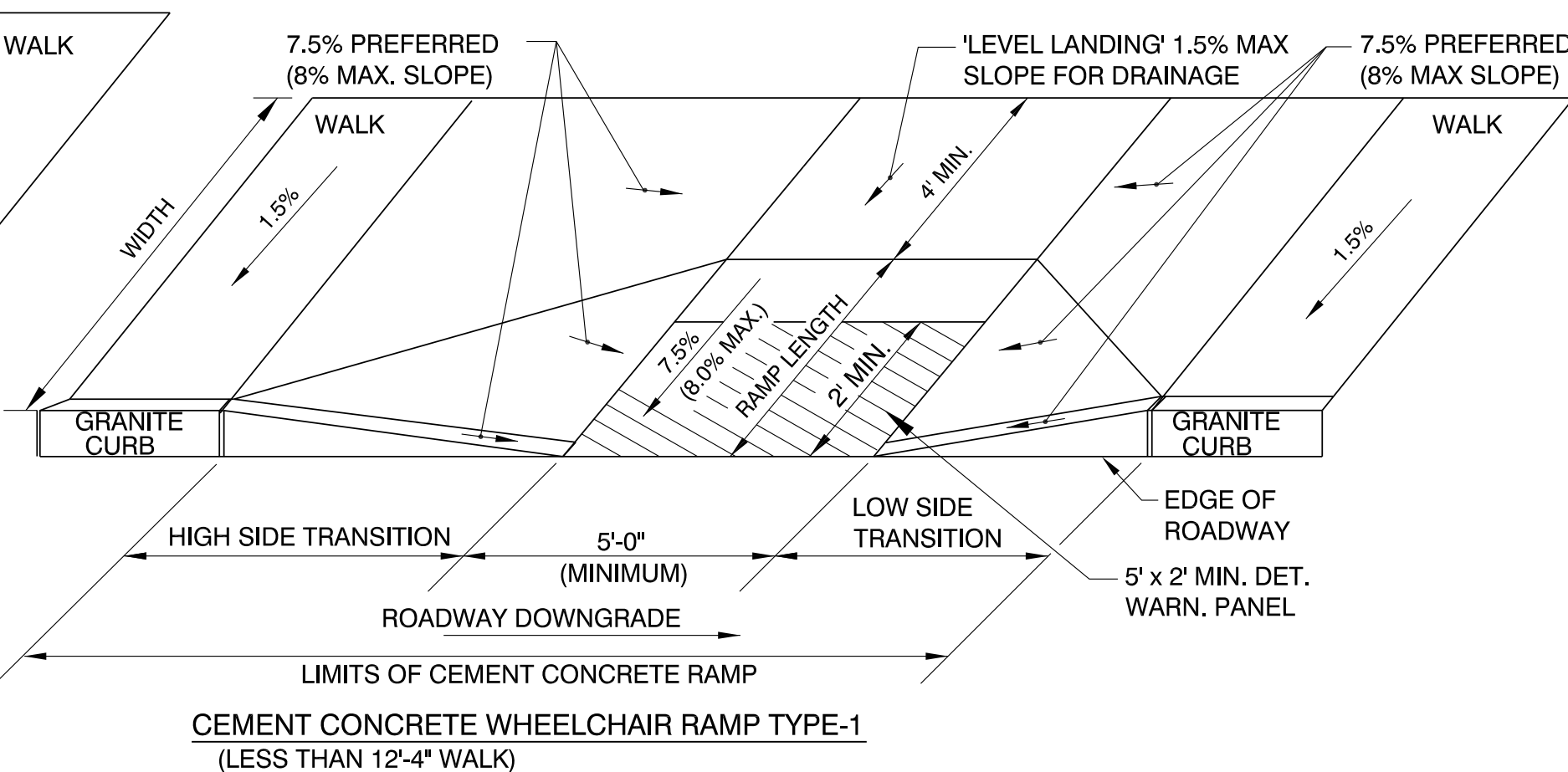
4 POROUS ASPHALT PAVEMENT
SCALE: N.T.S.



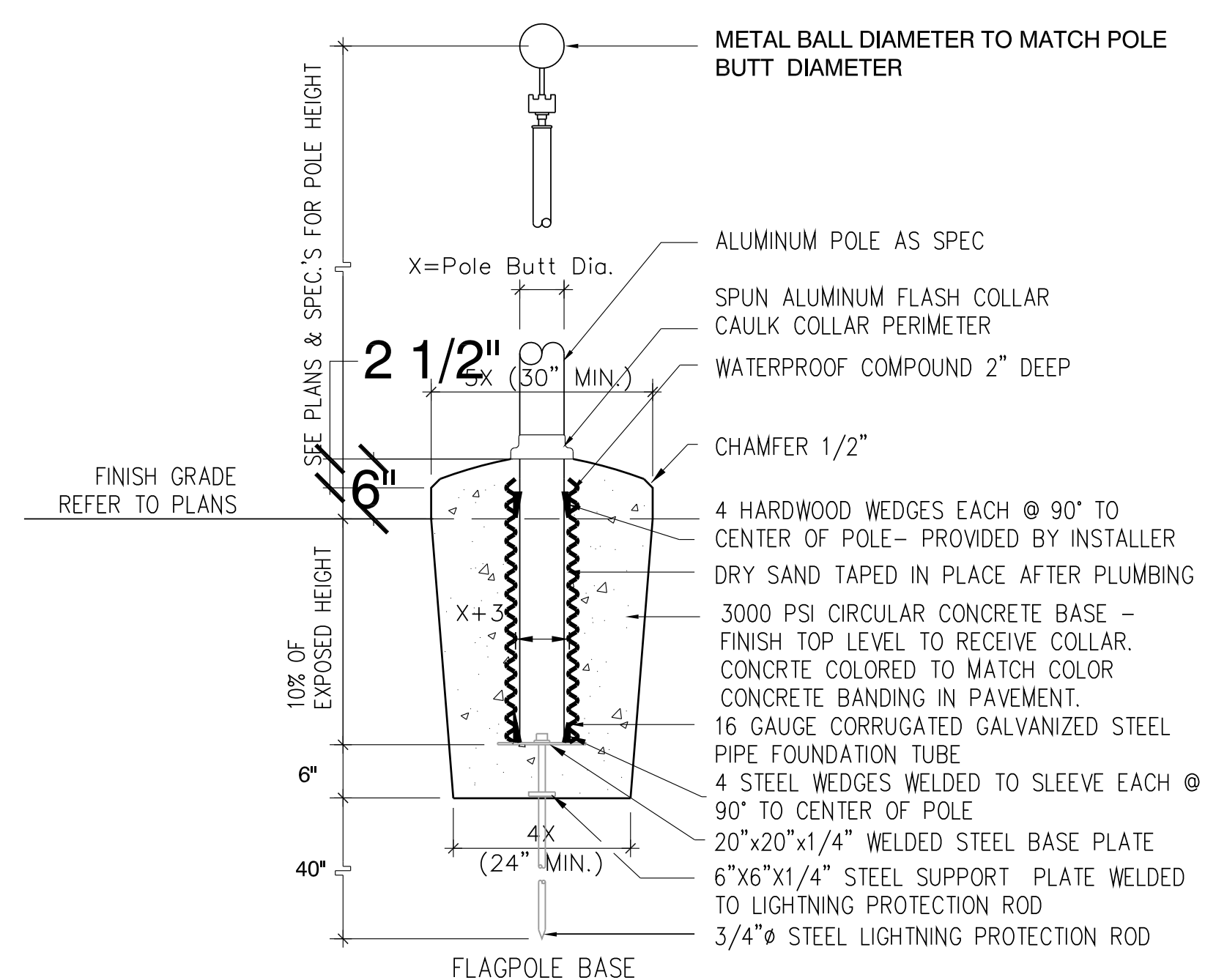
5 SLOPED GRANITE CURB AT PARKING STALLS
SCALE: N.T.S.



6 GRANITE CURB AT PARKING STALLS
SCALE: N.T.S.



7 CURB INLET DETAIL
SCALE: N.T.S.



- NOTES:
1. LENGTH OF FOUNDATION TUBE IS 10% OF POLE LENGTH.
 2. FULL EXCAVATION DEPTH EQUALS LENGTH OF FOUNDATION TUBE PLUS. 1'-0".
 3. POLES TO BE COMMERCIAL ALUMINUM FLAGPOLE WITH INTERNAL HALYARD AS PROVIDED BY: FLAGMAN OF AMERICA (TEL: 860-678-0275) OR APPROVED EQUAL.
 4. CONFIRM LOCATION OF FLAGPOLE, [1 @ 40'-0"] IN FIELD.

8 FLAG POLE FOOTING
NOT TO SCALE

Consultants:

North

Revisions:

| Rev | Date | Description |
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Seal:

CONSTRUCTION DOCUMENTS

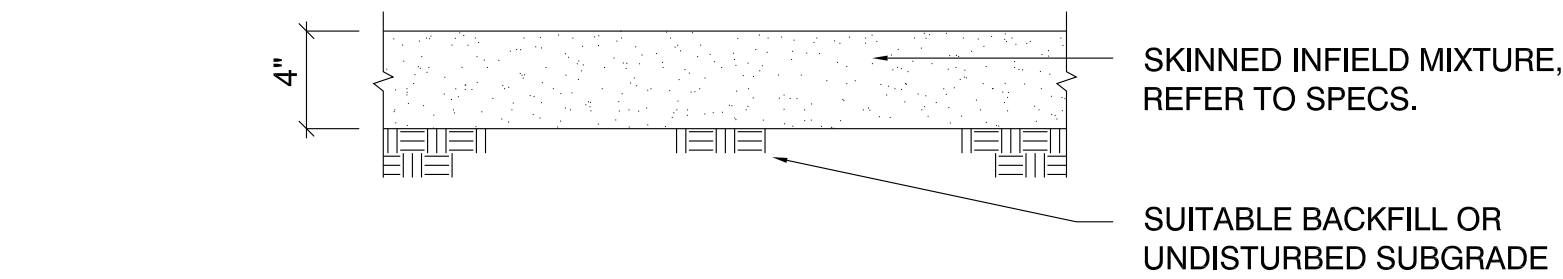
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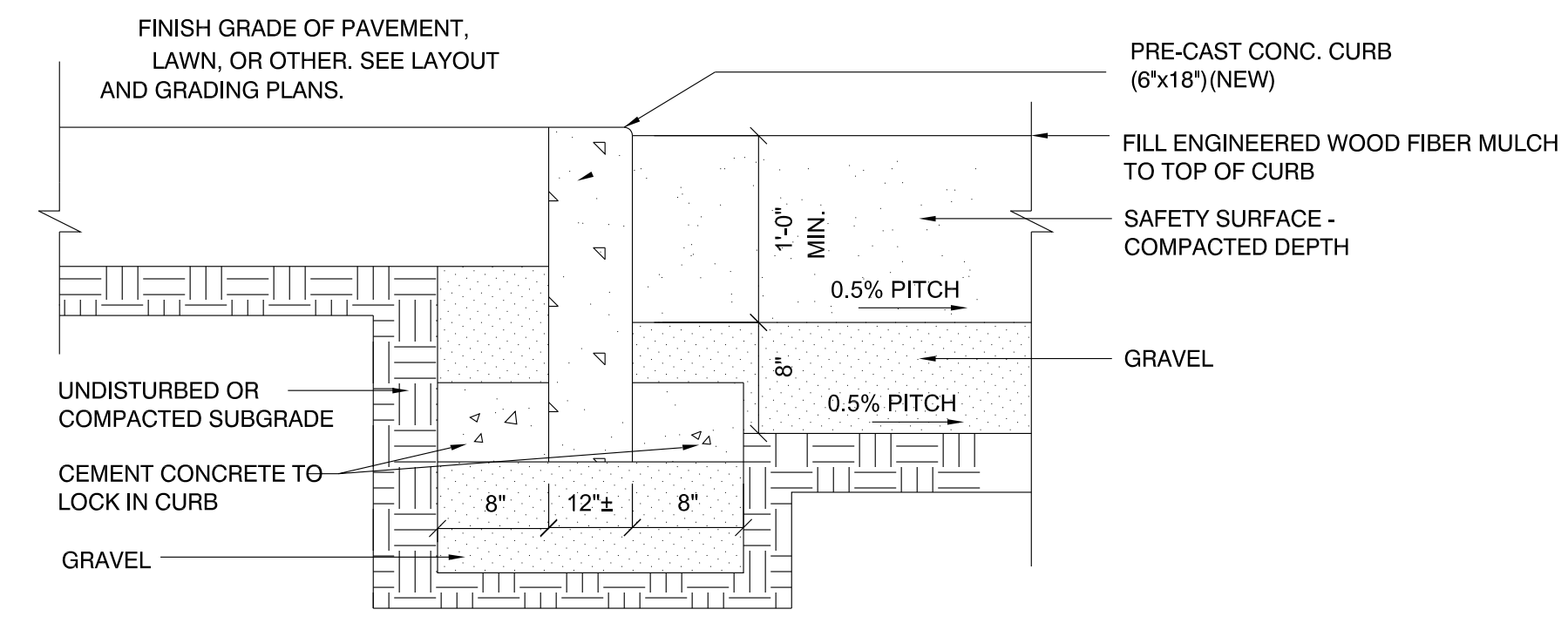
FALZONE PARK SPECIFIC SITE CONSTRUCTION DETAILS

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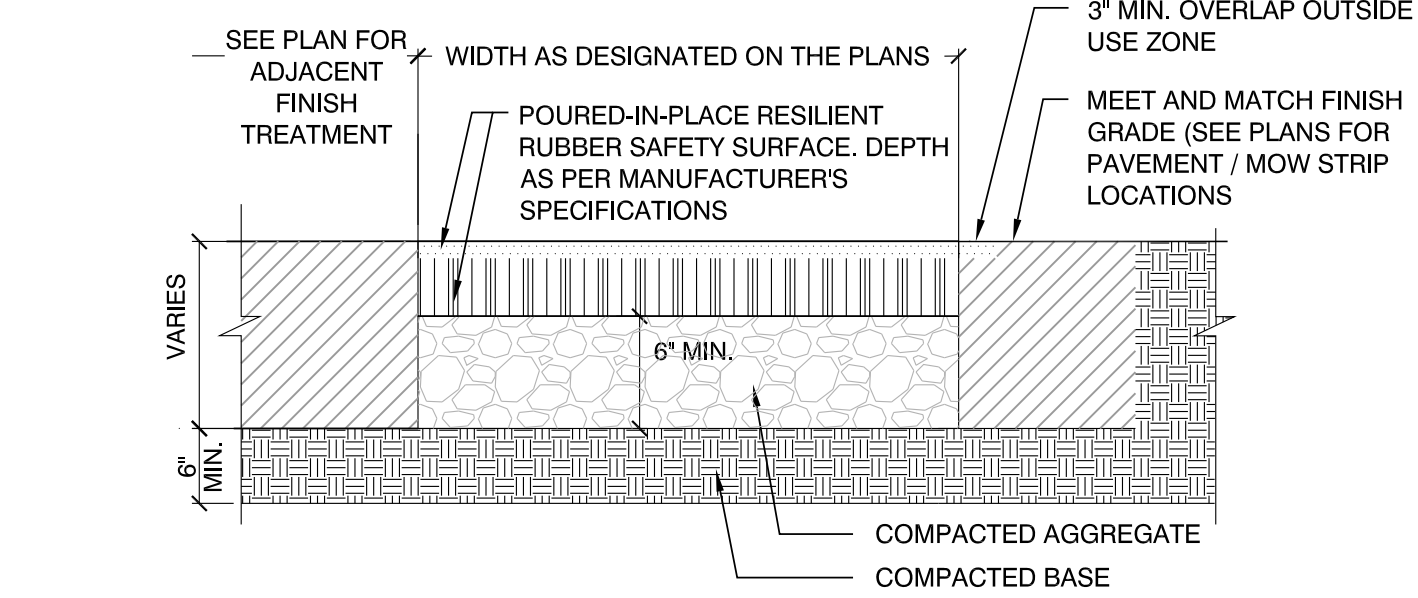
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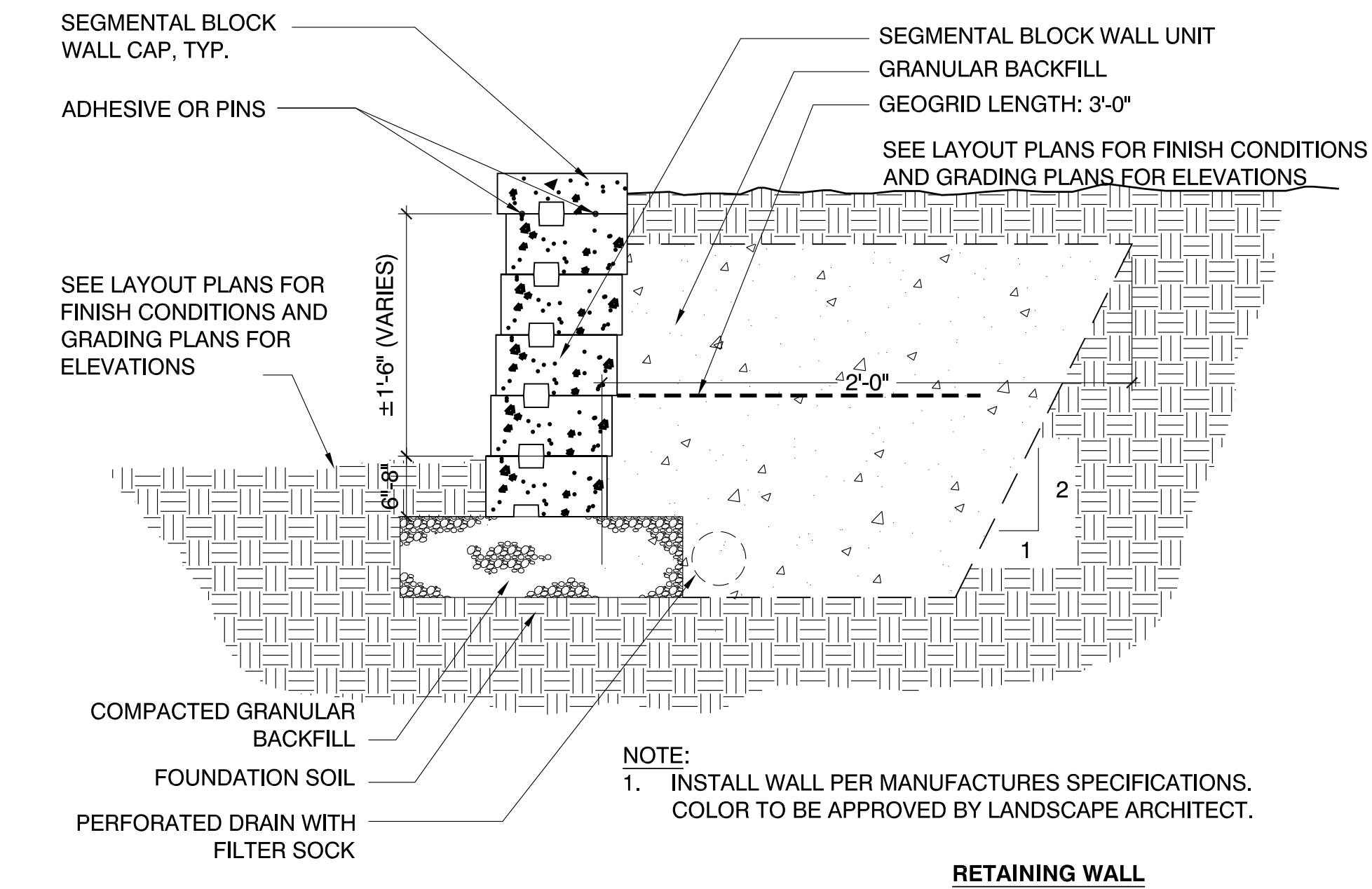
1 SKINNED INFIELD MIX
SCALE: N.T.S.



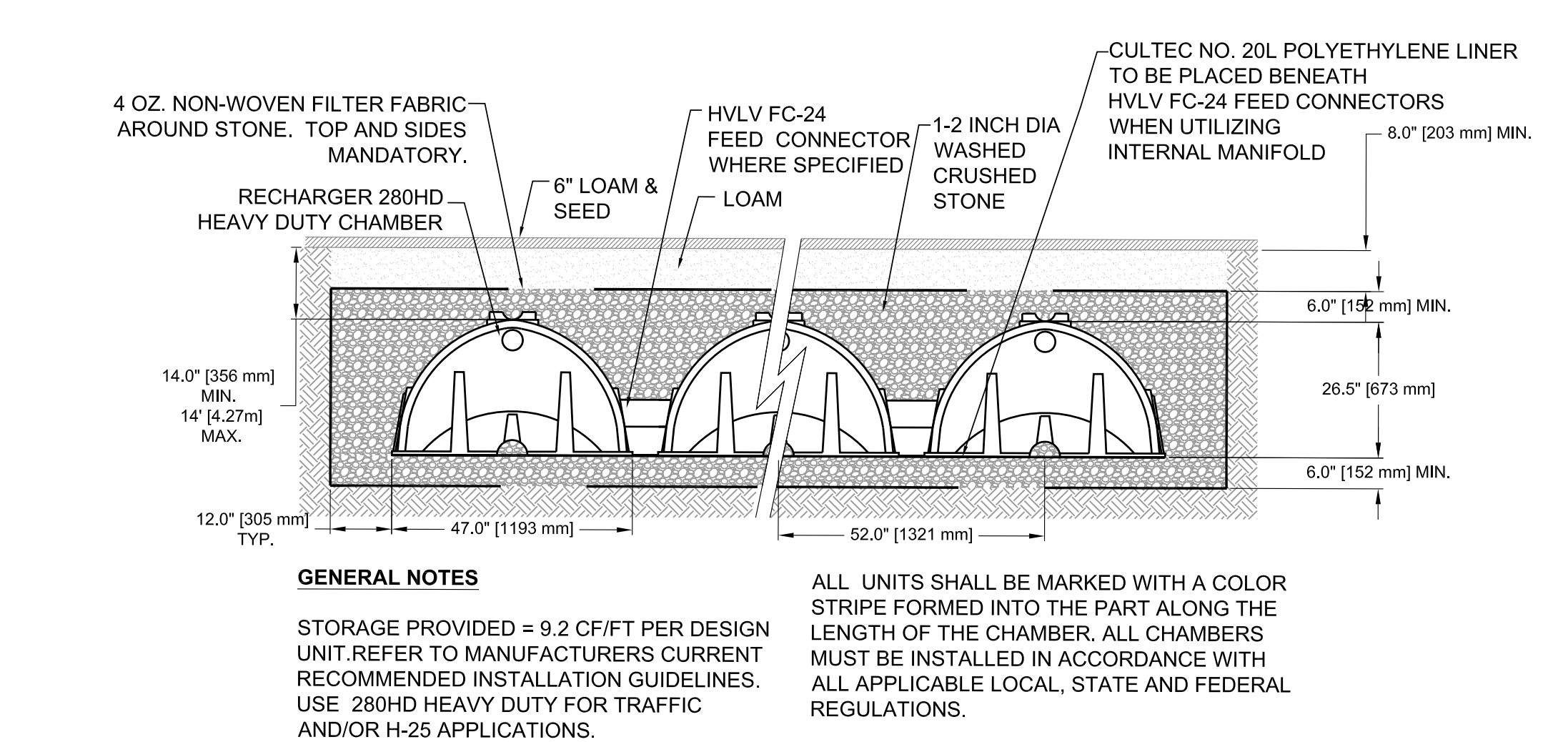
2 PRECAST CONCRETE CURB AT PLAYLOT EDGE
SCALE: N.T.S.



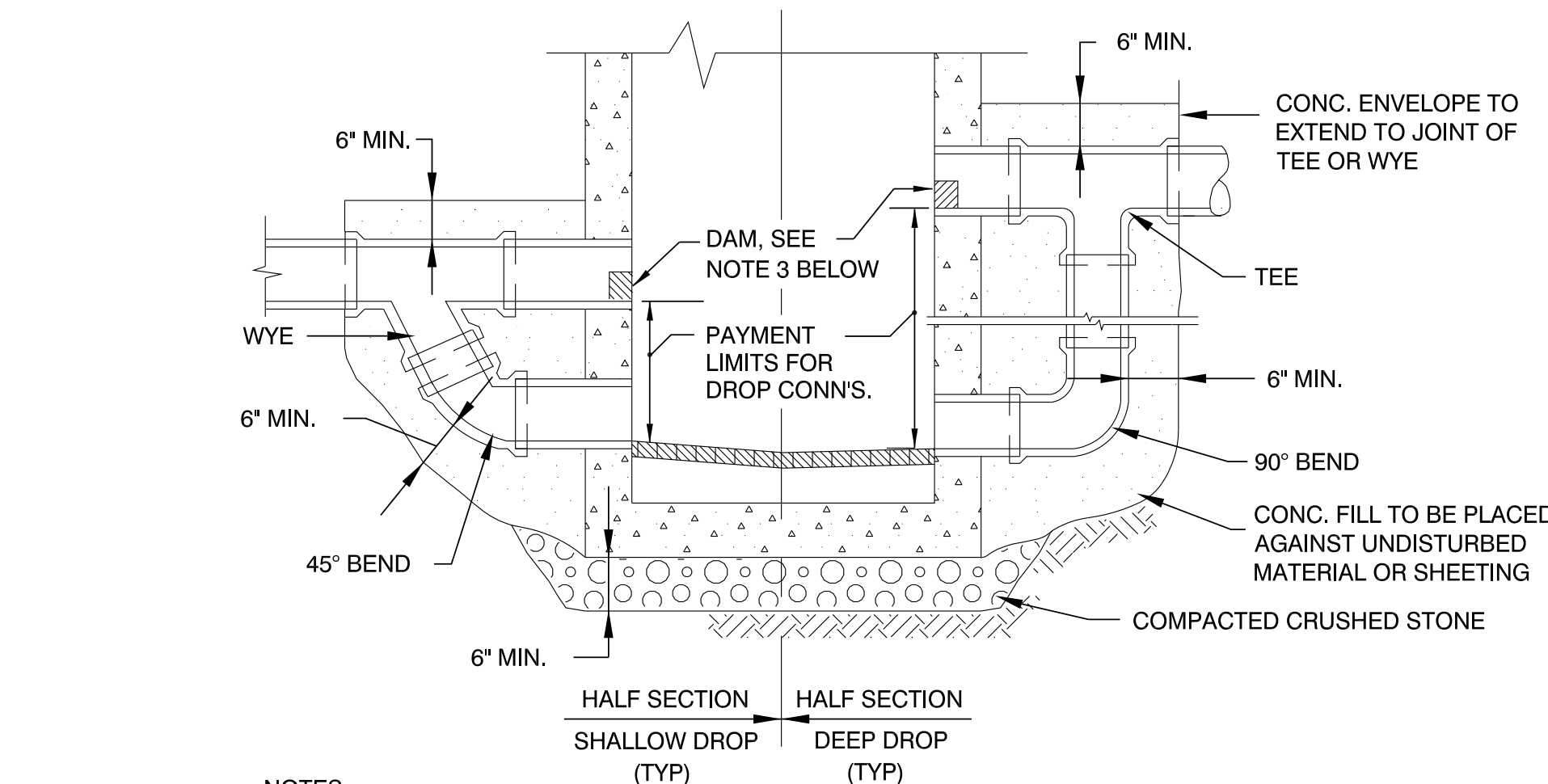
3 POURED IN PLACE RUBBER SURFACE
SCALE: N.T.S.



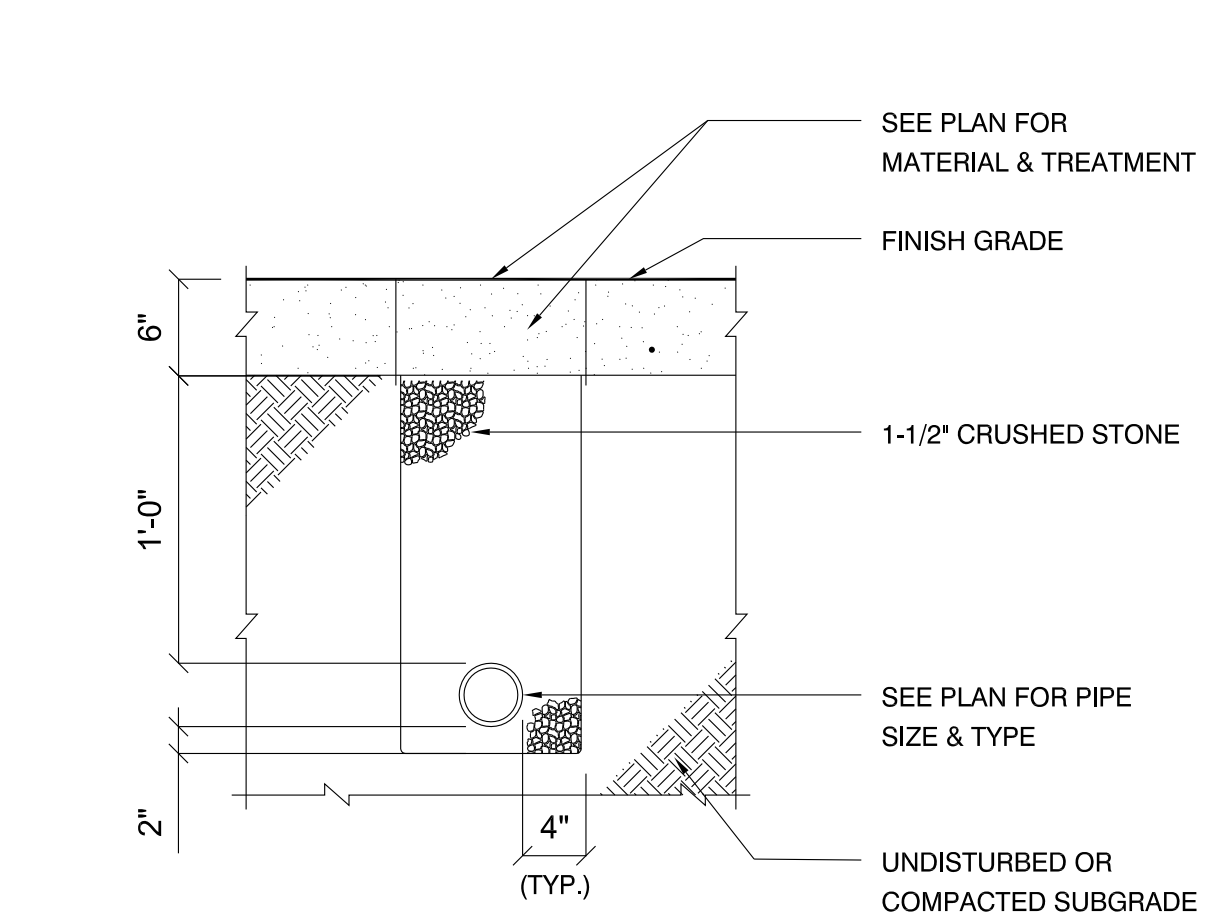
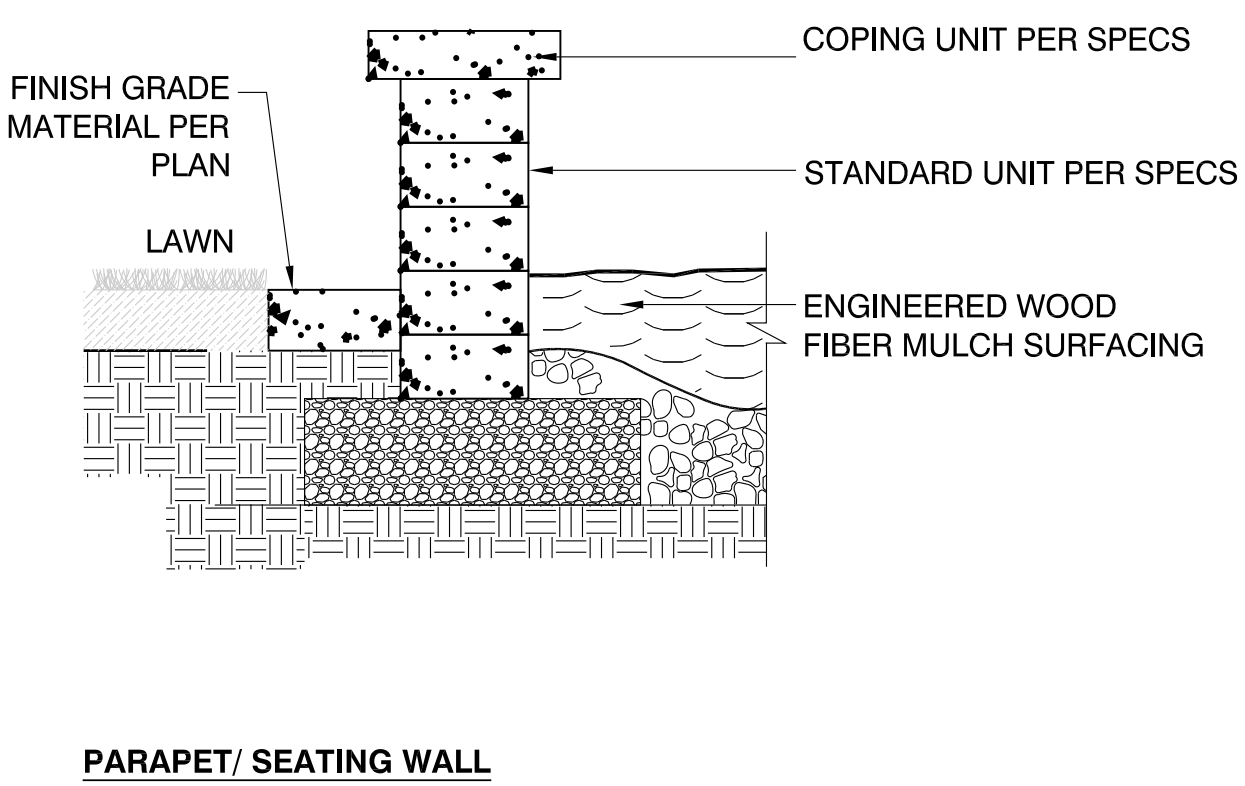
4 TYPICAL SEGMENTAL WALL INSTALLATION
SCALE: N.T.S.



5 HEAVY DUTY STORMWATER STORAGE CHAMBERS
SCALE: N.T.S.



7 EXTERNAL SEWER DROP CONNECTION
SCALE: N.T.S.



3 SUBDRAIN TRENCH
SCALE: N.T.S.

Project:
CITY OF WALTHAM

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Consultants:

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| Checked By: | LFK |
| Approved By: | ERB |

Drawing Title:

**NIPPER MAHER PARK
SPECIFIC SITE
CONSTRUCTION
DETAILS**

Sheet Number:

DT.7