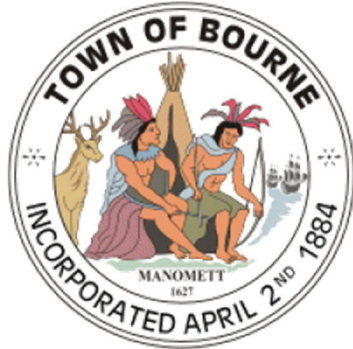


# Town of Bourne

## Invitation for Bid Project Manual



## 58 SAGAMORE RD BEACH ACCESS IMPROVEMENTS PROJECT

BSC GROUP, INC, ENGINEERS

<b>ISSUED:</b>	<b>SEPTEMBER 11, 2024</b>
<b>LAST DATE FOR QUESTIONS:</b>	<b>SEPTEMBER 27, 2024, NOON</b>
<b>BIDS DUE NO LATER THAN:</b>	<b>OCTOBER 4, 2024, 4:00 PM</b>
<b>DIRECT BIDS TO:</b>	<b>TOWN ADMINISTRATOR'S OFFICE 24 PERRY AVE BUZZARDS BAY MA 02532</b>
<b>CONTACT:</b>	Liz Hartsgrove, Assistant Town Administrator 508-759-0600 ext 1355 <a href="mailto:ehartsgrove@townofbourne.com">ehartsgrove@townofbourne.com</a>

This document and any addenda thereto are issued electronically only. It is the responsibility of every bidder who receives this bid and all associated documents to check the Town of Bourne website ([www.townofbourne.com](http://www.townofbourne.com)) for any addenda or modification to this solicitation, if they intend to respond. The Town of Bourne accepts no liability to provide accommodation to bidders who submit a response based upon an out of date solicitation document. Bidders may not alter (manually or electronically) the bid language or any bid documents. Unauthorized modifications to the body of the bid, specifications, terms or conditions, or which change the intent of this bid are prohibited and may disqualify a response.

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## **ATTACHMENTS**

- A. Prevailing Wage Rate Sheet, Dated December 22, 2023
- B. Construction Site Plans and Details (revised through 02/26/2024)
  - 1. Plan to Accompany Notice of Intent – Sheet 1 Existing Conditions Plan
  - 2. Plan to Accompany Notice of Intent – Sheet 2 Grading, Drainage and Layout
  - 3. Plan to Accompany Notice of Intent – Sheet 3 Site Details
- C. Order of Conditions from Conservation Commission

# INVITATION FOR BID

---

In accordance with MGLc.30 §39M, the Town of Bourne on behalf of the Engineering Department is requesting bids for the following:

## TOWN OF BOURNE 58 SAGAMORE RD BEACH ACCESS IMPROVEMENTS PROJECT

Sealed bids will be received at the Town of Bourne Administration Office, Attn: Liz Hartsgrove, Assistant Town Administrator, 24 Perry Ave, Buzzards Bay, MA 02532 until 4:00PM **October 4, 2024**.

The work to be performed under this contract includes, but is not limited to all labor, supervision, materials, fuel and equipment necessary to improve the parking area and storm drainage at 58 Sagamore Road Beach access lot in accordance with specifications provided in the bid documents.

Bid specifications may be immediately obtained on the Town of Bourne website, [www.townofbourne.com/home/pages/procurement-office](http://www.townofbourne.com/home/pages/procurement-office) All bidders must register to receive documents.

Bids shall be in a sealed envelope, bearing the words:  
**“58 SAGAMORE ROAD BEACH ACCESS IMPROVEMENT PROJECT”**

The public bid opening will be held at the Bourne Town Hall, Administration Office, 24 Perry Ave, Buzzards Bay, MA 02532 on **October 4, 2024**, 4:00pm. To receive consideration, bids shall be submitted no later than the above date and time for the opening.

A NON-MANDATORY pre-bid meeting is scheduled for **Tuesday, September 24, 2024, at 10:00AM**. The meeting will be at the site.

All potential bidders must view the project sites and shall be responsible for assessing the existing conditions prior to submitting a bid. All questions regarding the project should be submitted through the Assistant Town Administrator via email at [ehartsgrove@townofbourne.com](mailto:ehartsgrove@townofbourne.com) no later than 12:00pm, **September 27, 2024**.

The successful bidder will be required to furnish a performance bond and a payment bond each in the amount of one hundred (100%) percent of the contract amount.

To receive consideration, bids shall be submitted on the appropriate forms no later than the above date and time schedule for the opening. Bids must be accompanied by a bid security in the amount of not less than **five percent (5%) of the bid price**, in the form of a bid bond; or a certified check; or a treasurer's check; or by cashier's check issued by a responsible bank or trust company, made payable to the Town of Bourne. If, upon acceptance of the bid, a Bidder fails to enter into a Contract with the Town of Bourne, the bid security shall be forfeited to and become the property of the Town.

The cost of any bond and any insurance required in this Invitation For Bid are the responsibility of the bidder; such costs will not be reimbursed by the Town, and should be included in your bid.

Full compliance with Federal, State and Municipal Wage Laws is required of all work done for the Town of Bourne. Minimum Wage Rates as determined by the Commissioner of Department of Labor and Industries under the provision of the Massachusetts General Laws, Chapter 149, Section 26 to 27D, as amended, apply to this project. It is the responsibility of the contractor, before bid opening, to request, if necessary, any additional information on Minimum Wage Rates for those trades people who may be employed for the proposed work under this contract. Wage Rates dated December 22, 2023 shall be provided in the bid specification and are applicable to this project.

All bidders shall be required to provide Certification of Occupational Safety and Health Administration (OSHA) Training in accordance with Massachusetts General Law 30; Section 39S, as amended by Chapter 306 of the Acts of 2004, effective July 1, 2006. Contractors shall be required to comply with all applicable Massachusetts General Laws, Chapter 30, Section 39M, and all other applicable Massachusetts General Laws.

Bidders are not to include their Bid sales and compensating use taxes on materials and supplies purchased for this project. All materials used are tax exempt.

A weekly certified payroll submittal shall be required of the successful bidder in accordance with MGLc.149, §27B. No payments will be made by the Town until all payroll information necessary for the Town to determine compliance with prevailing wage law requirements for the time period of the payment request have been submitted. The Contractor shall not discriminate with regard to the personnel employed on this project on the basis of race, color, creed, national origin, gender, sexual preference, handicap or age.

The Town of Bourne reserves the right to reject any or all bids, waive any informality and/ or accept any bid that appears to be in the best interest of the Town.

<b>Key Dates for this Invitation</b>	
September 11, 2024	IFB available on the Town of Bourne <a href="http://www.townofbourne.com">www.townofbourne.com</a>
September 13, 2024	Advertised in the Bourne Enterprise
September 15, 2024	Advertised in the Cape Cod Times
September 12, 2024	Advertised in COMMBUYS
September 18, 2024	Advertised in the Central Register
September 24, 2024	Non-Mandatory Site Visit at 10:00am
September 27, 2024	Last day for written questions due to Assistant Town Administrator
October 4, 2024	<b>Proposals Due, no later than 4:00 pm to the Town Administrator's Office at 24 Perry Ave, Buzzards Bay, MA 02532</b>
October 11, 2024	Anticipated Contract Award
October 18, 2024	Estimated Contract Commencement Date

**A. PURCHASE DESCRIPTION/SCOPE OF SUPPLIES/SERVICES**

1. The purpose of this proposal is to provide labor, material, and equipment necessary to improve the parking area and storm drainage at 58 Sagamore Road Beach access lot.

2. All work must adhere to the standards identified in the attached Construction Documents Plans and Specifications.
3. The scope of the contract includes labor, material, and equipment for the completion of the work described in the specifications.
4. All work identified shall be performed and completed based on the following:
  - a) Work is to be completed during NTP thru November 29, 2024.
  - b) No work is to occur on the coastal bank or beach from April 1 through September 1 due to shore bird habitat.
5. If the vendor fails to supply and/or deliver in time to meet the requirements of the Town, the Town reserves the right to obtain these services from another source. Any additional costs incurred by the Town because of a price differential between the price paid on the open market and the contract price will be charged against the contractor or deducted from any balance owed to the contractor.
6. All bids must be firm and continue in effect for a period of two (2) months from date of bid opening.
7. SERVICE AND WARRANTY TERMS: All proposal prices must include standard warranty as described in the Specification.
8. DELIVERY REQUIREMENTS: All delivery charges shall be included in the price of the service.
9. The Delivery should be made to: Tim Lydon Engineering Dept. 24 Perry Avenue, Buzzards Bay, MA 02532-3441

**B. QUALITY REQUIREMENTS**

1. Bidders must provide all the items described in Purchase Description/Scope of Services and comply with all Proposal Submission Requirements. Missing information may cause the proposal to be considered unresponsive.
2. All work must comply with the Specifications identified as is Division 2 Site work and Division 3 Concrete.
3. Bidders must have satisfactory performance under at least five (5) different contracts two of which shall be similar in size and scope to the proposed contract. Contract information will be provided as part of Section V, References.

**C. RULE FOR AWARD**

1. Award shall be made, if at all, to the lowest eligible responsible bidder meeting the requirements described in Purchase Description/Scope of Services and offering the lowest Total Bid Price and in the best interest of the town.

END OF SECTION

# GENERAL BID FORM (REQUIRED)

---

## 58 SAGAMORE RD BEACH ACCESS IMPROVEMENTS PROJECT

The Bidder submits this bid proposal to perform all the work (including labor, equipment, and materials) as described in the solicitation for this Base Bid Price (including the costs for all Allowances, Bonds, and Addenda):

### A. BASE PRICE

Total Base Bid Price \$ \_\_\_\_\_ (numbers)

\_\_\_\_\_ (words)

In case of a discrepancy, words shall take precedence over numbers.

### B. UNIT PRICES - NONE

### C. ALTERNATES - NONE

Your signature below acknowledges your understanding of these parameters and your willingness to live within the stated financial constraint of the project.

Company: \_\_\_\_\_

Authorized Signature: \_\_\_\_\_

Print Name: \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_

Telephone: \_\_\_\_\_

Email: \_\_\_\_\_

Acknowledgement of Addendums received for this Invitation For Bid \_\_\_\_\_  
(Please list # of addendums)

# 58 SAGAMORE RD BEACH ACCESS IMPROVEMENTS PROJECT

## CERTIFICATIONS REQUIRED BY LAW FOR PUBLIC SERVICES CONTRACT (REQUIRED)

You must COMPLETE and SIGN the following certifications. You must also print, at the bottom of this page, the name of the contractor for whom these certifications are submitted.

### CERTIFICATE OF NON-COLLUSION

The undersigned certifies under the penalties of perjury that this bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this subsection the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity.

### TAX COMPLIANCE

Pursuant to Chapter 62C of the Massachusetts General Laws, Section 49A(b), I, the undersigned, authorized signatory for the below named contractor, do hereby certify under the pains and penalties of perjury that said contractor has complied with all laws of the Commonwealth of Massachusetts relating to taxes, reporting of employees and contractors, and withholding and remitting child support.

### PUBLIC CONTRACTOR DEPARTMENT

The undersigned certifies under penalty of perjury that the below named contractor is not presently debarred from doing public construction work in the commonwealth under the provisions of section twenty-nine F of chapter twenty-nine, or any other applicable debarment provisions of any other chapter of the General Laws or any rule or regulation promulgated thereunder.

### OSHA TRAINING

Pursuant to G.L. c. 30, §39S, the Contractor hereby certifies under penalties of perjury as follows: (1) Contractor is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the work; (2) All employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and they shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; and (3) All employees to be employed in the work subject to this contract 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.

### IF A FOREIGN CORPORATION

I hereby certify that I comply with the provisions of Massachusetts General Laws, Chapter 30, Section 39L and Chapter 156D as they relate to Foreign Corporations.

<input type="checkbox"/> (Check one)	<input type="checkbox"/> Not Applicable	<input type="checkbox"/> I comply and am registered and in good standing with the Massachusetts Secretary of State
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### COMPLETE AND SIGN BELOW:

\_\_\_\_\_  
Authorized Person's Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Print Name & Title of Signatory

\_\_\_\_\_  
Name of Contractor



**58 SAGAMORE RD BEACH ACCESS IMPROVEMENTS PROJECT**

**CERTIFICATE OF VOTE**  
**(REQUIRED, CORPORATIONS ONLY)**

At a duly authorized meeting of the Board of Directors of the \_\_\_\_\_  
(Name of Corporation)

held on \_\_\_\_\_ it was VOTED, that

\_\_\_\_\_  
Name Officer

of this company, be and hereby is authorized to execute contracts and bonds in the name and on behalf of said company and affix its corporate seal hereto; and such execution of any contract or obligation in this company's name on its behalf by such officer under seal of the company, shall be valid and binding upon this company.

I hereby certify that I am the clerk of the above-named corporation and that

\_\_\_\_\_ is the duly elected officer as above of said company,  
(name)

and that the above vote has not been amended or rescinded and remains in full force and effect as the date of this contract.

\_\_\_\_\_  
Date Clerk

Corporate Seal

## 58 SAGAMORE RD BEACH ACCESS IMPROVEMENTS PROJECT

### BIDDER'S REFERENCES (REQUIRED)

Responding Bidder's Name: \_\_\_\_\_

Proposers must provide a list of at least 5 references to which similar size and scope projects have been completed within the past five (5) years, along with a name of a contact person and phone numbers. (Municipalities desired, if applicable). Additionally, please attach to this form, a complete list of ongoing projects, projects completed within the past two years including project contact names, values and contact names and numbers. Town reserves the right to obtain additional references at their option.

1.	Town:		Project Date:		Project Value:	
	Project Description:					
	Contact:				Phone:	

2.	Town:		Project Date:		Project Value:	
	Project Description:					
	Contact:				Phone:	

3.	Town:		Project Date:		Project Value:	
	Project Description:					
	Contact:				Phone:	

4.	Town:		Project Date:		Project Value:	
	Project Description:					
	Contact:				Phone:	

5.	Town:		Project Date:		Project Value:	
	Project Description:					
	Contact:				Phone:	

# BID BOND FORM (REQUIRED)

---

KNOWN ALL MEN AND WOMEN BY THESE PRESENTS, THAT WE, THE UNDERSIGNED

\_\_\_\_\_ .as Principal, and

\_\_\_\_\_ .as Surety

are hereby held and firmly bound unto the Town of Bourne, MA, as Owner, in the penal sum of

\$ \_\_\_\_\_

for the payment for which, well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors, and assigns.

The Condition of the above obligation is such that whereas the Principal has submitted to the General Contractor, a certain Bid, attached hereto and hereby made a part hereof, to enter a Contract in writing for construction of the Sagamore Beach Access Ramp Site #1 project.

NOW, THEREFORE,

1. If said Bid shall be rejected, or in the alternate,
2. If said Bid shall be accepted and the Principal shall execute and deliver a Contract in the Form of Contract attached (properly completed in accordance with said Bid) and shall furnish a bond for his faithful performance of said Contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all respects perform the Agreement created by acceptance of said Bid.

Then the Condition of this Obligation is such that if the aforesaid principal shall be awarded the contract the said Principal will, within the time required, enter into a formal contract and give a good sufficient bond to secure the performance of the terms and conditions of the contract, then this obligation to void; otherwise the Principal and Surety will pay unto the Oblige the difference in money between the amount of the bid of the said Principal and the amount for which the Oblige legally contracts with another party to perform the work if the later amount be in excess of the former, but in no event shall liability hereunder exceed the penal sum hereof.

The Surety, for value received, hereby stipulates, and agrees that the obligations of said Surety and its bond shall be in no way impaired or affected by any extension of the time within which the Owner may accept such; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

PRINCIPAL \_\_\_\_\_ BY: \_\_\_\_\_

SURETY SEAL \_\_\_\_\_ BY: \_\_\_\_\_

## **PREVAILING WAGE RATES**

---

Prevailing wages dated December 22, 2023, Attachment A, apply to this project and are a part of this Contract.

# LABOR & MATERIALS PAYMENT BOND (REQUIRED)

---

KNOWN ALL MEN AND WOMEN BY THESE PRESENT, THAT:

\_\_\_\_\_ as principal, and

\_\_\_\_\_ as surety, are held and firmly bound unto the Town of Bourne, Buzzards Bay, Massachusetts in the sum of:

\_\_\_\_\_ lawful money of the United State of America, to be paid to the Town of Bourne, Buzzards Bay, Massachusetts, for which payments, well and truly to be made, we bind ourselves, our respective heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the said principal has made a contract with the Town of Bourne, Buzzards Bay, Massachusetts, bearing the date of \_\_\_\_\_ of \_\_\_\_\_, 2024, for the construction project:

## 58 SAGAMORE ROAD BEACH ACCEESS IMPROVEMENT PROJECT

Now the condition of this obligation is such that if the principal shall pay for all labor performed or furnished and for all materials used or employed in said contract and in any and all duly authorized modifications, alterations, extensions of time, changes or additions to said contract that may hereafter be made, notice to the surety of such modifications, alterations, extensions of time, changes or additions being hereby waived, the foregoing to include any other purpose or items set out in, and subject to, the provisions of Massachusetts General Laws, Chapter 30, Section 39A, and Chapter 149, Section 29, as amended, then this obligation shall become null and void; otherwise it shall remain in full force and virtue.

IN WITNESS THEREOF, we hereunto set our hands and seals this

\_\_\_\_\_ Day of \_\_\_\_\_, 2024.

**(Seal)**

By: \_\_\_\_\_

By: \_\_\_\_\_

# PERFORMANCE BOND (REQUIRED)

---

KNOWN ALL MEN AND WOMEN BY THESE PRESENT, THAT:

\_\_\_\_\_ as principal, and

\_\_\_\_\_ as surety, are held and firmly bound unto the Town of Bourne, Buzzards Bay, Massachusetts in the sum of \$\_\_\_\_\_ lawful money of the United State of America, to be paid to the Town of Bourne, Buzzards Bay, Massachusetts, for which payments, well and truly to be made, we bind ourselves, our respective heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the said principal has made a contract with the Town of Bourne, Buzzards Bay, Massachusetts, bearing the date of \_\_\_\_\_ of \_\_\_\_\_, 2024, for the construction project:

## 58 SAGAMORE ROAD BEACH ACCEESS IMPROVEMENT PROJECT

Now the condition of this obligation is such that if the principal shall well and truly keep and perform all the undertakings, covenants, agreements, terms and conditions of said contract on its part to kept and performed during the original term of said contract any extensions thereof that may be granted by the Town of Bourne, Buzzards Bay, Massachusetts, with or without notice to the surety, and during the life of any guarantee required under the contract, and shall also well and truly keep and perform all the undertakings, covenants, agreements, terms and conditions of any and all duly authorized modifications, alterations changes or additions being hereafter made, notice to the surety of such modifications, alterations, changes or additions being hereby waived, then this obligation shall become null and void; otherwise it shall remain in full force and virtue.

IN WITNESS THEREOF, we hereunto set our hands and seals this \_\_\_\_\_ day of \_\_\_\_\_, 2024.

(Seal)

By: \_\_\_\_\_

By: \_\_\_\_\_

# GENERAL WORK CONTRACT

---

## TOWN OF BOURNE, MASSACHUSETTS AGREEMENT BETWEEN CONTRACTOR AND TOWN OF BOURNE

THIS CONTRACT, made as of the \_\_\_\_ day of \_\_\_\_\_ 20\_\_ (“Commencement Date”) by and between the TOWN OF BOURNE, Massachusetts, a municipal corporation with its main address at 24 Perry Ave, Bourne, MA 02653 (the “Town”) and CONTRACTOR NAME with legal address and principal place of business at (the “Contractor”):

WITNESSETH: That for and in consideration of the payments to be made by the Town and the mutual promises set forth herein, the Contractor hereby agrees with the Town to commence and complete the **58 SAGAMORE RD BEACH ACCESS IMPROVEMENTS PROJECT**. (the “Project”), for the consideration set forth in the Bid, as defined herein, and all extra work in connection therewith, under the terms as stated in the Invitation for Bid dated \_\_\_\_\_, 20\_\_ including Addendums including all drawings, specification and attachments thereto (the “IFB”) and the additional terms and conditions set forth herein; and at the Contractor’s own proper cost and expense to furnish all the materials supplies, machinery, equipment, tools, superintending, labor, insurance, and other accessories and services necessary to complete said Project in accordance with the prices stated in the Contractor’s bid submittal dated \_\_\_\_\_, 20\_\_ (the “Bid”), all of which are made a part hereof by reference and collectively evidence and constitute the Contract.

Term – The Term of this Contract shall commence as of the Commencement Date set forth above and shall terminate on DATE, 20\_\_, unless sooner terminated as provided herein. Construction shall commence upon the issuance of a written notice to proceed by the Town after execution of this Contract.

Contract Value – Total payments to be made hereunder shall not exceed \$\_\_\_\_\_ ( PRICE IN WORDS)

Force Majeure – This Contract shall be subject to Force Majeure considerations. Either party hereto shall be excused from performance of any act under this Contract if prevented from the performance of any act required by reasons of strikes, lockouts, labor trouble, failure of power, fire, winds, Acts of God, riots, insurrections, war or other reason of a like nature not reasonably within the control of the party. The period for the performance of such obligation shall be extended for an equivalent period for no additional cost. Continued prevention from performance by such causes for periods aggregating sixty (60) or more days shall be deemed to render performance impossible, and either party shall thereafter have the right to terminate this Contract upon written notice to the other party.

Termination of Contract - Subject to the provisions of the section above explaining Force Majeure, if the Contractor shall fail to fulfill in a timely and satisfactory manner its obligations under this FY25 Contract, or if the Contractor shall violate any of the covenants, conditions, or stipulations of this Contract, the Town may terminate this Contract in accordance with \_\_\_\_\_, Termination or Suspension of the Contract of the IFB.

Insurance - The Contractor shall maintain insurance with minimum limits as defined in the Invitation for Bid, Special Conditions for the entire duration of the project work to be performed, and provide a certificate of insurance with the Town of Bourne named as an additional insured. Renewal certificates of insurance must be submitted to the Town of Bourne, Administration, 24 Perry Ave., Buzzards Bay, MA 02653 on a yearly basis.

Governing Law, Jurisdiction and Venue - This Contract shall be governed by and construed pursuant to the laws of the Commonwealth of Massachusetts without regard to its conflict of laws principles. Venue for any legal actions initiated concerning this Contract or arising in any way from and out of this Contract shall be brought in the appropriate state court sitting in Barnstable County, having jurisdiction over said claim. The parties waive any right they may have to venue in any other jurisdiction.

Massachusetts General Laws Chapter 30, Section 39M hereby applies to this Contract. Prevailing Wage Rates dated December 22, 2023 as referenced in the IFB apply to this Contract. The Contractor shall submit weekly certified payrolls with invoices to Town of Bourne, Attn: Timothy Lydon. OSHA 10 certification required for all employees and subcontractors performing work on the job site. A one hundred percent (100%) payment and a one hundred percent (100%) performance bond are required with this signed Contract. Contractor hereby agrees to comply with all Town, State or Federal Directives and guidelines in regard to construction and health safety related to COVID19 Pandemic.

It is expressly understood and agreed that the Contractor shall at all times during the term of this Contract act as an independent contractor, and shall not have any authority to bind the Town. Contractor and Contractor's employees, agents and/or subconsultants shall not be deemed to be employees or agents of the Town. Further, nothing contained herein shall be construed to create a joint venture, partnership, association or other affiliation between the Contractor and the Town.

To the fullest extent permitted by law, the Contractor shall indemnify, defend, and save harmless the Town and all of the Town officers, agents and employees from and against all suits and claims of liability of every name and nature, including attorney's fees and costs of defending any action or claim, for or on account of any claim, loss, liability or injuries to persons or damage to property of the Town or any person, firm, corporation or association arising out of or resulting from any act, omission, or negligence of the Contractor, subcontractors and their agents or employees in the performance of the work covered by this Contract and/or their failure to comply with terms and conditions of this Contract, regardless of whether said claim is caused in part by the Town or any third party. The foregoing provisions shall not be deemed to be released, waived or modified in any respect by reason of any surety or insurance provided by the Contractor under this Contract with the Town. The provisions of this paragraph shall survive the termination or expiration of the Contract.

IN WITNESS WHEREOF, the parties to these present have executed this Contract in the year and day first above mentioned.

By: CONTRACTOR

By: TOWN OF BOURNE

---

Marlene McCollem, Town Administrator



*I hereby certify that the Town of Bourne has an appropriation to cover the cost of this contract in accordance with Ch 44 §31C of the Massachusetts General Laws.*

By:

---

Town Accountant

## 01 10 00 SUMMARY OF WORK

---

### 1.1 LOCATION OF PROJECT

- A. The work to be performed will be at the existing municipal beach access and parking area at 58 Sagamore Road \ in Bourne, Massachusetts as shown on the Plans.

### 1.2 SCOPE OF WORK

- A. The work under this contract consists of furnishing all necessary labor, materials, and equipment to reconstruct the parking lot with storm water system improvements and improve the access ramp as described in these Specifications, and as shown on the Plans or specified herein.
- B. Work includes, without limiting the generality thereof, providing all labor, equipment, and materials to complete the work shown on the plans including:
  - 1. Complete necessary land survey to stake all improvements
  - 2. Install and maintain all erosion controls.
  - 3. Coordinate police details and traffic control as required to complete the work.
  - 4. Pulverize existing pavement reusing milled material as pavement base.
  - 5. Install all drainage structures, drainage piping, venting, underground infiltration,
  - 6. Install hot mix pavement, base, and curbing
  - 7. Install concrete pad for portable toilet (Toilet NIC)
  - 8. Extend concrete ramp and set /reset/ chink armor stone as needed.
  - 9. Install walkway with railroad tie steps, bike racks, trash receptacles and removable bollard.
  - 10. Complete beach nourishment as shown on the plans.
  - 11. Furnish and install beach grass culms as shown on the plans.
  - 12. Install signage and pavement markings.
  - 13. Legally disposal of all excess soils and construction debris.
  - 14. Provide full as-built plan of utility work.
  - 15. Clean up and` any incidental to the work.
- C. TIME LIMITATIONS. The Order of Conditions prohibits work on the coastal bank or beach from April 1 to August 31. For that reason, it is expected that the work on ramp will occur separate from the parking lot work.

END OF SECTION

## 01 10 20 GENERAL CONDITIONS

---

### 1.0 GENERAL PROVISIONS

#### 1.1 DEFINITIONS.

- 1.1.1 Awarding Authority.** Where the term “Awarding Authority” appears in any statutory provision, it shall mean “the Owner.”
- 1.1.2 Contracting Officer.** The term “Contracting Officer” shall mean the town official so designated below, or the individual duly appointed by him for the performance of any of his functions or responsibilities under this Contract. The Work shall be carried out under the direction and subject to the approval and acceptance of the **Town of Bourne** (hereinafter called the Contracting Officer).

- 1.2 SCOPE OF THE WORK.** The Work comprises the completed project described in the Contract Documents and includes all labor, professional services, transportation, tools, materials, supplies, equipment, permits, approvals, documents, calculations, submittals, and certificates necessary to develop, perform, construct and complete the project in accordance with all applicable laws, ordinances, and regulations, and in accordance with the Contract Documents. See work outline in Section 00-01-10 Summary of Work.
- 1.3 INTERPRETATION.** The Plans and Specifications and other Contract Documents are to be considered together and are intended to be mutually complementary, so that any work shown on the Plans though not specified in the Specifications, and any work specified in the Specifications though not shown on the Plans, is part of the Work to be performed by the Contractor.
- 1.4 WRITTEN AUTHORIZATION.** Actions taken, and approvals and decisions made by the Owner under this Contract require the prior approval and signature of the Contracting Officer. These include, but are not limited to, the following: changes in the Contract Price, time for completion, or any other provision of this Contract; written orders, notices, and approvals given by the Contracting Officer pursuant to the Contract Documents or pursuant to any laws applicable to this Contract, including approval of “or equal” submissions; issuance of stop work orders; approval of Contractor’s applications for payment; and termination of the Contract. Work undertaken by the Contractor not authorized by the Contracting Officer’s signature prior to the start of such work shall be considered unauthorized work and shall not entitle the Contractor to any extra payment. The Contractor shall perform, at its own expense, corrective measures required by the Owner due to any failure to obtain prior approval for any item of work.
- 1.5 CONTRACTOR'S GENERAL DUTIES.** The Contractor shall perform the Work in a competent manner in accordance with the Contract Documents and all applicable laws. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures, and coordination of all portions of the Work under this Contract. The Contractor shall provide and perform for the Contract Price all of the duties and obligations set forth in the Contract Documents. Except as otherwise specified in this Contract, it is not the Contractor's responsibility to ascertain that the Contract Documents are in accordance with applicable Laws. However, if the Contractor observes that portions of the Contract Documents are at variance with legal requirements, the Contractor shall promptly notify the Owner of that fact in writing. If the Contractor performs Work knowing it to be contrary to legal requirements, the Contractor shall be liable for all damages caused thereby, including the cost of correcting the Work.
- 1.6 SALES TAX EXEMPTION AND OTHER TAXES.** To the extent that materials and supplies are used or incorporated in the performance of this Contract, the Contractor is considered an exempt purchaser under the Massachusetts Sales Act, Chapter 14 of the Acts of 1966. The Contractor shall pay all taxes and tariffs of any sort related to the Work, subject to the applicable exemptions.

- 1.7 PERMITS, FEES, AND NOTICES.** The Contractor shall secure and pay for all permits and governmental fees, licenses, and inspections necessary for proper execution and completion of the Work. The Contractor shall coordinate all efforts required to obtain these permits unless otherwise directed in writing by the Owner. The Contractor shall comply with and give notices required by laws, ordinances, rules, regulations, codes, and lawful orders of public authorities bearing on the performance of the Work.
- 1.8 SAFETY REQUIREMENTS.** The Contractor shall comply with all Federal, State, and local safety laws and regulations applicable to the Work.
- 1.9 MINIMUM WAGE RATES.** The Contractor shall comply with M.G.L. c. 149, §§ 26- 27H. The wage schedule found in Exhibit A to the Instructions to Bidders lists the minimum wage rates that must be paid to all workers employed in the Work throughout the term of this Contract, subject to the exceptions provided in M.G.L c.149, §§ 26-27H. The Owner is not responsible for any errors, omissions, or misprints in the said schedule. The Contractor shall not have any claim for extra compensation from the Owner arising from the fact that the actual wages paid to workers employed in the Work exceed the rates listed on the schedule or as otherwise provided by law. The Contractor shall cause a copy of the schedule to be posted in a conspicuous place at the Site during the term of the Contract. If reserve police officers are employed by the Contractor, they shall be paid the prevailing wage of regular police officers. (See M.G.L c. 149, § 34B).
- 1.10 CORPORATE DISCLOSURES.** The Contractor, if a foreign corporation, shall comply with M.G.L. c. 181, §§ 3 and 5, and M.G.L. c. 30, § 39L.
- 1.11 SAFETY REQUIREMENTS; OSHA TRAINING [M.G.L. C. 30, S. 39S].** The Contractor shall comply and shall cause all subcontractors and persons employed on the Work to comply with all applicable safety requirements. By executing this contract the Contractor hereby certifies that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; and that all employees to be employed in the work subject to this bid have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration. Any employee found on a worksite subject to this section without documentation of successful completion of 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 shall be subject to immediate removal.
- 1.12 PAYROLL RECORDS AND STATEMENT OF COMPLIANCE.** The Contractor shall comply and shall cause its subcontractors to comply with Massachusetts General Law c. 149, §27B, which requires that a true and accurate record be kept of all persons employed on the project for which the prevailing wage rates have been provided. The Contractor and all Subcontractors shall keep these records and preserve them for a period of six years from the date of completion of the Contract. Such records shall be open to inspection by any authorized representative of the

Owner at any reasonable time, and as often as may be necessary. The Contractor shall, and shall cause its subcontractors to, submit weekly copies of their weekly payroll records to the Owner. In addition, the Contractor and each Subcontractor shall furnish to the Executive Department of Labor within fifteen days after completion of its portion of the Work a signed statement in the form required by the Owner.

- 1.13 WORKFORCE QUALIFICATIONS.** The Contractor shall: (i) employ competent workers; (ii) enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work; (iii) not permit employment of unfit persons or persons not skilled in tasks assigned to them. Whenever the Contracting Officer shall notify the Contractor in writing that any worker is, in the Contracting Officer's opinion, incompetent, unfaithful, disorderly, or otherwise unsatisfactory, such employee shall be discharged from the Work and shall not again be employed on the Work except with the consent of the Contracting Officer.
- 1.14 NON-DISCRIMINATION IN HIRING AND EMPLOYMENT.** By signing this Contract the Contractor hereby certifies under the pains and penalties of perjury that the Contractor currently complies with and will continue to comply with all federal and state laws, rules and regulations promoting fair employment practices or prohibiting employment discrimination and unfair labor practices and shall not discriminate in the hiring of any applicant for employment nor shall any qualified employee be demoted, discharged or otherwise subject to discrimination in the tenure, position, promotional opportunities, wages, benefits or terms and conditions of their employment because of race, color, national origin, ancestry, age, sex, religion, disability, handicap, sexual orientation or for exercising any rights afforded by law.
- 1.15 VETERANS PREFERENCE.** In the employment of mechanics and apprentices, teamsters, chauffeurs, and laborers in the performance of Work in the Commonwealth, preference shall first be given to citizens of the Commonwealth who have been residents of the Commonwealth for at least six months at the commencement of their employment and who are veterans as defined M.G.L. c. 4, § 7 (34), and who are qualified to perform the work to which the employment relates and, within such preference, preference shall be given to service-disabled veterans; and secondly, to citizens of the Commonwealth generally who have been residents of the Commonwealth for at least six months at the commencement of their employment, and if they cannot be obtained in sufficient numbers, then to citizens of the United States.
- 1.16 WEEKLY OR BIWEEKLY WAGE PAYMENTS [M.G.L. C. 149, § 148].** The Contractor shall comply with, and shall cause its Subcontractors to comply with M.G.L. c. 149, § 148, which requires the weekly or biweekly payment of employees within six days of the end of the pay period during which wages were earned if employed for five or six days of a calendar week, and within other periods of time under certain circumstances as set forth therein.
- 1.17 LABOR HARMONY [M.G.L. C. 30, S. 39S].** By executing this contract, the Contractor hereby certifies that (1) that Contractor is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the work. The Contractor shall procure materials from such sources and shall manage its own forces and the forces of its Subcontractors and any sub-subcontractors in such a manner as will result in harmonious labor relations on the site. The Contractor shall cause persons to be employed in the Work who will work in harmony

with others so employed. Should the Work be stopped or materially delayed in the Owner's reasonable judgment due to a labor dispute, the Owner shall have the right to require the Contractor to employ substitutes acceptable to the Owner.

- 1.18 RISK OF LOSS.** The Contractor shall bear the risk of loss with respect to any of its or its agents,' employees' or subcontractors' vehicles, equipment or tools brought onto or left at the worksite and for any materials stored at the worksite.

## **2.0 MATERIALS AND EQUIPMENT WARRANTY**

Materials and equipment to be installed as part of the Work (both or either of which are hereinafter referred to as "materials") shall be new, unused, of recent manufacture, assembled, and used in accordance with the best construction practices. The Contractor shall inform itself as to, and shall comply with, the provisions of M.G.L. c. 7, § 23A, as amended.

## **3.0 PROSECUTION OF THE WORK -- LIQUIDATED DAMAGES**

- 3.1 BEGINNING, PROGRESS SCHEDULE.** The Contract time shall commence upon the date specified in the Notice to Proceed executed by the Contracting Officer and delivered to the Contractor after the execution of this Contract. The Contractor shall begin Work at the Site within ten days of said date unless otherwise ordered in writing by the Owner. Prior to commencing the Work, the Contractor shall meet with representatives of the Owner to discuss the quality assurance program, safety program, labor provisions, progress schedule, schedule of values, and other Contract procedures. Upon Approval by the Contracting Officer, the progress schedule shall constitute the progress schedule for the Work. Upon approval by the Contracting Officer, the schedule of values shall be the basis for payment for the Work. The Contractor shall at the end of each month, or more often if required, furnish to the Owner a schedule meeting the requirements of the Specifications showing the actual progress of the parts of the Work in comparison with the approved progress schedule.

- 3.2 TIME FOR COMPLETION OF WORK.** Time is of the essence of this Contract. The Work shall be completed within the time specified in Agreement subject only to extensions specifically permitted in accordance with the terms of this Contract.

- 3.3 DEFINITION OF "SUBSTANTIAL COMPLETION."** For the purposes of this Contract the term "Substantial Completion" shall occur when (1) the Contractor fully completes the Work or substantially completes the Work so that the value of the Work remaining to be done is, in the estimate of the Owner, less than one percent of the original Contract price, or (2) the Contractor substantially completes the work and the Owner takes possession for occupancy, whichever occurs first. For the purposes of the preceding sentences the term "substantially completes" means that the work required by the Contract has been completed except for minor incomplete or unsatisfactory work items that do not materially impair the usefulness of the Work.

- 3.4 FAILURE TO COMPLETE WORK ON TIME - LIQUIDATED DAMAGES.** Because both parties recognize (1) that the time for completion of this Contract is of the essence, (2) that the Owner will suffer loss if the work is not completed in accordance with the phasing requirements and within the contract time specified, plus any extensions thereof allowed in accordance with the

provisions of this Contract, and that there are significant delays, expense and difficulties associated with a legal proceeding to determine the actual loss suffered by the Owner if the work is not completed on time; therefore, it is agreed that the Contractor will pay the Owner, as liquidated damages, the sum of One thousand (\$1,000.00) dollars per calendar per day for each and every day thereafter that it fails to deliver such Work completed according to the requirements of the Contract Documents. Such liquidated damages shall be paid not as a penalty, but to partially cover losses and expenses to the Owner, including intangible costs and losses that are or may be impracticable to ascertain. Allowing the Contractor to continue to finish the work (or any portion of the work) after the time specified for completion of the Work shall not operate as a waiver on the part of the Owner of any of its rights under the Contract Documents or otherwise under law or equity. The Owner's right to impose liquidated damages shall in no way prohibit or restrict the Owner's right to bring legal action for damages in lieu of its option to impose liquidated damages from money due the Contractor, and if such money is insufficient to cover the liquidated damages, then the Contractor shall pay the amount due.

**3.5 COLLECTION OF LIQUIDATED DAMAGES.** The Owner may recover liquidated damages by deducting the amount thereof from any moneys due or that might become due the Contractor, and if such moneys shall be insufficient to cover the liquidated damages, then the Contractor or the Surety shall pay to the Owner the amount due.

**3.6 OWNER'S APPROVALS AND INTERPRETATIONS.** Decisions by the Owner regarding interpretation of the specifications, approval of equipment, material or any other approval, or progress of the Work, shall be made promptly and, in any event, no later than thirty days after the Contractor's written submission for decision; but if such decision requires extended investigation and study, the Owner shall, within thirty days after the receipt of the submission, give the Contractor written notice of the reasons why the decision cannot be made within the thirty day period and the date by which the decision will be made.

**3.7 EXTENSION FOR DELAYS CAUSED BY OWNER.** The only circumstances under which the Contract Price shall be increased due to delays caused by the Owner are those specified in M.G.L. c. 30, § 39O, which provides:

The awarding authority may order the general contractor in writing to suspend, delay, or interrupt all or any part of the work for such period of time as it may determine to be appropriate for the convenience of the awarding authority; provided however, that if there is a suspension, delay or interruption for fifteen days or more or due to a failure of the awarding authority to act within the time specified in this contract, the awarding authority shall make an adjustment in the contract price for any increase in the cost of performance of this contract but shall not include any profit to the general contractor on such increase; and provided further, that the awarding authority shall not make any adjustment in the contract price under this provision for any suspension, delay, interruption or failure to act to the extent that such is due to any cause for which this contract provides for an equitable adjustment of the contract price under any other contract provisions.

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

In all other cases the Contractor shall be entitled neither to increase the Contract Price nor to receive damages on account of any hindrances or delays, avoidable or unavoidable, but if the delay is caused by the Owner, the Contractor shall be entitled to an extension of time to the extent provided in M.G.L. c. 30, §390. The Contractor must submit any claim under this paragraph to the Owner in writing as soon as practicable after the end of the Owner's suspension, delay, interruption, or failure to act and, in any event, not later than the date of final payment under this Contract. Except for costs due to a suspension order, the Owner shall not approve any costs in the claim incurred more than 20 days before the Contractor notified the Owner in writing of the act or failure to act or the Owner that gave rise to the claim.

**3.8 OWNER'S RIGHT TO REJECT DEFECTIVE MATERIALS AND WORK.** Except as otherwise provided herein, the Owner's inspection of the Work shall not relieve the Contractor of any of its responsibilities hereunder, and defective work shall be corrected. The Owner may reject unsuitable work, notwithstanding that such work and materials have been previously accepted for payment. If any part of the Work shall be found defective at any time before the final acceptance of the whole Work, the Contractor shall promptly correct such defect in a manner satisfactory to the Owner. If any material brought upon the site for use in the Work shall be rejected by the Owner as not in conformity with the Contract Documents, the Contractor shall promptly remove such materials from the site.

**3.9 SUBSTANTIAL COMPLETION OF THE WORK; FINAL COMPLETION; OWNER'S REMEDIES.** When the Work has reached the point of Substantial Completion as shown on Approved payment request, the Contractor shall assist the Owner in the development of a punch list identifying those items of unfinished or unacceptable Work that remain to be performed or corrected under the Contract. The Contractor shall complete the lunch list items to final completion within 30 days after the Owner's approval of the punch list. At any time after the value of the Work remaining to be done is, in the estimation of the Owner, less than 1 per cent of the adjusted Contract price, or the Owner has determined that the Contractor has substantially completed the work and the Owner has taken possession for occupancy, the Owner may send to the Contractor by certified mail, return receipt requested, a complete and final list of all incomplete and unsatisfactory work items, including, for each item on the list, a good faith estimate of the fair and reasonable cost of completing such item. The Contractor shall then complete all such work items within 30 days of receipt of such list or before the Contract completion date, whichever is later. If the Contractor fails to complete all incomplete and unsatisfactory work items within 45 days after receipt of such items furnished by the Owner or before the Contract completion date, whichever is later, subsequent to an additional 14 days' written notice to the Contractor by certified mail, return



receipt requested, the Owner may terminate this Contract and complete the incomplete and unsatisfactory work items and charge the cost of same to the Contractor and such termination shall be without prejudice to any other rights or remedies the Owner may have under this Contract.

## **5.0 CHANGES IN THE WORK**

- 4.1 CHANGES WITHIN THE SCOPE OF THE WORK.** A change order may be issued by the Owner for changes in the Work within the scope of the Contract, including but not limited to, changes in: (1) the Plans and Specifications; (2) the method or manner of performance of the Work; (3) the Owner-furnished facilities, equipment, materials, services, or Site; or (4) the schedule for performance of the Work. The Contractor shall immediately perform any change order work that is ordered in writing by the Owner.
- 4.2 REQUEST FOR EQUITABLE ADJUSTMENT DUE TO CHANGE ORDER.** Whenever a change order is issued by the Owner that will cause a change in the Contractor's cost or time for performance, the Contractor or the Owner may request an equitable adjustment in the Contract Price or the Contract time. A request for such an adjustment shall be in writing and shall be submitted by the party making such claim to the other party.
- 4.3 LATENT CONDITIONS.** If, during the progress of the Work, the Contractor or the Owner discovers that the actual subsurface or latent physical conditions encountered at the Site differ substantially or materially from those indicated in the Contract Documents, then either the Contractor or the Owner may request an equitable adjustment in the Contract Price in accordance with M.G.L. c. 30, § 39N, which provides:

If, during the progress of the work, the contractor or the awarding authority discovers that the actual subsurface or latent physical conditions encountered at the site differ substantially or materially from those shown on the plans or indicated in the contract documents either the contractor or the contracting authority may request an equitable adjustment in the contract price of the contract applying to work affected by the differing site conditions. A request for such an adjustment shall be in writing and shall be delivered by the party making such claim to the other party as soon as possible after such conditions are discovered. Upon receipt of such a claim from a contractor, or upon its own initiative, the contracting authority shall make an investigation of such physical conditions, and, if they differ substantially or materially from those shown on the plans or indicated in the contract documents or from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the plans and contract documents and are of such a nature as to cause an increase or decrease in the cost of performance of the work or a change in the construction methods required for the performance of the work which results in an increase or decrease in the cost of the work, the contracting authority shall make an equitable adjustment in the contract price and the contract shall be modified in writing accordingly

Likewise, if the latent or subsurface physical condition causes a change in the time for performing the Work, either the Contractor or the Owner may request an equitable adjustment of the time for the performance of the Work.

**4.4** **COMPUTATION OF EQUITABLE ADJUSTMENTS.** Equitable adjustments in the Contract Price shall be determined according to one of the following methods, or a combination thereof, as determined by the Owner: (1) fixed price basis, provided that the fixed price shall be inclusive of items described in 4.4.1 below and shall be computed in accordance with that provision; (2) estimated lump sum basis to be adjusted in accordance with Contract unit prices or other agreed upon unit prices provided that the unit prices shall be inclusive of all costs related to such equitable adjustment; (3) time and materials basis to be subsequently adjusted on the basis of actual costs (but subject to a predetermined "not to exceed limit") calculated as follows:

**4.4.1** Where the value of work performed directly by the Contractor under an change order is determined either by a lump sum proposal or by actual cost of work as it progresses, the Contractor will be allowed an additional amount of ten percent (10%) of the total cost of work plus an additional amount of two percent (2%) for the cost of bonds and insurance associated with the added work. Where such work is performed by a Subcontractor, the Contractor will be allowed an additional amount of five percent (5%) to the total payment made to the Subcontractor, plus an additional amount of two percent (2%) for the cost of bonds and insurance associated with the added work. The cost of work shall include the cost at the minimum wage rates established for this contract pursuant to M.G.L. c. 149, §§ 26-27H for direct labor, material, and use of equipment, plus the cost of workmen's compensation insurance, liability insurance, federal social security, and Massachusetts unemployment compensation. The cost of work may include the cost of added mobilization, engineering, layout, transit staging/scaffolding, lifting, hoisting, dumpster, handling, cleanup, street sweeping, safety protection, temporary weather protection, temporary heat and utilities, shipping/receiving, construction fences, police barricades and signs; provided, however, that such added costs may be included only to the extent that they are directly attributable to the added work and are properly substantiated as determined by the Owner and Architect, in their discretion. Mark-up for overhead, superintendence and profit shall include (and no additional payment shall be made for) general conditions, management, supervision coordination, record drawings, small tools/computers, "tools of the trade," administration, accounting, punch list, O&M manuals, estimator time, schedule updating, and certified payrolls. Contractor and Subcontractor mark-up of such rates for payroll costs associated FUI, SUI, MUI, worker's compensation insurance and other direct payroll costs, shall only be calculated on the direct labor rate as computed above and shall not exceed 30%, except that a higher rate may be allowed for subcontractors only to the extent such higher rate is based on actual payroll costs of the subcontractor for which substantiating documentation of how such higher cost is calculated provided, and no other labor cost mark-ups other than those specified above will be allowed.

- 4.5 **WORK PERFORMED UNDER PROTEST.** The Contractor must perform any work required by the Owner. If it considers the work to be 'extra' and the Owner disagrees, the work must be performed under protest.

## 5.0 PAYMENT PROVISION

- 5.1 **PAYMENT TO CONTRACTORS.** Notwithstanding anything in the Contract Documents to the contrary, any and all payments that the Owner is required to make under this Contract shall be subject to appropriation or other availability of funds as certified by the Town Accountant. Payments shall be made in accordance with M.G.L. c. 30, § 39G.

- 5.2 **APPLICATIONS FOR PERIODIC PAYMENTS.** Once each month, on a date established at the beginning of the Work, the Contractor shall deliver to the Owner an itemized Application for Payment, supported by such data substantiating the Contractor's right to payment as the Owner may require. The Owner shall deduct from its payment a retention based on its estimate of the fair value of its claims against the Contractor a retention for direct payments to subcontractors based on demands for the same in accordance with M.G.L. c. 30, § 39F, and a retention to secure satisfactory performance of the contractual work not exceeding five percent (5%) of the approved amount of any periodic payment, and the same retention shall apply to bonded subcontractors entitled to direct payment under M.G.L. c. 30, § 39F; provided, that a five percent (5%) value of all items that are panted in the ground shall be deducted from the periodic payments until final acceptance:

- 5.2.1. Acceptance of periodic payments by the Contractor shall constitute a waiver of claims known or knowable at the time by the payee except those previously made in writing and identified by the payee as unsettled at the time of periodic payment.
- 5.2.2. The payment of any periodic estimate or of any retained percentage shall in no way constitute an acceptance of the work or in no way prejudice or affect the obligation of the Contractor at its own cost or expense to repair, correct, renew, or replace any defects or imperfections in the work as well as all damages due or attributable to such defects, nor shall any such payments for any current estimate or of any retained percentages prejudice or affect the rights of the Owner to hold the Contractor liable for breach of contract or avail itself of other remedies under this Contract.
- 5.2.3. In submitting an Application for Payment, the Contractor warrants that title to all work covered by an application for payment will pass to the Owner either by incorporation into the construction or upon the receipt of payment by the Contractor, whichever occurs first, free and clear of all liens, claims, security interests, or encumbrances, hereinafter referred to in this article as 'liens.' The Contractor further agrees that the submission of any application for payment shall conclusively be deemed to waive all liens with respect to set work to which the Contractor may then be entitled, provided that such waiver of the lien rights shall not waive the Contractor's right to payment for such work. If at any time there shall be evidence of any lien or other claim for which, if established, the Owner may become liable, directly or indirectly, and which is chargeable to the Contractor, the Town may retain out of the payment then due or thereafter to become due, an amount sufficient to completely indemnify it against any such claim. If there proves to be any such claims after all the payments are made, the Contractor shall refund to the Owner all

moneys that the Owner pays in discharging such claim in the consequence of the Contractor's default.

- 5.2.4. Payment for materials stored off site shall be at the sole discretion of the Owner. Any additional costs to the Owner resulting from storage of material off site for which payment is requested, such as, but not limited to, travel expenses and time for inspectors, shall be charged to, and paid by, the Contractor.

**5.3 DEDUCTIONS BY THE OWNER.** The Owner may deduct from any application for a periodic payment submitted by the Contractor a retention based upon the value of its claims against the Contractor plus a retention of 5% of the approved amount of the Application for Payment and any other amounts authorized by M.G.L. c. 30, §39K.

**5.4 FINAL PAYMENT.** Final payment shall be made by the Owner to the Contractor when (a) a final Application for Payment, certified for payment by the Architect, Engineer, or the Owner as the case may be, has been submitted to the Owner, and (b) whichever of the following first occurs: (i) the Contractor has substantially completed the Work so that the value of the work remaining to be done is, in the estimate of the Owner, less than one (1 %) per cent of the original Contract Price, or (ii) the Contractor has substantially completed the work and the Owner takes possession for occupancy.

Final payment shall constitute payment of the entire balance due on the Contract less (i) a retention based on the Owner's estimate of its claims against the Contractor and of the cost of completing the incomplete and unsatisfactory items of work and less (ii) a retention for direct payments to Subcontractors pursuant to the provisions of G.L. c.30, §39F.

Interest on overdue payments shall be paid pursuant to the provisions of G.L. c.30, §39K.

The final payment for Work done under this Contract shall be made only after the Contractor has signed a statement under the penalty of perjury certifying that the Work described in this Contract has been completed by him.

The payments of the amounts due under this Contract or in accordance with any written alterations of the same by the parties hereto shall release the Owner and all of its officers, agents, and employees from any and all claims and liability in any way relating to this Contract or any such alternation thereof or anything relating thereto.

## **6.0 WARRANTIES AND GUARANTEE**

**6.1 WARRANTY.** The Contractor warrants to the Owner that materials and equipment furnished under the Contract will be of good quality and new unless otherwise required or permitted by the Contract Documents, that the Work will be free from defects not inherent in the quality required or permitted, and that the Work will conform with the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. The Contractor guarantees and

warrants to the Owner that all labor furnished under this Agreement will be competent to perform the tasks undertaken that the product of such labor will yield only first-class results.

**6.2** **GENERAL GUARANTY.** If at any time during the period of one (1) year from the date of the its substantial completion, as shown on an approved payment request, the Work or any part of the Work shall in the reasonable determination of the Owner require replacing or repairing due to the fact that it is broken, defective, or otherwise does not conform to the Contract Documents, the Owner will notify the Contractor to make the required repairs or replacement. If the Contractor shall neglect to commence such repairs or replacements to the satisfaction of the Owner within ten (10) days from the date of giving or mailing such notice, then the Owner may employ other persons to make said repairs or replacements. The Contractor agrees, upon demand, to pay to the Owner all amounts which the Owner expends for such repairs or replacements. For items of work completed after substantial completion, the one-year guarantee shall commence at the time the Owner approves of the completion of such items. This one-year guarantee shall not limit any express guaranty or warranty required to be assigned to the Owner pursuant to the terms of the Plans and Specifications.

**6.3** All guarantees and warranties required in the various Sections of the Specifications that originate with a Subcontractor or Manufacturer must be delivered to the Owner before final payment to the Contractor may be made for the amount of the sub-trade or for the phase of work to which the guarantee or warranty relates. The failure to deliver a required guarantee or warranty shall constitute a failure of the Subcontractor to fully complete its work in accordance with the Contract Documents. The Contractor's obligation to correct work is in addition to, and not in substitution of, such guarantees or warranties as may be required in the various Sections of the Specifications.

## **7.0 INSURANCE REQUIREMENTS**

**7.1** The Contractor shall purchase from, and maintain in a company or companies lawfully authorized to do business in the Commonwealth of Massachusetts, and to which the Owner has no reasonable objection, insurance for protection from claims under workers' compensation acts and other employee benefit acts which are applicable, claims for damages because of bodily injury, including death, and claims for damages, other than to the Work itself, to property which may arise out of or result from the Contractor's operations and completed operations under the Contract, whether such operations be by the Contractor or by a Subcontractor or anyone directly or indirectly employed by any of them. This insurance shall be written for not less than limits of liability specified herein.

**7.2** The insurance required by the above shall be written for not less than the following amounts and shall be submitted on ACORD Certificate of Insurance Form 2.5-S (08/01) or other similar form acceptable to the Owner:

**7.2.1** Commonwealth of Massachusetts Statutory Worker's Compensation and other benefits as required under the General Laws of Massachusetts, including Employer's Liability Part B: \$500,000/\$500,000/\$500,000.

- 7.2.2** Broad form Commercial General Liability, written on a “per occurrence” basis with an aggregate cap no less than three (3) times the required limit: \$1,000,000 C.S.L. Property Damage Liability shall include coverage for X- C-U hazard of explosion, collapse, and damage to underground property.
  - 7.2.3** Umbrella or Excess Liability coverage following form of underlying General, Automobile and Employers’ Liability Coverage: (a) Minimum of \$2,000,000 C.S.L. over primary insurance; (b) No more than \$10,000 Retention.
  - 7.2.4** Comprehensive Automobile Liability covering owned, non-owned, and hired or borrowed vehicles: \$1,000,000 C.S.L.
- 7.3** The above insurance policies shall also be subject to the following requirements:
  - 7.3.1** Certificates of Insurance and copies of policies acceptable to the Owner shall be addressed to and filed with the Owner prior to commencement of the work. Renewal certificates shall be filed with the Owner at least thirty (30) days prior to the expiration date of required policies.
  - 7.3.2** No insurance coverage shall be subject to cancellation or non-renewal without at least thirty (30) days prior written notice forwarded by registered or certified mail to the Town. The Contractor shall notify the Town of the attachment of any restrictive amendments, material changes or impairment to the policies.
  - 7.3.3** All premium costs shall be included in Contractor’s bid. The Contractor shall be responsible for the cost of any and all deductibles.
  - 7.3.4** The Town of \_\_ (including its officials, employees, agents, and representatives) shall be named as additional insured on Contractor’s General Liability, Automobile Liability, and Umbrella or Excess Liability Insurance Policies.
- 7.4** Neither the Owner’s authority to review certificates and policies of insurance nor its decision to raise or not to raise any objections about those certificates and policies, shall in any way give rise to any duty or responsibility on the part of the Owner to exercise this authority for the benefit of the Contractor, any Subcontractor, Sub-subcontractor, or Supplier, or any other party.
- 7.5** The Contractor’s liability insurance shall remain in effect until the end of the Correction period as defined in the Contract Documents, and at all times after that when the Contractor may be correcting, removing, or replacing defective Work. The Completed Operations insurance shall be maintained for three (3) years after Final Payment.
- 7.6** Insufficient insurance shall not release the Contractor from any liability for breach of its obligations under this Agreement.

## **8.0 INDEMNIFICATION**

To the fullest extent permitted by law, the Contractor shall defend, indemnify in whole or in part, defend, pay-on-behalf of and hold harmless the Owner, its officers, agents, employees, successors and assigns from and against all claims, damages, losses and expenses, including but not limited to attorneys’ fees and loss of use caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be

liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or otherwise reduce any other right or obligation of indemnity which would otherwise exist as to any party or person described in this Article 8.

## **9.0 BONDS**

The Contractor shall furnish a performance bond for the full amount of the Contract, and also a labor and materials payment bond for the full amount of the Contract, the form of which bonds are set forth in the Contract Documents, each of a surety company qualified to do business under State laws and satisfactory to the Owner, the premiums for which are to be included in the Contract Price and paid by the Contractor. These bonds shall (a) guarantee the faithful performance by the Contractor of all its obligations under this contract and (b) constitute the security required by M.G.L. c. 149, § 29 and M.G.L. c. 30, § 39A, as amended, for payment by the Contractor or its subcontractors used or employed in connection with the contract. Each bond shall incorporate by reference the terms of this contract. These bonds shall remain in effect for the entire guarantee period for each phase of the work, which shall commence on the date of Final Completion, as defined in the Contract Documents.

## **10.0 TERMINATION**

**10.1 TERMINATION FOR CAUSE.** If the Contractor is adjudged a bankrupt, or if the Contractor makes a general assignment for the benefit of the Contractor's creditors, or if a receiver is appointed on account of the Contractor's insolvency, or if the Contractor consistently or repeatedly refuses or fails, excepting cases of which extension of time is appropriated, to supply enough properly skilled workmen or proper materials, or if the Contractor fails to make prompt payment to the Subcontractors of for materials or labor, or persistently disregards law, ordinances, rules, regulations, or orders of any public authority having jurisdiction or disregards an instruction, order or decision of the Contracting Officer, or otherwise is guilty of a substantial violation of any provision of the contract, then the Contractor shall be in default, and the Owner may, without prejudice to any other right or remedy and upon written notice to the Contractor, take possession of all materials, tools, appliances, equipment, construction equipment, and machinery and vehicles, offices and other facilities on the project site and all material intended for the work, wherever stored, and seven (7) days after such notice, may terminate the employment of the Contractor, accept assignment of any or all Subcontractor's contracts pursuant to this Agreement, and furnish the work by whatever method the Owner may deem expedient. The Owner shall be entitled to collect from the Contractor all direct, indirect, and consequential damages suffered by the Owner of behalf of the Contractor's defaults. The Owner shall be entitled to hold all amounts due to Contractor at the date of termination until all of the Owner's damages have been established, and to apply such amounts to such damages.

**10.1.1** The Owner shall incur no liability by reason of such termination.

### **10.2 TERMINATION FOR CONVENIENCE.**

**10.2.1** In the event that this Contract is terminated by the Owner prior to the completion of construction and termination is not based on a reason listed in Paragraph 10.1, the Contractor shall be compensated for its costs incurred, including reasonable costs of

de-mobilization, calculated on a percent completion basis covering the period of time between the last Approved application for payment and the date of termination.

**10.2.2** Payment by the Owner pursuant to Subparagraph 10.2.1 shall be deemed to fully compensate the Contractor for all claims and expenses directly or indirectly attributable to the termination, including any claims for lost profits.

**10.3** The Contractor shall not be relieved of liability to the Owner by virtue of any termination of this Contract, and any claim for damages against the Contractor relating to the Contractor's performance under this Contract shall survive any termination hereunder.

## **11.0 NON-APPROPRIATION**

Payments are subject to appropriation and shall be made only for work performed in accordance with the terms of this Contract. The Contractor shall not be obligated to perform, and may not perform, work outside the duration and scope of this Contract without an appropriate amendment to this Contract, and a sufficient appropriation(s) to support such additional work. The Owner may immediately terminate or suspend this Contract in the event that the appropriation(s) funding this Contract is eliminated or reduced to an amount which will be insufficient to support anticipated future obligations under this Contract.

## **12.0 RECORDS AND LAWS**

The Contractor shall make, and keep for at least six years after final payment, books, records, and accounts, which in reasonable detail accurately and fairly reflect the transactions and dispositions of the Contractor.

## **13.0 CHOICE OF LAW**

This Contract shall be construed under and governed by the laws of the Commonwealth of Massachusetts. The Contractor, and the agents thereof, agree to bring any federal or state legal proceedings arising under this Contract, in which either the Commonwealth or the Owner is a party, in a court of competent jurisdiction within the Commonwealth of Massachusetts. This section shall not be construed to limit any rights a party may have to intervene in any action, in any court or wherever, pending, in which the other is a party.

## **14.0 NOTICES**

Notices to the Contractor shall be deemed given when hand delivered to the Contractor's Representative in person, or when deposited in the U.S. mail addressed to the Contractor at the Contractor's address specified in the Owner - Contractor Agreement, or when delivered by courier to either location. Unless otherwise specified in writing by the Owner, notices and deliveries to the Owner shall be effective only when delivered to the Owner at the address specified in the Owner - Contractor Agreement and date-stamped at the reception desk or for which a receipt has been signed by the agent or employee designated by the Owner to receive official notices.

END OF SECTION 01 10 00



## 02 10 00 SITE PREPARATION

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### Part 1. GENERAL

#### 1.1 DESCRIPTION

- A. This Section specifies requirements for site preparation.
- B. The work includes:
  - 1. Protection of existing vegetation, utilities, and pavements to remain.
  - 2. Maintenance of Erosion Control
  - 3. Survey / measurement requirements to stake out the work.

#### 1.2 RELATED SECTIONS

- A. Other specification Sections that relate to the work of this Section include:
  - 1. Section 31 00 00 – Earthwork

#### 1.3 GENERAL

- A. All activities shall be prohibited outside the limits of work, unless approved otherwise by the Engineer.

#### 1.4 SITE CONDITIONS

- A. The Owner will maintain, as far as practical, site conditions existing during the bidding period.
- B. Actual site condition variations that differ from those of the bidding period that affect site preparation operations shall be brought to the attention of the Owner prior to the commencement of any site work.
- C. Clear and restore areas used for the Contractor's convenience at no additional expense to the Owner. Restore such areas to a condition acceptable to the Engineer, including mulching, seeding, and planting.

#### 1.5 SUBMITTALS

- A. None required.

### Part 2. PRODUCTS

- A. NONE

### Part 3. EXECUTION

#### 3.1 PROTECTION

- A. Always maintain vehicular access.
- B. The Contractor shall flag the trees to be protected to prevent damage from equipment and shall protect existing trees that are to remain.
- C. The Contractor shall be liable for all damage and/or disturbance to existing trees and shrubs not otherwise designated for clearing and removal. When the Contractor's operations damage trees and/or other vegetation to remain, comparable replacement shall be performed as approved by the Engineer at No cost to the Owner.

#### 3.2 UTILITIES

- A. Notify all corporations, companies, individuals, or local authorities owning, or having authority over, utilities running to, through or across areas to be affected by demolition operations.

- B. Locate and identify existing utilities that are to remain and protect them from damage.

**3.3 STAKE OUT**

- A. The Contractor shall provide control stakes to locate the work and suitable benchmark. The contractor shall provide all necessary measurements and instrument survey to locate the feature and work based on this information.

**3.4 PROVISIONS FOR THE CONTROL OF EROSION**

- A. The Contractor shall take sufficient precautions, as approved by Engineer, during construction to minimize the run-off of polluting substances such as silt, clay, fuels, oils, bitumen, calcium chloride or other polluting materials harmful to humans, fish, or other life, into the water supplies and surface waters. Special precautions shall be taken in use of construction equipment to prevent operations which promote erosion.
  - 1. The Contractor shall maintain erosion control.

**Part 4. MEASUREMENT AND PAYMENT**

**4.1 GENERAL**

- A. Payment for this work will be made as part of the Lump Sum contract.

END OF SECTION 02 10 00

## **02 21 00 LAND SURVEY**

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**Part 1. GENERAL**

**1.1 LAND SURVEY**

- A. The work of this Section is integral with the whole of the Contract Documents and is not intended to be interpreted outside that context.

**1.2 RELATED DOCUMENTS**

- A. Before submitting a bid, the Contractor shall make a thorough examination of the conditions of the site, checking the requirements of the Plans and Specifications with the existing conditions.
- B. No claim for extra compensation or extension of time will be allowed on account of the Contractor's failure to estimate properly the quantities, locations and measurements of all items required to complete the work which could be discerned from visiting the site.
- C. The Contractor shall report any discrepancies to the Engineer and request an interpretation.
- D. Site Plans provided as part of the Contract Documents.

**1.3 UTILITY NOTE**

- A. Existing utilities, where shown hereon, are approximate. The Contractor shall be responsible for properly locating and coordinating any on-site activity with Dig-Safe and the appropriate utility company and maintaining existing utility system service. Dig-Safe shall be notified per the Commonwealth of Massachusetts Statute Chapter 82, Section 40, at 1-888-344-7233. No guarantee is implied or intended as to the accuracy, location

or that all utilities and/or subsurface structures are shown. The Contractor shall verify size, location and inverts or utilities and structures as required prior to the start of construction.

END OF SECTION 02 21 00

## **02 24 00 ENVIRONMENTAL ASSESSMENT**

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### **Part 1. GENERAL**

#### **1.1 GENERAL**

- 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 because of construction operations under this contract.
- B. The requirements set forth in this section of the specifications apply to all phases and areas of construction.
- C. The Contractor shall comply with all applicable federal, state, and local regulations, laws, and guidelines regarding environmental protection during the duration of the construction contract, whether the regulation, law or guideline is provided herein.
- D. Prior to commencement of work, the Contractor shall meet with representatives of the Engineer to develop mutual understandings relative to compliance with this Section.

#### **1.2 NOTIFICATION**

- A. The Engineer will notify the Contractor in writing of any non-compliance with the foregoing provisions. 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 Engineer may order stoppage of all or part of the work until satisfactory corrective action has been taken. No claim for an extension of time or for excess costs or damage incurred by the Contractor because of time lost due to any stop work orders shall be made unless it was later determined that the Contractor was complying.

#### **1.3 AIR POLLUTION CONTROL**

- A. The burning of trees, brush and other combustible materials will not be permitted. Provide satisfactory methods of disposal without additional compensation.
- B. Comply with the Massachusetts Department of Environmental Protection Regulation 7.07 – Open Burning, and Regulation 7.09 – Dust, Odor, Construction, and Demolition, and attention is called to Regulation 7.25 – Enforcement Provisions.

#### **1.4 PREVENTION OF WATER POLLUTION AND PROTECTION OF WILDLIFE**

- A. Comply with the requirements of Section 42 of the Massachusetts Clean Waters Act, Chapter 21 of the Massachusetts General Laws, as amended.

- B. During the performance of the work, the Contractor shall take sufficient precautions in the conduct of operations necessary to avoid contaminating water in adjacent waterways. All earthwork, grading, moving of equipment, water control in foundation areas, and other operations likely to create silting, shall be planned and conducted to avoid or minimize pollution in adjacent waterways. Water that has been used for any purpose that has been contaminated with oil, bitumen, salt, or other pollutants, shall be treated prior to discharge in accordance with applicable regulations to avoid affecting nearby waterways. Under no circumstance shall pollutants or polluted water be discharged into the environment.

**1.5 AREA OF CONSTRUCTION ACTIVITY**

- A. As far as possible, the Contractor shall confine his construction activities to those work 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.

**1.6 CHEMICAL CONSTRUCTION CONTROL**

- A. Exercise every reasonable precaution to prevent or minimize the chemical contamination of soil on the job site caused by spilling or leaking of oil and other chemicals used in the construction operations.

**1.7 PROTECTING AND MINIMIZING EXPOSED AREAS**

- A. The Contractor shall control erosion and sedimentation as stated herein and in accordance with Section 31 00 01 – Temporary Controls.
- B. Leave existing pavement or ground covering in place until the last possible moment prior to earth excavation for purposes of erosion and dust control. The Contractor shall limit the area of land that is exposed and free from vegetation during construction.

**1.8 LOCATION OF STORAGE AREAS**

- A. The location of Contractor's storage areas for equipment and/or materials shall be clear of existing vegetation or shall be on areas that are to be cleared of vegetation as part of this project. The Contractor's storage and staging area locations shall require written approval of the Engineer prior to use. Plans showing storage facilities for equipment and materials shall be submitted for approval of the Engineer.
- B. Provisions must be made in and around storage areas to contain any spills or rupture of storage supplies. The Engineer may designate a particular area or areas where the Contractor may store materials used in his operations.

**1.9 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 and Architect/Engineer. 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 that

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 and Owner. 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 direct 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 02 10 00 – Site Preparation.
- D. Cultivated hedges, shrubs, and other plants that 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 as directed by the Engineer.

#### 1.10 **DISCHARGE OF DEWATERING OPERATIONS**

- A. Any water that is pumped and discharged from the trench and/or excavation shall be filtered by an approved method prior to its discharge into a receiving water or drainage system.
- B. The pumped water shall be filtered through baled hay, a vegetative filter strip or a vegetative channel to trap sediment occurring because 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.

#### 1.11 **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, and specified under Section 31 00 02 – Site Watering and Dust Control.
- B. Calcium chloride shall only be used in areas allowed by state and local regulations.

END OF SECTION 02 24 00

## 03 30 00 SITE CAST – IN – PLACE CONCRETE

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### Part 1. GENERAL

#### 1.1 DESCRIPTION

- A. This Section specifies requirements for concrete cast-in-place on the site.
- B. The work includes cast-in-place bases, foundations, ramps and pads.

#### 1.2 RELATED SECTIONS

- A. Sections which relate to the work of this Section include:
  - 1. Section 31 00 00 – Earthwork

#### 1.3 REFERENCE STANDARDS

- 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.
  - 1. American Concrete Institute (ACI)
    - a. ACI 301 - Specifications for Structural Concrete for Building
    - b. ACI 305R - Hot Weather Concreting
    - c. ACI 306R - Cold Weather Concreting
    - d. ACI 316R - Recommendations for Construction of Concrete Pavements and Concrete Bases
  - 2. American Society for Testing and Materials (ASTM)
    - a. ASTM 185 - Welded Wire Steel Fabric for Concrete Reinforcement
    - b. ASTM 615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement
    - c. ASTM C33 - Concrete Aggregates
    - d. ASTM C94 - Ready-Mixed Concrete
    - e. ASTM C143 - Slump of Portland Cement Concrete
    - f. ASTM C150 - Portland Cement
    - g. ASTM C171 - Sheet Materials for Curing Concrete
    - h. ASTM C231 - Air Content of Freshly Mixed Concrete by the Pressure Method
    - i. ASTM C260 - Air Entraining Admixtures for Concrete
    - j. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete
    - k. ASTM C494 - Chemical Admixtures for Concrete
  - 3. Concrete Reinforcing Steel Institute (CRSI)
    - a. CRSI - Manual of Standard Practice.
  - 4. Americans with Disabilities Act and State Regulations

#### 1.4 QUALITY ASSURANCE

- A. Work and materials for construction of the cement concrete walks shall conform to ACI 316R. Other cast-in-place concrete shall conform to ACI 301.
- B. Work, materials, and color of the wheelchair ramp paving shall conform to applicable sections of Americans with Disabilities Act (ADA) and State standards, whichever is more stringent.

- C. Dimensions, locations, and details of equipment pads, anchors, supports, and similar features shown on the drawings are approximate. Manufacturer's approved shop Drawings of equipment to be supported, anchored, or contained thereby shall be consulted for exact location, size, and details.

#### 1.5 **SUBMITTALS**

- A. Description of methods and sequence of placement for each type of specially finished concrete, including description of methods and sequence of placement.
- B. Manufacturer's product data for the following:
  - 1. Form release agent.
  - 2. Preformed joint filler.

#### 1.6 **TESTING**

- A. The Owner may employ an independent testing laboratory to inspect and evaluate concrete paving and other cast-in-place concrete work.
- B. Testing of materials and installed work may occur at any time during progress of the work. Rejected materials and installed work shall be removed and replaced at no additional cost to the Owner.

### **Part 2. PRODUCTS**

#### 2.1 **STEEL REINFORCEMENT**

- A. Steel reinforcing bars shall conform to ASTM A615, Grade 60, deformed.
  - 1. Bars employed as dowels shall be hot-rolled plain rounds.
- B. Steel wire: ASTM A82, plain cold drawn steel.
- C. Welded wire fabric reinforcement shall conform to the applicable requirements of ASTM A185. Fabric reinforcement shall be furnished in flat sheets. Fabric reinforcement in rolls will not be permitted.
- D. Supports for Reinforcement: Bolsters, chairs, and other devices for spacing, supporting, and fastening reinforcing bars, and welded wire fabric in place shall be wire bar-type supports complying with CRSI specifications.
  - 1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
  - 2. For exposed-to-view concrete surfaces where legs of supports are in contact with forms, provide supports with legs that are protected by plastic (CRSI, Class 1).

#### 2.2 **PORTLAND CEMENT CONCRETE**

- A. Portland cement concrete shall:
  - 1. Have a maximum water cement ratio of 0.45 conforming to ACI 316R.
  - 2. Be Air-entrained type conforming to ASTM C94. Air content by volume shall be 6 percent + 1 percent and shall be evaluated in accordance with ASTM C260.
  - 3. Placed with a slump not less than 3 inches nor greater than 4 inches, determined in accordance with ASTM C143.
  - 4. Use cement conforming to ASTM C150, Type I or II. Only one color of cement, all the same manufacturer, shall be used for the work.
  - 5. Use fine and coarse aggregates conforming to ASTM C33.

6. Contain a water reducing agent to minimize cement and water content of the concrete mix at the specified slump. Water reducing agent shall conform to ASTM C494, Type A.
7. Contain no calcium chloride or admixtures containing calcium chloride shall be added to the concrete. No admixtures other than those specified shall be used in the concrete without the specific written permission of the Engineer in each case.

### 2.3 COLORED CONCRETE

- A. Not Required.

### 2.4 CURING MATERIALS FOR UNCOLORED CONCRETE

- A. Curing shall be accomplished by the following methods:
  1. Moist curing with burlap covering.
  2. Curing paper, non-staining, fiber reinforced laminated Kraft bituminous product conforming to ASTM C171. Four mil polyethylene sheeting may be substituted for curing paper.
  3. Curing compound, a resin-base, white pigmented compound conforming to ASTM C309, Type 2.

### 2.5 EXPANSION JOINTS

- A. Expansion joint filler shall be performed, non-bituminous type conforming to ASTM D1752, Type II, like Seal tight Cork Expansion Joint Filler, manufactured by W.R. Meadows, Inc., Elgin, IL 60120, or approved equivalent.
  1. Pre-molded filler shall be one piece for the full depth and width of the joint.
- B. Smooth dowel shall be hot rolled plain steel dowel bonded at one end and operating in smooth close-fitting sleeve (of same material) at the other.

### 2.6 FORMS

- A. Cylindrical Forms: Sonotube Fibre Forms, wax-impregnated strippable forms manufactured by Sonoco Products Company, General Products Division, ABS or PVC plastic reusable forms, or approved equivalent.
- B. Forms for Exposed Finish: Plywood, metal, metal-framed plywood faced, or other acceptable panel materials. Plywood shall be APA Ref. 1 B-B (Concrete Form), Class I Exterior Grade plywood or B-B or A-C Class I high density overlay concrete form plywood. Form work materials shall produce smooth, continuous, straight and level surfaces.
- C. Forms for Unexposed Finish: Plywood, lumber, or metal, with lumber dressed on at least two edges and one side.
- D. Form Ties: Prefabricated, adjustable length galvanized steel snap-off ties, with brackets, cones, corner locks and other accessories, as necessary.
- E. Form Release Agent: Commercial formulation compounds that will not bond with, stain, or adversely affect concrete.

## Part 3. EXECUTION

### 3.1 PREPARATION OF SUBGRADE

- A. All concrete for walkways shall be placed on a prepared stable subbase.



- B. Excavation required in pavement subgrade shall be completed before fine grading and final compaction of subgrade are performed. Where excavation must be performed in completed subgrade, subbase, base, or pavement, subsequent backfill and compaction shall be performed as required by the Engineer and as specified in Section 31 00 00, Earthwork.
- C. Materials shall not be stored or stockpiled on subgrade.
- D. The Engineer will inspect the prepared subgrade. Subgrade shall be approved for installation of the gravel base course. Disturbance to subgrade caused by inspection procedures shall be repaired.

### 3.2 **BASE COURSE**

- A. Base course for concrete paving shall be pavement subbase course or gravel base materials specified in Section 32 11 00, Base Courses, as shown on the Drawings.
- B. Width of base course shall extend beyond edge of the proposed pavement as shown on the Drawings.
- C. Material shall be placed in lifts no more than 6 inches thick, compacted measure. Each lift shall be separately compacted to specified density.
  - 1. Material shall be placed adjacent to wall, utility access hole, catch basin, and other structures only after they have been set to required grade.
  - 2. Rolling shall begin at sides and progress to center of crowned areas and shall begin on low side and progress toward high side of sloped areas. Rolling shall continue until material does not creep or wave ahead of roller wheels.
  - 3. Surface irregularities which exceed 1/2 inch as measured by means of a 10-foot-long straightedge, shall be regraded and recompacted.
- D. Base course shall be compacted at optimum moisture content to not less than 95 percent of maximum density as determined by ASTM D1557.
- E. The base course shall be kept clean and uncontaminated. Less select materials shall not be permitted to become mixed with the base course material.

### 3.3 **STEEL REINFORCEMENT**

- A. Before being placed in position, reinforcing steel shall be thoroughly cleaned of loose mill and rust scale, dirt, ice, and other foreign material which may reduce the bond between the concrete and reinforcing. Where there is delay in placing concrete after reinforcement is in place, bars shall be reinspected and cleaned when required.
- B. Any bar showing cracks after bending shall be discarded.
- C. Unless otherwise shown on the Drawings, reinforcing shall extend within 2 inches of form work and expansion joints. Reinforcing shall continue through control joints. Adjacent sheets of fabric reinforcing shall lap 6 inches.
- D. After forms have been coated with form release agent, but before concrete is placed, reinforcing steel shall be securely wired in the required position and shall be maintained in that position until concrete is placed and compacted. Chair bars and supports shall be installed in a number and arrangement approved by the Engineer.

### 3.4 **FORMS**

- A. General: Design, erect, support, brace, and maintain formwork to support vertical, lateral, static, and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances and surface irregularities complying with the following ACI 347 limits.
  - 1. Provide Class A tolerances for concrete surfaces exposed to view.
  - 2. Provide Class C tolerances for other concrete surfaces.
- B. Construct forms to provide for openings, offsets, sinkages, keyways, recesses, moldings, chamfers, blocking, screeds, bulkheads, anchorages, and inserts, and other features required for the work. Use selected materials to obtain required finishes. Solidly butt joints and provide back-up at joints to prevent cement paste from leaking.
- C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Kerf wood inserts for forming keyways, reglets, recesses, and other features for easy removal.
- D. Chamfer exposed corners and edges, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
- E. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before placing concrete. Re-tighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

### 3.5 **INSTALLING EMBEDDED ITEMS**

- A. General: Set and build into formwork the anchorage devices and other embedded items required for work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached.
- B. Forms for Slabs: Set edge forms, bulkheads, and intermediate screen strips for slabs to achieve required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting-type screeds.

### 3.6 **PREPARING FORM SURFACES**

- A. Coat contact surfaces of forms with an approved, non-residual, low-VOC form-coating compound before placing reinforcement.

### 3.7 **CONCRETE PLACING**

- A. Equipment, methods of mixing and placing, and precautions to be observed as to weather, and condition of base shall meet the requirements of ACI 316R.
- B. The Engineer shall be notified of scheduled concrete placement sufficiently in advance of start of operation to allow preliminary inspection of the work, including subgrade, forms, and reinforcing steel.
- C. Work shall not be performed during rainy weather or when temperature is less than 40°F (4.4°C).
- D. Adjacent work shall be protected from stain and damage. Damaged and stained areas shall be replaced or repaired to equal their original conditions.

- E. Existing concrete, earth, and other water-permeable material against which new concrete is to be placed shall be thoroughly damp when concrete is placed. There shall be no free water on surface.
- F. Concrete which has set or partially set, before placing shall not be used. Retempering of concrete will not be permitted.
- G. Concrete shall be thoroughly vibrated, or otherwise consolidated to secure a solid and homogeneous mass, thoroughly worked around reinforcement and into corners of forms.
- H. When joining fresh concrete to concrete which has attained full set, latter shall be cleaned of foreign matter, and mortar laitance shall be removed by chipping and washing. Clean, roughened base surface shall be saturated with water, but shall have no free water on surface. A coat of 1:1 cement-sand grout, approximately 1/8 inch thick, shall be well scrubbed into the thoroughly dampened concrete base. New concrete shall be placed immediately, before grout has dried or set.

### 3.8 FINISHING

- A. Concrete surfaces shall be screeded and finished true to line and grade, and free of hollows and bumps. Surface shall be dense and smooth.
  - 1. Finished concrete surface for concrete foundations for niche walls shall be floated to a smooth and uniform surface. Surfaces shall not deviate more than 1/8 inch in 10 feet.
  - 2. Finished concrete surfaces for walkways and floor slabs shall be wood-floated and steel troweled, or broom finished, to a uniform surface. Surface shall not deviate more than 1/8 inch in 10 feet.
- B. Horizontal surfaces of concrete surfaces which will be exposed shall be given a light broomed finish, with direction of grooves in concrete surface perpendicular to length of concrete band, slab, or pad. After concrete has set sufficiently to prevent coarse aggregate from being torn from surface, but before it has completely set, brooms shall be drawn across the surface to produce a pattern of small parallel grooves. Broomed surface shall be uniform, with no smooth, unduly rough, or porous spots, or other irregularities. Coarse aggregate shall not be dislodged by brooming operation.
- C. Immediately following finishing operations, arises at edges and both sides of expansion joints shall be rounded to a 1/4-inch radius. Control joints to be tooled shall be scored into slab surface with scoring tool. Adjacent edges of control joint shall at same time be finished to a 1/4-inch radius.
- D. Where finishing is performed before end of curing period, concrete shall not be permitted to dry out, and shall be kept continuously moist from time of placing until end of curing period, or until curing membrane is applied.
- E. Sidewalk wheelchair ramps shall have a coarse broom finish perpendicular to the direction of travel.

### 3.9 CURING

- A. Concrete shall be kept continuously damp from time of placement until end of specified curing period or cured by other methods. Water shall not be added to surface during floating and troweling operations, and not earlier than 24 hours after concrete

placement. Between finishing operations, surface shall be protected from rapid drying by a covering of waterproofing paper. Surface shall be damp when the covering is placed over it and shall be kept damp by means of a fog spray of water, applied as often as necessary to prevent drying, but not sooner than 24 hours after placing concrete. None of the water so applied shall be troweled or floated into surface.

- B. Concrete surfaces shall be cured by completely covering with curing paper or application of a curing compound.
  - 1. Concrete cured using waterproof paper shall be completely covered with paper with seams lapped and sealed with tape. Concrete surface shall not be allowed to become moistened between 24 and 36 hours after placing concrete. During curing period surface shall be checked frequently and sprayed with water as often as necessary to prevent drying, but not earlier than 24 hours after placing concrete.
  - 2. Concrete cured with a curing compound shall have the compound applied at a rate of 200 square feet per gallon, in two applications perpendicular to each other.
  - 3. Curing period shall be seven days minimum.
- C. Only if additional protection is absolutely required, the surface should remain uncovered after the seven-day period for at least 4 days, after which time new and unwrinkled non-staining reinforced waterproof Kraft curing paper may be used.

### 3.10 EXPANSION JOINTS

- A. Expansion joints shall be 1/2 inch wide and located where shown on the Drawings. Expansion joints shall be troweled in the concrete to required width with preformed joint filler in place. Joint filler shall extend the full depth of the slab and full length of the expansion joint.
  - 1. For concrete walks, pavements, and pads, depth of joint filler shall be placed to form a 1-1/4-inch-deep recess for sealant and backer rod below finished concrete surface.
  - 2. Use of multiple pieces to make up required depth and width of joint will not be permitted.

### 3.11 CONSTRUCTION JOINTS

- A. Construction joints shall be placed whenever placing of concrete is suspended for more than 30 minutes.
  - 1. Butt joint with dowels or thickened edge joint shall be used if construction joints occur at control joint locations.
  - 2. Keyed joints with tie bars shall be used if the joint occurs at any other location.

### 3.12 CONTROL JOINTS

- A. Control joints shall be tooled into the concrete slab, with 3-inch-wide border and troweled edges, in pattern shown on the Drawings, or every 4 feet on center (o.c.) maximum. Joint shall be made after concrete is finished and when the surface is stiff enough to support the weight of workers without damage to the slab, but before slab has achieved its final set.

- B. Scoring shall cut into slab surface at least 1 inch, but in no case not less than 25 percent of slab depth.

**3.13 COLD WEATHER CONCRETING**

- A. Materials for concrete shall be heated when concrete is mixed, placed, or cured when the mean daily temperature is below 40°F or is expected to fall to below 40°F within 72 hours. The concrete, after placing, shall be protected by covering, heat, or both.
- B. Details of handling and protecting of concrete during freezing weather shall be subject to the approval and direction of the Engineer. Procedures shall be in accordance with provisions of ACI 306R.

**3.14 HOT WEATHER CONCRETING**

- 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 icy water. Every effort shall be made to minimize delays which will result in excessive mixing of the concrete after arrival on the site.
- B. During periods of excessively hot weather (95°F., or above), ingredients in the concrete shall be cooled with cold mixing water to maintain the temperature of the concrete at permissible levels in accordance with the provisions of ACI 305. Any concrete with a temperature above 95°F., when ready for placement, will be rejected.
- C. Temperature records shall be maintained throughout the period of hot weather giving air temperature, general weather conditions (calm, windy, clear, cloudy, etc.) and relative humidity. Records shall include checks on temperature of concrete as delivered and after placing in forms. Data should be correlated with the progress of the work so that conditions surrounding the construction of any part of the structure can be ascertained.

**3.15 PROTECTION OF CONCRETE SURFACES**

- A. Concrete surfaces shall be protected from traffic or damage until surfaces have hardened sufficiently.

END OF SECTION 03 30 00

## **10 14 26 SIGNAGE**

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**Part 1. GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Section Includes:
  - 1. Nonilluminated post and panel signs.

**1.3 SUBMITTALS**

- A. Product Data: For each type of product.

- B. Shop Drawings: For post and panel signage.
  - 1. Include fabrication and installation details and attachments to other work.
  - 2. Show sign mounting heights.
  - 3. Show message list, typestyles, graphic elements, and layout for each sign at least half size.
- C. Sign Schedule: Use same designations specified or indicated on Drawings or in a sign schedule.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.

#### 1.5 FIELD CONDITIONS

- A. Field Measurements: Verify locations of embedded in permanent construction by other installers by field measurements before fabrication and indicate measurements on Shop Drawings.

#### 1.6 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Deterioration of finishes beyond normal weathering.
    - b. Deterioration of embedded graphic image.
    - c. Separation or delamination of sheet materials and components.
  - 2. Warranty Period: One year from date of Substantial Completion.

## Part 2. PRODUCTS

### 2.1 POST AND PANEL SIGNS

- A. Post and Panel Sign: Sign of single-panel configuration; with smooth, uniform surfaces and support assembly; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
  - 1. Laminated, Aluminum-Sheet Sign Panels: Aluminum sheet laminated to both sides of acrylic core sheet with painted edges.
    - a. Composite-Sheet Thickness: Manufacturer's standard for size of sign.
    - b. Surface-Applied Graphics: Applied vinyl film.
  - 2. Posts: Galvanized Steel Pipe.
    - a. Shape: Round.
    - b. Size: 2-3/8" OD Pipe (Sch 40).
    - c. Installation Method: Direct burial with concrete footing.
    - d. Finish and Color: Black
    - e. Metallic Coating for Pressed Steel or Cast Iron: Not less than 1.2 oz. /sq. ft. (366 g/sq. m) zinc.
      - 1) Polymer coating over metallic coating.
  - 3. Text and Typeface: typeface as indicated by manufacturer's designation and variable content as scheduled.

## 2.2 MATERIALS

- A. Aluminum Sheet and Plate: ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- B. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- C. Copper Sheet: ASTM B 152/B 152M.
- D. Steel Materials:
  - 1. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating, either commercial or forming steel.
  - 2. Bolts for Steel Framing: ASTM A 307 or ASTM A 325 (ASTM A 325M) as necessary for design loads and connection details.
  - 3. For steel exposed to view on completion, provide materials having flat, smooth surfaces without blemishes. Do not use materials whose surfaces exhibit pitting, seam marks, roller marks, rolled trade names, or roughness.
- E. Vinyl Film: UV-resistant vinyl film of nominal thickness indicated, with pressure-sensitive, permanent adhesive on back; die cut to form characters or images as indicated and suitable for exterior applications.
- F. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

## 2.3 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:
  - 1. Use concealed fasteners and anchors unless indicated to be exposed.
  - 2. For exterior exposure, furnish stainless-steel or hot-dip galvanized devices unless otherwise indicated.
  - 3. Exposed Metal-Fastener Components, General:
    - a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.
    - b. Fastener Heads: For nonstructural connections, use flathead or oval countersunk screws and bolts with tamper-resistant, Allen-head or one-way-head slots unless otherwise indicated.
  - 4. Inserts: Furnish inserts to be set by other trades into concrete or masonry work.
- B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- C. Anchoring Materials:
  - 1. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for exterior applications.
  - 2. Anchoring Cement: Factory-packaged, non-shrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

3. Water-Resistant Product: At exterior locations, provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

## 2.4 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
  1. Preassemble signs in the shop to greatest extent possible. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in locations concealed from view after final assembly.
  2. Mill joints to tight, hairline fit. Form joints exposed to weather to resist water penetration and retention.
  3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed joints of flux, and dress exposed and contact surfaces.
  4. Conceal fasteners and anchors unless indicated to be exposed; locate exposed fasteners where they will be inconspicuous.
  5. Internally brace signs for stability and for securing fasteners.
- B. Sign Message Panels: Construct sign-panel surfaces to be smooth and to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch (1.5 mm) measured diagonally from corner to corner.
  1. Coordinate dimensions and attachment methods to produce message panels with closely fitting joints. Align edges and surfaces with one another in the relationship indicated.
  2. Increase panel thickness or reinforce with concealed stiffeners or backing materials as needed to produce surfaces without distortion, buckles, warp, or other surface deformations.
  3. Continuously weld joints and seams unless other methods are indicated; grind, fill, and dress welds to produce smooth, flush, exposed surfaces with welds invisible after final finishing.
- C. Post Fabrication: Fabricate posts designed to withstand wind pressure indicated for Project location and of lengths required for installation method indicated for each sign.
  1. Aluminum Posts: 2-3/8" OD Pipe (Sch 40), coated, extruded-aluminum tubing unless otherwise indicated, with brackets or slots to engage sign panels. Include post caps, fillers, spacers, junction boxes, access panels, reinforcement where required for loading conditions, and related accessories required for complete installation.
  2. Direct Burial: Fabricate posts 36 inches (910 mm) longer than height of sign to permit direct burial and embedment in concrete foundations or concrete-filled postholes.



## 2.5 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.
- D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

## 2.6 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, Class I, 0.018 mm or thicker.
- B. Color Anodic Finish: AAMA 611, Class I, 0.018 mm or thicker.

## 2.7 METALLIC-COATED STEEL FINISHES

- A. Surface Preparation: Clean surfaces of oil and other contaminants. Use cleaning methods that do not leave residue. After cleaning, apply a conversion coating compatible with the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas and apply galvanizing repair paint, complying with SSPC-Paint 20, to comply with ASTM A 780/A 780M.
- B. Baked-Enamel or Powder-Coat Finish: After cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat to a minimum dry film thickness of 2 mils (0.05 mm).

## 2.8 STEEL FINISHES

- A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, and prepare for coating according to coating manufacturer's written instructions.
  - 1. For Baked-Enamel or Powder-Coat Finish: After cleaning, apply a conversion coating compatible with the organic coating to be applied over it.
- B. Factory Prime Finish: After surface preparation and pretreatment, apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer.
- C. Baked-Enamel or Powder-Coat Finish: After cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat to a minimum dry film thickness of 2 mils (0.05 mm).

## Part 3. EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.
- B. Verify that sign-support surfaces are within tolerances to accommodate signs.
- C. Verify that anchor inserts are correctly sized and located to accommodate signs.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 **INSTALLATION**

- A. General: Install signs using installation methods indicated and according to manufacturer's written instructions.
  - 1. Install signs level, plumb, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
  - 2. Install signs so they do not protrude or obstruct according to accessibility standard.
  - 3. Before installation, verify that sign components are clean and free of materials or debris that would impair installation.
  - 4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

### 3.3 **INSTALLING POSTS**

- A. Vertical Tolerance: Set posts plumb within a tolerance of 1/16 inch in 3 feet.
- B. Direct-Burial Method and Concrete Footing:
  - 1. Excavation: Excavate posthole to dimensions indicated. Reconstruct subgrade that is not firm, undisturbed, or compacted soil, or that is damaged by freezing temperatures, frost, rain, accumulated water, or construction activities by excavating an additional 12 inches (300 mm), backfilling with satisfactory soil or well-graded aggregate, and compacting to original subgrade elevation.
  - 2. Setting in Earth: Set post in position, support to prevent movement.
  - 3. Setting in Cast-in-Place Concrete: Set post in position, support to prevent movement, and place concrete for concrete foundation as indicated.
  - 4. Setting in Preformed Hole in Concrete Foundation: Form or core drill holes in concrete foundation not less than 3/4 inch larger than outside dimension of post for installing posts in concrete. Set post in position, shim to prevent movement, and fill annular space between post and hole with nonshrink, nonmetallic grout, mixed and placed to comply with manufacturer's written instructions.
    - a. Leave anchorage joint exposed with 1/8-inch anchoring material sloped away from post.

### 3.4 **FINISH AND CLEANING**

- A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10 14 26

# 31 00 00 EARTHWORK

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## Part 1. GENERAL

### 1.1 DESCRIPTION

- A. Provide facilities, labor, materials, tools, equipment, appliances, transportation, supervision, and related work necessary to complete the work specified in this section, and as shown on the Drawings.
- B. This task includes the excavation and filling required to develop burial areas and driveways, install the concrete foundations, concrete walks, and concrete slabs. The work of this section includes but is not necessarily limited to:
  - 1. Excavation, fill, and backfill, including compaction as indicated or required for the creation of niche foundations and to the lines and grades indicated on the Drawings.
  - 2. Provision of earthen fill from an approved offsite source. No soil from off-site shall be permitted to be brought on site without analysis for contamination for conformance with the Massachusetts Contingency Plan with soils meeting the Reportable Concentrations RC-S1 standards.
  - 3. Processing / screening of earth from on site or offsite to it to remove all stones over 4 inches in diameter prior to placement in grave areas. (Non-grave areas may use common fill).
  - 4. Excavation and disposal of unsuitable or excess materials on-site as directed by the owner. Excavation shall include removal and satisfactory disposal of all unclassified material encountered throughout the site.
  - 5. Rough grading, including placement, moisture conditioning and compaction of fills and backfills.
  - 6. Placement of base and subbase course materials under structures, slabs, and footings, including compaction.
  - 7. The removal, hauling and stockpiling of suitable excavated materials for subsequent use in the work. Stockpiling shall include protection to maintain materials in a workable condition.
  - 8. Rehandling, hauling, and placing of stockpiled materials for use in refilling, filling, backfilling, grading, and such other operations.
  - 9. Dust control shall be completed by the spraying of water as required and shall be the responsibility of the Contractor and dust control operations shall meet the requirements of the Commonwealth of Massachusetts Department of Environmental Protection 310 CMR 7.09: Air Pollution Control Regulations
  - 10. Protection of existing memorials, pavements, and utilities to remain.
  - 11. Furnishing and installing all sheeting, shoring, and bracing of structural and trench excavations.
  - 12. Providing products in sufficient quantities to meet the project requirements.
  - 13. Obtaining all required permits, licenses, and approvals of appropriate municipal and utility authorities, prior to commencing the work of this Section, and pay costs incurred therefrom.

- C. Contractor shall be responsible for notifying all owners of affected utilities and for contacting Dig Safe at least 72 hours prior to excavation.

## 1.2 DEFINITIONS

- A. Unacceptable material is soil material that does contain organic silt, peat, vegetation, wood or roots, stones, or rock fragments over 6 inches in diameter or exceeding 40 percent by weight of the backfill material, porous biodegradable matter, loose or soft fill, construction debris, or refuse, or material which cannot be compacted to the specified or indicated density. Percentage of rock shall be determined by the Contractor's independent testing laboratory. (Laboratory shall be approved by the Owner).
- B. Surplus material is excavated acceptable material that cannot be utilized elsewhere on the site as backfill or embankment fill, or as otherwise directed by the Engineer.

## 1.3 EXCAVATION CLASSIFICATIONS

- A. EXCAVATION. Excavation shall be unclassified, and no consideration will be given to the nature of the materials. Excavation shall comprise and include the satisfactory removal and disposal of all materials encountered regardless of the nature of the materials and shall be understood to include but not limited to earth, fill, foundations, pavements, curbs, piping, railroad track and ties, cobblestones, footings, bricks, concrete, previously abandoned drainage structures and utility structures abandoned and not removed by the utility and debris.
- B. ROCK EXCAVATION. Rock is defined for payment purposes as stone or hard shale in original ledge, boulders over two cubic yards (2yd<sup>3</sup>) in volume in open areas and one cubic yard (1yd<sup>3</sup>) in volume in trenches, and masonry or concrete that cannot be broken or removed by normal job equipment (power shovels, scoops, or D-8 bulldozers with ripper attachment) without the use of explosives or drills. The classification does not include materials that can be removed by means other than drilling and blasting or drilling and wedging but which, for reasons of economy in excavating, the Contractor prefers to remove by drilling and blasting. The word "trenches" shall mean excavation having vertical sides the depths of which exceed the width, made for drain, sewer, water, and gas pipes; electric and steam conduits; and the like.
- C. HAZARDOUS WASTE.
  - 1. The Contractor shall be familiar with the State Department of Environmental Protection (DEP) Hazardous Waste Regulations 310 CMR 30.00 and the Massachusetts Contingency Plan (MCP) 310 CMP 40.00 when conducting earthwork operations.
  - 2. In general, a hazardous waste (contaminated with oil or hazardous materials) is a waste or combination of wastes which, because of its quantity, concentration or physical, chemical or infectious characteristics, may cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible or incapacitating reversible illness or pose a substantial present or potential hazard to human health, safety, or welfare, or to the environment when improperly stored, treated, transported, or disposed of, or otherwise managed. (Additional criteria and characteristics to determine if a waste is hazardous are contained in 310 CMR 30.111, 30.112 and

30.120 through 30.125).

**1.4 LAWS AND REGULATIONS**

- A. Work shall be accomplished in accordance with regulations of local, county and state agencies and national or utility company standards as they apply.

**1.5 QUALITY ASSURANCE**

- A. The Engineers presence does not include supervision or direction of the actual work by the Contractor, his employees, or agents. Neither the presence of the Engineers, nor any observations and testing performed by him, nor any notice of failure to give notice shall excuse the Contractor from defects discovered in his work.
- B. Costs related to retesting due to failures shall be paid for by the Contractor at no additional expense to Owner.

**1.6 SUBMITTALS**

- A. The Engineer will be responsible for the approval or rejection of the suitability of all materials.
- B. Submit the name of each material supplier and specific type and source of each material. Any change in source throughout the job requires approval of the Owner or Engineer.
- C. For use of fabrics or geogrids, submit manufacturer's literature for approval by the Engineer.

**1.7 COORDINATION**

- A. As construction proceeds, the Contractor shall be responsible for notifying the Engineer prior to the start of earthwork operations requiring observation and/or testing.

**1.8 SUBSURFACE SOIL DATA**

- A. It is the Contractor's responsibility to make interpretations and to draw conclusions based on the character of materials to be encountered and the impact of his work based on his expert knowledge of the area and of earthwork techniques.
- B. The Drawings showing existing ground elevations are only for whatever use the Site Work Contractor may make of them with no responsibility on the part of the Surveyors, the Owner, or their Representatives for the accuracy and/or the reliability of the information given.

**1.9 TOLERANCES**

- A. Construct finished non-paved surfaces to plus or minus 1 inch of the elevations indicated. Complete embankment slopes to plus or minus six inches of the slope line (toe or tip) shown. Maintain the moisture content of fill materials as it is being placed within plus or minus two percent of the optimum moisture content of the material as determined by the laboratory tests herein specified.

**1.10 APPROVALS**

- A. No earthwork materials will be accepted on the jobsite without written approval from the Engineer.

## **Part 2. PRODUCTS**

### **2.1 MATERIALS**

- A. Common Fill/Ordinary Borrow shall conform to MHDSSHB Specification Section M1.01.0.
- B. Gravel Borrow shall conform to MHDSSHB Specification Section M1.03.0, Type b.
- C. Topsoil shall conform to MHDSSHB Specification Section M1.07.0.
- D. Loam Borrow shall conform to MHDSSHB Specification Section M1.05.0.
- E. Dumped Rip Rap shall conform to MHDSSHB Specification Section M 2.02 2.
- F. Filter Fabric shall conform to MHDSSHB Specification Section M 9. 50.0 Type II.

## **Part 3. EXECUTION**

### **3.1 GENERAL REQUIREMENTS**

- A. The Contractor shall control the grading so that ground is pitched to prevent water from running to excavated areas, eroding slopes, damaging other structures, or adjacent properties.
- B. Perform dewatering operations in accordance with Section 31 23 19 (Dewatering) to maintain excavated subgrades in a dry condition.
- C. Control dust during the contract.
- D. Construction Traffic. Disperse travel paths of traffic and construction equipment over entire width of compacted surfaces to aid in obtaining uniform compaction. Protect exposed soil layers with high moisture content from excessive wheel loads.
- E. USE OF MATERIALS FOUND OF SITE
  - 1. Suitable excavated materials shall be used for embankment, backfill, or any other purpose as directed, and the material shall be placed and compacted in a manner conforming to the specifications for the work required at no additional cost to the Owner.
  - 2. Suitable material that cannot be readily placed shall be stockpiled at the jobsite in an area designated by the Engineer and used in the manner and purpose described above. All work necessary to stockpile and re-handle suitable material will be at no additional cost to the Owner and will be included in the Contract price for the excavation it was obtained from. If the Contractor desires to store suitable material off the jobsite, or remove suitable material from the jobsite, written permission shall be obtained from the Engineer.
  - 3. All unsuitable material and suitable material not required for the proper completion of the Contract will be loaded and hauled and disposed of offsite by the Contractor.
  - 4. Do not excavate or remove any material from within the site, which is not within the excavation, as indicated, without written authorization from the Engineer.
- F. Salvaging Topsoil. Salvage topsoil within the neat lines as indicated, or as otherwise designated by the Engineer, and stockpile at the jobsite at locations approved by the Engineer. Prevent topsoil from contamination by other materials and provide adequate drainage and erosion protection. Clear, grub, and rough-grade storage areas so that the maximum amount of stockpiled material will be available for reuse.
- G. Stockpiling of Excavated Material. Establish excavated material stockpiles on site only in locations where they will not interfere with the progress of the work and only as

approved by the Engineer. Offsite stockpiling and re-handling, if required, shall be the responsibility of the Contractor, at no additional expense to the Owner. Such offsite stockpiling shall require written permission from the Engineer.

- H. Disposal of Surplus and Unsuitable Material. Haul from site and dispose of excavated materials which are excess or are determined to be unsuitable for embankment and backfill, at no additional expense to the Owner.
- I. Unfavorable Weather. Do not place, spread, roll, or compact fill material that is frozen or thawing, or during unfavorable weather conditions. If interrupted by heavy rain or other unfavorable conditions, do not resume until ascertaining that the moisture content and density of the previously placed soil are as specified.
- J. Maintenance of Excavation, Slopes and Embankments.
  - 1. Excavate and remove material outside the limits of excavation which in the opinion of the Engineer, is unsuitable and constitutes potential slides, and material which comes into excavations for any reason including the driving of piles therein.
  - 2. Maintain slopes and embankments until final completion and acceptance of the work. Promptly repair slides, slip outs, washouts, settlements, and subsidence which occur for any reason, and refinish the slope or embankment to the original lines and grades or as required by the Engineer.
  - 3. Provide earth retention systems as required by federal, state, and local regulations. Shoring and bracing of trenches and other excavations shall be in accordance with the latest OSHA Standards and Interpretation, Subpart P – Trenches and Shoring, and to all other applicable codes, rules, and regulations of the federal, state, and local authorities.

### 3.2 **OBSTRUCTIONS NOT INDICATED AND NOT VISIBLE**

- A. All available information was used to establish the location of pipes, drains, structures, and utilities, as shown on the Drawings. However, accuracy and completeness of such drawings cannot be guaranteed. Therefore, if the Contractor encounters such items within the indicated limits of excavation which will be damaged if work is to continue or which will cause delays, notify the Engineer immediately so the obstruction can be addressed and documented for payment, as authorized by the Owner.

### 3.3 **TEST PITS**

- A. The contractor may excavate test pits as he/she feels warranted.

### 3.4 **GENERAL EXCAVATION REQUIREMENTS**

- A. Excavate to the lines and grades indicated. Exercise care to preserve the material below and beyond the lines of excavation. Where excavation is conducted, through error, below indicated grade or beyond the lines of excavation, backfill to the indicated grade and compact with approved fill at no additional cost to the Owner, and at the direction of the Engineer.
- B. Limits of the excavation shall allow for adequate working space for installing forms and as required for safety of personnel. Cut excavations in solid rock accurately to the neat lines indicated, or, if not indicated, to the width of the trench.

- C. Excavation for the convenience of the Contractor shall conform to the limits acceptable to the Engineer and shall be at no additional cost to the Owner. Contractor shall not over excavate below proposed design grades for the purpose of obtaining borrow for use off-site.
- D. When any excavation is extended beyond the limits indicated, backfill, and compact the additional excavated area with material indicated to be under the pipe, conduit, or structure which was being excavated for, at no additional cost to the Owner.
- E. Limit the length of trench open at any one time as to eliminate interference with traffic and the operations of others and to reduce conditions dangerous to personnel, equipment, and existing site improvements, all according to site conditions. Attention is drawn to the General Conditions requiring permits, in particular the Trench Permit shall be obtained, if required.
- F. Excavate by use of hand tools when within 2 feet of existing pipes, conduits, or other structures.
- G. Remove topsoil with minimal cut into subsurface from areas to be excavated. Stockpile for reuse elsewhere on-site, as necessary. Maintain stockpiles to prevent migration of fines into adjacent drainage channels or waterways.

**3.5 SUBGRADE PREPARATION AND PROTECTIONS**

**A. GENERAL REQUIREMENTS**

- 1. All subgrade areas shall be made ready for fill by removal of all organic material, topsoil, loose fill, unsuitable soils, and deleterious materials, as directed by the Engineer.

**3.6 PLACEMENT AND COMPACTION OF MATERIALS**

**A. GENERAL REQUIREMENTS**

- 1. The soils testing laboratory will determine the optimum moisture content to achieve the maximum dry density for all soils specified or indicated to be compacted to a percentage of its maximum dry density.
- 2. Unless other material is indicated or specified, place excavated acceptable material for backfilling trenches and around structures and filling for embankments. The composition of these materials and tests performed to determine moisture-density relationships will govern both their acceptability for backfill and method best suited for their placement and compaction. If sufficient excavated acceptable material is not available from the excavations, provide backfill material of ordinary borrow, or as otherwise directed by the Engineer.
- 3. Provide adequate pumping and drainage facilities to keep the excavation area dry from groundwater and/or surface runoff so that it does not adversely affect construction procedures or cause excessive disturbance of underlying natural ground. Refer to Section 31 23 19 (Dewatering).
- 4. Compaction by puddling or jetting is prohibited.
- 5. Protect fill area by grading to drain and providing a smooth surface, which will readily shed water. Grade the surface of the areas in such a manner as to prevent ponding of surface runoff water in areas to receive compacted fill. Refer to Section 31 23 19.



6. Do not place frozen fill. Do not place fill on frozen ground.
7. Placement of fill shall not begin prior to observation and approval of subgrade conditions by Engineer.
8. To the extent that is practicable, each layer of fill shall be compacted to the specified density the same day it is placed. Fill shall be placed in horizontal layers. Where the horizontal layer meets a natural rising slope, the layer shall be keyed into the slope by cutting a bench during spreading of preceding lift.
9. Prior to backfilling between foundation wall and excavation limits, remove unsuitable material, including rubbish, organic materials, or other debris.
10. Do not commence filling operations until Engineer and/or Architect have observed conditions.
11. Protect foundations, footings, foundation waterproofing, and site utilities during backfilling. Repair damage at no cost to Owner.
12. Backfill shall not be placed against masonry, concrete or walls until they are braced or have cured sufficiently to develop strength necessary to withstand, without damage, pressure from backfilling and compacting operations.
13. Provide shoring, sheeting, and/or bracing of excavations as required to assure complete safety against collapse of the earth at the side of excavations. Alternatively, lay back excavations to a stable slope.
14. Upon completion of the work, the final ground surface shall be left in a firm, unyielding, true, uniform condition, free from ruts. Repair disturbed areas caused by equipment traffic at no cost to Owner.

**B. EQUIPMENT**

1. Compaction equipment used in open areas where space permits shall consist of vibratory rollers weighing at least 10,000 pounds.
2. Compaction equipment for fill against foundation walls and in other confined areas shall be accomplished by means of drum-type, power-driven, or by hand-guided vibratory plate compactors.

**C. COMPACTION**

**1. Compaction Requirements**

- a. The degree of compaction is expressed as a percentage of the maximum dry density at optimum moisture content as determined by ASTM Test D1557, Method C. The compaction requirements are as follows:

AREA	Min. Deg. of Compaction
Pavement base and subbase courses	95%
Subbase for foundations and piers	95%
General fill below pavement subbase	90%
Trench backfill (outside building):	
• Below pipe to spring line	95%
• Spring line to 1 ft. above pipe	90%
• 1 ft. above pipe to pavement subbase or finish grade	93%
Landscape Areas	90%

\*Compactions percentages are based on the laboratory derived Maximum Density values.

2. MOISTURE CONTROL

- a. Discontinue backfilling and compaction from November to April (wet season) unless the Contractor demonstrates successful moisture and compaction control techniques to achieve the indicated or specified density requirements.
- b. Fill material that is too wet for proper compaction shall be harrowed, or otherwise dried to a proper moisture content to allow compaction to the required density. If fill cannot be dried within 24 hours of placement, it shall be removed and replaced with drier fill at his expense.
- c. Fill material that is too dry for proper compaction shall receive water uniformly applied over the surface of the loose layer. Sufficient water shall be applied until the optimum moisture content is reached, as determined by the soil testing laboratory, as specified in paragraph 3.05.A.1.
- d. In no case shall fill be placed over material that is frozen. No fill material shall be placed, spread, or rolled during unfavorable weather conditions. When work is interrupted by heavy rains, fill operations shall not be resumed until the moisture content and the density of the previously placed fill are as specified.
- e. The Contractor shall continue to compact until the indicated or specified density requirements are achieved.

3. Placement and Lift Thickness of Material

- a. Distribute material such that stones and lumps do not become nested, causing voids between stones. Distribute such that voids are filled with fine materials regardless of compaction method.
- b. Deposit and spread material in uniform parallel layers not to exceed 12 inches (12") in thickness when utilizing heavy compaction equipment, and 6 inches (6") when utilizing light hand-operated compaction equipment.

D. TRENCH BACKFILL AND COMPACTION:

1. Begin backfilling and proceed until completed after the pipes and conduits have been laid, joints have acquired maximum degree of hardness, pipelines and conduits have successfully passed tests and inspections required under their applicable specification sections, and concrete or masonry within the trench have reached their design strength to support all loads.
2. Utilize compaction devices which will not damage the pipe, conduit, or structure within the trench.
3. Compact material around circumference of pipe by hand tamping 6-inch layers of indicated material in the area between the trench wall and the pipe to meet density requirements stated herein.
4. Compact material above the pipe by tamping or mechanical means if trench width is wide enough to accommodate the compaction equipment and if the load from the equipment does not damage the pipe.

E. FILL AND BACKFILL UNDER AND AROUND STRUCTURES:

1. Use gravel borrow, crushed stone, or fine aggregate for fill and backfill material under structures. Place and compact material in 6-inch lifts to the specified degree of compaction as specified herein.
2. Use excavated acceptable material to backfill around structures, except as otherwise indicated on the Drawings or specified herein. Backfill around retaining walls shall be crushed stone or gravel, as indicated on the Drawings.
3. Do not place backfill against or on concrete structures until they have attained the strength capable of withstanding the loading to which they will be subjected.
4. Place material evenly around structures to maintain equal soil pressure on all sides of the structure.

**3.7 OBSERVATION AND TESTING**

- A. The Owner may perform on-site observation and testing during the earthwork phase of the construction operations.

**3.8 DISPOSAL OF SURPLUS, UNACCEPTABLE OR HAZARDOUS MATERIAL**

- A. No excavated material shall be removed from the site or disposed of by the Contractor unless approved by the Engineer.
- B. Surplus excavated acceptable materials shall be loaded and hauled to the surplus soil area within the cemetery.
- C. Disposal of all unacceptable, surplus, and hazardous materials shall be in accordance with all applicable local, state, and federal regulations.

END OF SECTION 31 00 00

## **31 00 01 TEMPORARY CONTROLS**

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**Part 1. GENERAL**

**1.1 DESCRIPTION**

- A. This Section specifies requirements for temporary erosion and sedimentation control provisions.
- B. The work includes:
  1. Providing all temporary erosion and sedimentation control measures shown on the Drawings and required by the Engineer during the life of the Contract to control soil erosion and water pollution.
  2. The installation and maintenance of silt fence, berms, ditches, sedimentation basins, construction exits, fiber mats, catch basin filters, straw, netting, gravel, trenches, mulches, grasses, slope drains and other approved erosion control devices or methods.

**1.2 RELATED SECTIONS**

- A. Sections which relate to the work of this Section include:
  1. Section 02 10 00—Site Preparation
  2. Section 31 23 19—Dewatering

3. Section 32 92 00—Turf and Grasses

1.3 **LAWS AND REGULATIONS**

- A. The Contractor shall comply with the various laws and regulations including the Massachusetts Wetland Protection Act and EPA's NPDES requirements.

1.4 **SUBMITTALS**

- A. Prior to the start of the construction, the Contractor shall submit to the Engineer for acceptance, schedules for temporary and permanent erosion and sediment control work, and grading. No work shall be started until the control schedules and methods of operations have been accepted by the Engineer.
- B. Provide copies of inspection reports at completion of project.

1.5 **REFERENCES**

- A. Commonwealth of Massachusetts Department of Transportation Standard Specifications for Highways and Bridges, latest edition, hereinafter referred to as MHDSSHB.

**Part 2. PRODUCTS**

2.1 **MATERIALS**

- A. Erosion Seed for quick growing grasses, such as wheat, rye, or oats, shall be in accordance with MHDSSHB Section M6.03.1 Erosion Seed.
- B. Hay bales shall be individually banded with twine (nylon or other synthetic material is not acceptable) a minimum of two bands for bale, approximately two feet six inches (2'-6") in length.
- C. Stakes for hay bales shall be standard one-half inch (1/2") reinforcing steel rods, steel pickets, two inches by two inches (2"x2") wood stakes or approved equivalent.
- D. Silt fence fabric shall be 100X, as manufactured by Mirafi, or approved equal.
- E. Catch Basin Filters shall be "Silt Sak" by Jennian, "Dandy Bag" by Dandy Products, "Drain Pac," or approved equivalent.

**Part 3. EXECUTION**

3.1 **EROSION CONTROL-GENERAL**

- A. Erosion and sediment controls shall be in placed prior to any soil disturbing activities including, but not limited to, clearing and grubbing, earthwork, dewatering, and excavation work.
- B. All disturbed soils shall be stabilized, either permanently or temporarily, within two (2) weeks of disturbance.
- C. At a minimum, the following shall apply:
1. In cross country areas, brush and stumps shall not be removed until 1 week prior to the start of pipe laying in that area or as directed by the Engineer. The existing ground surface shall be disturbed as little as possible until no more than 1 week prior to the start of pipe laying.

2. Staked bales of hay shall be provided at points where drainage from the work site leaves the site, to reduce the sediment content of the water. Sufficient bales of hay shall be provided such that all flow will filter through the hay. Other methods which reduce the sediment content to an equal or greater degree may be used as approved by the Engineer.
  3. Drainage leaving the site shall flow to water courses in such a manner as to prevent erosion.
  4. Loaming and seeding or mulching of cross-country areas shall take place as soon after laying of the pipeline as practicable. This shall be considered part of the pipeline work, and full payment for the pipeline work need not be made until it has been completed.
- D. Measures for control of erosion must be adequate to assure that turbidity in any receiving water will not be increased more than 10 standard turbidity units (s.t.u.), or as otherwise required by the State or other controlling body, in waters used for public water supply or fish unless limits have been established for the water. In surface water used for other purposes, the turbidity must not exceed 25 s.t.u. unless otherwise permitted.
  - E. In cross country areas when excavating in wetlands or river floodplain, where no temporary diversion structure is required, the excavated material shall be placed within the limits of the construction easement shown on the construction drawings.
  - F. When it becomes necessary, the Engineer will inform the Contractor of construction procedures and operations that jeopardize erosion control provisions. If these construction procedures and operations are not corrected promptly, the Engineer may suspend the performance of any or all construction until corrections have been made, and such suspension shall not be the basis of any claim by the Contractor for additional compensation from the Owner nor for an extension of time to complete the Work.
  - G. The Engineer has the authority to order immediate, additional, temporary control measures to prevent contamination of adjacent streams or other watercourses, or other areas of water impoundment and damage by erosion.
  - H. The Contractor shall construct all permanent erosion and sediment control features at the earliest practical time as outlined in the accepted schedule. Temporary erosion and sediment control measures shall be used to correct conditions that develop during construction which were unforeseen, but are needed prior to installation of permanent control features, or that are needed temporarily to control erosion or sedimentation which develops during construction operations.
  - I. Where erosion is likely to be a problem, clearing and grubbing operations shall be scheduled and performed so that grading operations and permanent erosion and sediment control features can follow immediately thereafter, if conditions permit; otherwise, temporary control measures will be required between successive construction stages.
  - J. Failure by the Contractor to control erosion, pollution, and siltation shall be cause for the Owner to employ outside assistance to provide the necessary corrective measures. The cost of such assistance, including engineering costs, will be charged to the Contractor and appropriate deductions made to the Contractor's monthly progress payment request.

- K. The Contractor shall remove sediment from erosion control facilities as required, and as directed by the Engineer. The Contractor shall modify and improve erosion control facilities and replace deteriorated hay bales and other devices as required, and as directed by the Engineer.
- L. Temporary and permanent erosion and sedimentation control measures are shown on the Drawings. The Contractor shall strictly adhere to the provisions. Additionally, temporary measures shall be constructed to accommodate field conditions that develop during construction.
- M. Temporary sedimentation basins shall be employed as required during construction. Sedimentation shall be periodically removed from the basins and from behind erosion and sedimentation control devices. The Contractor shall direct all possible site runoff to the temporary sedimentation basins.
- N. The temporary sedimentation basins shall be maintained from the start of construction until construction of the permanent detention basins is completed, and perimeter areas are stabilized. A temporary outlet shall be constructed above the expected sediment levels. Construction of the basins shall be sequenced so that the temporary outlet is installed, and basin embankment is constructed with the material available from the initial site excavations.

### 3.2 HAY BALES (IF REQUIRED)

- A. Hay bales shall be installed at the following locations, as required by the Engineer, and as shown on the Drawings:
  - 1. Toe of slope of embankment construction to filter all runoff flowing to off-site discharges.
  - 2. Toe of temporary earthwork stockpile slopes.
  - 3. Across construction ditch prior to entry into drainage system or waterway.
  - 4. Each side of completed drainage inlets.
  - 5. Other locations shown on the Contract Drawings or designated by the Engineer.
- B. Tightly abut hay bales to form a continuous barrier. Secure bales in place with two stakes per bale. The bales shall be trenched 4 inches into the ground, unless noted otherwise by the local Conservation Commission. Soil shall be constructed on the upside slope side of the bales. Deteriorated, destroyed, or rotted bales shall be replaced immediately. Sediment shall be removed and disposed of periodically from behind the hay bales. The accumulated sediment shall not be allowed to rise above the mid height of the bale. All sediment, hay bales and appurtenances shall be removed and disposed of at the completion of the Contract, and as otherwise directed by the Engineer.

### 3.3 SILT FENCE

- A. Silt fence shall be installed as shown on the Drawings.
- B. Supporting posts shall be spaced 4 feet on center and driven at least two feet into the ground. Posts shall be 2-inch square or heavier wood posts, or standard steel posts.
- C. Fabric shall be anchored in a 4-inch-deep trench dug on the upslope side of the posts. The trench shall be at least 6 inches wide. The fabric shall be laid in the trench, backfilled and compacted.

- D. Fabric rolls shall be spliced at posts. The fabric shall be overlapped 6 inches, folded over and securely fastened to posts.

**3.4 CATCH BASIN FILTERS**

- A. Catch Basin Filters shall be installed in catch basins likely to receive runoff from disturbed areas.
- B. Catch Basin Filters shall be cleaned regularly and maintained until the area is stable.

**3.5 MAINTENANCE AND CLEAN UP**

- A. The Contractor shall inspect erosion control devices immediately after each storm event and at least daily during prolonged rainfall and maintain them in good operating condition for the life of the contract. Hay bales shall be replaced when deteriorated, and as directed by the Engineer.
- B. The Contractor shall inspect the condition of diversion dikes and ditches, filter berms, interceptor dikes, sediment basins and other erosion and sedimentation control devices after each rainstorm and during major storm events. Repairs shall be made as necessary and as directed by the Engineer.
- C. Accumulated sediment trapped by erosion and sedimentation control devices shall be removed as required, and as directed by the Engineer.
- D. During construction, temporary outlets of the drainage systems shall direct the flow to temporary or permanent sedimentation basins.
- E. Temporary soil erosion and sedimentation control devices shall be removed and adjacent areas outside the limits of grading restored upon completion of the work or when directed by the Engineer. Upon removal of the temporary controls, the site shall be restored to original condition.

END OF SECTION 31 00 01

## **31 00 02 SITE WATERING AND DUST CONTROL**

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**Part 1. GENERAL**

**1.1 DESCRIPTION**

- A. This section of the Specifications covers the control of dust at the work site.
- B. Dust control shall be the responsibility of the Contractor and dust control operations shall meet the requirements of the Commonwealth of Massachusetts Department of Environmental Protection 310 CMR 7.09: Air Pollution Control Regulations. Water and/or calcium chloride are acceptable for controlling dust.

**1.2 RELATED WORK**

- A. The following Sections contain work related to this Section:
  - 1. Section 02 24 00 Environmental Assessment
  - 2. Section 31 00 00 Earthwork
  - 3. Section 31 00 01 Temporary Controls

## **Part 2. MATERIALS**

### **2.1 MISCELLANEOUS**

- A. Acceptable materials and equipment for dust control use shall consist of the following or equivalent thereof:
  - 1. Twenty (20) mil thick PVC coverings.
  - 2. Potable water.
  - 3. Motorized street sweeper.

### **2.2 CALCIUM CHLORIDE**

- A. Calcium chloride shall conform to the requirements of AASHTO-M 144, Type I or Type II and Specification for Calcium Chloride, ASTM D98. The calcium chloride shall be packaged in moisture proof bags or in airtight drums with the manufacturer, name of product, net weight, and percentage of calcium chloride guaranteed by the manufacturer legibly marked on each container.
- B. Calcium chloride failing to meet the requirements of the specifications, or which has become caked or sticky in shipment may be rejected by the Engineer.

## **Part 3. EXECUTION**

### **3.1 GENERAL**

- A. Always maintain dust control throughout the construction period. Control measures will be required in all areas as well as for stockpiles, temporary traffic ways, and all other areas where dust may develop.
- B. Leave existing pavement or ground covering in place until the last possible moment prior to earth excavation for purposes of dust control.
- C. Provide positive methods and apply dust control materials to minimize raising dust from construction operations and provide positive means to prevent air-borne dust from dispersing into the atmosphere. These provisions do not supersede any specific requirements for methods of construction or applicable Conditions of the Contract regarding performance obligations of the General Contractor.
- D. Dust control procedures shall be monitored by the Clerk of the Works (or person of similar position in responsible charge of the construction site) and shall be subject to on-site review by authorities having jurisdiction, including the Engineer.
- E. Earthwork may be halted as deemed necessary should dust control procedures prove inadequate.
- F. STOCKPILES:
  - 1. Cover stockpiles in their entirety at the end of each day with a PVC, polypropylene or mylar covering. Securely anchor covering to prevent its removal and tearing during heavy winds. Maintain coverings and replace as necessary to assure constant covering and protection of all stockpiled materials.
- G. CONSTRUCTION VEHICLES
  - 1. Clean all soil and debris from wheels of all construction vehicles and cover earth loads prior to leaving the construction site. The Contractor shall use the construction entrance/exit shown on the plans.
- H. RAMPS AND PUBLIC STREETS



1. All temporary ramps and streets shall be swept daily or as required to prevent dust being a public nuisance.

**Part 4. CALCIUM CHLORIDE**

- A. Calcium chloride shall be applied when ordered by the Engineer and only in areas that will not be adversely affected by the application. See Section 02 24 00, ENVIRONMENTAL ASSESSMENT.
- B. Calcium chloride shall be uniformly applied at the rate of 1 1/2 pounds per square yard or at any other rate as directed by the Engineer. Application shall be by means of a mechanical spreader, or other approved methods. The Engineer shall determine the number and frequency of applications.

END OF SECTION 31 00 02

## **31 00 03 SITE CLEANUP AND WASTE MANAGEMENT**

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**Part 1. GENERAL**

**1.1 GENERAL REQUIREMENTS**

- A. Execute cleaning during progress of the work and at completion of the work.
- B. Furnish all labor, materials, equipment, and incidentals necessary to complete the work under this Section that includes operations which cannot be specified in detail as separate items but can be sufficiently described as to the kind and extent of work involved.
- C. When applicable, the Contractor will perform the work in accordance with other sections of this Specification. When no applicable Specification exists, the Contractor shall perform the work in accordance with the best modern practice and/or as directed by the Engineer.

**1.2 DISPOSAL REQUIREMENTS**

- A. Conduct cleaning and disposal operations to comply with codes, ordinances, regulations, and anti-pollution laws.

**Part 2. PRODUCTS**

- A. **NOT USED**

**Part 3. EXECUTION**

**3.1 DURING CONSTRUCTION**

- A. Execute daily cleaning to keep the work, the site, and adjacent properties free from accumulations of waste materials, rubbish, and windblown debris, resulting from construction operations.
- B. Provide onsite containers for the collection of waste materials, debris, and rubbish. All waste materials including containers, food debris and other miscellaneous materials must be disposed of daily in onsite containers.

- C. Remove waste materials, debris, and rubbish from the site periodically and dispose of at legal disposal areas away from the site.

### 3.2 FINAL CLEANING

- A. Requirements: At the completion of work and immediately prior to final inspection, clean the entire project as follows:
  - 1. Thoroughly clean, sweep, wash, and polish all work and equipment provided under the Contract, including finishes. Leave the structures and site in a complete and finished condition to the satisfaction of the ENGINEER.
  - 2. Direct all subcontractors to similarly perform, at the same time, an equivalent thorough cleaning of all work and equipment provided under their contracts.
  - 3. Remove all temporary structures and all debris, including dirt, sand, gravel, rubbish, and waste material.
  - 4. Should the CONTRACTOR not remove rubbish or debris or not clean the buildings and site as specified above, the OWNER reserves the right to have the cleaning done at the expense of the CONTRACTOR.
- B. Employ experienced workers, or professional cleaners, for final cleaning.
- C. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
- D. In preparation for substantial completion or occupancy, conduct final inspection of sight- exposed interior and exterior surfaces, and of concealed spaces.
- E. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from sight- exposed interior and exterior finished surfaces. Polish surfaces so designated to shine finish.
- F. Repair, patch, and touch up marred surfaces to specified finish, to match adjacent surfaces.
- G. Replace air-handling filters if units were operated during construction.
- H. Clean ducts, blowers, and coils if air-handling units were operated without filters during construction.
- I. Vacuums clean all interior spaces, including inside cabinets.
- J. Handle materials in a controlled manner with as few handlings as possible. Do not drop or throw materials from heights.
- K. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.
- L. Clean interior of all panel cabinets, pull boxes, and other equipment enclosures.
- M. Wash and wipe clean all lighting fixtures, lamps, and other electrical equipment which may have become soiled during installation.
- N. Perform touch-up painting.
- O. Broom clean exterior paved surfaces; rake clean other surfaces of the grounds.
- P. Remove erection plant, tools, temporary structures, and other materials.
- Q. Remove and dispose of all water, dirt, rubbish, or any other foreign substances.

### 3.3 FINAL INSPECTION

- A. After cleaning is complete the final inspection may be scheduled. The inspection will be done with the OWNER and ENGINEER.

## 31 22 19 FINISH GRADING

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### Part 1. GENERAL

#### 1.1 DESCRIPTION

- A. This Section of the Specifications and related drawings describes requirements pertaining to finish grading and temporary grassing work.
- B. Related work specified elsewhere:
  - 1. Section 31 00 00 – Earthwork
  - 2. Section 32 91 13 – Soil Preparation
  - 3. Section 32 92 00 – Turf and Grasses
  - 4. Section 32 90 00 – Planting

#### 1.2 STANDARDS

- A. Grass seed shall conform to tolerances for germination and purity in accordance with applicable standards of U.S. Department of Agriculture.
- B. Availability of various elements contained in all fertilizers shall conform to standards of the Association of Official Agricultural Chemists.
- C. ASTM: American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania, 19103, USA as Published in “Compilation of ASTM Standards in Building Codes”.

#### 1.3 SUBMITTALS TO CIVIL ENGINEER

- A. PRODUCT DATA: Manufacturer's current catalog cuts and specifications of the following:
  - 1. Fertilizer
  - 2. Mulch
  - 3. Grass seed mix

### Part 2. PRODUCTS

#### 2.1 TOPSOIL

- A. Topsoil shall comply to requirements in Section 32 91 13 Soil Preparation.
- B. All topsoil necessary to complete the work shall be obtained from topsoil stockpiles from grading and excavating operations and from approved topsoil sources on the site. In the event additional topsoil is required, it shall be obtained from approved sources off the site. Topsoil shall be natural, friable, topsoil characteristic of representative soils in the vicinity that produce heavy growths of crops, grass, or other vegetation. Topsoil shall be free from tree roots, stones, and other materials that hinder grading, planting, and maintenance operations, and free from noxious and other objectionable weed seeds and toxic substances.
- C. Topsoil borrows areas used on the site shall be neatly trimmed, drained, and grassed after borrowing excavations are completed.

- D. At Contractor's expense, topsoil shall be analyzed by a reputable laboratory with reference to grass species specified and the report shall contain fertilization and soil amendment recommendations. Furnish laboratory reports to the Architect of Record. The Architect of Record will accept or reject the topsoil based on the laboratory report prior to use.

**2.2 TEMPORARY GRASS SEED**

- A. Temporary grass seed shall be composed of domestic annual ryegrass, which shall evaluate to minimum percentages, purity and germination specified.

Germination <u>Minimum</u>	90%
Purity <u>Minimum</u>	95%

**2.3 FERTILIZER**

- A. Provide a commercial grade fertilizer manufactured in accordance with the recommendations of the State Agricultural Board.
- B. Fertilizer shall be a grade containing the appropriate plant food elements as determined by the soil test.
- C. Deliver the acceptable fertilizer in standard size bags, showing weight, analysis, and manufacturer's name. Store in weatherproof storage place in such manner that its effectiveness will not be impaired.

**2.4 GROUND LIMESTONE**

- A. Ground limestone (calcium carbonate) shall have the following analysis: at least 95 percent to pass 20 mesh sieves; at least 55 percent to pass 60 mesh sieves; and at least 40 percent to pass 100 mesh sieves.
- B. Total carbonates shall be not less than 80 percent of 44.8 percent calcium oxide equivalent; for purpose of calculation total carbonates are considered as calcium carbonate.

**2.5 HYDRO MULCH FOR TEMPORARY EROSION CONTROL**

- A. Hydro mulch shall be used for all temporary erosion control.
- B. Hydro mulch shall be composed of wood cellulose fiber and contain no germination- or growth inhibiting factors. It shall be colored green to allow visual metering in its application and have the property of being evenly dispersed and suspended when agitated in water.

**Part 3. EXECUTION**

**3.1 DEPOSITING, SPREADING AND PREPARATION OF TOPSOIL AREAS**

- A. Do not start work until after construction work on structures, walks, curbs, walls, and paved areas has been substantially completed, and rough grading has been completed, inspected, and accepted. The grassing work shall be accomplished only when satisfactory results can be expected. When conditions such as drought, excessive moisture, high winds, or other factors prevail to such an extent that satisfactory results are not likely to be obtained the work shall be stopped. The work shall be resumed only when the desired

results are likely to be obtained. All grassing operations shall be conducted across the slope.

- B. Prior to spreading topsoil, the subgrade shall be pulverized to a minimum depth of two inches with equipment capable of obtaining proper pulverization of the soil. The prepared subgrade condition shall be reviewed and approved by Landscape Architect prior to topsoil spreading.
- C. Topsoil shall be uniformly distributed and evenly spread to a minimum thickness of 6 inches. Topsoil shall be spread so that planting can proceed with little additional soil preparation or tillage.
- D. Any finished grade that is not free from lumps and foreign material as described in Paragraph 2.1 will not be acceptable.
- E. After placement, finish grade topsoil to levels, grades and contours as shown. Maintain surfaces to indicated finished grades. Deposit whatever additional topsoil may be required to take care of any settlement or erosion up to date of final acceptance. Rake surfaces upon which additional topsoil is to be deposited or otherwise prepare to insure proper bond.
- F. The General Contractor is responsible for final grades on the site.
- G. Till to provide a good seed bed. Hand tools such as a lawn rake, grading rake, steel tine speed rake, potato hook or spiker aerator or mechanical equipment such as a verticutter, disc harrow, scarifier rake, tine harrow, etc., shall be used during cultivation operations.
- H. These tools and equipment plus any other that the Contractor desires to use shall be employed during spreading of smooth draining grades and a fine graded surface upon which to receive seed.

### 3.2 AREAS OF GRASSING

- A. All areas disturbed by construction and grading operations shall be hydroseeded with temporary lawn grasses.

### 3.3 SLOPE AND DITCH TREATMENT

- A. The following seed mix shall be installed on slope more than one vertical to three horizontals: New England Erosion Control /Restoration Mix for Dry Sites as manufactured by New England Wetland Plants, Inc, 800 Main Street, Amherst, MA, 413-256-1752 or approved equal. The seed mix shall include Creeping Red Fescue, Annual Ryegrass, Timothy, White Clover, Little Bluestem, Red Top and Side-oats Gramma-grass.
- B. Apply at rate of 35 pounds per acre or as recommended by seed mix manufacturer.

### 3.4 LIMESTONE APPLICATION

- A. Apply ground limestone (at a rate as determined by the soil test) and thoroughly incorporate into the top 4 inches of soil.

### 3.5 FERTILIZER APPLICATION

- A. Apply fertilizer at a rate as determined by the soil test.
- B. Rework soil to remove all foreign matter and lumps as specified in preparation of topsoil areas.

### 3.6 HYDROSEEDING

- A. Hydroseed shall be applied with hydraulic equipment at the rate of 1,000 pounds to 1,500 pounds of hydro mulch per acre. Hydro mulch shall be added to the water slurry in the hydraulic seeder after the proportionate quantities of seed, fertilizer and other accepted materials have been added.
- B. The slurry shall be sprayed uniformly on the surface of the soil.

**3.7 TEMPORARY LAWNS**

- A. Annual Ryegrass (*Lolium Multiflorum*) at 250 lb./acre shall be added to water slurry.
- B. The temporary lawns shall be maintained by the Contractor until the preparation for permanent lawn is started.

**3.8 SMOOTHING ALL LAWNS**

- A. If the lawn surface has become bumpy and uneven during planting or because of washing during a heavy rain, begin smoothing operations at the time of first mowing. Apply topsoil to low spots in the lawn in light applications (up to 1/2 inch deep) to produce a smooth surface.

**3.9 MAINTENANCE**

- A. Provide maintenance from start of work until Grand Opening. Maintenance includes watering of lawns, re-fertilization, weeding, mowing, cleaning up and edging, repairs of all washouts and gullies, repairs or protection, and other necessary work of maintenance. Maintain slopes against erosion.

**3.10 EROSION**

- A. Contractor shall anticipate a certain amount of erosion after completion of grassing and he shall continue to re prepare, add topsoil, re fertilize, and re plant eroded areas using sod, or hydro mulch in areas where erosion persists, until the grass is acceptable in all respects. Contractor shall pay special attention to slopes steeper than 1:4 for acceptable grass establishment.

**3.11 MOWING**

- A. Mowing shall be accomplished with acceptable mowing machines as often as necessary in accordance with good turf establishment practices.
- B. Grasses shall be mowed to a height of two (2) inches when growth reaches three (3) inches or as directed by Owner's Representative.
- C. Mowing shall include removal of clippings.

**3.12 WATERING**

- A. During establishment, grassed areas shall be moist through the upper 4 inches of soil.

**3.13 CLEANUP**

- A. Before inspection of work, and before acceptance, paved areas that are soiled or stained by operations of work of this Section shall be cleaned. Clean by sweeping or washing and remove all defacements or stains.

- B. At the completion of work from this Section, the Contractor shall remove construction equipment, excess materials, and tools. Cart away from site any debris resultant from work of this Section and dispose in a legal manner off the Owner's property.

**3.14 INSPECTION AND ACCEPTANCE**

- A. The Contractor shall, after his personal inspection, request an acceptance inspection by the Landscape Architect of Record.
- B. After acceptance, maintenance will be assumed by the Owner or his designated representative.

**3.15 CONDITION UPON ACCEPTANCE**

- A. No erosion shall exist.
- B. Bare or thin spots more than 5 percent of any area will not be acceptable.

END OF SECTION 31 22 19

## **31 23 00 EXCAVATION AND FILL**

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**Part 1. GENERAL**

**1.1 GENERAL**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Specification Sections, apply to this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.
- C. Coordinate work with that of all other trades affecting or affected by the Work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

**1.2 DESCRIPTION OF WORK**

- A. Work to be done under this Section includes, but is not limited to, providing all labor, materials, equipment, and incidentals as necessary to the conduct and complete the Work specified herein and shown on the Drawings.
  - 1. Excavate all materials, including soil, boulders, abandoned utilities, existing building foundations, pavements, curbs, and all other unsuitable materials as necessary to construct the improvements shown on the Drawings.
  - 2. Preserve and protect existing and new site improvements during the Work.
  - 3. Over-excavate fill, organic soils and other unsuitable materials to suitable foundation bearing strata.
  - 4. Prepare, grade, shape, compact and protect all subgrades, backfills, and ground surfaces as shown on the Drawings.
  - 5. Furnish materials from approved off-site source(s) as required to complete the Work.
  - 6. Place and compact backfill materials to construct the improvements shown on the Drawings.

7. Segregate, handle, stockpile, manage, and reuse suitable excavated materials as specified herein.
8. Manage and legally dispose off-site all excess or unsuitable generated materials that cannot be reused on-site.
9. Provide and install drainage structures and systems as shown on the Drawings.

### 1.3 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 31 23 19 – Dewatering

### 1.4 DEFINITIONS AND REFERENCE STANDARDS

- A. Owner
- B. Engineer
- C. Site Improvements: When used in the context of "protecting adjacent site improvements" shall include, but not be limited to, buildings, utilities, pavements, roadways, slabs, sidewalks, curbs, foundations, and all other improvements and features that are outside the limits of the site, or those elements within the limits of the site that are to remain.
- D. Zone of Influence (ZOI): The zone containing the bearing soils for soil-supported structures. The ZOI is defined by imaginary lines extending 2 ft laterally from the outside lower edges of a soil bearing structure and down a 1 horizontal to 1 vertical slope to the top of the natural, inorganic bearing soils or other approved bearing soils.
- E. ASTM: Specifications of the American Society for Testing and Materials
- F. AWS: Standard Code for Welding in Building Construction (American Welding Society)
- G. AASHTO: American Association of State Highway and Transportation Officials
- H. ACI: American Concrete Institute
- I. PCI: Prestressed Concrete Institute
- J. Code: Sixth Edition of Massachusetts State Building Code
- K. USEPA: United States Environmental Protection Agency
- L. DEP: Massachusetts Department of Environmental Protection
- M. OSHA: Occupational Health and Safety Administration
- N. MCP: Massachusetts Contingency Plan
- O. MHDSSHB: Massachusetts Highway Department Standard Specifications for Highways and Bridges, most recent edition.

### 1.5 PROJECT CONDITIONS

- A. These documents are made available to the Contractor for information only. The subsurface conditions information presented in this document, as applicable, is for information only and shall not be interpreted as a warranty of subsurface conditions whether interpreted from written text, boring logs, or other data.

### 1.6 QUALITY CONTROL

- A. The Engineer will observe the Contractor's earthwork activities, including temporary excavation support system installation, excavation, dewatering, subgrade preparation, drainage system, sewer system and water system installation, and backfilling. The



Contractor shall provide sufficient notice to the Engineer to allow the Engineer to be present to observe and evaluate the Work.

- B. The Engineer will conduct field and laboratory testing to confirm compliance with the requirements of this Section. Field and laboratory testing will be conducted in general conformance with ASTM or other applicable reference standards. The Engineer may also conduct vibration monitoring, as necessary. The Contractor shall cooperate with the Engineer in all respects to facilitate any testing or observations.
- C. The presence of the Engineer shall not relieve the Contractor of its responsibility to perform the Work in accordance with the Contract Documents, nor shall it be construed to relieve the Contractor from full responsibility for the means and methods of construction, protection of site improvements against damage, and for safety on the construction site.
- D. The Contractor shall adhere to the applicable requirements of the Standard Specifications, OSHA Standards, and to all other applicable ordinances, codes, statutory rules, and regulations of federal, state, and local authorities having legal control over the Work of this Section and other applicable Sections.
- E. The Contractor may conduct additional field and laboratory testing or screening tests for its own information at no additional cost to the Owner.
- F. Work not in conformance with the specified requirements shall be improved, or removed and replaced, at no additional cost to the Owner. All costs related to testing of nonconforming Work or materials shall be paid for by the Contractor at no additional cost to the Owner.
- G. TOLERANCES
  - 1. Construct finished soil and backfilled surfaces to plus or minus ½-in. of the grades and elevations indicated on the Drawings.
  - 2. Maintain the moisture content of fill material as it is being placed to levels that allow for compaction to the specified degree of compaction

#### 1.7 EXCAVATION CLASSIFICATIONS

- A. EXCAVATION: Excavation shall be unclassified, and no consideration will be given to the nature of the materials. Excavation shall comprise and include the satisfactory removal and disposal of all materials encountered regardless of the nature of the materials and shall be understood to include but not limited to earth, fill, foundations, pavements, curbs, piping, railroad track and ties, cobblestones, footings, bricks, concrete, previously abandoned drainage structures and utility structures abandoned and not removed by the utility and debris.
- B. ROCK EXCAVATION: Rock is defined for payment purposes as stone or hard shale in original ledge, boulders over two cubic yards (2yd<sup>3</sup>) in volume in open areas and one cubic yard (1yd<sup>3</sup>) in volume in trenches, and masonry or concrete that cannot be broken or removed by normal job equipment (power shovels, scoops, or D-8 bulldozers with ripper attachment) without the use of explosives or drills or hoe-rams. The classification does not include materials that can be removed by means other than drilling and blasting or drilling and wedging or hoe-ramming but which, for reasons of economy in excavating, the Contractor prefers to remove by drilling and blasting. The word "trenches" shall mean

excavation having vertical sides the depths of which exceed the width, made for drain, sewer, water, and gas pipes; electric and steam conduits; and the like.

## 1.8 SUBMITTALS

### A. GENERAL

1. The Contractor shall forward submittals to the Engineer a minimum of two weeks prior to any planned work related to the Contractor's submittals.
2. The time(s) for submittals is the minimum required by the Engineer to review, comment, and respond to the Contractor. The Engineer may require resubmission(s) for several reasons. The Contractor is responsible for scheduling specified submittals and resubmittals to prevent delays in the work.
3. The Contractor's submittals shall be reviewed by the Engineer prior to conducting any work.
4. The Contractor's submittals shall be prepared and stamped by a Professional Engineer registered in the Commonwealth of Massachusetts, retained by the Contractor.
5. Review of the Contractor's submittals by the Engineer does not relieve the Contractor of the responsibility for the adequacy, safety, and performance of the Work.

### B. BACKFILL MATERIALS AND EQUIPMENT

1. Proposed types and sources of all fills and backfill materials, including topsoil. For each type of soil to be utilized as fill or backfill, the Contractor shall deliver two, 50 lb. bag samples from each borrow source or supplier to the Engineer's laboratory for review and laboratory testing. Do not import any material to the site unless accepted by the Engineer in writing. With each sample provide the following documentation:
  - a. Location of borrow source site, including name of the owner or facility name with contact phone number, street address, city, and state.
  - b. Present and past usage of the source site and material.
  - c. All existing report(s) associated with an assessment of the source site as relates to the presence of oil or hazardous materials.
2. SITE CHARACTERIZATION OF OFF-SITE BORROW SOURCES:
  - a. If the materials are not from a commercial borrow pit and/or are suspected of containing oil and/or hazardous materials based on the Engineer's review of the submitted data described above, the Contractor shall submit the below-listed chemical test data on the material. The cost of any required testing shall be the responsibility of the Contractor. The Engineer will review the data and determine its acceptability for use on site. All sampling of soils for chemical testing shall be performed by a person experienced in sample collection and either: 1) a Professional Engineer or Licensed Site Professional registered in the Commonwealth of Massachusetts, 2) a Professional Geologist registered in the Commonwealth of Massachusetts, 3) a certified groundwater of environmental professional, or 4) an authorized representative of the one

of the persons listed above. All testing of samples of each material shall be by a DEP-certified laboratory.

- b. Total Petroleum Hydrocarbons (EPA Method 9071/418.1) every 150 cy.
  - c. Extractable and Volatile Petroleum Hydrocarbons every 150 cy.
  - d. Volatile Organic Compounds (EPA Method 8260) every 250 cy.
  - e. PCB and Pesticides (EPA Method 8080) every 250 cy.
  - f. Thirteen Priority Pollutant Metals (EPA Method 6000-7000 series) every 250 cy.
  - g. Acid-Base Neutrals (EPA Method 8270) every 300 cy.
  - h. TCLP (for a particular parameter) if the measured concentration for that parameter exceeds twenty times the RCRA Hazardous Waste TCLP Regulatory criteria.
- 3. Submit additional material samples every 5,000-cu. yd. throughout the course of the Work, if requested by the Engineer, to evaluate the consistency of the source or process, at no additional cost to the Owner.
  - 4. Details of compaction equipment, including descriptions, product literature, specifications, and ratings, proposed for use in compacting fill and backfill materials.
- C. EXTERIOR PERIMETER
- 1. Manufacturer's literature and technical data for: (1) drainage pipe, sewer pipe, water pipe solid pipe, tees, wyes, bends, reducers, and other pipe fittings; and (2) filter fabric (geotextile).
  - 2. Source and 50-lb bag sample for Drainage Fill (Refer to Section 1.6 for additional requirements).
  - 3. As-built plans of drainage systems if as-built layouts differ from design layouts.

**Part 2. PRODUCTS**

**2.1 MATERIALS**

- A. GRANULAR FILL: shall consist of clean, aggregate sand and gravel material free of organic material, loam, trash, snow, ice, frozen soil, or other deleterious material well graded within the following limits:

Sieve Size (ASTM D422)	Percent Passing by Weight
3 in.	100
No. 4	30-90
No. 40	10-50
No. 200	0-5

- 1. Granular Fill shall be used below structural slabs, sidewalks, footings, exterior slabs, and at other locations shown on the Drawings or indicated in the Specifications. Granular Fill shall also be used to backfill above, below and to the sides of new site structures and utilities and below pavements unless otherwise noted on the Drawings or approved by the Engineer.

- B. ORDINARY FILL: Ordinary Fill shall consist of well-graded, natural, mineral soil free from organic materials, loam, wood, snow, ice, frozen soil cinders, asphalt, brick, concrete, trash, debris and other weak, compressible, or deleterious materials.
1. Ordinary Fill shall not contain particles larger than 4 in. in maximum dimension and shall have a maximum of 80 percent passing the No. 40 sieve and a maximum of 30 percent passing the No. 200 sieve. It shall have a maximum dry density of at least 120 pounds per cubic foot and have physical properties such that it can be readily spread and compacted to the specified densities in a reasonable length of time. The material shall not contain materials subject to decay, decomposition, or dissolution.
  2. On-site fill soils containing chemical contaminants at concentrations less than Method-1 S-1 as listed in the MCP may be used as Ordinary Fill if approved by the Engineer. The Contractor shall mechanically screen on-site soils to remove debris prior to reuse as directed by the Engineer. Only those soils approved by the Engineer shall be reused on-site.
- C. GRAVEL BORROW: shall conform to the requirements of item M1.03.0 Types a, b, and c of the Commonwealth of Massachusetts Department of Transportation Standard Specifications for Highways and Bridges. Gravel Borrow of the type indicated shall be used at the locations shown on the Drawings or indicated in the Specifications.
- D. SAND BORROW: shall conform to the requirements of item M1.04.0 Types a and b (as applicable) of the Commonwealth of Massachusetts Department of Transportation Standard Specifications for Highways and Bridges. Sand Borrow of the type indicated shall be used at the locations shown on the Drawings or indicated in the Specifications.
- E. PROCESSED GRAVEL: shall conform to the requirements of item M1.03.1 of the Commonwealth of Massachusetts Department of Transportation Standard Specifications for Highways and Bridges. Processed Gravel shall be used at the locations shown on the Drawings or indicated in the Specifications.
- F. DENSE-GRADED CRUSHED STONE: shall conform to the requirements of item M2.01.7 of the Commonwealth of Massachusetts Department of Transportation Standard Specifications for Highways and Bridges. Dense-graded crushed stone shall be used at the locations shown on the Drawings or indicated in the Specifications.
- G. ¾-IN. CRUSHED STONE (DRAINAGE FILL): shall conform to the requirements of item M2.01.4 of the Commonwealth of Massachusetts Department of Transportation Standard Specifications for Highways and Bridges. Crushed stone (¾-in.) shall be washed at the source facility to remove fine-grained soils.
- H. PIPE BEDDING MATERIAL: shall consist of Granular Fill unless otherwise noted on the Drawings or indicated in the Specifications.
- I. GEOTEXTILE (FILTER FABRIC): shall consist of six ounces per square yard minimum, needle-punched, non-woven, synthetic, chemically resistant non-biodegradable fabric. Geotextile shall be used to prevent fine-grained soils from migrating into coarse grain materials as judged necessary by the Engineer, and at the locations shown on the Drawings or indicated in the Specifications.
- J. LEAN CONCRETE: shall have a maximum 28-day compressive strength of  $f'c = 1,500$  psi, unless otherwise noted, with a maximum slump of 6 in. Lean concrete may be used to

backfill excavations in lieu of Compacted Granular Fill at locations proposed by the Contractor and approved by the Engineer.

### **Part 3. EXECUTION**

#### **3.1 INSPECTION**

- A. Examine the site and all work prepared by others and report to the Engineer in writing any conditions detrimental to the proper and timely completion of the Work of this Section. Do not proceed with the Work until unsatisfactory conditions have been corrected in an acceptable manner.

#### **3.2 GENERAL REQUIREMENTS**

- A. Excavation, backfilling, and other earthwork activities shall conform with the Contract Documents and submittals that are acceptable to the Engineer. No work shall be performed unless it is conducted under the observation of the Engineer, and in accordance with the submitted schedule and sequence.
- B. Always prevent erosion at the site.
- C. All excavated material, excluding contaminated soil and groundwater if present, shall be removed from the site and shall be legally disposed of by the Contractor. All excavated material will become the property of the Contractor.
- D. **USE OF ON-SITE MATERIALS**
  - 1. Some existing on-site soils are considered suitable for reuse as Ordinary Fill. The Contractor shall reuse those on-site soils approved by the Engineer as Ordinary Fill at the locations shown on the Drawings and/or indicated by the Engineer. The Contractor shall conduct all on-site reuse activities, including screening and stockpiling, at no additional cost to the Owner.
  - 2. If unanticipated contaminated material is suspected or encountered during an excavation, the Contractor shall halt construction activities in that area, and contact the Owner or Engineer as soon as possible. The Owner or Engineer will provide direction on how to proceed and disposition of the excavated material.
- E. **STOCKPILING OF MATERIAL**
  - 1. Establish material stockpiles on-site only at locations that are acceptable to the Engineer, will not interfere with the progress of the work, and will not damage existing structures. Off-site stockpiling is not permitted unless otherwise approved by the Engineer. Rehandling, if required, shall be the responsibility of the Contractor at no additional expense to the Owner.
- F. **UNFAVORABLE WEATHER**
  - 1. **FREEZING WEATHER:**
    - a. Fill materials and/or concrete shall not be placed on snow, ice, frozen subgrades, or uncompacted frozen soil.
    - b. Fill materials and lean concrete shall not be frozen when placed or be allowed to freeze prior to or after compaction or placement. At the end of each day's work during freezing weather, the last lift of fill, after compaction, shall be rolled by a smooth wheeled roller to eliminate ridges of uncompacted soil. Fill materials and lean concrete shall be covered with insulating tarps or heated during freezing weather. The Contractor shall

suspend backfilling operations and placement of lean concrete when air temperatures are below 32oF if directed by the Engineer.

- c. Soil bearing surfaces below completed slabs and foundations shall be protected against freezing, before and after concreting. Frost protection shall be provided in a manner acceptable to the Engineer as soon as possible after foundations or structures are constructed.
- d. Do not excavate to full indicated depth when freezing temperatures may be expected, unless the mat, footing, or slab is poured immediately after the excavation has been completed. Protect the excavation from frost if placing of concrete is delayed. Where footings, slabs or mud mats are exposed to freezing temperatures, they shall be protected to prevent damage to the concrete by freezing or frost penetration into the soil upon which they rest. Where foundations are exposed over the winter during construction, provide at least  
2.5 ft. of earth cover above the bottom surface of concrete, plus hay or other protection if temperatures are severe, as directed by the Engineer.

2. WET WEATHER:

- a. If fill material placement, spreading, rolling, or compaction operations are interrupted by rain or other unfavorable conditions, do not resume such operations until ascertaining that the moisture content and density of the previously placed soil are as required by these specifications.

G. MAINTENANCE OF EXCAVATIONS AND SLOPES

- 1. Stability of excavations and job safety are the sole responsibility of the Contractor.
- 2. Shoring and bracing of trenches and other excavations shall be in accordance with the requirements of the Department of Labor Occupational Health and Safety (OSHA) 29 CFR 1926 dated October 31, 1989, and subsequent amendments and revisions.

H. Coordinate excavation activities to limit movements indicated in Section 31 40 00 (Shoring and Underpinning) and Section 31 23 17 (Lateral Support of Excavation).

### 3.3 EXCAVATION

A. GENERAL REQUIREMENTS

- 1. Excavate to the lines and grades indicated, and no deeper unless approved.
- 2. Excavate and backfill using appropriate methods and equipment in sufficient quantity, models, and sizes to perform the work in the minimum time possible.
- 3. Coordinate the sequence of excavation with all construction activities, including installation of instrumentation, bracing, construction dewatering, wintry weather protection, placements of structures, etc.
- 4. Conduct excavation in such a manner that movements of temporary excavation support systems are minimized and damage to adjacent buildings, structures and utilities is prevented.
- 5. Coordinate the rate of excavation with ground conditions encountered in the field and observations from instrumentation as necessary to prevent movement and loss of ground during excavation and support operations.
- 6. Prevent disturbance to soil subgrades.

7. Exercise care to preserve the material below and beyond the lines of all excavations. Where excavation is carried below required grade, backfill to the structure subgrade according to methods and materials approved by the Engineer.
- B. When excavation has reached required subgrade elevations, notify the Engineer, who will observe the excavation and bearing conditions. After review by the Engineer, the excavation may be required to proceed deeper due to Contractor disturbance of the subgrade, variation in subsurface conditions, or the presence of unsuitable soils at the design subgrade level. Replace the excavated material with Granular Fill or Lean Concrete as directed by the Engineer. Conduct additional excavation and backfilling at no additional cost to the Owner.
- C. Excavate trenches to the depth indicated or required. Carry the depth of trenches for piping to establish the indicated flow lines and invert elevations. Excavation for the convenience of the Contractor shall conform to limits acceptable to the Engineer and shall be at no additional cost to the Owner.
- D. **UNAUTHORIZED EXCAVATIONS**
  1. Unauthorized excavation consists of removal of materials beyond required subgrade elevations or dimensions without specific direction of the Engineer. Unauthorized excavation, as well as remedial work directed by the Engineer shall be at the Contractor's expense.
  2. Backfill and compact unauthorized excavations with Granular Fill or Lean Concrete as specified for authorized excavations unless otherwise directed by the Engineer.

### 3.4 **TRENCH EXCAVATION**

- A. Excavate trenches for utilities, drain and sewer pipes, and utility structures by the open cut method except where tunneling or jacking is indicated or approved by the Engineer.
- B. Excavate trench to permit pipe, conduit, or structure to be laid or constructed at the elevation, slope and depth of cover indicated on the Drawings, and at uniform slopes between indicated elevations. Make trenches no wider than indicated and do not widen by scraping or loosening materials from the sides during construction or operation of equipment in or adjacent of the trench or by surcharging excavation with material piled next to the trench. Keep sides firm and undisturbed until backfilling and compaction has been completed.
- C. When pipe, conduit or structures are to be laid in gravel or crushed stone bedding, excavate trench by machine to indicated aggregate subgrade. Compact any disturbed material at the bottom of the trench to 95 percent prior to placing the bedding material.
- D. When pipe, conduit, or structures are to be laid directly on the bottom of the trench, do not excavate the lower part of the trenches to subgrade by machinery. Remove last of material by use of hand tools and form a flat or shaped bottom, true to grade, so that pipe or structure will have a uniform and continuous bearing.
- E. In paved areas, saw cut pavement on the neat lines at the width indicated for the trench. After compacting the backfill, restore pavement to a condition equivalent to that existing at the start of construction. Restore pavement damaged outside the neat lines at no additional cost to the Owner.

- F. TRENCH EXCAVATION IN FILL:
  - 1. Place and compact to 95 percent of maximum density indicated fill material to top of proposed fill or to a minimum height of 1 foot above top of pipe or structure, whichever is less, when pipe or structure is to be laid in fill.

### 3.5 ROCK EXCAVATION

- A. Cross Sectioning: When rock is encountered during excavation, it shall be uncovered and exposed, and the Engineer shall be notified in writing by the Contractor before rock-removal work proceeds. The areas in question shall then be measured, and payment shall be determined. Excavation of material in question before agreement by the Engineer as to the character of the material, or failure to notify the Engineer or to take measurements will forfeit the Contractor's right to payment for rock excavation. The quantity of rock to be removed shall be based on the limits established below. Measurements shall be made by a Registered Surveyor, paid for by the Contractor, and approved by the Engineer.
- B. MEASUREMENT: Excavation of rock, as defined in paragraph 1.4.B, if ordered in writing by the Engineer with the prior written approval of the Owner, measured in place within the Contract limits as defined on the Plans or in any duly authorized modifications thereto. Measurement for rock excavation will be made for:
  - 1. Foundations within the limits of the concrete lines as defined by the working plans or by duly authorized modifications thereto, plus twelve inches (12") outside the vertical concrete lines and twelve inches (12") below base.
  - 2. Pipe trenches to a depth of six inches (6") below the bottom of the bell and for a width equal to the inside diameter of the pipe, plus fifteen inches (15") beyond the inside diameter on each side, provided that overlapping computed volumes of any ledge or boulder excavation shall be paid for only once.
  - 3. Paved areas to the underside of the respective subbase for such areas.
  - 4. Lawns and planting areas to a depth of twenty-four (24") below finished grade.
  - 5. Any foreseen rock or boulder encountered, which must be removed for construction of the work defined on the plans or in modification thereto, shall be measured in its original position to the limits of clearly defined vertical construction lines and to the depth required for the defined construction; payment will be at the unit prices stated above.
- C. BLASTING:
  - 1. The Driller and Geotechnical Engineer shall log the bottom elevation of all drill holes made for blasting within the building area.
  - 2. No blasting shall be done without the Engineer's approval. Written permission and approval of methods must be obtained from the local government authority.
  - 3. Contractor shall, before doing any blasting work, present to the Engineer written certificate of insurance showing evidence that his insurance includes coverage for blasting operations.
  - 4. Experienced powder men or persons who are licensed or otherwise authorized to use explosives shall do blasting. Accurate records shall be maintained, noting location of each blast, time of detonation, total explosive weight in each blast,



maximum explosive weight per delay in each blast hole, and designation of delay cap used in each hole.

5. Explosives shall be stored, overseen, and employed in accordance with state and local regulations, or, in the absence of such, in accordance with the provisions of the Manual of Accident Prevention in Construction of the Associated General Contractors of America, Inc. and in accordance with applicable OSHA regulations.
6. The amount of vibration and air blast overpressure generated by blasting shall not exceed regulatory statutes or directives established by state, local or other governing authorities, such as but not limited to, 527 CMR 13.091. In no case shall the maximum Peak Particle Velocity (PPV) exceed the limits indicated on figure B-1, Appendix B, of the United State Bureau of Mines Report of Investigations, RI8507, 1980 (copy attached). These limits shall apply at all existing and under construction structures, utilities as well as at property and construction limits. (The Engineer may designate lower levels at sensitive structures.)
7. Contractor shall take great care to do no damage to existing buildings, foundations, glazing and trees to remain. All damage caused by Contractor's blasting operations shall be repaired to the full satisfaction of the Engineer at no additional cost to the Owner.

### **3.6 STRIPPING, SCREENING, AND STOCKPILING OF TOPSOIL (LOAM)**

- A. STRIPPING: Prior to starting general excavation or building renovations, all topsoil from areas to be excavated, filled, regraded, and resurfaced shall be stripped to its full depth and stockpiled in approved locations for later reuse. All stockpiled loam shall be protected from wind and water erosion as specified in Section 31 00 01 – Temporary Controls. All stockpiled topsoil shall be evaluated for suitability as loam as specified, performed, and paid for in Section 32 90 00 Planting. If topsoil cannot meet the specifications for loam as specified under the Sections, it may be used as ordinary fill if it meets the requirements as specified. All topsoil that is found under paved areas shall be stripped and either used as fill, if it meets the requirements for fill, or removed from the site and disposed of in a legal manner. Under no condition may topsoil be taken away from the premises without approval by the Owner's Representative. Do not strip without a clear understanding of existing soil, planting, and site conditions to be preserved.
- B. Contractor shall have the existing topsoil evaluated for reuse as loam as specified, performed, and paid for in Section 32 90 00 Planting and submit the results to the Owner's Representative for review. Stockpiled topsoil may be used as general borrow for fill under lawn and landscaped areas provided that the material conforms to the specifications of this Division 2 Section, EARTHWORK, for testing and general borrow.
- C. Loam borrow that is deemed by the Owner's Representative to be suitable for reuse on site as loam shall be mechanically screened through a  $\frac{3}{4}$  inch by 6-inch screen prior to stockpiling operation. Remove and discard all debris left from the screening operation off site in a legal manner.

- D. Topsoil shall be deemed unsuitable and shall be removed from the site and legally disposed if one of the following cannot be achieved:
  - 1. Topsoil which is not suitable for use as general borrow under the work of the Division 2 Section, EARTHWORK.
  - 2. Topsoil which is not suitable for use as loam borrow as specified and evaluated under the requirements of Section 32 90 00 Planting.
- E. Contractor shall not remove existing topsoil from the contract limits of Work without the written approval of the Owner's Representative. The Contractor shall not remove topsoil from the contract limits of Work if forbidden to do so by local Town or City bylaws.

### 3.7 **EXCAVATION, FILLING AND GRADING AROUND TREES**

- A. Excavate within drip line of trees only where indicated or directed. Notify Owner's Representative prior to any excavation.
- B. Maintain existing grade within drip line of trees, unless otherwise indicated.
- C. Place no fill within drip line of existing trees, unless otherwise shown on the Drawings.

### 3.8 **SUBGRADE PREPARATION AND PROTECTION**

#### A. GENERAL

- 1. Complete the excavations to the required subgrade elevations allowing for subbase material, mud mats, bedding layers, plus any additional depth required to accommodate the drainage layer, geotextile, pipes, pavements, sidewalks, etc.
- 2. All subgrades must be observed and accepted by the Engineer prior to placement of Granular Fill, Lean Concrete, or any structure over the subgrade.
- 3. Where noted by the Engineer, backfill all holes or voids encountered outside of minimum excavation limits with materials approved and accepted by the Engineer.
- 4. Backfill all holes and low points that will not otherwise be removed in the course of the work with materials acceptable to the Engineer to the subgrade elevation indicated on the Drawings.

#### B. SOIL SUBGRADES

##### 1. FOUNDATIONS AND SLABS

- a. Soil subgrades below foundations and slabs shall consist of undisturbed, naturally deposited inorganic soils, Drainage Fill, Granular Fill, or Lean Concrete acceptable to the Engineer, which is placed above the natural inorganic soils. Miscellaneous fill, organic soils, debris, and other unsuitable foundation materials, if encountered at subgrade, shall be over-excavated and backfilled with Granular Fill or Lean Concrete.
- b. Excavate materials to 2 ft above the indicated subgrade level by general excavation methods.
- c. Excavate the final 2-ft with smooth-edged bucket equipment. Equipment shall not be operated directly on final soil subgrades. Excavation shall progress until undisturbed naturally deposited inorganic soil is achieved. The surface of the glacial deposits shall be made smooth and cleaned of all disturbed material. Back blading of soil surfaces to smooth disturbed soil will not be permitted.

2. UTILITIES, PAVEMENTS AND SIDEWALKS
  - a. Soil subgrades below utilities shall consist of undisturbed, naturally deposited inorganic soils or compacted imported granular soils that are free of contamination, free of organic matter, stable under proof-compaction, and otherwise suitable to the Engineer. Unsuitable soils or materials present at the subgrade level shall be over-excavated and backfilled with Granular Fill or other materials approved by the Engineer.
- C. BACKFILL SURFACES
  1. Backfill surfaces that become disturbed, contaminated with clay, or otherwise unacceptable to the Engineer shall be removed and replaced with acceptable backfill at no additional cost to the Owner.
- D. COLD WEATHER SUBGRADE PROTECTION
  1. When the atmospheric temperature is less than 32o F, the Contractor shall protect excavation subgrades and Lean Concrete from freezing. Wintry weather subgrade protection may consist of an earth fill cover, hay cover, insulation cover, heating, or other means of protecting the subgrade materials from freezing.
  2. Subgrades that have been permitted to freeze by the Contractor will be judged to be unsuitable for placement of Lean Concrete or Granular Fill by the Engineer. The Contractor at the Contractor's expense shall conduct additional excavation of subgrade soils that have frozen and replacement with materials acceptable to the Engineer.

### 3.9 BACKFILLING

- A. GENERAL
  1. Backfilling activities, including placement and compaction, shall not be performed when air temperatures are at or below 32oF.
  2. Backfill excavations as promptly as work permits, but not until the subgrade, or below grade construction, is acceptable to the Engineer.
  3. Previously placed, and possibly accepted, backfill shall be excavated and replaced at no additional cost if the backfill does not conform to the Contract Documents.
  4. During compaction operations, incidental compaction due to traffic by construction equipment other than that used specifically in compaction operations will not be credited toward the required minimum coverages specified.
  5. Compaction by puddling or flooding is prohibited.
  6. Exercise care in the placement of backfill against walls and directly in contact with waterproofed structures such that stones contained in the backfill do not damage waterproofing.
  7. Repair any damage to waterproofing that occurs during placement and compaction operations at no additional cost to the Owner.
  8. Control groundwater as required to permit efficient collection and removal with minimal disturbance to materials being placed.
  9. Prior to placing backfill materials, complete the specified subgrade preparation.
  10. Placement of fill and backfill shall be systematically conducted in the specified uniform layer thicknesses.

11. Measurement of backfill layer or lift thickness shall be conducted in all cases prior to compaction.
  12. Backfill excavations as promptly as work permits, but not until completion of the following:
    - a. Acceptance by the Engineer of construction below finish grade including, where applicable, damp proofing, waterproofing, utility placements, etc.
    - b. Completion of quality control testing, acceptance by the Engineer and recording locations of underground utilities.
    - c. Removal of concrete formwork unless formwork is specified to remain in place.
    - d. Removal of trash and debris.
- B. BACKFILL MATERIALS
1. Backfill materials brought to the site must be obtained from an approved borrow source(s).
  2. Backfill materials below the lowest level floor slab shall consist of Granular Fill, Lean Concrete, or Drainage Fill.
- C. COMPACTION EQUIPMENT
1. In all cases, the Contractor shall only use compaction equipment that is deemed acceptable by the Engineer.
  2. Compact with a minimum of four coverages of acceptable compaction equipment.
  3. Compaction in open areas shall be conducted with heavy smooth-wheeled vibratory rollers imparting a dynamic force of at least 25,000 lbs., approved by the Engineer.
  4. Compaction in confined areas (against walls, piers, and in trenches) shall be conducted with acceptable equipment such as hand guided vibratory compactors or mechanical tampers as approved by the Engineer.
- D. PLACEMENT, COMPACTION, AND PROTECTION
1. All backfill material shall be placed "in the dry" on subgrades acceptable to the Engineer. The Contractor shall dewater excavated areas as required to perform the work in such a manner as to preserve the undisturbed state of the approved subgrade material.
  2. Backfill materials shall not be placed on snow, ice, frozen subgrades, or uncompacted frozen soil.
  3. Backfill materials shall not be frozen when placed or be allowed to freeze prior to or after compaction, placement, or curing. At the end of each day's work during freezing weather, the last lift of fill, after compaction, shall be followed by a smooth-wheeled roller to eliminate ridges of uncompacted soil.
  4. GRANULAR FILL: Place Granular Fill materials in layers not exceeding 10 in. measured prior to compaction in open areas, and 6 in. in confined areas such as adjacent to footings and pipes. Compact each layer with a minimum of four coverages of the equipment described herein to obtain at least 95 percent of maximum dry density as determined by ASTM Test D1557.

5. DRAINAGE FILL: Place Drainage Fill materials in layers not exceeding 6 in. measured prior to compaction. Compact each layer with a minimum of four coverages of the equipment described herein.
6. ORDINARY FILL: Place in layers not to exceed 12 in. when utilizing heavy compaction equipment and 8 in. when utilizing light hand operated compaction equipment. Compact to at least 92 percent of maximum dry density as determined by ASTM Test D1557.
7. COMPACTION REQUIREMENTS
  - a. The degree of compaction is expressed as a percentage of the maximum dry density at optimum moisture content as determined by ASTM Test D1557, Method C. The compaction requirements are as follows:

Area	Minimum Degree of Compaction
Below Footings	95%
Below Slabs	95%
Pavement base and subbase courses	95%
Detention Basin Berms	95%
General Fill below pavement subbase	90%
Trench backfill (inside bldg.)	95%
Trench backfill (outside bldg.)	
-Below pipe to spring line	95%
-Spring line to 1 ft. above pipe	90%
-1 ft. above pipe to pavement subbase or finish grade	95%
Landscape Areas:	
-Fills within lawn and plating areas within 18" of finished grade	85% (min.) 90% (max)
-Fills within lawn and planting areas on top 18" of finished grade	85% (min.) 90% (max)

\*Compactions percentages are based on the laboratory derived Maximum Density values.

- b. In the case of lawn and planting areas, compaction requirements for subgrades and fills shall be considered minimums and maximums within the density percentages called for, and any over-compaction of subgrades or fills which would be detrimental to lawn or planting objectives shall be corrected by loosening subgrades or fills through tilling or other means and re-compacting to specified compaction limits.
8. MOISTURE CONTROL
  - a. Discontinue backfilling and compaction from November to April (wet season) unless the Contractor demonstrates successful moisture and compaction control techniques to achieve the indicated or specified density requirements.
  - b. Fill material that is too wet for proper compaction shall be harrowed, or otherwise dried to a proper moisture content to allow compaction to the

- required density. If fill cannot be dried within 24 hours of placement, it shall be removed and replaced with drier fill at his expense.
- c. Fill material that is too dry for proper compaction shall receive water uniformly applied over the surface of the loose layer. Sufficient water shall be applied until the optimum moisture content is reached, as determined by the soil testing laboratory, as specified in paragraph 3.5.A.1.
  - d. In no case shall fill be placed over material that is frozen. No fill material shall be placed, spread, or rolled during unfavorable weather conditions. When work is interrupted by heavy rains, fill operations shall not be resumed until the moisture content and the density of the previously placed fill are as specified.
  - e. The Contractor shall continue to compact until the indicated or specified density requirements are achieved.
9. PLACEMENT AND LIFT THICKNESS OF MATERIAL
- a. Distribute material such that stones and lumps do not become nested, causing voids between stones. Distribute such that voids are filled with fine materials regardless of compaction method.
  - b. Deposit and spread material in uniform parallel layers not to exceed 12 inches (12") in thickness when utilizing heavy compaction equipment, and 6 inches (6") when utilizing light hand-operated compaction equipment.
10. TRENCH BACKFILL AND COMPACTION:
- a. Begin backfilling and proceed until completed after the pipes and conduits have been laid, joints have acquired maximum degree of hardness, pipelines and conduits have successfully passed tests and inspections required under their applicable specification sections, and concrete or masonry within the trench have reached their design strength to support all loads.
  - b. Utilize compaction devices which will not damage the pipe, conduit, or structure within the trench.
  - c. Compact material around circumference of pipe by hand tamping 6-inch layers of indicated material in the area between the trench wall and the pipe to meet density requirements stated herein.
  - d. Compact material above the pipe by tamping or mechanical means if trench width is wide enough to accommodate the compaction equipment and if the load from the equipment does not damage the pipe.
11. PROTECTION: Contractor shall not begin backfilling against walls until the walls and support slabs have sufficiently aged to attain the strength required to resist backfill pressures without damage. Contractor shall correct any damage to the structures caused by backfilling at no added cost to the Owner.
12. GEOTEXTILE
- a. Place on approved subgrade in accordance with manufacturer's specifications.

- b. Minimum overlap of adjacent pieces of geotextile shall be 18 in.
- 13. EXTERIOR PERIMETER AND UNDER SLAB DRAINAGE PIPING
  - a. Coordinate with other under slab utilities and set pipe at grade required to ensure adequate flow from the system to the sump(s).
  - b. Perforations of drainage piping shall be free of foreign matter before installing.

### 3.10 GRADING AND COMPACTING

- A. FINE GRADING AND COMPACTING: Shape the subgrade, to a fine surface conforming to the indicated cross section, and compact (granular subgrades only) the top 6 in. to a minimum of 95 percent of the maximum dry density of the subgrade material. Cut down all high spots (exclusive of landscaping drainage sloping), fill depressions and recompact until the surface is smooth and satisfactorily compacted.
- B. GRADING AND FINISHING: In areas designated for grading and finishing, rake or machine grade the areas to remove stones over two inches and other unsatisfactory material; fill depressions and finish the surface within the indicated tolerances.
- C. Unless noted otherwise in the Drawings or specifications, grades at the perimeter of excavated areas shall be gradually sloped down to existing grades.

## Part 4. MEASUREMENT AND PAYMENT

### 4.1 MEASUREMENT

- A. Excavation and Backfilling will not be measured but will be paid for as part of the Base Contract Price and shall include furnishing all material, mobilization, labor, equipment, tools, and incidentals necessary to complete the work shown on the Drawings. No separate measurement or payment will be made for acquisition of permits, backfill, equipment, material disposal, temporary excavation support systems, construction dewatering, exploratory test pits for underpinning (Shoring and Underpinning 31 40 00), stockpiling, police details, material rehandling, surveying, or other associated items or work considered incidental to the conduct the work of this Section.

END OF SECTION 31 23 00

## 31 23 19 DEWATERING

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### Part 1. GENERAL

#### 1.1 SCOPE OF WORK

- A. The Contractor shall prevent surface water and subsurface or groundwater from flowing onto excavations or earthwork areas which would cause flooding of the project site and surrounding area or softening or loosening of the soil at excavation or earthwork subgrade.
- B. The Contractor shall provide adequate and satisfactory dewatering and drainage of excavations and furnish all materials and equipment and do all incidental work required in conjunction with the furnishing, installing, and maintaining of same to permit proper gravel and rock removal operation. The Contractor may choose any satisfactory method

he wishes, subject to the approval of the Owner, for handling groundwater or surface water encountered in the work, provided they perform the dewatering required, and shall assume all responsibility for the adequacy of the methods, materials, and equipment employed. The Contractor shall bear the full cost of providing the dewatering at all times of the year, throughout the construction period, and no additional payment shall be made for this work. The Contractor shall take all precautions necessary to prevent loosening or softening up of the subgrade. In this regard, the Contractor shall always be prepared to alter his construction method or sequence. Dewatering and control of water shall be conducted as necessary to prohibit seepage, groundwater flow or surface infiltration and runoff from in any way undermining or otherwise damaging adjacent structures and utilities.

- C. Pumping equipment and devices to safely remove and dispose of all water entering trenches and excavation for structures shall be provided if required. The grade shall be maintained dry during all gravel and stone removal activities. Existing or new sanitary sewers shall not be used to dispose of drainage.
- D. The Contractor's method of dewatering shall maintain the bottom of the excavation always dry.
- E. In areas adjacent to water courses, the Contractor shall provide the degree of protection against flooding of the excavation that he deems suitable. Should flooding occur, the Contractor shall restore and repair the excavation as required.

**1.2 SUBMITTALS**

- A. Submit to the Owner's ENGINEER a plan describing the method and equipment to be used to dewater and drain site excavations.

**Part 2. PRODUCTS**

- A. (NONE THIS SECTION)

**Part 3. EXECUTION**

**3.1 GENERAL**

- A. Remove water from excavations to prevent softening of the land surface, trenches, and subgrades.
- B. Do not allow water to accumulate in excavations. The Contractor shall, always during construction, provide ample means and devices with which to remove promptly and dispose properly of water entering site, trenches, and excavations.
- C. Drainage shall be adequate to allow proper gravel operation to occur and to allow for the future use of the site as specified.

END OF SECTION 31 23 19

## **32 01 16 FULL-DEPTH RECLAIMED ASPHALT PAVING BASE COURSES**

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**Part 1. GENERAL**

**1.1 DESCRIPTION**



- A. Full-depth reclamation (FDR) shall consist of pulverizing and mixing existing asphalt pavement and base course material, soil, and water (as needed), to produce a dense, hard, treated base. It shall be proportioned, mixed, placed, compacted, and cured in accordance with this specification, and shall conform to the lines, grades, thicknesses, and typical cross sections shown in the plan.

**Part 2. MATERIAL**

**2.1 RECYCLED ASPHALT PAVEMENT (RAP) AND BASE**

- A. Shall consist of the existing asphalt pavement, existing base course material and/or subgrade material. The base course and subgrade material shall not contain roots, topsoil, or any material deleterious to its reaction with cement. The particle distribution of the processed material shall be such that 100% passes a 3-inch (75 mm) sieve, at least 95% passes a 2-inch (50 mm) sieve, and at least 55% passes a No. 4 (4.75 mm) sieve.

**2.2 MIX DESIGN**

- A. Remove samples of RAP and RAM to the specified depth and perform appropriate testing to establish mix design. Submit mix design to the Owner/Representative (O/R) for approval one week before the planned start of work. Approval of the mix design by the O/R is solely for monitoring quality control and in no way releases the Contractor from his responsibilities.
- B. MIX DESIGN DEVELOPMENT. Samples must be obtained inclusive of the depth to be recycled. Sampled materials must be properly processed and prepared to closely simulate field conditions. A Qualified Technical Representative will analyze the samples and provide the following information as part of the mix design to the O/R:
  - 1. Location core samples.
  - 2. Thickness and description of existing pavement and aggregate layers to be reclaimed.
  - 3. A selected matrix of soils testing standards.
    - a. Moisture Content AASHTO T265 - Mechanical and Hydrometer
    - b. Particle Size Analysis of Soils AASHTO T88-90 - Liquid Limit, Plastic Limit AASHTO T89
    - c. Unconfined Compression AASHTO T208 - To be performed only if more than 20% of the underlying subgrade is to be included in the Portland Cement stabilized layer.

**2.3 WATER**

- A. Shall be free from substances deleterious to the hardening of the cement-treated material.

**Part 3. EQUIPMENT**

**3.1 DESCRIPTION**

- A. FDR may be constructed with any machine or combination of machines or equipment that will produce a satisfactory product meeting the requirements for pulverization, water application, mixing, compacting, finishing, and curing as provided in this specification.

### 3.2 MIXING METHODS

- A. Mixing shall be accomplished in place, using single-shaft or multiple-shaft mixers. Agricultural disks or motor graders are not acceptable mixing equipment.

### 3.3 APPLICATION OF WATER

- A. Water may be applied through the mixer or with water trucks equipped with pressure-spray bars. If using the spray bar system, road base shall be pre-wet to obtain optimum moisture content prior to the dispensing of cement.

### 3.4 COMPACTION

- A. The processed material shall be compacted with one or a combination of the following: Tamping or grid roller, pneumatic-tire roller, steel-wheel roller, vibratory roller, or vibrating-plate compactor. The full depth recycled material shall be rolled with a vibratory pad/tamping foot roller and a vibratory steel drum soil compactor. The pad/tamping foot roller drum shall have a minimum of 112 tamping feet 73 mm [3 in] in height, a minimum contact area per foot of 110 cm<sup>2</sup>[17 in<sup>2</sup>], and a minimum width of 2.15 m [84 in]. The vibratory steel drum roller shall have a minimum 2.15 meter [84 in] width single drum.

## Part 4. CONSTRUCTION REQUIREMENTS

### 4.1 PREPARATION

- A. Prior to the start of the reclamation, all utilities and drainage systems shall be relocated, as necessary.
- B. Methods, equipment, tools, and any machinery to be used during construction shall be approved by the Engineer prior to the start of the project. Prior to the actual reclaiming of the roadway, drop inlets or catch basins that might be affected shall be sufficiently barricaded to prevent reclaimed subbase material, silt, or runoff from plugging the drainage system.
- C. Sufficient surface drainage must be provided for each stage of construction so that ponding does not occur on the reclaimed sub-base course prior to the placement of bituminous concrete.
- D. Reclamation shall be accomplished by means of a self-propelled, traveling rotary reclaimer or equivalent machine capable of cutting through existing bituminous concrete pavement to depths of up to 15 inches with one pass. The machine shall be equipped with an adjustable grading blade leaving its path generally smooth for initial compaction. Equipment such as road planers or cold milling machines designed to mill or shred the existing bituminous concrete, rather than crush or fracture it, shall not be allowed.
- E. Existing bituminous concrete pavement and any underlying granular material must be pulverized and mixed to form a homogenous mass of reclaimed sub-base material which will bond together when compacted.
- F. In areas where the vertical or horizontal geometry of the proposed roadway is different than that of the existing, the roadway shall be reclaimed in-place and the reclaimed material sub-base placed in windrows or stockpiled while any filling or excavation is performed. When the proposed sub-grade elevation is achieved, the reclaimed sub-base

material will be placed back onto the roadway in lifts no greater than five (5) inches in depth before being compacted.

- G. Reshaping using the reclaimed sub-base material should be minimized to ensure that the roadway has a uniform thickness of reclaimed sub-base material throughout. Unless otherwise specified, when reshaping of the roadway is required, it should be performed utilizing additional sub-base or processed aggregate base. The reclaimed sub-base material shall be compacted prior to the placement of any additional granular material used (sub-base or processed aggregate base). After the compaction of the reclaimed sub-base material, any reshaped material or additional material placed on the roadway should not exceed five (5) inches in depth before being compacted.
- H. The reclaimed sub-base material shall be compacted to the requirements above prior to the placement of traffic on the roadway.
- I. A motor grader shall be used for shaping, fine grading, and finishing the surface of the reclaimed material or any other granular materials placed to form the surface prior to paving.
- J. Any surface irregularities which develop during or after the above-described work shall be corrected until it is brought to a firm and uniform surface satisfactory to the Engineer.

#### 4.2 **MIXING AND PLACING**

- A. FDR processing shall not commence when the soil aggregate or subgrade is frozen, or when the air temperature is below 40°F (4°C). Moisture in the base course material shall not exceed the quantity that will permit a uniform and intimate mixture of the pulverized asphalt and base material and shall be within 2% of the optimum moisture content for the processed material at start of compaction.

#### 4.3 **SCARIFYING**

- A. Initial pulverization or scarification may be required to the full depth of mixing. Scarification or pre-pulverization is a requirement for the following condition when the processed material is more than 3% above or below optimum moisture content. When the material is below optimum moisture content, water shall be added. The pre-pulverized material shall be sealed and properly drained at the end of the day or if rain is expected.

#### 4.4 **MIXING**

- A. Mixing shall continue until a uniform mixture is produced. The mixed material shall meet the following gradation conditions:
  - 1. The final mixture (bituminous surface, granular base, and sub-grade soil) shall be pulverized such that 100% passes the 3-inch (75 mm) sieve, at least 95% passes the 2- in. (50 mm) sieve, and at least 55% passes the No. 4 (4.75 mm) sieve. No more than 50% of the final mixed material shall be made of the existing bituminous material unless approved by the engineer and included in a mixture design. Additional material can be added to the top or from the sub-grade to improve the mixture gradation if this material was included in the mixture design.
  - 2. The final pulverization test shall be made at the conclusion of mixing operations. Mixing shall be continued until the product is uniform in color, meets gradation

requirements, and is at the required moisture content throughout. The entire operation of spreading, water application, and mixing shall result in a uniform pulverized asphalt, soil, cement, and water mixture for the full design depth and width.

#### 4.5 **COMPACTION**

- A. The processed material shall be uniformly compacted to a minimum of 98% of maximum density based on a moving average of five consecutive tests with no individual test below 98%. Field density of compacted material can be determined by nuclear method in the direct transmission mode (ASTM D 2922, AASHTO T 310), sand cone method (ASTM D 1556, AASHTO T 191), or rubber balloon method (ASTM D 2167). Optimum moisture and maximum density shall be determined prior to start of construction and in the field during construction by a moisture-density test (ASTM D 558 or AASHTO T 134).
- B. At the start of compaction, the moisture content shall be within 2% of the specified optimum moisture. No section shall be left undisturbed for longer than 30 minutes during compaction operations. All compaction operations shall be completed within 2 hours from start of mixing.

#### 4.6 **FINISHING**

- A. As compaction nears completion, the surface of the FDR material shall be shaped to the specified lines, grades, and cross sections. If necessary or as required by the engineer, the surface shall be lightly scarified or broom-dragged to remove imprints left by equipment or to prevent compaction planes. Compaction shall then be continued until uniform and adequate density is obtained.
- B. During the finishing process the surface shall be kept moist by means of water spray devices that will not erode the surface. Compaction and finishing shall be done in such a manner as to produce a dense surface free of compaction planes, cracks, ridges, or loose material. All finishing operations shall be completed within 4 hours from start of mixing.

#### 4.7 **CURING**

- A. Finished portions of the FDR base that are traveled on by equipment used in constructing an adjoining section shall be protected in such a manner as to prevent equipment from marring or damaging completed work.
- B. After completion of final finishing, the surface shall be cured by application of a bituminous or other approved sealing membrane, or by being kept continuously moist for a period of 7 days with a water spray that will not erode the surface of the FDR base. If curing material is used, it shall be applied as soon as possible, but not later than 24 hours after completing finishing operations. The surface shall be kept continuously moist prior to application of curing material.
- C. For bituminous curing material, the FDR base surface shall be dense, free of all loose and extraneous materials, and shall contain sufficient moisture to prevent excessive penetration of the bituminous material. The bituminous material shall be uniformly applied to the surface. The exact rate and temperature of application for complete coverage, without undue runoff, shall be specified by the engineer.

- D. Should it be necessary for construction equipment or other traffic to use the bituminous-covered surface before the bituminous material has dried sufficiently to prevent pickup, sufficient sand cover shall be applied before such use.

#### 4.8 TRAFFIC

- A. Completed portions of FDR base can be opened immediately to low-speed local traffic and to construction equipment, provided the curing material or moist curing operations are not impaired, and provided the FDR base is sufficiently stable to withstand marring or permanent deformation. The section can be opened to all traffic after the FDR base has received a curing compound or subsequent surface and is sufficiently stable to withstand marring or permanent deformation. If continuous moist curing is employed in lieu of a curing compound or subsequent surfacing within 7 days, the FDR base can be opened to all traffic after the 7-day moist curing period, provided the FDR base has hardened sufficiently to prevent marring or permanent deformation.

#### 4.9 SURFACING

- A. Subsequent pavement layers (asphalt, chip-seal, or concrete) can be placed any time after finishing, if the surface is sufficiently stable to support the required construction equipment without marring or permanent distortion of the surface.

#### 4.10 MAINTENANCE

- A. The contractor shall maintain the FDR material in good condition until all work is completed and accepted. Maintenance shall include immediate repairs of any defects that may occur. If it is necessary to replace any processed material, the replacement shall be for the full depth, with vertical cuts, using FDR material. No skin patches will be permitted.

### Part 5. INSPECTION AND TESTING

#### 5.1 DESCRIPTION

- A. The contractor shall make such inspections and tests as deemed necessary to ensure the conformance of the work to the contract documents. These inspections and tests may include, but shall not be limited to:
  1. Recycling operations including recycling speed, yield monitoring, monitoring treatment depth, procedures for avoiding recycling and curing in inclement weather, methods to ensure that segregation is minimized, procedures for mix design modification, grading and compacting operations, and cement application procedure.
  2. Density testing recycled material will be performed using the nuclear method. Only those materials, machines, and methods meeting the requirements of the contract documents shall be used unless otherwise approved by the engineer.
  3. All testing of processed material or its individual components, unless otherwise provided specifically in the contract documents, shall be in accordance with the latest applicable ASTM or AASHTO specifications in effect as of the date of advertisement for bids on the project.

## 32 01 26 ASPHALT OVERLAY

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### Part 1. GENERAL

#### 1.1 SCOPE OF WORK

- A. This Section specifies the requirements for scarifying, grinding, sweeping and repair of existing asphalt concrete pavement to establish a base course and provide a new asphalt surface course to the lines, grades and elevations as determined from the drawings and in accordance with these specifications.

#### 1.2 APPLICABLE PUBLICATIONS

- A. The following publications of the latest issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the references thereto:
- B. Massachusetts Department of Transportation Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges (MDOT).
  - 1. Item 247 - Flexible Base
  - 2. Item 300 - Asphalts, Oils and Emulsions
  - 3. Item 302 – Aggregates for Surface Treatments
  - 4. Item 310 – Prime Coat
  - 5. Item 320 – Equipment for Asphalt Concrete Pavement
  - 6. Item 340 – Dense Graded Hot Mix Asphalt
  - 7. Item 292 – Asphalt Treatment (Plant Mix)
- C. American Society for Testing and Materials Standards (ASTM)
  - 1. D 698 - Moisture Density Relations of Soil Using 5.5 Pound Rammer and 12 Inch Drop.
  - 2. D 8-02 – Standard Terminology Relating to Materials for Road Pavements
- D. Massachusetts Department of Transportation Test Procedures
  - 1. MA 207-F – Determining Density of Compacted Bituminous Mixtures
  - 2. MA 227-F – Theoretical Maximum Specific Gravity of Bituminous Mixtures
  - 3. MA 227-F – Theoretical Maximum Specific Gravity of Bituminous Mixtures

#### 1.3 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 31 22 19 Finish Grading
- B. Section 02 10 00 Site Preparation
- C. Section 32 17 23 Pavement Markings

#### 1.4 DEFINITIONS

- A. Hot-Mix Asphalt Paving Terminology: Refer to ASTM D 8 for definitions of terms.

#### 1.5 SUBMITTALS

- A. Product Data: For each type of product indicated. Include technical data and evaluated physical and performance properties.

- B. Material Certificates: For each paving material, signed by manufacturers.

## 1.6 **QUALITY ASSURANCE**

### A. Manufacturer Qualifications:

1. Manufacturer shall be a paving-mix manufacturer registered with and approved by authorities having legal control or if none exists, the DOT of the state in which Project is located.

## 1.7 **PROJECT CONDITIONS**

### A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp or if the following conditions are not met:

1. Prime and Tack Coats: Minimum surface temperature of 60 deg F.
2. Slurry Coat: Comply with weather limitations of ASTM D 3910.
3. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
4. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

## **Part 2. PRODUCTS**

### 2.1 **ASPHALTIC MATERIALS**

#### A. Asphaltic material shall conform to the applicable requirements of MDOT Item 300.

1. Asphalt cement shall be AC-20.
2. Prime coat shall be MC-250 or as directed by the Engineer.
3. Tack coat shall be CSS-1, CSS-1h, RS-1, or CRS-1 as directed by the Engineer.

### 2.2 **MINERAL AGGREGATES**

#### A. The coarse aggregate, fine aggregate, and mineral filler shall conform to the requirements of MDOT Item 340 article 340.2.A.1 Coarse Aggregate, 340.2.A.3 Fine Aggregate and 340.2.B Mineral Filler

### 2.3 **ADDITIONAL BASE MATERIAL**

#### A. Additional Crushed Limestone required per section 3.3.B below shall conform to the following requirements:

1. Table 1 in MDOT Item 247.2.A Aggregate for Grade 2 when constructing roadways and Grade 3 when constructing parking lots.
2. Test results: Maximum Liquid Limit = 40; Maximum Plasticity Index = 12
3. Materials must be Crushed stone produced and graded from oversize quarried aggregate that originates from a single, naturally occurring source. Do not use gravel or multiple sources.

### 2.4 **SURFACE COARSE AGGREGATE**

#### A. Surface coarse aggregate material shall be composed of clean, tough, and durable particles of gravel, crushed gravel or crushed stone meeting the sieve analysis requirements of MDOT Item 302 "Type D."

### 2.5 **EQUIPMENT**

- A. All equipment necessary to perform the work within the scope of this Section shall conform to requirements of Item 320, MDOT.

## 2.6 WATER

- A. Water used for mixing or curing shall be reasonably clean and free of oil, salt, acid, alkali, sugar, vegetable matter or other substances injurious to the finished product.
- B. Water sources other than the local municipal domestic water supply must be approved by the Owner.
  - 1. If onsite reclaimed water sources are used, tanks and apprenices must be clearly marked with the words "non-potable" water.

## Part 3. EXECUTION

### 3.1 GENERAL

- A. The equipment to be provided for the recycling and stabilization of the material specified herein shall include but not be limited to the following:
- B. Recycling Unit: The recycling unit shall be a self-propelled unit consisting of a variable speed rotor equipped with a minimum of 100 removable cutting teeth. The rotor shall have a minimum cutting width of 72 inches and a minimum cutting depth of 9 inches.
- C. Compaction Equipment: The compaction equipment used to compact the stabilized material shall consist of approved rollers including pneumatic, steel wheel, and vibratory sheepsfoot of sufficient compactify effort to attain the required density requirements.
- D. Water Placement Equipment: The equipment used to add water to the mixed material shall include spray bars or other distribution devices which will insure even distribution of water across the surface of the mixture. The equipment shall have adequate capacity to distribute the water during one application.

### 3.2 EROSION PROTECTION

- A. There shall be always adequate protection to newly graded areas to prevent soil erosion as provided in Section 31 25 13 Erosion and Sedimentation Control.
- B. Soil erosion that occurs prior to acceptance of the work shall be repaired at no expense to the Owner.

### 3.3 CONSTRUCTION METHOD

- A. Prior to the start of the milling/mixing operations the pavement surface shall be cleaned of any loose materials and all vegetation. This shall be accomplished by blading and sweeping.
- B. All asphalt and base material where specified shall be removed and relocated to a stockpile area. Additional base material consisting of crushed limestone per section 2.2 above as required shall be added to the stockpiled mix. The limestone material shall be thoroughly mixed with the stockpiled material to a uniform gradation throughout the mixture.
- C. The completely mixed composite base material shall then be relocated to its original location after the subgrade has been lime stabilized per Section 31 32 13.19 "Lime Stabilization." Water shall be added during this operation until the optimum moisture content has been reached. The water shall be introduced into the mixture and shall be uniformly mixed throughout the material.



- D. The base material shall be compacted as described in MDOT ITEM 247 Flexible Base per article 247.4.C Compaction using Density Controls.
- E. Degree of finish:
  - 1. The surface of the completed pavement will be checked longitudinally and transversely for smoothness with a 10-foot straightedge.
  - 2. The surface shall not vary more than 1/4" in 16 feet. Correct by loosening, adding, or removing material, reshaping and recompacting in accordance with part C above.
- F. Base course shall be allowed to cure until the moisture content is at least 2 percentage points below optimum before applying the next successive course or prime coat.
- G. Contractor shall take particular care in working around underground electrical conduit for parking lot lights.

### 3.4 ASPHALTIC STABILIZED BASE

- A. Before any material is placed, the subgrade and subgrade material shall be approved by the Owner. Subgrade fill material shall conform to the specifications for select fill as outlined in Site Grading Section 31 22 13, Article \*2.2. A.2, \* prepared and placed to the lines and grades shown on the plans. This does not preclude using site soils if they can be made to meet these specifications. Subgrade must be compacted to 95% of standard density in accordance with Section 31 22 13 before placing any base material. Where required by these specifications or as shown on the plans, the subgrade shall be stabilized with lime or cement.
- B. Asphaltic stabilized base course shall be stockpiled, stored, proportioned, mixed, and applied in accordance with Article 340.4 Item 340, MDOT.
- C. A tack coat of 0.05 to 0.15 gallons per square yard of surface shall be applied on each layer of the black base course and allowed to cure before placing the succeeding course.
- D. The asphaltic stabilized base material shall be spread and shaped to a thickness and cross section that will provide the required thickness and section after compaction.
- E. Compacting and finishing shall be accomplished as follows:
  - 1. The mix shall be compacted immediately after placing.
  - 2. Initial rolling with a steel-wheeled tandem roller, steel three-wheeled roller, or a pneumatic-tired roller shall follow the paver as close as possible.
  - 3. Intermediate rolling with a pneumatic-tired roller shall follow the paver as close as possible.
  - 4. Final rolling shall eliminate marks from previous rolling.
  - 5. Initial, Intermediate and Final rolling pattern input can be obtained from Testing Laboratory to meet compaction and density requirements stated below.
  - 6. In areas too small for the roller, a vibrating plate compactor or a hand tamper shall be used to achieve thorough compaction.
  - 7. Compaction with Density Control shall meet requirements stated in MDOT Item 292.4.E
  - 8. Target density will be determined by taking the average density of five laboratory- prepared specimens collected at random from trucks delivering the mixture to the job site. A bulk sample must be taken at least every 300 tons or at a minimum of 1 per day.

9. Samples will be evaluated in accordance with MA 207-F, MA 222-F and MA 227-F and test results shall be reported the same day the tests are made.
- F. DEGREE OF FINISH:
1. The surface of the completed pavement will be checked longitudinally and transversely for smoothness with a 10-foot straightedge.
  2. The surface shall not vary more than 1/8" in 10 feet.
- G. Base course shall be allowed to cure for a minimum of 72 hours prior to asphalt surfacing.

### 3.5 ASPHALT SURFACE COURSE

- A. Asphalt surface course shall be applied in accordance with Article 340.4, Item 340, MDOT.
- B. Prior to the application of the prime coat, the prepared base shall be cleaned of all foreign or objectionable matter with power blowers, power brooms, or hand brooms as required.
- C. Prime coat shall be applied to the base at a rate ranging from 0.2 to 0.5 gallons per square yard of surface.
- D. Prime coat shall be applied in accordance with Item 310, MDOT.
1. Material shall be as specified in paragraph \*2.1 ASPHALTIC MATERIALS\*.
  2. Application temperature 100 degrees F.
- E. A tack coat of 0.05 to 0.15 gallons per square yard of surface shall be applied on each layer of the surface course and allowed to cure before placing the succeeding course.
- F. Compacting and finishing shall be accomplished as follows:
1. The mix shall be compacted immediately after placing.
  2. Initial rolling with a steel-wheeled tandem roller, steel three-wheeled roller, or a pneumatic-tired roller shall follow the paver as close as possible.
  3. Intermediate rolling with a pneumatic-tired roller shall follow the paver as close as possible.
  4. Final rolling shall eliminate marks from previous rolling.
  5. In areas too small for the roller, a vibrating plate compactor or a hand tamper shall be used to achieve thorough compaction.
  6. Compaction with Air Void Control shall meet requirements stated in MDOT Item 340.4.H
  7. Target density will be determined by taking the average density of five laboratory- prepared specimens collected at random from trucks delivering the mixture to the job site. A bulk sample must be taken at least every 300 tons or at a minimum of 1 per day.
  8. Samples will be evaluated in accordance with MA 207-F, MA 222-F and MA 227-F and test results shall be reported the same day the tests are made.
  9. The surface of the completed pavement will be checked longitudinally and transversely for smoothness with a 10-foot straightedge.
  10. The surface shall not vary more than 1/8" in 10 feet.

### 3.6 TESTING AND INSPECTION

- A. Contractor shall notify Owner's testing laboratory 24 hours in advance of beginning any earth work operations and coordinate testing schedules to meet these specifications.
- B. BASE COURSE TESTING

1. Maximum density tests per ASTM D 698-07e1 shall be taken on all fill materials at a rate of one test for every 100 cubic yards of fill.
  2. Field density tests per ASTM D 1556-07 shall be taken on all fill material at a rate of one test for every 100 cubic yards of fill.
  3. All imported fill material shall be approved prior to importing.
  4. Contractor shall provide certifications from the Owner approved testing laboratory that the specified quantity of cement has been provided.
  5. Payment of all pay requests will not be made until specified tests are submitted to the Owner.
- C. SURFACE COURSE TESTING
1. Samples will be evaluated in accordance with MA 207-F, MA 222-F and MA 227-F and test results shall be reported the same day the tests are made.

### 3.7 DUST ABATEMENT

- A. The Contractor shall comply with applicable Federal, State, and local laws and regulations concerning the prevention and control of dust pollution.
- B. During the performance of the work required by these specifications or any operations appurtenant thereto, whether on right-of-way provided by the Owner or elsewhere, the Contractor shall furnish all the labor, equipment, materials, and means required, and shall carry out proper and efficient measures wherever and as often as necessary to reduce the dust nuisance, and to prevent dust which has originated from his operations from damaging crops, orchards, cultivated fields, and dwellings, or causing a nuisance to persons. The Contractor will be held liable for any damage resulting from dust originating from his operations under these specifications.
- C. Dust Control shall be accomplished by one of the following methods:
  1. Whenever ordered by the Owner, the Contractor shall furnish and distribute over the traveled road surfaces, which have not yet been fully restored, an application of Calcium Chloride. The material used shall be Regular Flake Calcium Chloride having a minimum chemical content of Calcium Chloride of 77%. Unless otherwise specified or ordered by the Owner, rate of application shall be three (3) pounds per square yard of surface covered.
  2. Whenever ordered by the Owner, the Contractor shall apply on traveled road surfaces "Bituminous Surface Treatment" in accordance with the current Massachusetts Standard Specifications for Construction of Highways, Streets and Bridges.
- D. The cost of sprinkling or of other methods of reducing formation of dust shall be included in the prices bid in the schedule for other items of work.

END OF SECTION 32 01 26

## 32 11 00 BASE COURSES

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### Part 1. GENERAL

#### 1.1 DESCRIPTION

- A. This Section specifies requirements for the preparation and placement of granular pavement subbase and base materials. These subbase and base shall consist of approved granular materials placed on the subgrade and in close conformity with the lines and grades on the plans or established by the Engineer.
- B. The work includes:
  - 1. Fine grading and compaction of pavement subgrade.
  - 2. Furnishing, placing, and compacting of subbase and base materials.
  - 3. Producing a stabilized base course and/or sub-base through the recycling of the existing pavement structure and a specified depth of acceptable sub-base material. This combination of pavement and sub-base material is to be uniformly crushed, pulverized, and blended, then spread, graded, and compacted to the lines and grades shown on the plans or established by the Engineer.

## 1.2 RELATED SECTIONS

- A. Other specification sections that directly relate to the work of this Section include:
  - 1. Section 31 00 00 - Earthwork
  - 2. Section 32 12 00 – Flexible Pavement
  - 3. Section 03 30 00 - Site Cast-in-Place Concrete

## Part 2. PRODUCTS

### 2.1 GRAVEL SUBBASE AND BASE

- A. Gravel Borrow shall conform to the requirements for Gravel Fill of Section 31 00 00 – Earthwork. Largest stone size shall be 2-inches.

### 2.2 DENSE GRADED CRUSHED STONE SUBBASE AND BASE

- A. Dense Graded Crushed Stone shall conform to the requirements for Dense Graded Crushed Stone of Section 31 00 00 – Earthwork.

## Part 3. EXECUTION

### 3.1 SUBGRADE PREPARATION

- A. All subsurface utility construction shall be completed before fine grading is begun.
- B. The pavement and curb subgrade shall be fine graded to the location, elevations and cross slope shown on the Drawings.
- C. Subgrades in in-situ soils in excavation areas and in embankment areas shall be compacted in conformance with Section 31 00 00 - Earthwork.

### 3.2 SUBBASE MATERIAL PLACEMENT

- A. Subbase material shall not be placed until the Engineer has approved the fine grading, compaction, and condition of the subgrade.
- B. Subbase material shall be placed and spread on the approved subgrade in layers not exceeding four inches in thickness by approved self-spreading equipment. Any displacement of the compacted subgrade material by the equipment shall be restored to the required grade and recompacted before placement of the subbase material.
- C. Subbase material shall be compacted conformance with Section 31 00 00 - Earthwork.

- D. The surface of the subbase material shall be fine graded to the location, elevations and cross slope shown on the Drawings during final layer compaction operations.

### 3.3 **BASE MATERIAL PLACEMENT**

- A. Base material shall not be placed until the Engineer has approved the fine grading, compaction, and condition of the subbase material.
- B. Base material shall be spread on the approved subbase in layers not exceeding four inches in thickness by approved self-spreading equipment. Any displacement of the subbase material by equipment shall be restored to the required grade and recompact before of the base material.
- C. Base material shall be compacted in conformance with Section 31 00 00 - Earthwork.
- D. The surface of the base material shall be fine graded to the proposed location, elevations and cross slope shown on the Drawings during final layer compaction operations.

END OF SECTION 32 11 00

## **32 12 00 FLEXIBLE PAVING**

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### **Part 1. GENERAL**

#### 1.1 **SECTION INCLUDES**

- A. Bituminous concrete wearing and binder course paving
- B. Aggregate base course.

#### 1.2 **RELATED SECTIONS**

- A. Section 02 10 00- Site Preparation
- B. Section 31 00 00 – Earthwork
- C. Section 31 22 19 – Finish Grading

#### 1.3 **REFERENCES**

- A. ASTM D946 Penetration Graded Bituminous Cement for Use in Pavement Construction.
- B. TBI (The Bituminous Institute) MS 2 Mix Design Methods for Bituminous Concrete and Other Hot Mix Types.
- C. TBI (The Bituminous Institute) MS 3 Bituminous Plant Manual.
- D. TBI (The Bituminous Institute) MS 8 Bituminous Paving Manual.

#### 1.4 **QUALITY ASSURANCE**

- A. Perform Work in accordance with the Standard Specifications as specified herein.
- B. Obtain materials from same source throughout.

#### 1.5 **ENVIRONMENTAL REQUIREMENT**

- A. Do not place Bituminous when ambient air or base surface temperature is less than 40 degrees F or surface is wet or frozen.
- B. Place bitumen mixture when temperature is not more than 15 F degrees below bitumen suppliers bill of lading and not more than maximum specified temperature.

### **Part 2. PRODUCTS**

**2.1 MATERIALS**

- A. Binder course shall be Class I Bituminous Concrete Binder Course in accordance with M3.11 of the Standard Specifications.
- B. Wearing (top) course shall be Class I Bituminous Concrete Top Course in accordance with M3.11 of the Standard Specifications.
- C. Aggregate base Course (Gravel base) shall be Gravel Borrow conforming to MHDSSHB Specification Section M1.03.0, Type b. Alternatively, The contractor may utilize pulverized asphalt pavement material for the aggregate base provided the material meets the gradation analysis specified below:

Sieve Designation	Percentage by Passing Weight
3"	100
1-1/2"	70-100
3/4"	55-90
#4	40-75
#40	10-30
#200	0-10
Residual Asphalt Content	2-4

**Part 3. EXECUTION**

**3.1 EXAMINATION**

- A. Verify that compacted subgrade is dry and ready to support paving and imposed loads.
- B. Verify gradients and elevations of subgrade are correct.

**3.2 GRAVEL BASE**

- A. See Section 32 11 00 –for placement of Aggregate Base for work of this section.

**3.3 PLACING BITUMINOUS CONCRETE PAVEMENT**

- A. Pavement shall be laid in accordance with Section 460 of the Standard Specifications and shall be laid in two (2) courses with minimum depths, as shown in the drawings.
- B. Binder Course shall be the first course laid with a depth as shown on the drawings.
- C. Wearing Course shall be the second course laid with a depth as shown on the drawings.
- D. Compact pavement by rolling. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.

**3.4 TOLERANCES**

- A. Driveway area: 1/4" in 10'-0"

**3.5 PROTECTION**

- A. Immediately after placement, protect pavement from mechanical injury for 2 days or until surface temperature is less than 140 degrees F (60 degrees C).
- B. All street castings shall be protected during construction. Upon satisfactory placement of road base, the castings shall be reset and adjusted to the proper grade and alignment consistent with the finished roadway surface. A full bed of mortar shall be placed around

the castings after the final setting. Mortar (shall not be) placed for this purpose within 3” of the proposed finished surface.

END OF SECTION 32 12 00

## 32 16 13 CONCRETE CURBING

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### Part 1. GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions, are hereby made a part of this Section.

#### 1.2 SUMMARY

- A. This Section specifies requirements for precast concrete curb.
- B. The work includes:
  - 1. Furnishing and installing precast concrete curb.
  - 2. All associated items and operations required to complete the installations, including surface preparation, concrete support, jointing and finishing.
- C. Related Work: The following Sections contain work related to this Section:
  - 1. Section 02 10 00 Site Preparation
  - 2. Section 31 00 00 Earthwork
  - 3. Section 32 11 00 Base Courses
  - 4. Section 32 11 00 Flexible Paving

#### 1.3 REFERENCE STANDARDS

- A. All work done under this contract shall be in conformance with the Commonwealth of Massachusetts Department of Transportation Standard Specifications for Highways and Bridges dated 2023(MDTSSHB); the 2017 Construction Standard Details, the 1996 Construction and Traffic Standard Details (as relates to traffic standard details only); the 2009 Manual on Uniform Traffic Control Devices with Massachusetts Amendments; the 1990 Standard Drawings for Signs and Supports; the 1968 Standard Drawings for Traffic Signals and Highway Lighting; the latest edition of American Standard for Nursery Stock; and the Contract Drawings and these Contract Specifications.
- B. References herein are made in accordance with the following abbreviations and, all work under this Section shall conform to the latest editions as applicable.
- C. ACI 304<sup>®</sup>Recommended Practice for measuring, mixing, transporting and placing concrete.
- D. ANSI/ASTM D1751<sup>®</sup>Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).
- E. ANSI/ASTM D1752<sup>®</sup>Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
- F. ASTM C33<sup>®</sup>Concrete Aggregates.
- G. ASTM C94<sup>®</sup>Ready-Mixed Concrete.
- H. ASTM C150<sup>®</sup>Portland Cement.

- I. ASTM C260 Air-Entraining Admixtures for Concrete.
- J. ASTM C309 Liquid Membrane-Forming Compounds for Curbing Concrete.
- K. ASTM C494 Chemical Admixtures for Concrete.
- L. Except as otherwise specified herein, the current Standard Specifications for Highways and Bridges, including all addenda, issued by the Commonwealth of Massachusetts, Department of Public Works (MassHighway Standard Specifications) shall apply to materials and workmanship required for the work of this Section.

#### 1.4 SUBMITTALS

- A. Submit Shop Drawings and Manufacturer's literature for curb, indicating size, shape and dimensions, finish and setting method for Engineer's approval.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Curbing 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.

#### 1.6 WARRANTIES

- A. Attention is directed to provisions of the CONDITIONS OF CONTRACT and applicable parts of Division 1 regarding guaranties and warranties.
- B. Manufacturers shall provide their standard guaranties for work specified in this Section. However, such guaranties shall be in addition to and not in lieu of all other liabilities which manufacturers and Contractor may have by law or by other provisions of the Contract Documents.

## Part 2. PRODUCTS

### 2.1 PRECAST CONCRETE CURB

- A. Precast concrete curbing shall conform to the current edition of the Commonwealth of Massachusetts Department of Transportation Standard Specifications for Highways and Bridges (MDTSSHB). Precast concrete curbing shall be as specified in Section M4.02.14.
- B. All precast curb with radius of 100 foot or less shall be formed to the radius shown on the Drawings.
- C. Precast concrete curb units shall be rub finished:
  - 1. After the concrete has properly hardened, the exposed surfaces shall be rubbed with a #16 carborundum stone or an approved abrasive to fully remove laitance and sand grain finish. No cement shall be used in the rubbing process.
  - 2. The finish of the units shall be uniform and shall conform to those of adjacent work in their final position.
- D. Precast concrete curb sections shall be furnished with sockets in each end to receive dowels to maintain the horizontal and vertical alignment of the curb. The dowel socket shall be 11/16 inch by 2-1/2 inches. 5/8 inch by 4 inch dowels shall be provided.

### 2.2 TRANSITION SECTIONS

- A. Horizontal transition sections shall be provided at all locations where curb sections change (i.e., vertical to sloped). Vertical transition sections shall also be provided for



precast curb sections at accessible ramps. Vertical transition sections for granite curb shall be made as shown on the Drawings.

### 2.3 CEMENT MORTAR

- A. Cement mortar shall be composed of one part Portland Cement and two parts of sand by volume with sufficient water to form a workable mix. Cement shall be Portland Cement Type II.

## Part 3. EXECUTION

### 3.1 PRECAST CONCRETE CURB INSTALLATION

- A. Precast units delivered to the site shall be inspected for damage, unloaded and placed along the prepared curb trench, or other designated location, with the minimum amount of handling.
  - 1. Materials shall be handled in a manner that prevents damage to the curb units.
  - 2. All individual pieces of curved curbing shall be marked to correspond to the radius and location where curbing is to be set.
- B. EXCAVATION
  - 1. The trench for curb shall be excavated to a width of 18 inches. The gravel base shall be placed in the excavated area, compacted, and graded to above the proposed curb subgrade.
  - 2. The subgrade of the trench shall be a depth below the proposed finished grade of the curb equal to 6 inches plus the depth of the curbstone.
- C. Precast concrete curb units shall be doweled together continuously to the line and grade shown on the Drawings. Any units damaged during setting operations shall be removed and replaced.
- D. After the curb is set, the trench shall be backfilled immediately with approved material. The first layer shall be 4 inches in depth and compacted. The other layers shall be not more than 6 inches in depth and compacted until the trench is filled. Care shall be taken to prevent disturbing the line or grade of the curb during this procedure.

END OF SECTION 32 16 13

## 32 17 23 PAVEMENT MARKINGS

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### Part 1. GENERAL

#### 1.1 SUMMARY

- A. Section includes:
  - 1. Temporary or permanent painted pavement markings, including but not limited shoulder lines, stop bars, crosswalks, parking stalls, lane arrows, and painting of paved islands or medians.
  - 2. Maintaining access for vehicular and pedestrian traffic as required for other construction activities. Utilize barricades as required.
- B. Contractor shall coordinate work between all Subcontractors, sections, and trades required for the proper completion of the work.

- C. Contractor is responsible for all health and safety.

## 1.2 SUBMITTALS

- A. Submit material specifications and shop drawings for all materials furnished under this Section.
- B. Submit material certificates signed by the material producer and Contractor, certifying that materials comply with these Specifications.

## 1.3 REFERENCES

- A. Reference herein to any technical society, organization, group, or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.
- B. State of Massachusetts Department of Transportation (MDOT)
  - 1. Standard Specifications for Roads, Bridges and Incidental Construction, Form 816, 2004 and any supplements.
- C. Code of Federal Regulations (CFR)
  - 1. 29 CFR 1926, Safety and Health Regulations for Construction
- D. American Society for Testing and Materials (ASTM)
  - 1. ASTM C501 - Standard Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser.
  - 2. ASTM D211 - Standard Specification for Chrome Yellow and Chrome Orange Pigments.
  - 3. ASTM D476 - Standard Classification for Dry Pigmentary Titanium Dioxide Products.
  - 4. ASTM D562 - Standard Test Method for Consistency of Paints Measuring Krebs Unit (KU) Viscosity Using a Stormer-Type Viscometer.
  - 5. ASTM D605 - Standard Specification for Magnesium Silicate Pigment (Talc).
  - 6. ASTM D638 - Standard Test Method for Tensile Properties of Plastics.
  - 7. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics.
  - 8. ASTM D711 - Standard Test Method for No-Pick-Up Time of Traffic Paint.
  - 9. ASTM D869 - Standard Test Method for Evaluating Degree of Settling of Paint.
  - 10. ASTM D1475 - Standard Test Method for Density of Liquid Coatings, Inks, and Related Products.
  - 11. ASTM D1763 - Standard Specification for Epoxy Resins.
  - 12. ASTM D2240 - Standard Test Method for Rubber Property- Durometer Hardness
  - 13. ASTM D2486 - Standard Test Methods for Scrub Resistance of Wall Paints.
  - 14. ASTM D4060 - Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.
  - 15. ASTM D4505 - Standard Specification for Preformed Retroreflective Pavement Marking Tape for Extended Service Life.
  - 16. ASTM E303 - Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester.
  - 17. ASTM G153 - Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials.
- E. American Association of State High and Transportation Officials (AASHTO)

1. AASHTO M 247 - Standard Specification for Glass Beads Used in Traffic Paints.
- F. American Concrete Institute
  1. ACI 503R - Use of Epoxy Compounds with Concrete.
- G. United States General Services Administration, Federal Specifications.
  1. Federal Specification TT-P-1952D - Paint, Traffic and Airfield Marking, Water Emulsion Base.
- H. United States General Services Administration, Federal Standards.
  1. Federal Standard No. 595 - Colors Used in Government Procurement.

#### 1.4 **QUALITY ASSURANCE**

- A. Use adequate numbers of skilled workers who are trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods required for proper performance of the work in this Section. Use equipment of adequate size, capacity, and quantity to accomplish the work of this Section in a timely manner.
- B. Contractor shall furnish one technical expert, who shall be fully knowledgeable about all equipment operations and application techniques, to oversee the work of this Section.

## **Part 2. PRODUCTS**

### 2.1 **WATERBORNE PAVEMENT MARKING PAINT**

- A. GENERAL
  1. White and yellow fast-drying waterborne pavement marking paint, low VOC, ready-mixed, one component, 100 percent acrylic, Federal Specification TT-P-1952D.
  2. Paint shall be capable of being applied with paint striping equipment at ambient temperatures.
  3. Weight per gallon shall not be less than 12.5 pounds/gallon when assessed in accordance with ASTM D 1475.
  4. Colors: ASTM D211 and per Federal Standard No. 595.
- B. MANUFACTURE
  1. Paint shall be formulated and manufactured from first-grade raw materials and shall be free from defects and imperfections that might adversely affect the serviceability of the finished product. The materials shall not exhibit settling or jelling after storage in the sealed containers as received that will affect the performance of the products. The paint shall provide the proper anchorage, refraction and reflection for the finished glass spheres when applied as specified.
- C. COMPOSITION
  1. Composition of the paint shall be at the discretion of the manufacturer, provided that the finished product meets the requirements of any applicable Federal, State or Local regulations for products of this type and the requirements as follows:
    - a. Paint shall not contain more than 0.06% lead.
    - b. Total nonvolatile shall not be less than 70% by weight (mass).
    - c. Pigment shall be 45-55% by weight (mass).
    - d. Resin solids shall be composed of 100% acrylic emulsion polymer.

- e. Volatile organic compounds shall not exceed 150 grams/liter, excluding water.
  - f. Closed-cup flash point shall not be less than 100°F (38°C), and weight per gallon shall not be less than 12.5 pounds/gallon when assessed in accordance with ASTM D 1475.
- D. VISCOSITY
- 1. Consistency of the paint shall not be less than 80, nor more than 90 Krieb units when assessed in accordance with ASTM D562. The paint shall have good spraying characteristics when the material is heated to application temperature of 130°F to 145°F.
- E. FLEXIBILITY
- 1. Paint shall not show cracking or flaking when subjected to the TT-P-1952D flexibility test in which the panels used shall be tin plates that are 3 inches x 5 inches in area and 35 – 31 U.S. Gauge in thickness. The tin panels shall be lightly buffed with steel wool and thoroughly cleaned with solvent before being used for tests.
- F. DRY OPACITY
- 1. Both white and yellow paints shall have a minimum contrast ratio of 0.96. Contrast ratio shall be determined by applying a wet film thickness of 0.005 inches (127 microns) to a standard hiding power chart. After drying, the black and white reflectance values shall be determined using a suitable reflectometer and the contrast ratio determined.
- G. BLEEDING
- 1. Paints shall have a minimum bleeding ratio of 0.97 when assessed in accordance with FS TT-P-1952D.
- H. ABRASION RESISTANCE
- 1. No less than 210 liters of sand shall be required to remove paint film when assessed in accordance with TT-P-1952D.
- I. COLOR
- 1. Yellow: FS 595, No. 13538, latest issue.
  - 2. White: No darker or yellower than FS 595, No. 17778, latest issue, when the material is placed in a type EH weatherometer for a period of 500 hours and weathered according to ASTM G153. Paint shall not discolor in sunlight and shall maintain colorfastness throughout its life, approximately two years. Color determination shall be made without beads, after a minimum of 24 hours.
- J. SCRUB RESISTANCE
- 1. Paint shall pass 300 cycles minimum when assessed in accordance with ASTM D2486.
- K. DRYING TIME
- 1. Reflectorized line shall dry to no pickup in 120 seconds or less when applied at the ratio provided for specified glass spheres to paint (the paint at 15+ 1 mil (381 millimeters + 25 millimeters) wet film thickness equivalent to 100-115 square foot/gallon (2.45-2.82 square meters/liter) and the glass spheres at the equivalent rate of 6.0 pounds/gallon (0.72 kilograms/liter). The paint shall be

applied with equipment to have the paint at a temperature of 130°F to 145°F (54°C to 63°C) at the spray gun.

### **Part 3. EXECUTION**

#### **3.1 GENERAL**

- A. Pavement markings shall be applied in accordance with the details shown on the plans and the control points established by the Contractor and approved by the Engineer.
- B. No paint shall be applied to new bituminous pavement until the top course has cured at least one week minimum.
- C. Pavement areas to be painted shall be dry and sufficiently cleaned of sand and road debris to provide an acceptable bond between the paint and the pavement.
- D. All painting shall be performed in a neat and skillful manner. The lines shall be sharp and clear with no feathered edging or fogging and precautions shall be taken to prevent tracking by tires of the striping equipment. Paint shall be applied as shown on the Drawings with no unsightly deviations.
- E. Contractor shall protect the buildings, walks, pavement, curbing, trees, shrubs, mulch, etc. from over-spray of paint and damage by his operations.
- F. Operations shall be conducted only when the road surface temperature is at least 40°F or as allowed by Engineer. They shall be discontinued during periods of rain and shall not continue until Engineer determines that the pavement surface is dry enough to achieve adhesion.
- G. After application, paint shall be protected from crossing vehicles using traffic cones or other acceptable method for a time at least equivalent to the drying or curing time of the paint.
- H. The material shall be applied to the pavement by equipment used specifically for the application of pavement markings and shall be of a standard commercial manufacturer.
- I. Contractor shall provide survey control for layout of pavement markings by utilizing his own surveyor or hiring a registered land surveyor. The cost of this survey control shall be included in other items of work.

END OF SECTION 32 17 23

## **32 30 00 SITE IMPROVEMENTS**

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### **Part 1. GENERAL**

#### **1.1 DESCRIPTION**

- A. The Town of Bourne Bid Form, General Conditions, Supplementary Conditions, and applicable parts of the Special Conditions form a part of this Specification, and the Contractor shall consult them in detail for instructions.
- B. The Contractor shall provide all labor, equipment, and materials; and perform all operations necessary to complete the work of this section as indicated on the Drawings and specified herein which shall include but is not limited to the following:
  - 1. Beach Access construction sign
  - 2. Trash receptacles (by town)

3. Bike rack (to be relocated from onsite)

## 1.2 SUBMITTALS

- A. The Contractor shall prepare and submit Shop Drawings to the Owner's representative for approval prior to ordering the listed materials.
  1. Shop drawings shall show required sizes, dimensions, sections, profiles of units; the arrangement of and provision for jointing, anchoring, fastening, and support; and other necessary details.
  2. Shop drawings shall include large-scale details of any unique fabrication and setting requirements, or any other specified areas seen as necessary or as directed by the Owner's representative.
  3. Each shop drawing shall reference the section and paragraph of the Specifications that requires the items included.
  4. The Contractor shall provide complete shop drawings for approval by the Owner's representative for all items listed below:
    - a. Construction and Beach Access sign
    - b. Bike rack
    - c. Trash receptacle
- B. The Contractor shall provide complete product literature and applicable color samples for approval by the Owner's representative prior to ordering the below listed materials:
  - a. Construction and Beach Access signs
  - b. Bike rack
  - c. Trash receptacle

## 1.3 QUALITY ASSURANCE

- A. Site improvement work shall be assigned to experienced and qualified subcontractors employing experienced workers who will work under the full-time supervision of a qualified supervisor with a minimum of five (5) years of experience on projects comparable to this project. The Contractor shall use an adequate number of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for the proper performance of the work in this Section. The Contractor shall demonstrate that he has successfully completed work of comparable size and scope.

## 1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. The Contractor shall be responsible for timing the delivery of site improvement materials to minimize on-site storage time prior to installation. All stored materials shall be protected from weather, careless handling, and vandalism.
- B. The Contractor, sub-contractors, and suppliers are all individually required to furnish their own equipment necessary to get workers, material, and equipment from the point of delivery at the project site to the point of use or installation within the project site. All crane and rigging services required are the responsibility of each individual Contractor or trade.
- C. The Contractor shall deliver materials in original sealed containers marked with name of manufacturer and identification of contents. The Contractor shall store materials under

waterproof covers on planking clear of ground and protect from handling damage, dirt, stain, water, and wind.

- D. The Contractor shall take all necessary precautions to prevent all items from chipping, cracking, or other damage during the transportation of these materials to the project, unloading and storage on the site. The Contractor shall lift items with wide-belt type slings wherever possible; he/she shall not use wire rope or ropes containing tar or other substances which might cause staining. If required, he/she shall use wood rollers and provide cushion at end of wood slides. Damaged items will not be allowed to be installed and should any damaged items be found in constructed work, such items shall be removed immediately and replaced, and the Contractor shall assume all expenses incurred therefrom.
- E. Stored materials shall be adequately protected against moisture by one (1) stacking in such a manner as to allow a complete circulation of air under each stack, and two (2) covering each stack, top and sides with a waterproof paper or membrane. Coverings shall always remain in place, when not working from the stack.

#### 1.5 **EXAMINATION OF CONDITIONS**

- A. The Contractor shall fully inform themselves of existing conditions of the site and shall be fully responsible for conducting all work required to execute the work of the Contract fully and properly, regardless of the conditions encountered in the actual work. 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. At the beginning of work, the installer shall accept substrates, subgrades, previous work, and conditions. No claim for extra compensation or extension of time will be allowed on account of actual conditions inconsistent with those assumed.
- B. The Contractor shall be solely responsible for judging the potential need for storing materials temporarily and/or re-handling items prior to final installation.

#### 1.6 **STANDARDS**

- A. Except as modified by governing code and by the Contract Documents, the Contractor shall comply with applicable provisions and recommendations of the following:
  - 1. AASHTO: American Association of State Highway and Transportation Officials, latest edition.
  - 2. ASTM: American Society for Testing and Materials, latest edition.
  - 3. ADA: Americans with Disabilities Act, latest edition.
  - 4. AAB: Architectural Access Board, Commonwealth of Massachusetts, Chapter 521 CMR, latest edition.
  - 5. ASTM C94 Ready-Mixed Concrete
  - 6. ASTM C1372 Segmental Retaining Wall Units

## **Part 2. PRODUCTS**

### 2.1 **BEACH ACCESS CONSTRUCTION SIGN**

- A. See Project Special Conditions and Specifications.
- B. The Contractor shall provide and install the construction sign as shown in the Drawings.

- C. The construction of this sign shall conform exactly to the Town of Bourne’s prototype Beach Access sign including but not limited to backer material, font, font size, capitalization, color, font relief, style, rainproofing, fasteners, and fastener location.

**2.2 TRASH RECEPTACLES**

- A. Trash receptacles will be provided and placed by the Town

**2.3 BIKE RACKS**

- A. Bike racks are to be reused and reset from on site.

**2.4 CONCRETE FOOTINGS**

- A. Concrete for footings shall comply with section 03 30 00 Cast in place concrete.

**Part 3. GEXECUTION**

**3.1 BEACH ACCESS CONSTRUCTION SIGN**

- A. Installation of the Beach Access construction sign shall conform exactly to the Town of Bourne’s prototype Beach Access sign installation requirements. (See Project Special Conditions and Specifications.)

**3.2 SITE FURNISHINGS**

- A. The excavation for the concrete pad shall be done to the line and grades shown on the plans and details in the drawings.
- B. The gravel borrow base shall be placed and compacted as shown in the drawings.
- C. All aluminum parts in contact with cement concrete shall be coated with zinc chromate paint to a minimum of a three (3) mils thickness.
- D. The site furnishings shall be set and bolted in place. Dip all nuts in locktite or lochnut epoxy or approved equal, to secure permanently. Cut bolt to flush with nut.

**3.3 CONCRETE FOOTINGS**

- A. Concrete footing installation shall comply with requirements of section 03 30 00 Cast in place concrete.

END OF SECTION 32 30 00

## **32 40 00 PRESSURE TREATED WOODEN TIMBER STEPS**

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**Part 1. GENERAL**

**1.1 GENERAL REFERENCE**

- A. The work of this Section is integral with the whole of the Contract Documents and is not in- tended to be interpreted outside that context.

**1.2 DESCRIPTION OF WORK**

- A. Provide all labor, materials, equipment, services and accessories necessary to furnish and install Pressure Treated Wooden Timber steps, complete and functional, as indicated in the Contract Documents and as specified herein.
- B. The principal work of this Section includes, but may not be limited to, the following:



1. Furnishing and installing rail road tie steps.
2. All associated items and operations required to complete the installation, including sur- face preparation, jointing and finishing.

### 1.3 RELATED WORK SPECIFIED ELSEWHERE

- A. All work done under this contract shall be in conformance with the Commonwealth of Mas- sachusetts Department of Transportation Standard Specifications for Highways and Bridges (MDTSSHB) 2023 or latest edition; the 2017 Construction Standard Details; the 2009 Man- ual on Uniform Traffic Control Devices with Massachusetts Amendments; the 1990 Stand- ard Drawings for Signs and Supports; the 1968 Standard Drawings for Traffic Signals and Highway Lighting; the latest edition of American Standard for Nursery Stock; and the Con- tract Drawings and these Contract Specifications.

### 1.4 REFERENCE STANDARDS

- A. Contract Drawings and Supplemental and General Conditions in the Contract Specifications.

### 1.5 SUBMITTALS

- A. Submit to the Engineer for approval shop drawings for materials. No materials shall be fabricated or shipped prior to approval of the shop drawings by the Engineer.
- B. A certificate of wood treatment shall be furnished to the Engineer upon delivery of the treated wood products. Treated wood shall bear the appropriate American Wood Preserves Bureau [AWPB] quality mark for the treatment employed. The certificate shall indicate acceptability of treated wood to receive field-applied stain.

### 1.6 DELIVERY, STORAGE AND HANDLING

- A. Wood shall be adequately protected from damage during transit to the site.
- B. Wood shall be protected against staining, chipping, and other damage. Cracked, badly chipped, or stained ties will be rejected and shall not be employed in the work.

### 1.7 QUALITY ASSURANCE

- A. Wood that contain unsound knots and shakes, excessive checking or other defects that may be detrimental to the structural integrity will be rejected and shall not be used in the proposed work.

### 1.8 WARRANTIES

- A. Attention is directed to provisions of the CONDITIONS OF CONTRACT and applicable parts of Division 1 regarding guaranties and warranties.
- B. Manufacturers shall provide their standard guaranties for work specified in this Section. How- ever, such guaranties shall be in addition to and not in lieu of all other liabilities which manufacturers and Contractor may have by law or by other provisions of the Contract Documents.

## Part 2. PRODUCTS

### 2.1 WOOD

- A. Wood shall be all from the same species, and shall be stress grade 1,000 psi or more, extreme fiber in bending.
- B. Treated with a wood preservative as specified in Article 2.1 B. Minimum net retention shall be 0.40 lbs. /cubic foot.
- C. All treated wood shall be marked in accordance with AWPA Standards.

**Part 3. EXECUTION**

**3.1 WOOD TIES**

- A. The base material shall be tamped to grade. Ties shall be set level at the required location.
- B. Wood surfaces, cut or injured, shall be brush treated with two application of wood preservative using material of the same specifications as that used in the preservative treatment.

END OF SECTION 32 40 00

## **33 05 33 HIGH DENSITY POLYETHYLENE (HDPE) PIPE**

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**Part 1. GENERAL**

**1.1 SCOPE OF WORK**

- A. Furnish all labor, materials, equipment, and incidentals required to install and test High Density Polyethylene (HDPE) pipe and fittings complete as shown on the Drawings and as specified herein.

**1.2 RELATED WORK SPECIFIED ELSEWHERE**

- A. EXCAVATING AND FILL- Section 31 23 00.
- B. STORM DRAINAGE UTILITIES – Section 33 40 00

**1.3 SUBMITTALS**

- A. Submit catalog cuts of the pipe and fitting material.

**1.4 QUALITY ASSURANCE**

- A. All HDPE pipe and fittings shall be from a single manufacturer. The supplier shall be responsible for the provisions of all test requirements specified in AASHTO M294 and shall produce written documentation thereto. The pipe shall be subject to rejection at any time for failure to meet any of the Specification requirements, even though sample pipes may have been accepted as satisfactory at the place of manufacture. Pipe rejected after delivery shall be marked for identification and shall be removed from the job site at once.

**Part 2. PRODUCTS**

**2.1 HIGH DENSITY POLYETHYLENE (HDPE) DRAINAGE PIPE AND FITTINGS**

- A. Pipe and fittings shall have full diameter dimensions and shall meet the provisions and all test requirements as specified in ASTM F 405 or ASTM F 667.

- B. HDPE pipe and fittings shall have bell and spigot push on joints. The bell shall consist of an integral wall section with a solid cross section elastomeric gasket securely locked in place to prevent displacement during assembly.
- C. All fittings and accessories shall have bell and/or spigot configurations compatible with the pipe.

### **Part 3. EXECUTION**

#### **3.1 HANDLING AND CUTTING PIPE**

- A. Pipe and fittings are slightly brittle. Care shall be taken in shipping, handling, and laying to avoid damage to the pipe and fittings. Extra care will be necessary during cold weather construction.
- B. Any pipe or fitting showing a crack, or which has received a blow that may have caused an incipient fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the site.
- C. All pipe ends shall be square after cutting.
- D. While stored, pipe shall be adequately supported from below at not more than 3 ft intervals to prevent deformation. Pipe shall not be stacked higher than 6 ft. Pipe and fittings shall be stored in a manner that will keep them at ambient outdoor temperatures. Temporary shading as required to meet this requirement shall be provided. Simple covering of the pipe and fittings which allows temperature build up when exposed to direct sunlight will not be permitted.

#### **3.2 JOINTING HDPE PIPE AND FITTINGS**

- A. HDPE pipe and fittings shall be jointed in accordance with the recommendations of the latest ASTM D2321 Standard and detailed instructions of the manufacturer.
- B. All manhole connections shall be as shown on the Drawings except that concrete and mortared connections shall have a positive watertight seal.

#### **3.3 INSTALLATION OF HDPE PIPE AND FITTINGS**

- A. No single piece of pipe shall be laid unless it is straight. The centerline of the pipe shall not deviate from a straight line drawn between the centers of the openings at the ends of the pipe by more than 1/16 inch per foot of length.
  - 1. If a piece of pipe fails to meet this requirement check for straightness, it shall be rejected and removed from the job site. Laying instructions of the manufacturer shall be explicitly followed.
- B. Any pipe or fitting discovered to be defective after laying shall be removed and replaced with a sound piece.
- C. The Engineer shall examine each bell and spigot end to determine whether any preformed joint has been damaged prior to installation. Any pipe having defective joint surfaces shall be rejected, marked as such, and immediately removed from the site.
- D. All pipes shall be sound and clean before laying. When laying is not in progress, including lunchtime, the open ends of the pipe shall be closed by watertight plugs or other approved means. Good and proper alignment shall be preserved in laying the pipe.
- E. Pipe and fittings shall be installed in accordance with instructions of the manufacturer, ASTM D2321 and as specified herein. As soon as the excavation is complete to normal

grade of the bottom of the trench, the 6-inch-deep drainage aggregate bedding shall be placed, compacted, and graded to provide firm, uniform, and continuous support for the pipe. Bell holes shall be excavated so that only the barrel of the pipe bears upon the bedding. The pipe shall be laid accurately to the lines and grades indicated on the Drawings, making certain that in locations where perforated pipe is specified, the pipe shall be laid with the perforations facing down. Blocking under the pipe will not be permitted. Drainage aggregate shall be placed evenly on each side of the pipe to mid diameter and hand tools shall be used to force the aggregate under the haunches of the pipe and into the bell holes to give firm continuous support for the pipe. Drainage aggregate shall be placed to six inches above the top of the pipe. The initial three feet of backfill above the sand backfill shall be placed in one-foot layers and carefully compacted. Generally, the compaction shall be done evenly on each side of the pipe and compaction equipment shall not be operated directly over the pipe until sufficient backfill has been placed to ensure that such compaction equipment will not have a damaging effect on the pipe. Equipment used in compacting the initial three feet of backfill shall be approved by the Engineer prior to use.

- F. Each length of the pipe shall be positioned against the pipe previously laid and held securely until enough backfill has been placed to hold the pipe in place. Joints shall not be "pulled" or "cramped".
- G. Before any joint is completed, the pipe shall be checked to assure that a close joint with the next adjoining pipe has been maintained and that the inverts are matched and conform to the required grade. The pipe shall not be driven down to grade by striking it.
- H. Precautions shall be taken to prevent flotation of the pipe in the trench.
- I. When moveable trench bracing such as trench boxes, moveable sheeting, shoring, or plates are used to support the sides of the trench, care shall be taken in placing and moving the boxes or supporting bracing to prevent movement of the pipe, or disturbance of the pipe bedding and the screened gravel backfill. Trench boxes, moveable sheeting, shoring or plates shall not be allowed to extend below mid diameter of the pipe. As trench boxes, moveable sheeting, shoring, or plates are moved, sand shall be placed to fill any voids created and the sand and backfill shall be recompact to provide uniform side support for the pipe.

END OF SECTION 33 05 33

## **33 40 00 STORM DRAINAGE UTILITIES**

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### **Part 1. GENERAL**

#### **1.1 DESCRIPTION**

- A. This Section specifies requirements for the site storm drainage improvements.
- B. The work includes:
  - 1. Site storm drainage system (basin drainage structures & recharge systems).

#### **1.2 RELATED SECTIONS**

- A. Sections which relate to the work of this Section include:
  - 1. Section 31 23 19—Dewatering

2. Section 31 00 00—Earthwork
3. Section 33 05 33—HDPE Pipe

### 1.3 SUBMITTALS

#### A. SHOP DRAWINGS

1. Materials list of items proposed for the work.
2. Shop drawings or descriptive literature, or both, showing dimensions, joint and other details of all materials proposed for the work. Shop drawings shall be submitted to the Engineer for approval prior to ordering material.

## Part 2. PRODUCTS

### 2.1 GENERAL

- A. All materials for storm drainage system shall be new and unused.

### 2.2 PIPE

- A. HDPE as per Section 33 05 33

### 2.3 CATCH BASINS AND MANHOLES

- A. Precast catch basins, Manholes and leach pits shall be manufactured in accordance with ASTM Designation C478 (4,000 psi minimum compressive strength) to the diameters and depths shown on the Drawings. All structures shall be designed for HS-20 / H-20 loading. Precast unit joints shall be sealed with butyl rubber in accordance with ASTM 990.
- B. Where required for hood, a slot and opening shall be cast in the catch basin wall for mounting the cast iron hood over the outlet pipe.
- C. When approved by the Engineer, catch basins, and drop inlets may be constructed with brick or concrete block walls and poured reinforced concrete bases as an alternative to precast concrete units.
- D. Brick and concrete block and other materials shall conform to Article 2.03B.
- E. Cast iron frames and grate shall conform to ASTM A48, Class 30.
- F. Single catch basin frame and grate shall be LeBaron L15 (Cascade type) or approved equivalent with four flanges.
- G. Catch basin traps shall be LeBaron Oil and Grease Trap Model No. L 219 or approved equivalent.

### 2.4 STORMWATER CHAMBERS

- A. Chambers shall be Stormtech, Cultec or Infiltrator.
- B. Chambers shall conform to the requirements of ASTM F2418-05, "Standard Specification for Polypropylene Pipe (PP) Corrugated Wall Stormwater Collection Chambers".
- C. Chamber rows shall provide continuous, unobstructed internal space with no internal support panels.
- D. The structural design of the chambers, the structural backfill and the installation requirements shall insure that the load factors specified in the ASSHTO LRFD Bridge Design Specifications, Section 12.12 are met for: 1) long-duration dead loads and 2) short-duration live loads, based on ASSHTO design truck with consideration for impact and multiple vehicle presence.

- E. Only chambers that are approved by the engineer will be allowed. The contractor shall submit three (3) sets of the following to the engineer for approval before delivering chambers to the project site:
  - 1. A structural evaluation by a registered structural engineer that demonstrates that the load factors specified in the AASHTO LRFD Bridge Design Specifications, Section 12.12 are met. The 50-year creep modulus data specified in ASTM F2418-05 must be used as part of the AASHTO structural evaluation to verify long-term performance.
  - 2. A certification by the manufacturer that the chambers are in accordance with ATSM F2418-05.
- F. Chambers shall be produced at an ISO 9001 certified manufacturing facility.
- G. All design specifications for chambers shall be in accordance with the manufacturer's latest installation instructions.

### **Part 3. EXECUTION**

#### **3.1 CATCH BASINS**

- A. Catch Basins shall be constructed at the locations and to the lines, grades, dimensions, and design shown on the Drawings or as required by the Engineer.
- B. Precast Concrete Units shall be installed in a manner that ensures watertight construction and all leaks in precast concrete structures shall be sealed. If required, precast concrete structures shall be repaired or replaced to obtain watertight construction.
- C. Stubs shall be short pieces of pipe cut from the bell ends of the pipe. Stubs shall be plugged with brick masonry unless otherwise directed by the Engineer.
- D. Manhole Inverts shall conform accurately to the size of the adjoining pipes.
  - 1. Utility access hole inverts shall be constructed of 3,500 psi concrete as shown the Drawings.
  - 2. Inverts shall be laid out in smooth diameter curves of the longest possible radius to provide uniform flow channels.
  - 3. Invert shelves shall be graded with a 1-inch drop per 1-foot length sloped from the utility access hole walls.
- E. Utility access hole steps shall be accurately positioned and embedded in the concrete when the section is cast. Precast-reinforced concrete Utility Access Hole sections shall be set vertical and with sections and steps in true alignment.
- F. All holes in sections used for their handling shall be thoroughly plugged with rubber plugs made specifically for this purpose or with mortar. The mortar shall be one part cement to 1- 1/2 parts sand, mixed slightly damp to the touch, hammered into the holes until it is dense, and an excess of paste appears on the surface, and finished smooth and flush with the adjoining surfaces.
- G. Precast sections shall be level and plumb with approved joint seals. Water shall not be permitted to rise over newly made joints until after inspection and acceptance. All joints shall be watertight.

- H. Openings which must be cut in the sections in the field shall be carefully made to prevent damage to the riser. Damaged risers will be rejected and shall be replaced at no additional cost to the Owner.

### 3.2 BRICK MASONRY

- A. Brick masonry structures shall be watertight. All leaks in brick masonry structures shall be sealed. Skilled workers shall lay all brick masonry.
- B. All beds on which masonry is to be laid shall be cleaned and wetted properly. Brick shall be wetted as required to be damp, but free of any surface water when placed in the work. Bed joints shall be formed of a thick layer of mortar which shall be smoothed or furrowed slightly. Head joints shall be formed by applying a full coat of mortar on the entire brick end, or on the entire side, and then shoving the mortar covered end or side of the brick tightly against the bricks laid previously. The practice of buttering at the corners of the brick and then throwing the mortar or cappings in the empty joints will not be permitted. Dry or butt joints will not be permitted. Joints shall be uniform in thickness and approximately 1/4 inch thick.
- C. Brickwork shall be constructed accurately to the required structure dimensions and tapered at the top to the dimensions of the flanges of the cast-iron frames, as shown on the Drawings.
- D. Joints on the inside face of walls shall be tooled slightly concave with an approved jointer when the mortar is thumbprint hard. The mortar shall be compressed with complete contact along the edges to seal the surface of the joints.
- E. All castings to be embedded in the brickwork shall be accurately set and built-in as the work progresses.
- F. Water shall not be allowed to flow against brickwork or to rise on the masonry for 60 hours after it has been laid, and any brick masonry damaged in this manner shall be replaced as directed at no additional cost to the Owner. Adequate precautions shall be taken in freezing weather to protect the masonry from damage by frost.

### 3.3 CONCRETE MASONRY UNITS

- A. Concrete masonry units shall be soaked in water before laying. As circular concrete block walls are laid-up, the horizontal joints and keyways shall be flushed full of mortar. As rectangular blocks are laid-up, all horizontal and vertical joints shall be flushed full of mortar. Plastering of the outside of block structures will not be required. No structure shall be backfilled until all mortar has completely set.

### 3.4 MANHOLE STEPS

- A. Steps shall be cast into the precast walls during manufacture.
- B. Steps in brick masonry and concrete units shall be installed as the masonry courses are laid.

### 3.5 CASTINGS

- A. Cast-iron frames for grates and covers shall be well bedded in cement mortar and accurately set to the proposed grades.

- B. All voids between the bottom flange and the structure shall be filled to make a watertight fit. A ring of mortar, at least one-inch thick and pitched to shed water away from the frame shall be placed over and around the outside of the bottom flange. The mortar shall extend to the outer edge of the masonry all around its circumference and shall be finished smooth. No visible leakage will be permitted.
- C. Structures within the limits of bituminous concrete pavement shall be temporarily set at the elevation of the bottom of the binder course. After the binder course has been compacted, the structures shall be set at their final grade. Backfill necessary around such structures after the binder course has been completed shall be made with 3,500 psi concrete.

**3.6 STORMWATER CHAMBERS**

- A. Stormwater chambers shall be installed in accordance with the manufacturer's latest written installation instructions and the drawings.

END OF SECTION 33 40 00

## **35 31 01 BEACH NOURISHMENT**

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**Part 1. GENERAL**

**1.1 DESCRIPTION OF WORK**

- A. Contractor shall provide all labor, materials, and equipment necessary to complete the placement of compatible nourishment sands in the eroded beach area.

**1.2 SUBMITTALS**

- A. Provide grain size analysis of the sand fill and of the beach surface soils. Nourishment sands shall be clean sand of similar grain size to that of the beach.

**Part 2. PRODUCTS**

**2.1 BEACH NOURISHMENT**

- A. Nourishment sand shall be clean sand of similar grain size to that of the beach.

**2.2 PLACEMENT EQUIPMENT**

- A. Equipment for the distribution and grading of the beach nourishment material shall be suitable for working in the saltwater environment and sandy conditions.
- B. All equipment shall be inspected regularly to ensure proper operation and to prevent spills and leakage. Regular maintenance must be performed throughout the project.

**Part 3. EXECUTION**

**3.1 ACCESS:**

- A. Access to the beach sites is directly from Sagamore Street.
- B. The Contractor shall notify the Engineer representative of the schedule of sand deliveries, providing a minimum advance notice of 24 hours prior to sand delivery.

**3.2 PLACEMENT PROCEDURES:**

- A. Contractor shall place sand to the limits as indicted on the Drawings.



- B. Make changes in grade gradual. Blend slopes into level areas.

END OF SECTION 35 31 01

## 35 31 19 COASTAL REVETMENT SUPPLEMENT

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### Part 1. GENERAL

#### 1.1 DESCRIPTION

- A. The work under this section includes the provision of all labor, materials, tools, transportation, instrumentation, etc. necessary as needed to supplement the existing revetment with additional armor stone as shown on the drawings. Existing stones that have shifted may be reused.

#### 1.2 PROTECTION OF EXISTING STRUCTURES

- A. The Contractor shall be responsible for protecting, upholding, upkeeping and the existing ramp and revetment to remain.

#### 1.3 SITE CONDITIONS

- A. Prior to the submission of a bid, the Contractor shall have visited the Site to fully acquaint himself as to the nature, extent and practicality of the excavation, earthworks or associated temporary works (if any). The Contractor shall satisfy himself that the existing ground and formation levels as shown on the drawings are correct.
- B. The Contractor shall ensure that his method of excavation and revetment repair is suitable and safe for use at the Site.

#### 1.4 SITE ACCESS

- A. The access to the beach /revetment area shall be via the existing ramp.

#### 1.5 PREPARATION OF SITE.

- A. The existing stone revetment and sand beach shall be adjusted only to the extent necessary to set the additional revetment stones as necessary to fill voids in the existing revetment around the ramp.

#### 1.6 REVETMENT STONE MATERIAL.

- A. All armor stone shall be of comparable size and tonnage to the existing revetment and consist of durable granite broken or rounded as needed to be installed into the space available.
- B. Chink stone shall 4- 8-inch diameter and be durable granite broken or rounded to allow placement in the voids between the armor stones.

#### 1.7 SAMPLES

- A. None needed.

#### 1.8 SEQUENCE OF WORK

- A. The Contractor shall at his own cost protect the underlayers of the revetment already in place with suitably sized armor units if construction work is suspended.

**1.9 PERSONNEL**

- A. The Contractor shall provide qualified site staff who are experienced in similar works to be present full time to supervise the work and to perform all necessary tests to the approval of the Engineer.

**1.10 ACCEPTANCE OF ROCK AT THE SITE**

- A. An inspection of the rock shall be conducted at the site upon delivery to ensure that rock conforms to the above specification. Material which, in the opinion of the Engineer does not conform with the requirements of this specifications regarding its proposed use, will be rejected and it shall be removed from the site and the cost of removal and loss of time shall be borne by the Contractor.

**1.11 STOCKPILING OF STONES**

- A. Stones may be stockpiled on the beach.
- B. Any surplus armor stone or chink stone shall be removed at the completion of the work under this section.

**1.12 GEOTEXTILES**

- A. Geotextiles shall be a woven heavy-duty fabric.
- B. The geotextile shall be placed loosely on the ground surface with no wrinkles or folds, and with no void spaces between the geotextile and the ground surface. Care shall be taken during installation to avoid damage occurring to the geotextile because of the installation process. Atmospheric exposure of geotextiles to the elements following lay down shall not exceed 7 days.
- C. Should the geotextile be damaged during installation it shall be replaced.
- D. Geotextile overlaps shall be at least 1 foot.

**1.13 PLACING OF ARMOR UNITS AND SECONDARY ROCKS**

- A. The armor system placement shall begin at the toe and proceed up the slope. Placement shall take place to avoid stretching resulting in tearing of the geotextile. Riprap and heavy stone filling shall not be dropped as to damage the geotextile.
- B. Any geotextile damaged during the riprap placement shall be replaced immediately.

**1.14 TOLERANCE**

- A. The exposed surface of the revetement is intended to be a rough surface. The allowable tolerance surface of the revetment shall not more than 20% of the specified layer thickness.

**1.15 MEASUREMENT OF PAYMENT**

- A. Measurement and payment shall be part of the Lump Sum.

END OF SECTION 35 31 19