

**BOSTON PUBLIC HEALTH COMMISSION**

Administration and Finance



Request For Proposal

112 Southampton St. Courtyard Project

January 20, 2023

Request for Proposal Timeline	
1/30/23	RFP and instructions available online at <a href="http://www.bphc.org">www.bphc.org</a> at 10:00 AM
2/01/23	Publication of Request for Proposal (RFP) printed in the Boston Globe
2/10/23	<p>Bidder's conference and walkthrough will be held as an opportunity to raise concerns regarding specifications, requirements, and terms of this solicitation.</p> <p><u>Conference will be held at:</u>  Boston Public Health Commission  112 Southamptn St.  Boston, MA. 02118  <u>9:00 AM – 10:00 AM</u></p> <p>Failure to raise concerns over any issues at this opportunity will not be considered in any protest filed regarding such items that were known as of the walkthrough.</p>
2/15/23	Questions are due in writing by 2:00 PM to <a href="mailto:sbarry@bphc.org">sbarry@bphc.org</a> Subject: 112 Southampton Courtyard Project
2/17/23	Responses to questions will be emailed to all interested parties:
2/20/23	<p>Bid due by 2:30PM – Submit (2) original bids (do not bind) and PDF file of bid on a USB flash drive. Bid documents must be submitted in separate sealed envelope or box addressed to:</p> <p style="text-align: center;">Boston Public Health Commission  Property Office  205 River St., 2nd Floor  Mattapan, MA 02126  Attention: Steven Barry, Project Manager</p> <p>Clearly mark each envelope or box:  1. Organization Name and Address  2. 112 Southampton St. Courtyard Project</p>
2/24/23	<p>Notification of Decision</p> <p>Note: This is the desired date for notification of award to bidder(s) however, BPHC has the discretion to extend this date without notice. BPHC reserves the right to accept or reject any or all bids. BPHC anticipates submitting a Notice of Award to the selected bidder(s) by email or address provided in the RFP responses. The contract(s) will be awarded to the lowest responsible and responsive bidder(s) meeting all requirements. The lowest responsible and responsive bidder shall mean the bidder that best meets the requirements set forth in this solicitation and offers the lowest cost. The contract(s) resulting from this RFP shall be in effect when all necessary contract documentation is fully executed by BPHC and awarded vendor(s).</p>

**PROJECT CONTACTS**

**112 Southampton Street  
Courtyard Project  
Boston, MA**

Owner

**Boston Public Health Commission**

Main Office: 1010 Massachusetts Ave, 2nd Floor,  
Boston, Massachusetts 02118

Phone # 617-534-2390

Property Office: 205 River Street,  
Mattapan, MA 02126

Phone # 617-534-3073

Contact: Gerry Thomas, Director – Homeless Services Bureau  
Steven Barry, Project Manager – BPHC Property Management

Landscape Architect

**Halvorson | Tighe & Bond Studio**

25 Kingston Street, 5<sup>th</sup> Floor, Boston, Massachusetts 02111

Phone # 617-536-0380, Fax # 617-536-0626

Contact: Iris Lin

Architectural Advisor

**Juann Khoory Design Studio**

18 Kendall Road, Wellesley, Massachusetts 02482

Phone # 781-507-5408

Contact: Juann Khoory

**BID SET  
20 JANUARY 2023**

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**END OF SECTION**

**SECTION 001116  
INVITATION TO BID**

Proposals from Pre-Qualified Contractors for **112 Southamptton Street Courtyard** project will be received until 2:30 PM on February 20<sup>th</sup>, 2023, at Boston Health Commission Property Office, 205 River Street, Mattapan, MA 02126, Attention; Steven Barry, Project Manager, Phone # 617 534 3073, Mobile: 617 921 9072

The Owner intends to conduct a Pre-Bid Meeting at the site at 9:00 AM on 2/10/23

The **112 Southamptton Street Courtyard** project includes the following scope of work: for which the responsibility for furnishing and installing is defined in the Drawings and Form of General Bid:

- Mobilization and Site Logistics
- General Conditions
- Temporary Facilities and Controls
- Site Preparation
- Power Washing of Existing Surfaces
- Turf Top Rubber Surfacing
- Rubber Safety Surfacing over Fiberglass Molded Grate over Pedestal Paving System
- Rubber Safety Surfacing over Cast-in-Place Concrete Pad
- Foam ADA Compliant Ramp
- Rubber Tile ADA Compliant Ramp
- Rubber Curb – Type 1 Abutting Gaming Area
- Rubber Curb – Type 2 Abutting Fitness Area
- Perforated Metal Edge – Type 1 Abutting Library Area
- Perforated Metal Edge – Type 2 Abutting Fitness Area
- Moveable Metal Café Tables and Chairs
- Moveable Wood and Metal Lounge Chairs
- Moveable Metal Lounge Tables
- Moveable Metal Picnic Table with ADA Extension
- Moveable Metal Benches
- Modular Wood and Metal Top Bench without Back on Planter
- Modular Wood and Metal Top Bench with Back on Planter
- Modular Metal Rectangular Planter
- Modular Metal Square Planter
- Metal Trellis
- Freestanding USB Charger
- Moveable Metal and Wood Bench with Back
- Lockable Storage Cabinet
- Composite Wood Screen over Pressure Treated Wood Framing with Lockable Access Door
- Existing Metal Guardrail and Handrail to be Sanded, Primed and Painted
- Adult Fitness Equipment – Type 1 over Cast in Place Concrete Pad
- Adult Fitness Equipment – Type 2 over Cast in Place Concrete Pad
- Adult Fitness Equipment – Type 3 over Cast in Place Concrete Pad
- Adult Fitness Equipment – Type 4 over Cast in Place Concrete Pad
- Green Stairs – Offload at Site and Installation
- Coordination with Artist Painted Graphics Project by Others under Separate Contract with Owner. Work anticipated in 2023 by Others under separate contract with the Owner includes:
  - a. Green Stairs: Fabricated, Furnished and Delivered to Site by Metal Fabricator under Separate Contract with Owner
  - b. Artist Painted Graphics on Existing Existing Bituminous Concrete Paving to remain and coordinated with 112 Southamptton Street project.

To obtain completed Drawings and Specifications as well as additional bidding information and procedures, contact Steven Barry, Project Manager at Boston Health Commission at the contact information below. Drawings and Specifications will be available after 1/30/23 for viewing at the following location: Boston Health Commission Property Office, 205 River Street, Mattapan, MA 02126

The Owner reserves the unqualified right to reject any and all proposals. Inquiries should be made to:

Owner:

Boston Public Health Commission  
Attention: Steven Barry  
Project Manager  
205 River Street  
Mattapan, MA 02126  
Phone # 617 534 3073  
Mobile # 617-921-9072

Landscape Architect:

Tighe & Bond (Halvorson | Tighe & Bond Studio)  
Attention: Iris Yung-Ching Lin  
Senior Landscape Architect  
25 Kingston Street, 5<sup>th</sup> floor  
Boston, MA 02111  
Office # 857.449.7883

**DOCUMENT 001134**  
**FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR/ EXHIBITS**

**PART 1 - GENERAL**

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1.01 OWNER-CONTRACTOR AGREEMENT

- A. "AIA A107-2007 Abbreviated Standard Form of Agreement between Owner and Contractor for Construction Projects of a Limited Scope where the basis of payment is a Stipulated Sum - 2007 edition", is not included but referenced and hereby made part of these Contract Documents. This form of agreement shall be used by Contractor in fulfilling the requirements of these Contract Documents.
- B. The Agreement is supplemented by the following exhibits:
  - Exhibit A-1: Contractor's Partial Waiver and Subordination of Lien
  - Exhibit A-2: Contractor's Sworn Statement and Certified Subcontractor/Supplier List
  - Exhibit A-3: Subcontractor's Partial Lien Waiver – Subcontractor or Supplier who does not have a Direct Contract with the Owner

**PART 2 - PRODUCTS**

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Not Used

**PART 3 - EXECUTION**

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Not Used

**END OF DOCUMENT**



**EXHIBIT A-1  
CONTRACTOR'S PARTIAL WAIVER AND SUBORDINATION OF LIEN**

PROJECT LOCATION: 112 Southampton Street, Boston, MA 02118

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

Application for Payment No. \_\_\_\_\_

OWNER: Boston Public Health Commission

CONTRACTOR: \_\_\_\_\_

1.	Original Contract Amount:	\$ _____
2.	Approved Change Orders:	\$ _____
3.	Adjusted Contract Amount:	\$ _____
4.	Completed to Date:	\$ _____
5.	Less Retainage:	\$ _____
6.	Completed to Date, Less Retainage:	\$ _____
7.	Less Previous Payments:	\$ _____
8.	Current Amount Due: (line 6 less line 7)	\$ _____
9.	Pending Change Orders:	\$ _____
10.	Disputed Claims:	\$ _____

The undersigned who have a contract with \_\_\_\_\_

for furnishing labor or materials or both labor and materials or rental equipment, appliances or tools

for the erection, alteration, repair or removal of a building or structure or other improvement of real

property known and identified as \_\_\_\_\_.

\_\_\_\_\_ and owned by \_\_\_\_\_, upon receipt of

\_\_\_\_\_ (\$ \_\_\_\_\_) in payment of an

invoice/application for payment dated \_\_\_\_\_ does hereby:

- (a) waive any and all liens and right of lien on such real property for labor or materials, or both labor and materials, or rental equipment, appliances or tools, performed or furnished through the following date: \_\_\_\_\_ (payment period), except for retainage, unpaid agreed or pending change orders, and disputed claims as stated above; and
- (b) subordinate any and all liens and right of lien to secure payment for such unpaid, agreed or pending change orders and disputed claims, and such further labor or materials, or both labor and materials, or rental equipment, appliances or tools, except for retainage, performed or furnished at any time through the twenty-fifth day after the end of the above payment period, to the extent of the amount actually advanced by the above lender/mortgagee through such twenty-fifth day.

Signed under the penalties of perjury this \_\_\_\_\_ day of \_\_\_\_\_.

Contractor:

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

Project Location: 112 Southampton Street, Boston, MA 02118

\_\_\_\_\_ (date)

Then personally appeared the above named \_\_\_\_\_ and acknowledged the foregoing instrument to be his/her free act and deed and the free act and deed of \_\_\_\_\_ before me.

\_\_\_\_\_

Notary Public

My Commission Expires: \_\_\_\_\_

**EXHIBIT A-2**  
**CONTRACTOR'S SWORN STATEMENT AND**  
**CERTIFIED SUBCONTRACTOR/SUPPLIER LIST**  
(To be Submitted with each application for Payment)

Owner: Boston Public Health Commission

Contractor: \_\_\_\_\_

Project: 112 Southampton Street, Boston, MA 02118

We hereby certify that the following is a true and complete list of (a) all subcontractors and suppliers who have furnished material and/or labor to the Project pursuant to the construction Contract with Owner, (b) the current amounts of the contracts with such subcontractors and suppliers, and (c) the amounts for such subcontractors and suppliers requested in the current application for payment.

Subcontractor/Supplier Name	Contract Amount	Amount Requested this Application for Payment
1. _____	\$ _____	\$ _____
2. _____	\$ _____	\$ _____
3. _____	\$ _____	\$ _____
4. _____	\$ _____	\$ _____
5. _____	\$ _____	\$ _____
6. _____	\$ _____	\$ _____
7. _____	\$ _____	\$ _____
8. _____	\$ _____	\$ _____

The undersigned individual represents and warrants that he is duly authorized representative of the Contractor, empowered and authorized to execute and deliver this document on behalf of the Contractor undersigned, and that this document shall be binding upon the Contractor.

Signed and Sealed under the pains and penalties of perjury, this \_\_\_\_\_ day of \_\_\_\_\_.

Submitted with Application

CONTRACTOR:

for Payment # \_\_\_\_\_

By: \_\_\_\_\_  
Printed Name & Title of Above Individual

**EXHIBIT A-3**  
**SUBCONTRACTOR'S PARTIAL LIEN WAIVER –**  
**SUBCONTRACTOR OR SUPPLIER WHO DOES NOT**  
**HAVE A DIRECT CONTRACT WITH THE OWNER**  
(To Be Submitted with Each Application for Payment)

OWNER: Boston Public Health Commission

CONTRACTOR: \_\_\_\_\_

PROJECT: 112 Southamton Street, Boston, MA 02118

SUBCONTRACTOR AND/OR SUPPLIER: \_\_\_\_\_

Current Contract Amount: \$ \_\_\_\_\_

Total Amount Previously Paid: \$ \_\_\_\_\_

Total Amount Invoiced and Outstanding: \$ \_\_\_\_\_

Retainage Held to Date: \$ \_\_\_\_\_

Invoice Date(s): \_\_\_\_\_

In consideration of all past payments received from the Contractor in connection with the Project, the undersigned acknowledges and agrees that it has been paid all sums shown above as previously paid for labor, materials and/or equipment furnished by the undersigned to or in connection with the Project and the undersigned hereby releases, discharges, relinquishes and waives any and all liens, claims or rights to lien under the statutes of the \_\_\_\_\_ with respect to the Owner, the Project and/or against the Owner on account any labor, materials and/or equipment previously furnished and paid for as shown above.

The undersigned individual represents and warrants that he/she is the duly authorized representative of the Subcontractor/Supplier, empowered and authorized to execute and deliver this document on behalf of the Subcontractor/Supplier and that this document shall be binding upon the undersigned.

Signed under the penalties of perjury as of this \_\_\_\_\_ date of \_\_\_\_\_.

\_\_\_\_\_  
Name of Subcontractor or Supplier Releasing Lien

\_\_\_\_\_  
Signature of Individual Signing this Lien Waiver

\_\_\_\_\_  
Printed Name and Title of Above Individual

\_\_\_\_\_  
Submitted with General Contractor's Payment  
Application Number

**DOCUMENT 001135  
GENERAL CONDITIONS OF THE CONTRACT**

**PART 1 - GENERAL**

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1.01 GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

- A. "AIA A201 General Conditions of the Contract for Construction, latest edition", is not included but referenced and hereby made part of these Contract Documents. These conditions apply to the Work of the Contractor in fulfilling the requirements of the Contract Documents.

**PART 2 - PRODUCTS**

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Not Used

**PART 3 - EXECUTION**

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Not Used

**END OF DOCUMENT**

**SECTION 004000**

**FORM OF GENERAL BID  
SINGLE PRIME CONTRACT  
STIPULATED SUM**

PROJECT IDENTIFICATION: 112 Southampton Street Courtyard Project

THIS BID IS SUBMITTED TO: Boston Public Health Commission  
Property Office:  
205 River Street  
Mattapan, MA 02126  
Attention: Steven Barry, Project Manager  
Phone # 617 534 3073  
Mobile: 617 921 9072

CONTRACTOR NAME, ADDRESS  
AND PHONE NUMBER:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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**CONTRACT SUM**

A. The bidder proposes and agrees, if this proposal is accepted, to contract with the Boston Public Health Commission in the form of contract specified, to furnish design, materials, equipment, machinery, tools, apparatus, means of transportation, and labor to complete the project in full and complete accordance with the Bidding Requirements, Contracting Requirements, Drawings, Specifications, and Contract Documents, and to the full satisfaction of Stop & Shop Plaza, with the definite understanding that no money will be allowed for extra work except as set forth in the Contract Documents; and to meet the milestone dates scheduled for substantial completion of the Work for the sum of:

1. Base Bid: \_\_\_\_\_ Dollars

(\$ \_\_\_\_\_).

(Bid **includes** all State and local sales and use taxes.)

B. Bid Breakdown: Provide the following breakout costs for the Base Bid as follows:  
 (These breakout costs must add up to the Base Bid Total)

1. Mobilization	Dollars	\$
2. General Conditions	Dollars	\$
3. General Requirements	Dollars	\$
4. Turf Top Tile Rubber Surfacing over Existing Bituminous Concrete Paving to remain and adhered using adhesive recommended by manufacturer – Furnished by Owner & Installed by Contractor	Dollars	\$
5. Rubber Safety Surfacing Tile (Furnished by Owner) over Fiberglass Molded Grate (Furnished by Contractor) over Pedestal Paving System or over Cast in Place Concrete Pad (Furnished by Contractor) and adhered to Bituminous Concrete using adhesive recommended by manufacturer – Installed by Contractor	Dollars	\$
6. Cast in Place Concrete Pad over Existing Bituminous Concrete Paving to remain to support Fitness Equipment – Furnished & Installed by Contractor	Dollars	\$
7. Foam Ramp over Existing Bituminous Concrete Paving to remain and adhered using adhesive recommended by manufacturer – Furnished by Owner & Installed by Contractor	Dollars	\$
8. Rubble Tile ADA Compliant Ramp over Existing Bituminous Concrete Paving to remain and adhered using adhesive recommended by manufacturer – Furnished by Owner & Installed by Contractor	Dollars	\$
9. Rubber Curb – Type 1 abutting Gaming Area and adhered to Bituminous Concrete and adjacent surfacing using adhesive recommended by manufacturer – Furnished by Owner & Installed by Contractor	Dollars	\$
10. Rubber Curb – Type 2 abutting Fitness Area and secured vertically between components as recommended by manufacturer and horizontally adhered to Bituminous Concrete and adjacent surfacing as approved by Owner’s Representative and recommended by manufacturer – Furnished by Owner & Installed by Contractor	Dollars	\$
11. Perforated Metal Edge – Type 1 abutting Library Area and adhered to Bituminous Concrete and adjacent surfacing as approved by Owner’s Representative and recommended by manufacturer – Furnished & Installed by Contractor	Dollars	\$

12. Perforated Metal Edge – Type 2 abutting Fitness Area and adhered to Bituminous Concrete and adjacent surfacing as approved by Owner’s Representative and recommended by manufacturer – Furnished & Installed by Contractor	Dollars	\$
13. Moveable Metal Café Tables and Chairs – Furnished by Owner & Installed by Contractor	Dollars	\$
14. Moveable Wood and Metal Lounge Chairs – Furnished by Owner & Installed by Contractor	Dollars	\$
15. Moveable Metal Lounge Tables – Furnished by Owner & Installed by Contractor	Dollars	\$
16. Movable Metal Picnic Table with 2’ ADA Extension – Furnished by Owner & Installed by Contractor	Dollars	\$
17. Moveable Metal Benches – Furnished by Owner & Installed by Contractor	Dollars	\$
18. Modular Wood and Metal Top Bench without Back on Planter – Furnished by Owner & Installed by Contractor	Dollars	\$
19. Modular Wood and Metal Top Bench with Back on Planter – Furnished by Owner & Installed by Contractor	Dollars	\$
20. Modular Metal Rectangular Planter – Furnished by Owner & Installed by Contractor	Dollars	\$
21. Modular Metal Square Planter – Furnished by Owner & Installed by Contractor	Dollars	\$
22. Metal Trellis – Furnished by Owner & Installed by Contractor	Dollars	\$
23. Freestanding USB Charger – Furnished by Owner & Installed by Contractor	Dollars	\$
24. Moveable Metal and Wood Bench with Back–Furnished by Owner & Installed by Contractor	Dollars	\$
25. Lockable Storage Cabinet– Furnished by Owner & Installed by Contractor	Dollars	\$
26. Framing and Composite Wood Screen installed over Pressure Treated Wood Framing Beneath Wood Stair and Ramp and provide Access Door with Lock – Furnished & Installed by Contractor	Dollars	\$



27. Existing Metal Guardrail to be Sanded, Primed and Painted, Color: Black – by Contractor	Dollars	\$
28. Adult Fitness Equipment – Type 1 (Furnished by Owner) over Rubber Safety Surfacing Tile (Furnished by Owner) over Concrete Pad (Furnished by Contractor) and adhered to Bituminous Concrete using adhesive recommended by manufacturer –Installed by Contractor	Dollars	\$
29. Adult Fitness Equipment – Type 2 (Furnished by Owner) over Rubber Safety Surfacing Tile (Furnished by Owner) over Concrete Pad (Furnished by Contractor) and adhered to Bituminous Concrete using adhesive recommended by manufacturer –Installed by Contractor	Dollars	\$
30. Adult Fitness Equipment – Type 3 (Furnished by Owner) over Rubber Safety Surfacing Tile (Furnished by Owner) over Concrete Pad (Furnished by Contractor) and adhered to Bituminous Concrete using adhesive recommended by manufacturer –Installed by Contractor	Dollars	\$
31. Adult Fitness Equipment – Type 4 (Furnished by Owner) over Rubber Safety Surfacing Tile (Furnished by Owner) over Concrete Pad (Furnished by Contractor) and adhered to Bituminous Concrete using adhesive recommended by manufacturer –Installed by Contractor	Dollars	\$
32. Landscape Plantings – Furnished & Installed by Contractor	Dollars	\$
33. Planting Soils – Furnished & Installed by Contractor	Dollars	\$
34. Green Stairs – Furnished and Delivered to Site by Metal Fabricator under Separate Contract with the Owner – Offloaded at Site and Installed by Contractor	Dollars	\$
35. For Coordination Only regarding Painted Graphics on Existing Bituminous Concrete Paving to remain– By Artists under Separate Contract with Owner	Dollars	\$
<b>Base Bid Total:</b>	Dollars	\$

## GENERAL

- A. The undersigned bidder proposes and agrees, if this bid is accepted, to enter into an agreement with Boston Public Health Commission in the form included in the Contract Documents to perform, furnish, and install all work as specified or indicated in the Contract Documents for the Contract Sum and within the Contract Time indicated in this bid and in accordance with the other terms and conditions of the Contract Documents.
- B. This bid will remain subject to acceptance for ninety (90) days after the day of bid opening.
- C. Bidder has familiarized itself with the nature and extent of the Contract Documents, work, site locality, and local conditions and laws and regulations that may affect cost, progress, performance or furnishing of the work.
- D. Bidder has obtained and carefully studied (or assumes responsibility for obtaining and carefully studying) all such examinations, investigations, explorations, tests and studies which pertain to the physical conditions at the site or otherwise may affect the cost, progress, performance or furnishing of the work as bidder considers necessary for the performance or furnishing of the work at the Contract Sum, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents, of the Documents and General Requirements; and no additional examinations, investigations, explorations, tests, reports or similar information or data are or will be required by bidder for such purposes.
- E. Bidder has reviewed and checked information and data shown or indicated on the Contract Documents with respect to existing facilities at or contiguous to the site and assumes responsibility for the accurate location of said facilities. No additional examinations, investigations, explorations, tests, reports or similar information or data in respect of said facilities are or will be required by bidder to perform and furnish the work at the Contract Sum, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents, including specifically the provisions of the Documents and General Requirements.
- F. Bidder has correlated the results of all such observations, examinations, investigations, explorations, tests, reports, and studies with the terms and conditions of the Contract Documents.
- G. Bidder has given Architect/ Owner written notice of conflicts, errors, or discrepancies that the Bidder has discovered in the Contract Documents and the written resolution thereof by Architect/Owner is acceptable to bidder.
- H. The undersigned, as bidder, declares that the only person/persons interested in this proposal as principal/principals is/are named herein and that no other person than herein mentioned has any interest in this proposal or in the contract to be entered into; that this proposal is made without connection with any other person, companies or parties making a bid or proposal; and that it is in all respects fair and in good faith without collusion or fraud. The bidder further declares that he has examined the site of work and informed himself fully regarding all conditions pertaining to the place where work is to be done; that he has examined the specifications for the work and the Contract Documents relative thereto and he has read all special provisions furnished prior to the opening of bids; that he has satisfied himself relative to the work to be performed.
- I. It is distinctly understood that Boston Public Health Commission has the right to reject any and all bids should they deem it to be in the best interest of the owner.
- K. The terms used in this bid which are defined in the Documents and General Requirements of the construction contract included as part of the Contract Documents have the meanings assigned to them in the Documents and General Requirements.

**ADDENDA CLARIFICATION**

- A. In submitting this bid, bidder represents that:
  - 1. Bidder has examined copies of the bidding documents and of the following addenda (receipt of all which is hereby acknowledged):
    - a. Addendum Number: \_\_\_\_\_ Dated: \_\_\_\_\_
    - b. Addendum Number: \_\_\_\_\_ Dated: \_\_\_\_\_
    - c. Addendum Number: \_\_\_\_\_ Dated: \_\_\_\_\_
    - d. Addendum Number: \_\_\_\_\_ Dated: \_\_\_\_\_

**LIST OF SUBCONTRACTORS**

- A. The general contractor proposes to use the following subcontractors as part of their team:

<u>SUBCONTRACTOR</u>	<u>ADDRESS</u>	<u>TRADE</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

**CONTRACT TIME**

- A. Bidder agrees that the Work as set forth in the Contract Documents, will achieve Project Completion and Final Acceptance as follows:
  - 1. March 6<sup>th</sup>, 2023 – Construction Start
  - 5. June 30<sup>th</sup>, 2023 – Substantial Completion

**BID SECURITY**

- A. This bid shall contain a 5% bid security in the form of a Bid Bond, cash or certified check.

**COMMUNICATIONS**

- A. Communications concerning this bid shall be addressed to:

Bidder: \_\_\_\_\_

Address: \_\_\_\_\_

Attention: \_\_\_\_\_

SUBMITTED on \_\_\_\_\_, 20\_\_\_\_.

By \_\_\_\_\_  
(Firm or Corporation Name)

\_\_\_\_\_  
(State of Incorporation)

By \_\_\_\_\_  
(Name of Person Authorized to Sign)

\_\_\_\_\_  
(Title)

MA. License No.: \_\_\_\_\_

(Corporate Seal)

Attest \_\_\_\_\_  
(Secretary)

Business Address: \_\_\_\_\_

\_\_\_\_\_

Phone No.: \_\_\_\_\_

**SECTION 008500  
EXISTING CONDITIONS**

**PART 1- GENERAL**

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1.01 GENERAL PROVISIONS

- A. All of the Contract Documents, including Bidding Requirements and Contracting Requirements, and Division 1 — General Requirements, apply to the work of this Section.

1.02 SECTION INCLUDES

- A. Information related to existing conditions.

1.03 EXISTING CONDITIONS INFORMATION

- A. Existing Survey consisting of property, topographic and utility surveys and existing surface conditions.

1.04 PURPOSE OF EXISTING CONDITIONS INFORMATION

- A. Existing conditions information was based on an existing conditions site survey dated approximately 2015 by Owner for Architect/Engineer's use in designing Project. This survey was not current, so it was updated, and the current existing conditions plan was prepared by Halvorson | Tighe & Bond Studio based on a compilation of the existing conditions survey and hand held field measurements. Contractor to field verify existing conditions on site prior to construction.

1.05 CONTRACTOR'S USE OF EXISTING CONDITIONS INFORMATION

- A. Existing conditions information made available to Contractor:
  - 1. Is not part of Contract Documents.
  - 2. Is not guaranteed by Owner or Architect to be complete or accurate.
  - 3. Is made available for Contractor's Information.
  - 4. May be used by Contractor at Contractor's sole risk and judgment.

**PART 2 - PRODUCTS**

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Not Used

**PART 3 - EXECUTION**

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Not Used

**END OF SECTION**

**Existing Conditions**

**008500 - 1**

**SECTION 008800  
COMPUTER FILE TRANSMITTAL AGREEMENT**

**PART 1- GENERAL**

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1.01 GENERAL PROVISIONS

- A. All of the Contract Documents, including Bidding Requirements and Contracting Requirements, and Division 1 — General Requirements, apply to the work of this Section.

1.02 SECTION INCLUDES

- A. Terms and conditions for Contractor to obtain use of Landscape Architect's and Landscape Architect's and consultants' computer files and CAD documents.

1.03 GENERAL

- A. Contractor may benefit by using Landscape Architect's and Landscape Architect's consultants' computer files and CAD documents for preparation of base sheets for "Coordination Drawings" and "Record Drawings".
- B. Landscape Architect and Landscape Architect's consultants will provide copies of computer files and CAD documents for Contractor's use under the following terms and conditions:
1. Landscape Architect and Landscape Architect's consultants retain ownership of and copyrights to their computer files and CAD documents.
  2. Landscape Architect and Landscape Architect's consultants give Contractors a limited and nontransferable license to use their computer files and CAD documents for sole purpose of preparing "Coordination Drawings" and "Record Drawings" for this project only. No other use or purpose is authorized or permitted.
  3. Contractor shall not copy, distribute, or disseminate the computer files and CAD documents furnished to him for any use or purpose other than purposes authorized by this Agreement.
  4. Landscape Architect and Landscape Architect's consultants do not state, guarantee, or warrant that computer files and CAD documents furnished to Contractor are complete or accurate. Addenda and modifications to original computer files and CAD documents may not have been incorporated into computer files and CAD documents furnished to Contractor.
  5. Computer files and CAD documents will be furnished in their existing layering, filing, and directories. No special layering, file organization, directory organization, or compilation will be created for Contractor.
  6. Landscape Architect and Landscape Architect's consultants do not state, guarantee, or warrant that computer files and CAD documents furnished to Contractor are usable with a computer hardware or software other than computer hardware and software used by Landscape Architect and Landscape Architect's consultants to create computer files and CAD files. Landscape Architect and Landscape Architect's consultants may have used multiple, different, and non-compatible computer hardware and software systems and products.

7. Contract shall check information contained in computer files and CAD documents furnished by Landscape Architect and Landscape Architect's consultants. Contractor shall be solely responsible for completeness and accuracy of "Coordination Drawings" and "Record Drawings" prepared using computer files and CAD documents furnished by Landscape Architect and Landscape Architect's consultants.
8. Contractor shall remove the Landscape Architect's and Landscape Architect's consultants' names and professional seals from "Coordination Drawings" and "Record Drawings" prepared using computer files and CAD documents furnished to him.
9. Contractor shall indemnify and hold harmless the Landscape Architect and Landscape Architect's consultants and officers, employees, and assigns of the Landscape Architect and Landscape Architect's consultants from damages and claims resulting from Contractor's use of Landscape Architect's and Landscape Architect's consultants' computer files and CAD files.
10. Payment in full is required prior to preparation of the computer files and CAD documents for transmittal.
11. Data transmittal will be by one or more compact discs or DVD-ROM discs unless otherwise requested by Contractor and approved by Landscape Architect.
12. These terms and conditions constitute the complete Agreement between the Contractor and the Landscape Architect and the Landscape Architect's consultants.
13. These terms and conditions may only be modified in writing by mutual agreement of all parties to Agreement.
14. This Agreement is governed by laws of the State of Massachusetts.

This Agreement and these terms and conditions accepted:

By: \_\_\_\_\_ Date: \_\_\_\_\_  
Authorized officer of the Contractor

**PART 2 - PRODUCTS**

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Not Used

**PART 3 - EXECUTION**

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Not Used

**END OF SECTION**

**SECTION 009313  
REQUESTS FOR INFORMATION**

**PART 1 - GENERAL**

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1.01 GENERAL PROVISIONS

- A. All of the Contract Documents, including Bidding Requirements and Contracting Requirements, and Division 1 — General Requirements, apply to the work of this Section.

1.02 SECTION INCLUDES

- A. Requirements for Contractor's Requests for information (RFI).

1.03 GENERAL

- A. Requirements for Contractor's Requests for Information (RFI).
- B. Definition: for this section, a "request for information" and a "request for interpretation" are the same.
- C. Contractor May Request Information
  - 1. Contractor may request information as permitted by General Conditions of the Contract for Construction.
- D. Contractor's Requests for Information After Bidding or After Contract Award:
  - 1. During bidding and pricing, Contractor is required to study and understand Contract Documents, to compare Contract Documents with each other, and to report errors, inconsistencies, and ambiguities discovered. By submitting a bid and by executing Contract for Construction, Contractor affirms that Contractor understands Contract Documents. Consequently, there should be few requests for information after bidding and after Contract Award.
- E. Requirements for Requests for Information
  - 1. Contractor shall:
    - a. Make a request only after confirming information is not already available.
    - b. Use RFI form.
    - c. Use separate RFI form for each topic and request.
    - d. Maintain log of RFI's including topic, date issued, date response received.
- F. Architect/ Engineer's Response Time
  - 1. Allow at least 10 business days for Owner's Representatives' response. Responses, which require response by Landscape Architect's consultants, require at least 5 additional business days.
- G. RFI Form
  - 1. Submit RFI's on form provided by Contractor to be approved by Owner's Representative.



**PART 2 - PRODUCTS**

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Not Used

**PART 3 - EXECUTION**

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Not Used

**END OF SECTION**

**SECTION 011100  
SUMMARY**

**PART 1 - GENERAL**

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1.01 GENERAL PROVISIONS

- A. All of the Contract Documents, including Bidding Requirements and Contracting Requirements, and Division 1 — General Requirements, apply to the work of this Section.

1.02 SECTION INCLUDES

- A. Contract description.  
B. Contractor's use of site and premises.

1.03 CONTRACT DESCRIPTION

- A. The 112 Southampton Street Courtyard includes the following scope of work:
- Mobilization and Site Logistics
  - General Conditions
  - Temporary Facilities and Controls
  - Site Preparation
  - Power Washing of Existing Surfaces
  - Turf Top Rubber Surfacing
  - Rubber Safety Surfacing over Fiberglass Molded Grate over Pedestal Paving System
  - Rubber Safety Surfacing over Cast-in-Place Concrete Pad
  - Foam ADA Compliant Ramp
  - Rubber Tile ADA Compliant Ramp
  - Rubber Curb – Type 1 Abutting Gaming Area
  - Rubber Curb – Type 2 Abutting Fitness Area
  - Perforated Metal Edge – Type 1 Abutting Library Area
  - Perforated Metal Edge – Type 2 Abutting Fitness Area
  - Moveable Metal Café Tables and Chairs
  - Moveable Wood and Metal Lounge Chairs
  - Moveable Metal Lounge Tables
  - Moveable Metal Picnic Table with ADA Extension
  - Moveable Metal Benches
  - Modular Wood and Metal Top Bench without Back on Planter
  - Modular Wood and Metal Top Bench with Back on Planter
  - Modular Metal Rectangular Planter
  - Modular Metal Square Planter
  - Metal Trellis
  - Freestanding USB Charger
  - Moveable Metal and Wood Bench with Back
  - Lockable Storage Cabinet
  - Composite Wood Screen over Pressure Treated Wood Framing
  - Existing Metal Guardrail and Handrail to be Sanded, Primed and Painted
  - Adult Fitness Equipment – Type 1 over Cast in Place Concrete Pad
  - Adult Fitness Equipment – Type 2 over Cast in Place Concrete Pad
  - Adult Fitness Equipment – Type 3 over Cast in Place Concrete Pad
  - Adult Fitness Equipment – Type 4 over Cast in Place Concrete Pad
  - Green Stairs – Offload at Site and Install

- Coordination with Artist Painted Graphics Project by Others under Separate Contract with Owner.

B. Perform Work of Contract under a stipulated sum contract with the Owner in accordance with the Conditions of Contract.

1.04 CONTRACTOR'S USE OF SITE AND PREMISES

A. Limit use of site and premises to allow:

1. Pedestrians to safely circulate adjacent to work zone.
2. Vehicles to safely circulate on roadways adjacent to work zone.

**PART 2 - PRODUCTS**

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Not Used

**PART 3 - EXECUTION**

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Not Used

**END OF SECTION**

**SECTION 011500  
FIELD ENGINEERING**

**PART 1- GENERAL**

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1.01 GENERAL PROVISIONS

- A. All of the Contract Documents, including Bidding Requirements and Contracting Requirements, and Division 1 — General Requirements, apply to the work of this Section.

1.02 SECTION INCLUDES

- A. Field engineering services required for the Project, including but not limited to:
  - 1. Survey work.
  - 2. Civil, structural, or other professional engineering services specified, or required to execute Contractor's construction methods.
- B. Architect/Engineer will identify existing control points and property line corner stakes indicated on the Drawings, as required.

1.03 RELATED REQUIREMENTS

- A. Examine Contract Documents for requirements that affect the work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
  - 1. Section 01700, Execution Requirements; Record documents.

1.04 QUALIFICATIONS OF SURVEYOR OR ENGINEER

- A. Qualified engineer or registered land surveyor, acceptable to Owner's Representative.
- B. Registered professional engineer of the discipline required for the specific service on the Project, licensed in the state in which the Project is located.

1.05 SURVEY REFERENCE POINTS

- A. Existing basic horizontal and vertical control points for the Project are those designated on Drawings.
- B. Locate and protect control points prior to starting sitework and preserve permanent reference points during construction.
  - 1. Make no changes or relocations without prior written notice to Owner's Representative.
  - 2. Report to Owner's Representative when any reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations.
  - 3. Require surveyor to replace Project control points which may be destroyed.
    - a. Establish replacements based on original survey control.

1.06 PROJECT SURVEY REQUIREMENTS

- A. Establish a minimum of two permanent benchmarks on site, referenced to data established by survey control points.

1. Record locations, with horizontal and vertical data, on Project Record Documents.
- B. Establish lines and levels, locate and layout by instrumentation and similar appropriate means:
  1. Site Improvements
    - a. Stakes for grading, fill, and soil placement.
    - b. Utility slopes and invert elevations.
  2. Batter boards for foundations and structures.
- C. From time to time, verify layouts by same methods.

#### 1.07 RECORDS

- A. Maintain a complete, accurate log of all control and survey work as it progresses.
- B. On completion of major site improvements, prepare a certified survey showing all dimensions, locations, angles, and elevations of construction.

#### 1.08 SUBMITTALS

- A. Submit name and address of surveyor and professional engineer to Owner's Representative.
- B. On request of Owner's Representative, submit documentation to verify accuracy of field engineering work.
- C. Submit certificate signed by registered engineer or surveyor certifying that elevation and locations of improvements are in conformance, or non-conformance, with Contract Documents.

### **PART 2 - PRODUCTS**

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Not used

### **PART 3 - EXECUTION**

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Not used

**END OF SECTION**

**SECTION 012400  
SCHEDULE OF VALUES**

**PART 1 - GENERAL**

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1.01 GENERAL PROVISIONS

- A. All of the Contract Documents, including Bidding Requirements and Contracting Requirements, and Division 1 — General Requirements, apply to the work of this Section.

1.02 SECTION INCLUDES

- A. Requirements for the following procedures.
  - 1. Preparation and submittal of the Preliminary and Final Schedule of Values
- B. Related work includes, but is not limited to, the following work under other Sections
  - 1. Requirements for construction schedules and general procedures for submittals: Section 013000 – Administrative Requirements.

1.03 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.04 SUBMITTALS

- A. Prepare and submit the following submittals in accordance with the requirements of Section 013000 – Administrative Requirements.
- B. Schedule of Values:
  - 1. Schedule of Values shall be typewritten on 8-1/2 by 11-inch white paper.
  - 2. Submit to the Owner's Representative, three (3) copies of each Schedule of Values within 7 days of receipt of Notice to Proceed.
- C. List of Subcontractors and Sub-subcontractors: Attached to the Preliminary Schedule of Values shall be a list of the names, addresses (and whether individual, partnership or corporation) of each Subcontractor or Sub-Subcontractor who is to perform all or any part of each subdivision. In the event any Subcontractors, or Sub-subcontractors are not known at the time said schedule is prepared, an amended or supplementary list containing the names of the Subcontractors and Sub-Subcontractors involved and indicating their division of the Work shall be furnished to the Owner's Representative as soon as the information is available. A code number for identification on requisitions shall be used to identify the Contractor, each of the Subcontractors and subordinate Subcontractors, and shall be shown in each requisition where any part of the Work performed by the Contractor, such Subcontractor, Sub-Subcontractors or material supplier is incorporated in the amount of the requisition for which payment is requested.
- D. Monthly Updates: Submit to the Owner's Representative with the Schedule of Values on a monthly basis such schedules of quantities and costs, payrolls, reports, estimates,

records, and other data as the Owner may request concerning work performed or to be performed under this Contract. The Schedule of Values shall be submitted at the same time as the updated Schedule showing the current status of the work, as required under Section 013000 – Administrative Requirements.

#### 1.05 SUBMITTAL REQUIREMENTS

- A. General: Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Schedule. Provide line items for principal subcontract amounts, where appropriate, and for portions of the work designated in this Section.
- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one-line item for each Specification Section. Identify each line item by Specification Number and Title, and by portion of the Work of that Section where the Work of a Section is allocated to more than one-line item.
- C. The Schedule of Values shall be arranged in vertical columns identified with titles, including Names of Items; Original Amounts, Percent Completed to Date; Previous Payments; Current Requests; and Balance Not Yet Requested. A summary of the total amount due to date and the amount of the five percent retained shall be included in the statement which shall be signed by the Contractor. A separate sheet shall be included with each requisition showing status of work covered by approved Change Orders. The Schedule of Values shall be revised if later found by the Owner's Representative to be inaccurate.
- D. In preparing the Schedule, each sub-division or classification of the Work shall be identified by code number referring to each individual Section (or Sub-Section where applicable) of the Specifications. The Schedule of Values shall be prepared in accordance with AIA Documents G702 and G703.
- E. Initial values will be recognized to be an accurate accounting of the value of the work. Upon request by the Owner's Representative, support values given with data that will substantiate their correctness.
- F. Identify quantities of designated materials or materials stored on which payment is expected to be made.
- G. Use monthly submissions of Schedule of Values only as basis for Contractor's Application for Payment.

#### 1.06 PREPARING SCHEDULE OF VALUES

- A. General Procedures:
  - 1. Prepare Preliminary Schedule of Values for review by Owner's Representative.
  - 2. Incorporate requested modifications to produce a Final Schedule of Values, which will become the basis for documenting the progress of the Work with each Application for Payment.
  - 3. Update Final Schedule of Values as necessary to reflect changes in the Work.
- B. Itemize separate line item cost for each of the general cost items as specified in this Section.

- C. Breakdown installed costs into:
  - 1. Delivered cost of product
  - 2. Total installation cost, with overhead and profit.
  - 3. Construction phase.
  - 4. Note that the Owner is exempt from Sales and Use Tax for all materials incorporated into the Work.
- D. For each line item which has installed value of more than \$20,000.00 breakdown costs to list major products, components, or operations under each line.
- E. Sum of costs of all items listed in schedule shall be equal to total Contract Sum.
- F. Each item shown on an Application for Payment Schedule of Values shall also appear on the CPM Schedule.

1.07 LINE ITEMS FOR SCHEDULE OF VALUES

- G. Work Covered in Division 1: Itemize separate line-item cost for each of the following general cost items:
  - 1. Performance and Payment Bonds for General Contractor and Subcontractors.
  - 2. Field engineering; photographic documentation.
  - 3. Coordination; project management.
  - 4. Preparation of schedule and periodic updates.
  - 5. If periodic updates of schedule are not performed in a timely manner, the amount shown on the Schedule of Values for this line item shall be forfeit.
  - 6. Weather protection; temporary fence.
  - 7. Equipment Storage.
  - 8. Construction aids.
  - 9. Construction waste management.
  - 10. Cutting and patching; selective demolition
  - 11. Final cleaning.
  - 12. Punchlist preparation and response.
  - 13. Maintenance of as-built documents for site work and preparation of closeout documents.
  - 14. Overhead.
  - 15. Other items of work as requested by Owner's Representative.
- H. Work Covered in Divisions 2 through 50: Provide at least one separate line item for each Section of the Specifications. Section line items shall be further subdivided into separate line items as follows:
  - 1. Identify material costs separately from labor costs.
  - 2. Provide separate line items for the following where applicable:
    - a. Submittals
    - b. Maintenance of as-built documents
    - c. Preparation of closeout documents
    - d. Operations and Maintenance Manuals.
    - e. Training
  - 3. Other items of work as requested by Owner's Representative.



4. For each line item which has installed value of more than \$20,000.00 break down costs to list major products, components, or operations under each line.

**PART 2 - PRODUCTS**

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Not Used

**PART 3 - EXECUTION**

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Not Used

**END OF SECTION**

**SECTION 012500  
SUBSTITUTION REQUEST FORM**

No substitutions will be considered  
Without this completed substitution request form and supporting documentation.

Substitutions made without completion of this form  
Will be considered defective work.

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

Project: **112 Southampton Street Courtyard Project**  
Boston, MA

To: Owner's Representative

Re: Request for Substitution

The Contractor proposes the following substitution in accordance with the requirements of the Contract Documents:

Scope of Substitution \_\_\_\_\_  
\_\_\_\_\_

Specification Reference \_\_\_\_\_  
\_\_\_\_\_

Reason for Proposed Substitution \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Impact on Project Cost \_\_\_\_\_  
\_\_\_\_\_

Impact on Project Schedule \_\_\_\_\_  
\_\_\_\_\_

Impact on  
Guarantees and  
Warranties \_\_\_\_\_  
\_\_\_\_\_

Coordination  
Required with  
Adjacent  
Materials and  
System \_\_\_\_\_  
\_\_\_\_\_

List Deviations  
From Specified  
Requirements \_\_\_\_\_  
\_\_\_\_\_

Attachments: Attach supporting documentation sufficient for Owner's Representative to evaluate situation. Substitution Request Forms submitted without adequate documentation will be returned without review.

Attachments \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Response date: List date by which response by Owner's Representative is requested to maintain project schedule and allow sufficient time for inclusion of proposed substitution.

Response Date \_\_\_\_\_

Submitted by \_\_\_\_\_

Firm and  
Address \_\_\_\_\_  
\_\_\_\_\_

Signature below signifies acceptance of responsibility for accuracy and completeness of information included in this Substitution Request Form.

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



**SECTION 013000  
ADMINISTRATIVE REQUIREMENTS**

**PART 1 - GENERAL**

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1.01 GENERAL PROVISIONS

- A. All of the Contract Documents, including Bidding Requirements and Contracting Requirements, and Division 1 — General Requirements, apply to the work of this Section.

1.02 SECTION INCLUDES

- A. Coordination and project conditions.
- B. Pre-construction meeting.
- C. Progress meetings.
- D. Pre-installation meetings.
- E. Submittal procedures.
- F. Submittal Schedule
- G. Site Logistics Plan / Construction progress schedules.
- H. Proposed products list.
- I. Product data.
- J. Shop drawings.
- K. Samples.
- L. Daily Progress Reports
- M. Design data.
- N. Test reports.
- O. Certificates.
- P. Manufacturer's instructions.
- Q. Erection drawings.
- R. Cutting and patching.

1.02 COORDINATION AND PROJECT CONDITIONS

- A. Coordinate scheduling, submittals, and Work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- C. Coordinate space requirements, supports, and installation of mechanical and electrical Work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- D. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- E. Coordinate completion and clean-up of Work of separate sections in preparation for Substantial Completion.
- F. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.03 PRE-CONSTRUCTION MEETING

- A. Schedule Pre-Construction Meeting within five (5) days after Notice of Award.
- B. Attendance Required: Owner, Owner's Representative, Prime Contractor and major subcontractors.
- C. Agenda:
  - 1. Submission of list of Subcontractors, list of products, schedule of values, and progress schedule.
  - 2. Designation of personnel representing the parties in Contract, and the Owner's Representative.
  - 3. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
  - 4. Scheduling.
  - 5. Submittal Log
  - 6. Schedule Testing Agency
- D. Record minutes and distribute copies to participants, and those affected by decisions made.

1.04 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the Work at maximum monthly intervals.
- B. Make arrangements for meetings, prepare agenda with copies for participants, and preside at meetings
- C. Attendance Required: Job superintendent, major subcontractors and suppliers, Owner, Owner's Representative, as appropriate to agenda topics for each meeting.

D. Agenda:

1. Review minutes of previous meetings.
2. Review of Work progress.
3. Field observations, problems, and decisions.
4. Identification of problems which impede planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of off-site fabrication and delivery schedules.
7. Maintenance of progress schedule.
8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding work period.
10. Coordination of projected progress.
11. Maintenance of quality and work standards.
12. Effect of proposed changes on progress schedule and coordination.
13. Other business relating to Work.
14. Review Logs: RFI, Submittal, Sketches, Proposal Requests
15. Pending Changes and Substitutions

E. Record minutes and distribute copies to participants, and those affected by decisions made.

1.05 PRE-INSTALLATION MEETING

A. When required in individual specification sections, convene a pre-installation meeting at the site prior to commencing work of the section.

B. Require attendance of parties directly affecting, or affected by, Work of the specific section.

C. Notify Owner's Representative four days in advance of meeting date.

D. Prepare agenda and preside at meeting:

1. Review conditions of installation, preparation and installation procedures.
2. Review coordination with related work.

E. Record minutes and distribute copies within two (2) days after meeting to participants, with copies to Owner's Representative, participants, and those affected by decisions made.

1.06 SUBMITTAL PROCEDURES

A. Transmit each submittal with Owner's Representative accepted form.

B. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.

C. Identify Project, Contractor, subcontractor and supplier, pertinent drawing and detail number, and specification section number, as appropriate.

D. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.

E. Schedule submittals to expedite the Project and deliver to Owner's Representative at business address. Coordinate submission of related items.

- F. For each submittal for review, allow five (5) business days excluding delivery time to and from the Contractor.
  - G. Identify variations from Contract Documents and product or system limitations which may be detrimental to successful performance of the completed Work.
  - H. Provide space for Contractor and Owner's Representative review stamps.
  - I. When revised for resubmission, identify all changes made since previous submission.
  - J. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.
  - K. Submittals not requested will not be recognized or processed.
- 1.07 SUBMITTAL SCHEDULE
- A. Timing: Prepare and issue complete Submittal Schedule no later than five (5) business days after Owner or Architect accepts Progress Schedule.
  - B. Preparation: Coordinate Submittal Schedule with Progress Schedule, and Schedule of Values.
  - C. Content of Submittal Schedule: Prepare schedule in order by Specification Section. Provide the following information for each submittal:
    - 1. Scheduled date of initial submittal.
    - 2. Specification Section number.
    - 3. Submittal type.
    - 4. Name of subcontractor or supplier.
  - D. Distribution: Print and distribute progress schedule to Owner or Architect, subcontractors, and other parties affected. Post copies in field office.
  - E. Revisions: Update and reissue progress schedule monthly in conjunction with Application for Payment.
- 1.08 SITE LOGISTICS PLAN AND CONSTRUCTION PROGRESS SCHEDULES
- A. Submit Site Logistics Plan and Preliminary Construction schedule within 10 business days after Notice of Award. After review, resubmit revised Site Logistics Plan and revised Construction Schedule within ten days.
  - B. Submit revised Progress Schedules with each Application for Payment.
  - C. Distribute copies of reviewed schedules to Project site file, subcontractors, suppliers, and other concerned parties.
  - D. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.
  - E. Submit a computer-generated horizontal bar chart with separate line for each major portion of Work or operation, identifying first workday of each week.
  - F. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration.



- G. Indicate estimated percentage of completion for each item of Work at each submission.
- H. Provide separate schedule of submittal dates for shop drawings, product data, and samples, and dates reviewed submittals will be required from Owner's Representative. Indicate decision dates for selection of finishes.

1.09 PROPOSED PRODUCTS LIST

- A. Within 7 days after date of after Notice of Award, submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
- B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.10 PRODUCT DATA

- A. Product Data: Submit to Owner's Representative for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents. Provide copies and distribute in accordance with Submittal Procedures article and for record documents purposes described in Section 017000 – Execution Requirements.
- B. Submit the number of copies which the Contractor requires, plus four copies which will be retained by the Owner's Representative.
- C. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- D. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- E. After review distribute in accordance with the Submittal Procedures article above and provide copies for record documents described in Section 017000 – Execution Requirements.
- F. Installer Copy: Verify that installer of Work possesses a current copy of Owner or Architect approved product data prior to installation.

1.11 SHOP DRAWINGS

- A. Shop Drawings: Submit to Owner's Representative for review for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. Produce copies and distribute in accordance with Submittal Procedures article and for record documents purposes described in Section 01700 – Execution Requirements.
- B. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. Submit the number of opaque reproductions which Contractor requires, plus four copies which will be retained by Owner's Representative.
- D. Provide accurately prepared, large, to scale and detailed shop drawings prepared specifically for this Project on reproducible sheets. Show adjacent conditions and related work. Show accurate field dimensions where appropriate. Identify materials and products shown. Note special coordination required. Standard information prepared without specific reference to Project is not considered shop drawings.

- E. Shop drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, and similar drawings.
- F. Show every component of fabricated item, notes regarding manufacturing process, coatings and finishes, identifying numbers conforming to Contract Documents, dimensions, and appropriate trade names. Show anchorage and fastening details, including type, size and spacing. Show material gauge and thickness. Indicate welding details and joint types.
- G. Installer Copy: Verify that installer of Work possesses a current copy of Owner or Architect-approved shop drawings prior to installation.

#### 1.12 SAMPLES

- A. Samples: Submit to Owner's Representative for review for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. Produce duplicates and distribute in accordance with Submittal Procedures article and for record documents purposes described in Section 017000 – Execution Requirements.
- B. Samples for Selection as Specified in Product Sections:
  - 1. Submit to Owner's Representative for aesthetic, color, or finish selection.
  - 2. Submit samples of finishes from the full range of manufacturers' standard colors, or in custom colors selected, textures, and patterns for Owner's Representative selection.
  - 3. After review, produce duplicates and distribute in accordance with Submittal Procedures article and for record documents purposes described in Section 017000 – Execution Requirements.
- C. Submit samples to illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
- D. Include identification on each sample, with full Project information.
- E. Submit the number of samples specified in individual specification sections; one of which will be retained by Owner's Representative.
- F. Reviewed samples which may be used in the Work are indicated in individual specification sections.
- G. Samples will not be used for testing purposes unless specifically stated in the specification section.

#### 1.13 DAILY PROGRESS REPORTS

- A. Prepare daily construction Progress Reports. Record the following information concerning events on Project Site:
  - 1. List of subcontractors on site.
  - 2. General weather conditions and temperature.
  - 3. Daily Summary of work efforts.
  - 4. Identification of work efforts in relation to Schedule of Values.
  - 5. Digital image(s) documenting work efforts.
  - 6. Meetings and significant decisions.
  - 7. Orders and requests by governing authorities.
  - 8. Change orders received.
  - 9. Authorized substantial completions.

- B. Distribution: Distribute copies to Owner and Architect daily via email.

#### 1.14 DESIGN DATA

- A. Submit for the Owner's Representative's knowledge as contract administrator and for the Owner.
- B. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the Contract Documents.

#### 1.15 TEST REPORTS

- A. Submit for the Owner's Representative's knowledge as contract administrator and for the Owner.
- B. Submit test reports for information for the limited purpose of assessing conformance with information given and the design concept expressed in the Contract Documents.

#### 1.16 CERTIFICATES

- A. When specified in individual specification sections, submit certification by the manufacturer, installation/application subcontractor, or the Contractor to Owner's Representative, in quantities specified for Product Data.
- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or product but must be acceptable to Owner's Representative.

#### 1.17 MANUFACTURER'S INSTRUCTIONS

- A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to Owner's Representative for delivery to Owner in quantities specified for Product Data.
- B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

#### 1.18 MANUFACTURER'S FIELD REPORTS

- A. Submit reports for the Owner's Representative's benefit as contract administrator or for the Owner.
- B. Submit report in duplicate within 30 days of observation to Owner's Representative for information.
- C. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the Contract Documents.

#### 1.19 ERECTION DRAWINGS

- A. Submit drawings for the Owner's Representative's benefit as contract administrator or for the Owner.
- B. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the Contract Documents.

- C. Data indicating inappropriate or unacceptable Work may be subject to action by the Owner's Representative or Owner.

## **PART 2 - PRODUCTS**

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Not Used

## **PART 3 - EXECUTION**

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### 3.01 CUTTING AND PATCHING

- A. Employ skilled and experienced installer to perform cutting and patching.
- B. Submit written request in advance of cutting or altering elements which affect:
  - 1. Structural integrity of element.
  - 2. Integrity of weather-exposed or moisture-resistant elements.
  - 3. Efficiency, maintenance, or safety of element.
  - 4. Visual qualities of sight exposed elements.
  - 5. Work of Owner or separate contractor.
- C. Execute cutting, fitting, and patching to complete Work, and to:
  - 1. Fit the several parts together, to integrate with other Work.
  - 2. Uncover Work to install or correct ill-timed Work.
  - 3. Remove and replace defective and non-conforming Work.
  - 4. Remove samples of installed Work for testing.
  - 5. Provide openings in elements of Work for penetrations of mechanical and electrical Work.
- D. Execute work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
- E. Cut masonry and concrete materials using masonry saw or core drill.
- F. Restore Work with new products in accordance with requirements of Contract Documents.
- G. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.
- H. Identify hazardous substances or conditions exposed during the Work to the Owner's Representative for decision or remedy.

**END OF SECTION**

**SECTION 014000  
QUALITY REQUIREMENTS**

**PART 1 - GENERAL**

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1.01 GENERAL PROVISIONS

- A. All of the Contract Documents, including Bidding Requirements and Contracting Requirements, and Division 1 — General Requirements, apply to the work of this Section.

1.02 SECTION INCLUDES

- A. Quality control and control of installation.
- B. Tolerances
- C. References.
- D. Mock-up requirements.
- E. Testing and inspection services.
- F. Manufacturers' field services.
- G. Examination.
- H. Preparation.

1.03 QUALITY CONTROL AND CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step-in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Owner's Representative before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform Work by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on Shop Drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.04 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Owner's Representative before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

#### 1.01 REFERENCES

- A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current on date of Contract Documents, except where a specific date is established by code.
- C. Obtain copies of standards where required by product specification sections.
- D. Should specified reference standards conflict with Contract Documents, request clarification from the Owner's Representative before proceeding.
- E. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of the Owner's Representative shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

#### 1.02 MOCK-UP REQUIREMENTS

- A. Tests will be performed under provisions identified in this section and identified in the respective product specification sections.
- B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- C. Accepted mock-ups shall be a comparison standard for the remaining Work.
- D. Where mock-up has been accepted by Owner's Representative and is specified in product specification sections to be removed; remove mock-up and clear area when directed to do so by Owner's Representative.

#### 1.03 TESTING AND INSPECTION SERVICES

- A. Owner will employ and pay for specified services of an independent firm to perform testing and inspection.
- B. The independent firm will perform tests, inspections and other services specified in individual specification sections and as required by the Owner's Representative.
  - 1. Laboratory: Authorized to operate in location in which Project is located.
  - 2. Laboratory Staff: Maintain a full-time registered Engineer on staff to review services.
  - 3. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants.
- C. Testing, inspections and source quality control may occur on or off the project site. Perform off-site testing as required by the Owner's Representative or the Owner.
- D. Reports will be submitted by the independent firm to the Owner's Representative and Contractor, in duplicate indicating observations and results of tests and indicating compliance or

non-compliance with Contract Documents.

- E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
  - 1. Notify Owner's Representative and independent firm 24 hours prior to expected time for operations requiring services.
  - 2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.
- F. Testing and employment of testing agency or laboratory shall not relieve Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
- G. Re-testing or re-inspection required because of non-conformance to specified requirements shall be performed by the same independent firm on instructions by the Owner's Representative. Payment for re-testing or re-inspection will be charged to the Contractor by deducting testing charges from the Contract Sum/Price.
- H. Agency Responsibilities:
  - 1. Test samples of mixes submitted by Contractor.
  - 2. Provide qualified personnel at site. Cooperate with Owner's Representative and Contractor in performance of services.
  - 3. Perform specified sampling and testing of products in accordance with specified standards.
  - 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
  - 5. Promptly notify Owner's Representative and Contractor of observed irregularities or non-conformance of Work or products.
  - 6. Perform additional tests required by Owner's Representative.
  - 7. Attend pre-construction meetings and progress meetings.
- I. Agency Reports: After each test, promptly submit two copies of report to Owner's Representative and to Contractor. When requested by Owner's Representative, provide interpretation of test results. Include the following:
  - 1. Date issued.
  - 2. Project title and number.
  - 3. Name of inspector.
  - 4. Date and time of sampling or inspection.
  - 5. Identification of product and specifications section.
  - 6. Location in the Project.
  - 7. Type of inspection or test.
  - 8. Date of test.
  - 9. Results of tests.
  - 10. Conformance with Contract Documents.
- J. Limits on Testing Authority:
  - 4. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
  - 5. Agency or laboratory may not approve or accept any portion of the Work.
  - 6. Agency or laboratory may not assume any duties of Contractor.
  - 7. Agency or laboratory has no authority to stop the Work.

1.04 MANUFACTURERS' FIELD SERVICES

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, and test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to Owner's Representative ten (10) days in advance of required observations.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- D. Refer to Section 013000 - Administrative Requirements, Manufacturers' Field Reports Article.

**PART 2 - PRODUCTS**

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Not Used

**PART 3 - EXECUTION**

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3.01 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new Work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Verify that utility services are available, of the correct characteristics, and in the correct locations.

3.02 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

**END OF SECTION**



**SECTION 015000  
TEMPORARY FACILITIES**

**PART 1 - GENERAL**

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1.01 GENERAL PROVISIONS

- A. All of the Contract Documents, including Bidding Requirements and Contracting Requirements, and Division 1 — General Requirements, apply to the work of this Section.

1.02 SECTION INCLUDES

A. Temporary Utilities:

- 1. Temporary electricity, lighting, telephone, internet and email service.
- 2. Temporary water service.
- 3. Temporary sanitary facilities.

B. Construction Facilities:

- 1. Field offices.
- 2. Parking.
- 3. Progress cleaning and waste removal.
- 4. Project identification.

C. Temporary Controls:

- 1. Barriers.
- 2. Protective Construction Fence.
- 3. Protection of the Work.
- 4. Water control.
- 5. Pest control.
- 6. Pollution control.
- 7. Rodent control.

D. Removal of utilities, facilities, and controls.

1.03 TEMPORARY ELECTRICITY, LIGHTING, TELEPHONE, INTERNET AND EMAIL

- A. Owner will provide temporary electrical service from existing electrical service on site.
- B. Temporary lighting, telephone, internet, WiFi and email will not be provided by the Owner on site.

1.04 TEMPORARY WATER SERVICE

- A. Owner will provide reasonable water service in the form of a hose bib to assist with construction operations.
- B. Extend water service branch piping with outlets located so water is available by hoses with threaded connections.

1.05 TEMPORARY SANITARY FACILITIES

- A. Contractor will provide portable restroom facilities on site in a location approved by the Owner's Representative.

1.06 FIELD OFFICE AND EQUIPEMENT STORAGE

- A. Field Office will not be required on site but assumes Contractor will operate out of their vehicles.
- B. Equipment Storage will be limited to a shipping container provided by Contractor in a location approved by the Owner.
- C. Project meetings will occur virtually or on site at agreed upon location between Contractor and Owner's Representative.

1.07 PARKING

- A. Arrange for parking areas to accommodate construction personnel off site.
- B. Use of existing parking facilities used by construction personnel is not permitted.
- C. Do not allow heavy vehicles or construction equipment in parking areas.
- D. Mud from Site Vehicles: Provide means of removing mud from vehicle wheels before entering streets.

1.08 PROGRESS CLEANING AND WASTE REMOVAL

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Collect and remove waste materials, debris, and rubbish from site weekly and dispose off-site.

1.09 BARRIERS

- A. Provide barriers to protect the public and prevent unauthorized entry to construction areas to allow for Owner's use of site, and to protect existing facilities and adjacent properties from damage from construction operations.
- B. Provide protection for plants designated to remain. Replace damaged plants.
- C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.11 PROTECTION OF INSTALLED WORK

- A. Protect installed Work and provide special protection where specified in individual specification Sections.
- B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to minimize damage.
- C. Protect finished paving, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- D. Prohibit traffic from landscaped areas.

1.12 STORM WATER CONTROL

- A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

1.14 PEST CONTROL

- A. Provide methods, means, and facilities to prevent pests and insects from damaging the Work.

1.15 POLLUTION CONTROL

- A. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.

1.16 RODENT CONTROL

- A. Provide methods, means, and facilities to prevent rodents from accessing or invading premises.

1.17 REMOVAL OF UTILITIES AND FACILITIES

- A. Remove temporary utilities, equipment, facilities, materials, prior to Final Application for Payment inspection.
- B. Clean and repair damage caused by installation or use of temporary work.
- C. Restore existing and permanent facilities used during construction to original condition.

**PART 2 - PRODUCTS**

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2.01 PROTECTIVE CONSTRUCTION FENCE

- A. Protective construction fence: Six-foot high black vinyl coated chain link fence with 11.5-gauge galvanized chain link fabric components including galvanized posts, rails, fabric, and miscellaneous accessories. Fence posts: galvanized steel and set securely into moveable concrete bases resting on the ground and weighing a minimum of 50 lbs. each. Dimensions and layout shall be as shown on Drawings. Green construction fabric shall be applied to chain link fence for the full height and full length and fastened securely. Used fence components may be used if in good shape as determined by Owner's Representative.
- B. The existing site has fence and gates at the perimeter of the site, however temporary protective fencing shall be placed to restrict access from the building to the site during construction.
- C. Obtain Owner's Representative's approval of fence components before obtaining fence system.

**PART 3 - EXECUTION**

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2.01 PROTECTIVE CONSTRUCTION FENCE

- A. Protective construction fence: Place continuously at base of stairs and ramp from building to the site during construction.

**END OF SECTION**

**SECTION 016000  
PRODUCT REQUIREMENTS**

**PART 1 - GENERAL**

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1.01 GENERAL PROVISIONS

- A. All of the Contract Documents, including Bidding Requirements and Contracting Requirements, and Division 1 — General Requirements, apply to the work of this Section.

1.02 SECTION INCLUDES

- A. Products.
- B. Product delivery requirements.
- C. Product storage and handling requirements.
- D. Product options.
- E. Product substitution procedures.

1.03 PRODUCTS

- A. Provide products of qualified manufacturers suitable for intended use. Provide products of each type by a single manufacturer unless specified otherwise.
- B. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.
- C. Provide interchangeable components of the same manufacturer for components being replaced.

1.04 PRODUCT DELIVERY REQUIREMENTS

- A. Transport and handle products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.05 PRODUCT STORAGE AND HANDLING REQUIREMENTS

- A. Store and protect products in accordance with manufacturers' instructions.
- B. Store with seals and labels intact and legible.
- C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- D. For exterior storage of fabricated products, place on sloped supports above ground.

- E. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.
- F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- G. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

#### 1.02 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named in accordance with the following article.

#### 1.03 PRODUCT SUBSTITUTION PROCEDURES

- A. Requests for Substitutions During the Bidding Period: Owner's Representative will consider requests for Substitutions only up to 10 days before the receipt of Bids.
- B. Requests for Substitutions During the Construction Period: Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.
- C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- D. A request constitutes a representation that the Bidder:
  - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
  - 2. Will provide the same warranty for the Substitution as for the specified product.
  - 3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
  - 4. Waives claims for additional costs or time extension which may subsequently become apparent.
  - 5. Will reimburse Owner and Owner's Representative for review or redesign services associated with re-approval by authorities.
- E. Substitutions will not be considered when they are indicated or implied on Shop Drawing or Product Data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- F. Substitution Submittal Procedure:
  - 1. Submit three copies of request for Substitution for consideration. Limit each request to one proposed Substitution.

2. Submit Shop Drawings, Product Data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
3. The Owner's Representative will notify Contractor in writing of decision to accept or reject request.

**PART 2 - PRODUCTS**

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Not Used

**PART 3 - EXECUTION**

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Not Used

**END OF SECTION**

**SECTION 017000  
EXECUTION REQUIREMENTS**

**PART 1 - GENERAL**

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1.01 GENERAL PROVISIONS

- A. All of the Contract Documents, including Bidding Requirements and Contracting Requirements, and Division 1 — General Requirements, apply to the work of this Section.

1.02 SECTION INCLUDES

- A. Closeout procedures.
- B. Final cleaning.
- C. Protecting installed construction.
- D. Project record documents.
- E. Manual for materials and finishes.
- F. Spare parts and maintenance products.
- G. Product warranties and product bonds.

1.03 CLOSEOUT PROCEDURES

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Owner's Representative's review.
- B. Provide submittals to Owner's Representative that are required by governing or other authorities.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.04 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment.
- B. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- C. Clean debris from roofs, gutters, downspouts, and drainage systems.
- D. Clean site: sweep paved areas, rake clean landscaped surfaces.
- E. Remove waste and surplus materials, rubbish, and construction facilities from the site.



1.05 PROTECTING INSTALLED CONSTRUCTION

- A. Protect installed Work and provide special protection where specified in individual specification sections.
- B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- C. Protect finished paving, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- D. Prohibit traffic from landscaped areas.

1.06 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
  - 1. Drawings.
  - 2. Specifications.
  - 3. Addenda.
  - 4. Change Orders and other modifications to the Contract.
  - 5. Reviewed Shop Drawings, Product Data, and Samples.
  - 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress, not less than weekly.
  - 7. Manufacturer's name and product model and number.
  - 8. Product substitutions or alternates utilized.
  - 9. Changes made by Addenda and modifications.
- E. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
  - 1. Electronic file in the latest release of Autocad of the site plan showing hardscape and plantings.
  - 2. Electronic file in the latest release of Autocad of the site plan showing irrigation main line and control wires dimensioned from two permanent fixed points of reference.
  - 3. Measured depths of foundations in relation to finish main floor datum.
  - 4. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  - 5. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
  - 6. Field changes of dimension and detail.
  - 7. Details not on original Contract drawings.
  - 8. Plant list with plant materials, substitutions, quantities of plants size and nursery source for each plant type.
- F. Submit documents to Owner's Representative with claim for final Application for Payment.

1.07 MANUAL FOR MATERIALS AND FINISHES

- A. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Owner's Representative will review draft and return one copy with comments.
- B. Submit one copy of completed volumes 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Owner's Representative comments. Revise content of all documents sets as required prior to final submission.
- C. Submit two sets of revised final volumes in final form within 10 days after final inspection.
- D. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Provide information for re-ordering custom manufactured products.
- E. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- F. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.
- G. Additional Requirements: As specified in individual product specification sections.
- H. Provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.07 SPARE PARTS AND MAINTENANCE PRODUCTS

- A. Provide spare parts, maintenance, and extra products in quantities specified in individual specification sections.
- B. Deliver to Project site and place in location as directed by Owner; obtain receipt prior to final payment.

1.2 PRODUCT WARRANTIES AND PRODUCT BONDS

- A. Obtain warranties and bonds executed in duplicate by responsible subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work.
- B. Execute and assemble transferable warranty documents and bonds from subcontractors, suppliers, and manufacturers.
- C. Verify that documents are in proper form, contain full information, and are notarized.
- D. Co-execute submittals when required.
- E. Provide Table of Contents and assemble in loose leaf binder with durable plastic cover.
- F. Submit prior to final Application for Payment.

G. Time of Submittals:

1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten days after acceptance.
2. Make other submittals within ten days after Date of Substantial Completion, prior to final Application for Payment.
3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing the date of acceptance as the beginning of the warranty or bond period.

**PART 2 - PRODUCTS**

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Not Used

**PART 3 - EXECUTION**

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Not Used

**END OF SECTION**

**SECTION 033000  
SITE CAST-IN-PLACE CONCRETE**

**PART 1 - GENERAL**

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1.01 GENERAL PROVISIONS

- A. All of the Contract Documents, including Bidding Requirements and Contracting Requirements, and Division 1 — General Requirements, apply to the work of this Section.

1.02 DESCRIPTION OF WORK

- A. Provide labor, materials, equipment, services and transportation required to complete work.
1. Cast-in-place concrete, including but not limited to formwork, reinforcement, and concrete accessories for furnishing, placing, curing, finishing and protecting foundations, footings, frost walls, grade beams, slabs-on-grade, mud mats, topping slabs, equipment pads, concrete encasement, and thrust blocks, complete, and other concrete work, as indicated on the Drawings and as specified.
  2. Coordinate and install embedded items required to support or attach to the work of other trades. Embedment items shall be supplied by other Sections.
  3. Coordinate, supply and install reinforcing dowels required for the attachment of or to adjacent masonry construction.

1.04 REFERENCES

- A. Comply with applicable requirements of the latest editions of the following:
1. MassDOT Standard Specifications and Supplements, except for Compensation sections
  2. ASTM: American Society of Testing Materials.
  3. A.C.I. – American Concrete Institute
  4. C.R.S.I. – Concrete Reinforcing Steel Institute

1.05 REFERENCE STANDARDS

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirement shall govern.
1. American Concrete Institute (ACI):

212	Guide for Use of Admixtures in Concrete
301	Specifications for Structural Concrete for Buildings.
304.2	Placing Concrete by Pumping Methods
305	Hot Weather Concreting
306	Cold Weather Concreting
316	Recommended Practice for Construction of Concrete Pavements and Concrete Bases.

- 318 Building Code Requirements for Reinforced Concrete
2. American Plywood Association (APA):
- Ref. 1 APA Design/Construction Guide, Residential and Commercial
3. American Society for Testing and Materials (ASTM):
- A 185 Welded Steel Wire Fabric for Concrete Reinforcement
- A 307 Carbon Steel Externally Threaded Standard Fasteners
- A 563 Carbon and Alloy Steel Nuts
- A 615 Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
- C33 Standard Specification for Concrete Aggregates
- C39 Standard Test Method for Compressive Strength of Cylindrical Concrete specimens
- C40 Standard Test Method for Organic Impurities in Fine Aggregates for Concrete
- C42 Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
- C78 Standard Test Method for flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
- C87 Standard Test Method for Effect of Organic Impurities in Fine Aggregate on Strength of Mortar
- C94 Standard Specification for Ready-Mixed Concrete
- C109 Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. Cube Specimens)
- C13 Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- C138 Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
- C143 Standard Test Method for Slump of Hydraulic-Cement Concrete
- C150 Standard Specification for Portland Cement
- C 171 Sheet Materials for Curing Concrete
- C 231 Air Content of Freshly Mixed Concrete by the Pressure Method
- C260 Standard Specification for Air-Entraining Admixtures for Concrete

C293	Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Center-Point Loading)
C 309	Liquid Membrane-Forming Compounds for Curing Concrete
C330	Standard Specification for Lightweight Aggregates for Structural Concrete
C494	Standard Specification for Chemical Admixtures for Concrete
C496	Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens
C535	Standard Test Method for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
C618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete
C666	Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing
C881	Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
C882	Standard Test Method for Bond Strength of Epoxy-Resin Systems used With Concrete by Slant Shear
C884	Standard Test Method for Thermal Compatibility Between Concrete and an Epoxy-Resin Overlay
C989	Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars
D 1557	Moisture - Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb. (4.5-kg) Rammer and 18-in. (457-mm) Drop
D1622	Standard Test Method for Apparent Density of Rigid Cellular Plastics
D1623	Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics
D1752	Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
D2126	Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging
F 436	Hardened Steel Washers
4.	Corps of Engineers (COE):
CRD-C 621	Specification for Nonshrink Grout: Hardened State
(588)	Volume Change
1.07	SUBMITTALS

- A. Submittals: in accordance with Division 01 – General Requirements.
- B. Product Data: submit manufacturer's specifications and installation instructions for:
  - 1. Color Pigment
  - 2. Preformed Joint Filler
  - 3. Silicon Sealant
  - 4. Backer Rod
  - 5. Admixtures, each type
  - 6. Curing compounds
  - 7. Nonshrink grout
  - 8. Pipe sleeves
  - 9. Sieve analysis of aggregates
  - 10. Waterproof curing paper
  - 11. Waterstops
  - 12. Macro-fiber reinforcement
- B. Samples of the following shall be submitted:
  - 1. Color finish samples for selection by Architect/Engineer of the following:
    - a. Color Pigment – 12” square samples of a range of three colors based on selection by the Architect/ Owner’s Representative. Each sample to exhibit full range of color and texture variation to be expected in completed components.
  - 2. Material samples for selection by Architect/Engineer of the following:
    - a. Aggregate - 1 pint
  - 3. Preformed joint filler Two pieces, full depth and width, 4 in. length
  - 4. Full Size Sample Mockups: Provide full size sample mockups for review and approval by Landscape Architect/Owner’s Representative prior to providing remaining walls.
    - a. Submittal – submittals may not become part of the finished work, but the selected sample will be maintained throughout the project as representative of the approved finish and appearance to be expected in the completed components.
      - 1. Cast-in-place Wall: provide three sample mockups of Cast-in-Place Concrete – each sample to be 5’ length x 3’ exposed height. Samples to exhibit a heavy, medium and light sand blast finish for review and approval by the Landscape Architect/ Owner’s Representative. Mockup samples to include form ties, chamfers, reveals, and jointing of wall.
- D. Prior to start of concrete work, Contractor shall submit to the Owner’s Representative for review a schedule for execution of the Work of this Section.
- E. Shop drawings indicating the complete layout of architectural formwork including material specifications, layout details of formwork panels, joint locations, reveal locations, form tie locations, and other items which will be exposed to view or will create a visible delineation or mark of any kind on the face of the exposed concrete.
- F. Shop drawings indicating fabrication, bending diagrams, bar schedules, cutting lists and other information as required to completely define and establish the shape, size, location, and spacing

of all reinforcing bars. Include details of splicing and keying at construction joints. Indicate grades of all reinforcing. Opposite hand reinforcing shall be detailed separately. Wall reinforcing shall be detailed on wall elevations.

1. Review MEP drawings and identify all required housekeeping pads and their required reinforcing.
2. Coordinate reinforcement placement with embedded utility drawings furnished by other trades.

#### 1.08 DESIGN OF CONCRETE MIX(ES)

- A. Mix design shall be certified by independent testing laboratory. Statement of materials constituting design of mixes (as required by referenced standards) shall be submitted for Owner's Representative's approval within one week following award of Contract.
- B. Concrete mix design shall include the following information:
  1. Proportions of cement, fine and coarse aggregates, and water.
  2. Water-cement ratio, design strength, slump, and air content.
  3. Type of cement and aggregates.
  4. Type and dosage of all admixtures.
  5. Special requirements for pumping.
  6. Range of ambient temperature and humidity for which the design is valid.
  7. Any special characteristics of the mix which require precautions in the mixing, placing, finishing, or curing methods to achieve the finished product specified.
- C. No concrete shall be delivered to the job site until the Owner's Representative has approved the design mixes.
- D. Submit detailed methods proposed for curing and protection of concrete not less than 10 days prior to the placement of any concrete.
- E. Submit drawings showing details of any proposed corrective work.
- F. Submit a truck load ticket for every concrete delivery. Ticket information shall include batch time and date, weights of all constituents, quantity of admixtures, water added at the batch plant and moisture content of coarse and fine aggregates.
- G. Maintain an accurate daily record of the locations and quantity of concrete placed. Submit a certified copy of this record with each pay estimate.

#### 1.09 QUALITY ASSURANCE

- A. Unless otherwise specified, cast-in-place concrete work shall conform to ACI 301 and ACI 318. Copies of these referenced standards shall be kept available in the Contractor's field office.
- B. Dimensions, locations, and details of equipment pads, anchors, supports, and similar features indicated 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.
- C. Provide inspection of cast-in-place concrete work, and testing, including slump tests, air content, and standard compression testing. Materials and workmanship shall be subjected to inspection and testing in mill, shop and/or field by the Owner's Representative. Such inspection and testing shall not relieve Contractor of his responsibility to provide his own inspection, testing, and quality



control as necessary to furnish materials and workmanship in accordance with requirements of this Section.

- D. Provide source of and allow access to materials required to be sampled and tested.

#### 1.10 TESTING

- A. Inspection and testing of the concrete mix will be performed by Contractor's Independent Testing Laboratory in accordance with General Condition. Testing equipment shall be supplied by the laboratory, and the preparation of samples and testing shall be performed by laboratory personnel.
- B. Concrete materials and operations will be tested and inspected by Contractor as work progresses. Failure to detect defective work or material shall not prevent later rejection when such defect is discovered, nor shall it obligate Owner's Representative to final acceptance.
- C. The following testing services shall be performed by Contractor:
  - 1. Materials for compliance with the specifications.
  - 2. Proposed mix design.
  - 3. Sampling and testing of materials at plants or stockpiles during the course of the work for compliance with the specifications.
  - 4. Strength tests of concrete specimens.
  - 5. Inspection of concrete batching, mixing, and delivery.
  - 6. Additional testing and inspection required because of changes in materials or proportions requested by the Contractor.
  - 7. Additional testing of materials or concrete occasioned by their failure by testing or inspection to meet specification requirements.
- D. At Contractor's expense, at least six standard compression test cylinders shall be made and tested from each day's placement of each type and design strength of concrete. Six concrete test cylinders will be taken for every 50 cubic yards or fraction thereof of each type and design strength of concrete placed. Two cylinders shall be tested at seven days, and two at 28 days. The remaining two cylinders will be held in reserve. If the results of the 28-day tests indicate low strength concrete, the Owner's Representative will direct the Testing Laboratory to test the remaining two cylinders at a time indicated by Owner's Representative.
  - 1. One additional test cylinder will be taken during cold weather concreting and will be cured at the job site under the same conditions as the concrete it represents.
  - 2. If job experience indicates additional cylinder tests or other tests are required for proper control or determination of concrete quality, such tests shall be made.
  - 3. Where high-early strength (Type III) concrete is specified or permitted by the Owner's Representative, concrete cylinders shall be tested as follows: two at one day and two at seven days.
- E. For modified mix with fly ash or ground granulated blast furnace slag, 1 cylinder of each set shall be tested for 7-day compressive strength, 2 cylinders shall be tested for 28-day compressive strength and 2 cylinders shall be tested for 56-days compressive strength. The remaining cylinder shall be tested for 84-day compressive strength if either one of the 56-day tests are below the specified strength, otherwise the 84-day test will be eliminated.
- F. One slump test and one air content test will be taken for each set of test cylinders taken.
- G. Contractor shall provide free access to the work and shall provide full assistance and cooperation, concrete for samples, and such auxiliary personnel and equipment for the testing

agency to take samples for tests. Contractor shall notify the testing agency and Owner's Representative of his intent to place concrete at least two working days prior to scheduled time of placement.

- H. Sampling and testing required by the Owner's Representative to determine if materials proposed for use in the project comply with Specification requirements shall be made prior to actual use of materials in project. Coordinate the work to ensure that materials are supplied, sampled, tested and approved so as not to delay progress of the work.
- I. Whenever source, quality, or characteristics of approved material changes, or indicates lack of compliance with requirements of Contract Documents, resubmit additional materials for sampling and testing until requirements are satisfied. Additional sampling, testing and inspection of materials and workmanship not originally conforming to requirements of Contract Documents shall be provided at no additional cost.

#### 1.11 EVALUATION AND ACCEPTANCE

- A. The strength level of the concrete mix shall be considered satisfactory if both of the following criteria are satisfied:
  - 1. Every arithmetic average of any three consecutive strength tests equals or exceeds the specified design strength.
  - 2. No individual strength test (average of two cylinders from the same test group) falls below the specified design strength by more than 500 psi when the specified design strength is 5000 psi or less or by more than 10 percent of the specified design strength when the design strength is more than 5000 psi.
- B. Completed concrete work will be accepted when the requirements of ACI 301 Chapter 18 have been complied with.
- C. When tests of control specimens fall below these requirements, the Owner's Representative will require 56 day, or 84-day cylinder tests or core specimens taken from concrete in question and tested in accordance with ASTM C42. If these specimens do not meet strength requirements, the Owner's Representative has the right to require additional curing, load tests, strengthening or removal and replacement of those parts of the structure which are unacceptable, and in addition, removal of such sound portions of structure as necessary to ensure safety, appearance, and durability of structure. Additional testing, load tests, strengthening or removal and replacement of parts or structure and any costs associated with delay of project shall be at no additional cost to the Owner.
- D. Tests for determination of air content shall be made as required to verify conformance with the specifications.
- E. Any material or workmanship that is rejected, either at the batch plant or at the site, shall be replaced promptly at no additional cost to the Owner.
- F. If arrangements for corrections and/or replacements are not made within seven days after notice of rejection, the Owner has the right to have corrections and/or replacement made and charge cost thereof and any costs associated with delay of project against balance of monies withheld.
- G. Acceptance of work and admixtures at the batch plant shall not prevent final rejection at job site upon arrival or after it has been installed, if work is found to be defective.

- H. Portions of a structure which do not meet the requirements of the Contract Documents based on appearance or for any other aesthetic reason, shall be corrected or removed and replaced at no additional cost to the Owner.
- I. Work on new concrete structures shall conform to the requirements of ACI 306.1, Standard Specifications for Cold Weather Concreting, except as modified herein.
- J. Owner's Representative shall have the right to reject concrete represented by low strength tests. Rejected concrete shall be promptly removed and replaced with concrete conforming to the specification. The decision of Owner's Representative as to whether substandard concrete is to be accepted or rejected shall be final.

## **PART 2 - MATERIALS**

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### **2.01 FORMS**

- A. Cylindrical Forms: Sonotube Fibre Forms, wax-impregnated strippable forms manufactured by Sonoco Products Company, General Products Division or approved equal, or ABS or PVC plastic reusable forms.
- 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. Formwork 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: integrally colored fiberglass flush form ties, with color to match pigmented aggregate in this concrete. Review and inspect tie locations with Architect/ Owner's Representative before placement of concrete. After removal of forms for architectural concrete, cut tie flush with surface of concrete prior to sandblasting. Grind tie flush with adjacent surfaces after sandblasting to conceal appearance.
- E. Form Coatings: Commercial formulation compounds that will not bond with, stain or adversely affect concrete.
- F. Forms shall be true to line and free from warp, and shall be of sufficient strength, when staked, to resist the pressure of the concrete without springing. Formwork shall be designed so that sections may be fastened together to prevent vertical or horizontal movement of ends.
- G. Form Liner. Striated Random from Symons Corporation as approved by Landscape Architect/ Owner's Representative. Application methods as directed by Manufacturer.

### **2.02 CONCRETE MIX**

- A. Cement shall be American-made Portland Cement, free from water soluble salts or alkalis which will cause efflorescence on exposed surfaces. Portland Cement shall be Type II, ASTM C150 except in foundation mat where either Type II or Type IV, ASTM C150 may be used, as required, to meet heat gain requirements specified herein. Air entraining cements are prohibited.

- B. Unless otherwise indicated on the Drawings, minimum 28-day compressive strength shall be 4,000 psi.
- C. Concrete slump shall be no less than 2 in. nor greater than 4 in., determined in accordance with ASTM C 143.
- D. Air content by volume shall be 3 to 6% and shall be tested in accordance with ASTM C 231. "Relative durability factor" of concrete containing air-entrainment admixture shall be at least 90.
- E. Concrete shall contain a water reducing agent to minimize water-cement ratio of the mix, at the specified slump.
- F. 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 Owner's Representative.
- G. No additional water, except for the amount indicated by the design mix shall be added to the concrete without prior permission of the Owner's Representative.
- H. No concrete shall be placed by pumping methods without the prior written approval of the Owner's Representative. Should the Contractor be allowed to place concrete by pumping methods, pumping procedures, mix design of concrete, and all other precautions shall be in accordance with ACI 304 and shall be subject to review by the Owner's Representative. Tests for approval of concrete mixtures to be pumped shall be paid for by Contractor. Provide certified mill test reports of cement, (including names and locations of mills and shops, and analyses of chemical and physical properties), properly correlated to concrete to be used.
- I. Use maximum water-cement ratio of 0.42

## 2.03 CONCRETE REINFORCING

- A. Steel reinforcing bars shall conform to ASTM A615.
  - 1. Bars employed as reinforcement shall be deformed type.
  - 2. Bars employed as dowels where indicated on the Drawings shall be hot-rolled plain rounds.
  - 3. Unless otherwise indicated on the Drawings, reinforcing bars shall be Grade 60.
- B. Welded wire fabric reinforcement shall conform to the applicable requirements of ASTM A 185. Fabric reinforcement shall be furnished in flat sheets. Fabric reinforcement in rolls will not be permitted.

## 2.04 CEMENT

- A. Cement shall be an approved brand of American manufactured Portland cement, conforming to ASTM C 150, Type II. Submit manufacturer's name and type of cement for Owner's Representative's approval immediately.
- A. Only one color of cement, all of the same manufacturer, shall be used for the work.
- B. Do not use Type III cement without the Owner's Representative's approval.
- D. Pozzolans and Blast Furnace Slag
  - 1. Fly Ash: Class F conforming to the requirements of ASTM C618
  - 2. Ground Granulated Blast Furnace Slag: Conform to ASTM C989

## 2.05 ADMIXTURES

- A. Except as otherwise specified, use of concrete admixtures shall conform to ACI 212.
- B. Admixtures employed shall be produced and serviced by established, reputable manufacturer and used in compliance with manufacturer's recommendations.
- C. Air entraining agent shall conform to ASTM C 260 and shall be "Daravair" or "Darex AEA", manufactured by W.R. Grace & Company; "Airmix" or "Perma-Air", manufactured by The Euclid Chemical Co.; "MB-WR", manufactured by Master Builder's Co., or an approved equal product.
  - 1. When a high range water reducing (HRWR) admixture is used, air-entraining admixture shall be a neutralized vinsol resin solution.
  - 2. When requested by the Owner's Representative, certification attesting to compliance with these specifications shall be furnished.
- D. Water reducing agent shall conform to ASTM C 494, Type A and shall contain no more than 0.05% chloride ions. Water reducing agent shall be "WRDA with Hycol", manufactured by W.R. Grace & Company; "Eucon WR-75" manufactured by The Euclid Chemical Co.; "Pozzolith 200N", manufactured by Master Builders's Co., or approved equal product.
  - 1. Water reducing agent shall be manufactured by same manufacturer as air-entraining agent.
- E. Water reducing agent-retarder shall conform to ASTM C 494, Type D and shall be "Daratard-40", manufactured by W.R. Grace & Company, or an approved equal product.
- F. Mid-range water-reducing agent:
  - 1. Mid-range water-reducing agent shall be by same manufacturer as air-entraining agent.
  - 2. Daracem - 55 W.R. Grace & Co.
  - 3. Pozzolith 220N – BASF Admixtures, Inc.
  - 4. Eucon MR - Euclid Chemical Co.
  - 5. Or equal conforming to ASTM C494 Type A
- G. Admixtures which retard setting of cement in concrete shall not be used without written approval of the Owner's Representative. Admixtures causing accelerated setting of cement in concrete shall not be used.
- H. Fly ash conforming to ASTM C 618, equal to TPA, manufactured by the Trinity Division of General Portland Inc., may be used in non-architecturally exposed concrete. Carbon content shall not exceed 3% by volume.
  - 1. When required, certification attesting to the carbon content and compliance with ASTM C 618 shall be submitted to the Owner's Representative.
  - 2. Maximum replacement of cement with fly ash shall be 30% by weight.
- I. Superplasticizers: Where permitted by the Owner's Representative and where indicated in the approved concrete design mix, a high-range water-reducing (HRWR) admixture (superplasticizers) complying with ASTM C 494, Type F or Type G, and containing more than 0.05% chloride ions, may be used subject to the following requirements:

1. When a high range water-reducing admixture is used, the air-entraining admixture shall be a neutralized vinsol resin solution.
  2. Concrete shall arrive at the jobsite having a slump conforming to the requirements specified in Paragraph 2.01. HRWR shall be added after the concrete has been thoroughly mixed and the desired initial slump has been achieved.
  3. Water to cement ratio shall not exceed 5.0 gal/cwt (0.42 weight basis).
  4. Pretesting of the concrete shall be performed under the guidance of the admixture manufacturer's representative to determine dosage, addition times, and compatibility with other admixtures and mixture constituents.
  5. HRWR shall be added at the job site and shall be dispensed to the truck mixer using automatic dispensing equipment which accurately measured dosage.
  6. Slump after addition of HRWR to concrete shall be no greater than is necessary for proper placement and compaction and shall in no case exceed 7 in.
  7. Air tests shall be run on the admixed concrete as placed, and air content shall be within the specified limits.
  8. HRWR admixture shall be "Melment", manufactured by American Admixtures Corp., Chicago, IL; "WRDA-19", manufactured by W. R. Grace & Co.; "Daracem 100", manufactured by W.R. Grace & Co.; "Eucon 37", manufactured by The Euclid Chemical Co.; "Sikament", manufactured by Sika Chemical Co., or approved equal.
  9. Dosage as determined by mix design.
- J. High-range water reducing agent:
1. Daracem - 100 W.R. Grace & Co.
  2. Reobuild 1000 - BASF Admixtures, Inc.
  3. Eucon-37 - Euclid Chemical Co.
  4. Or equal conforming to ASTM C494 Type F
- 2.06 AGGREGATE
- A. Except as otherwise noted, aggregate shall be washed, inert, natural sand conforming to ASTM C33.
- B. Maximum size aggregate for sections 16 in. or greater in thickness shall be 1-1/2 in. Maximum size aggregate for sections less than 16 in. thick shall be 3/4-in.
- C. Maximum size of aggregate shall in no case exceed that permitted by ACI 318.
- D. Normal Weight Fine Aggregate
1. Washed, inert, natural sand conforming to ASTM C33 and the following additional requirements:
- E. Normal Weight Coarse Aggregate:
1. Well graded crushed stone or washed gravel conforming to ASTM C33 and the following additional requirements.
    - ii. Material finer than No. 200 sieve – 1.0 percent maximum
    - iii. Clay lumps and friable particles – 2.0 percent maximum
    - iv. Chert (less than 2.40 specific gravity, saturated surface dry) – 3.0 percent maximum by weight.

- v. Sum of clay lumps, friable particles, and chert (less than 2.40 specific gravity, saturated surface dry) – 3.0 percent maximum by weight. This limitation only applies to aggregates in which chert appears as an impurity.
  - vi. Coal and lignite – 0.5 percent maximum
  - vii. Soundness - 18 percent maximum loss (magnesium sulfate solution, five cycles)
  - viii. Soundness - 10 percent maximum loss (sodium sulfate solution, five cycles)
3. Coarse aggregates shall not exceed 35 percent by weight "percentage of wear" as determined by the Los Angeles Abrasion and Impact Tests in ASTM C131 and C535.
- i. Provide designated sizes noted in Table A for normal weight coarse aggregate to minimize shrinkage and cracking. The sizes shall also be chosen in accordance with ACI requirements for actual reinforcement clearances.
4. Lightweight Fine and Coarse Aggregates: rotary kiln expanded shale conforming to ASTM C330 and as specified herein. Aggregate sizes shall include fine aggregate designated as "sand size", and coarse aggregate designated as graded 3/4-inch size or 3/8 inch size.

2.07 WATER

- A. Water shall conform to ASTM C 94, Section 4.1.3.
- B. Water shall be from approved source, potable, clean and free from oils, acids, alkali, organic matter and other deleterious material.

2.08 GROUT

- A. Grout shall be mixed in the proportions of one-part Portland cement to two parts sand, by volume. Only sufficient water shall be used to enable grout to barely hold its shape when squeezed into a ball in the hand. Sand for grout shall be ASTM C 33 Fine Aggregate.
- B. Grout shall be a ready-to-use, non-metallic, non-shrink aggregate product requiring only the addition of water at the job site. Grout shall be easily workable and shall have no drying shrinkage at any age. Compressive strength of grout (2 inch by 2-inch cubes) shall not be less than 5000 psi at 7 days, and 7500 psi at 28 days, but in no case less than the specified strength of the adjacent concrete. Manufacturer shall provide evidence that the material meets the requirements of the COE CRD-C 621 (558). Grout permanently exposed to view shall be non-oxidizing.

- 1. Nonshrink grout shall be one of the following, or approved equivalent product:

<u>Manufacturer</u>	<u>Product</u>
Gifford-Hill Co.	Supreme
Master Builders Co.	Embeco
U.S. Grout Corporation	Five Star Grout

C. Chemical Grout Foam

- 1. The Chemical Grout Foam shall be a moisture curing polyurethane liquid designed to seal leaking cracks, fractures, joints and holes in concrete and masonry. The grout shall adhere to the concrete surface and form a flexible, tough, rubbery, closed-cell gasket that stops water.
- 2. Cured material shall meet the following minimum requirements:

- i. Molded Density (ASTM D1622): 4.2 lbs/ft<sup>3</sup>
    - ii. Tensile Strength (ASTM D1623): 15 psi
    - iii. Elongation (ASTM D1623): +25 percent
    - iv. Shrinkage (ASTM D2126): 0%
    - v. Toxicity: Non-toxic
    - vi. Approval and test certification in accordance with NSF/ANSI 61 is required for all uses in contact with potable water.
- D. Repair Mortar for Existing Spalled Concrete Surfaces:
  1. Polymer-modified Portland-cement trowel-grade mortar conforming to the following properties:
    - i. Compressive Strength (ASTM C-109)
      1. 1 day: 1,800 psi min.
      2. 7 days: 5,500 psi min.
      3. 28 day: 7,000 psi min.
    - ii. Splitting Tensile Strength (ASTM C-496) at 28 days: 700 psi min.
    - iii. Flexural Strength (Modulus of Rupture) (ASTM C-293) at 28 days: 1,500 psi min.
    - iv. Freeze/Thaw Resistance (ASTM C-666): 300 cycles - 98%
    - v. Bond Strength (ASTM C-882 Modified) at 28 days: 2,500 psi min.
    - vi. Thermal Compatibility (ASTM C-884 Modified): passes test min.
    - vii. USDA approval and NSF/ANSI 61 certification is required for all uses in contact with potable water.
    - viii. The polymer-modified portland cement mortar shall not produce a vapor barrier.
  2. Provide polymer-modified Portland-cement concrete conforming to the following properties:
    - i. Compressive Strength (ASTM C-109)
      1. 1 day: 2,500 psi min.
      2. 7 day: 5,500 psi min.
      3. 28 day: 7,000 psi min.
    - ii. Splitting Tensile Strength (ASTM C-496) at 28 days: 700 psi min.
    - iii. Flexural Strength (Modulus of Rupture) (ASTM C-78) at 28 days: 1,500 psi min.
    - iv. Freeze/Thaw Resistance (ASTM C-666): 300 cycles - 98%
    - v. Aggregates shall conform to ASTM C-33.
    - vi. USDA approval and NSF/ANSI 61 certification is required for all uses in contact with potable water.



## 2.09 CURING MATERIALS

- A. Curing shall be by moist curing. Refer to Section 033000 – Site Cast-in-Place Concrete, Paragraph 3.13 for curing procedures.
- B. Curing paper shall be a non-staining, fiber reinforced laminated kraft bituminous product conforming to ASTM C 171. Four mil polyethylene sheeting may be substituted for curing paper.
- C. Curing, Sealing, and Hardening of Interior Concrete Floors/Slabs not Scheduled to receive Finish Floor Material: All Portland cement concrete floors/slabs and aprons in buildings not scheduled to receive applied finishes such as vinyl composition floor tile, shall be cured, sealed and hardened by two applications of "Ashford Formula", manufactured by Curecrete Chemical Company, Inc., Springville, UT 84663-0551; or approved equal. Apply after wet cure is completed.

## 2.10 BONDING AGENT

- A. Bonding agent for adhering fresh concrete to old shall be Sika Armatec 110, three components, water-based epoxy resin/ Portland cement bonding agent, manufactured by Sika Corporation, Lyndhurst, NJ 07071, or approved equal.
- B. Provide a two-component, 100% solids, moisture-tolerant structural epoxy adhesive conforming to ASTM C881, Type II. The bonding agent shall be Sikadur 32 Hi-Mod by Sika Corporation of Lyndhurst, NJ, Concrete Liquid (LPL) by Degussa Admixtures, Inc. of Cleveland, OH or equal.
- C. Latex bonding agent shall be a non-reemulsifiable acrylic-polymer latex conforming to ASTM C1059 Type II.

## 2.11 EXPANSION JOINTS

- A. Expansion joints shall be 1/2 in. wide and shall be filled with preformed joint filler.
- B. Expansion joint filler shall be a preformed, non-bituminous type joint filler conforming to ASTM D 1752, Type II, Sealtight Cork Expansion Joint Filler, manufactured by W.R. Meadows, Inc., or approved equivalent product.
  - 1. Joint filler shall be one piece for the full depth and width of the joint.
  - 2. Use of multiple pieces of lesser dimensions to make up the required depth and width of the joint will not be permitted.

## 2.12 SLEEVES

- A. Sleeves shall be galvanized steel pipe, Schedule 40.

## 2.13 MISCELLANEOUS ITEMS

- A. Bolts: Conform to ASTM A 307 or ASTM A 36 (as indicated on the Drawings), carbon steel with regular hexagon nuts conforming to ASTM A 563, and carbon steel washers conforming to ASTM F 436.
- B. Expansion bolts for anchoring into existing concrete shall conform to ASTM A 307 and shall have a self-drilling shell similar to Phillips Red Head Self-Drilling Shells, manufactured by Phillips Red Head Anchor Division of ITT, Michigan City, IN., or approved equivalent product.
- C. Vapor Barrier: Class A vapor barrier system. Use only materials which have a water vapor transmission rate of less than 0.01 grains per square foot per hour and meet the requirements of

ASTME1745 and ASTME1643. Use polyethylene sheet not less than 15 mils thick or approved equivalent product as follows:

1. "Vapor Block VB15" by Raven Industries
  2. Griffolyn "15-mil Green" by Reef Industries
  3. "15 mil Stego Wrap" by Stego Industries
- D. Waterstops: Hydrophilic waterstop strip, a swellable, conformable polyurethane/butyl blended rubber-based material free of sodium bentonite between the contact faces of construction joints, such as ADCOR ES by WR Grace as manufactured by WR Grace or approved equivalent product.
- E. Macro Synthetic Fibers: Structural fibers shall be a coarse monofilament, self-fibrillating, polypropylene/polyethylene blend in accordance with ASTM C1116, Paragraph 4.1.3, Type III. Structural fiber shall have a minimum tensile strength of 73 to 80 ksi, minimum length of 1.5 inches. The dosage shall be 3.5 lbs/cy or higher as required to achieve an average residual strength (ARS) of 200 psi when tested in accordance with ASTM C1399, "Standard Test Method for Obtaining Average Residual Strength of Fiber Reinforced Concrete". Contractor shall follow fiber manufacturer's recommendations regarding required concrete mix dosage rates. Use one of the following or approved equivalent product:
1. "Tuf-Strand SF"; Euclid Chemical Company
  2. "Strux 90/40"; Grace Construction Products
  3. "Novomesh 950"; Propex
- F. Floor Hardener, Sealer, and Waterproofing Treatment:
1. Concrete floor surfaces not covered with resilient flooring or carpet shall receive a surface treatment after steel trowel finishing.
  2. Product and Manufacturer:
    - i. Ashford Formula hardener and sealer as manufactured by Concrete Chemical Company, Inc., Springville, Utah
    - ii. Seal Hard concrete sealer as manufactured by L&M Construction Chemicals, Inc., Omaha, Nebraska
    - iii. Approved equal
    - iv. Concrete Construction Joint Roughener:
      1. Provide a water-soluble non-flammable, surface-retardant roughener.
      2. Product and Manufacturer:
        - a. Rugasol-S by Sika Corporation for horizontal joints only
        - b. MasterFinish QD 200 by BASF Corporation for vertical joints
        - c. Approval equal
    - v. Bond Breaker:
      1. Provide an adhesive-backed glazed butyl or polyethylene tape, which will satisfactorily adhere to the premolded joint filler or concrete surface as required. The tape shall be the same width as the joint.

2. Bond breaker for concrete other than where tape is specifically called for shall be either bond breaker tape or an ASTM C309 non-staining type bond prevention coating such as Masterkure 100WB by Degussa Construction Chemicals, Dayton Superior Sure Lift J6WB, StarSeal Clean Lift by Vexcon Chemicals or equal.

### **PART 3 – EXECUTION**

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#### **3.01 EXAMINATION**

- A. Verify all work prepared by other trades to receive work of this Section and correct any defective installations.
- B. Verify cover requirements over all reinforcement.
- C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.

#### **3.02 SUITABILITY OF SUBGRADE**

- A. Aggregate subbase to receive concrete slab-on-grade shall be inspected to ensure that material is suitable to receive concrete, including compaction. Subgrade unacceptable shall be brought to the attention of the Owner's Representative.

#### **3.03 PREPARATION OF SUBGRADE**

- A. Subgrade shall be compacted as required to bring the top 6 in. of subgrade material immediately below the concrete to a density of not less than 95% at optimum moisture content as determined by ASTM D 1557. Subgrade compaction shall extend for a distance of at least 1 ft. beyond edge of concrete.
  1. Existing subgrade material which will not readily compact as required shall be removed and replaced with satisfactory materials. Additional materials needed to bring subgrade to required line and grade and to replace unsuitable material removed shall be material conforming to Section 310000 - Earthwork.

#### **3.04 ACCEPTABILITY OF CONCRETE SURFACES**

- A. Concrete structures to receive concrete topping slab shall be inspected to ensure that surface is suitable to receive concrete. Waterproofed surfaces shall be thoroughly cured and suitably protected with protection board prior to start of concrete work of this section.

#### **3.05 REINFORCING**

- A. Before being placed in position, reinforcing 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 necessary.
- B. Bars showing cracks after bending shall be discarded.

- C. Unless otherwise indicated on the Drawings, reinforcing shall extend within 2 in. of formwork and expansion joints. Reinforcing shall continue through control joints. Adjacent sheets of fabric reinforcing shall lap 6 in.
  - 1. After forms have been coated with form release agent, but before concrete is placed, reinforcing steel and anchors shall be securely wired in the exact position called for, and shall be maintained in that position until concrete is placed and compacted. Chair bars and supports shall be provided in a number and arrangement satisfactory to the Owner's Representative.

3.06 MIXING, CONSISTENCY, AND DELIVERY OF CONCRETE

- A. Concrete shall be ready-mixed, produced by a central batch plant. Hand or site mixing shall not be allowed. Constituents, including admixtures, except certain corrosion inhibitors and superplasticizers, shall be batched at the central batch plant. Admixtures shall be premixed in solution form and dispensed as recommended by the manufacturer.
- B. Central plant and rolling stock equipment and methods shall conform to Truck Mixer and Agitator Standard of Truck Mixer Manufacturer's National Ready-Mixed Concrete Association, ASTM C94, ASTM C685, and Contract Documents. Consistency of concrete at time of placement shall be as specified in Table D.
- C. Ready mixed concrete shall be transported to the site in watertight agitator or mixer trucks loaded not in excess of rated capacities. Discharge at site shall be within one and one-half hours after cement is first introduced into the aggregates. Concrete with a temperature greater than 90°F. shall be rejected and removed from the site.
- D. During hot weather conditions as defined in ACI 306R (i.e., any of the following conditions: high ambient temperature, high concrete temperature, low relative humidity, increased wind velocity, high solar radiation), when the temperature of the concrete is 85°F or above, the time between the introduction of cement to the aggregates and discharge shall not exceed one hour. In addition, when the rate of evaporation on the surface of the concrete is expected to approach 0.2 lb/ft<sup>2</sup>/hr. (see chart in ACI 305R) special precautions shall be taken against the formation of plastic shrinkage cracking on the surface of the concrete after placement.
- E. During cold weather conditions, that is, any period when for more than three successive days the average daily outdoor temperature drops below 40°F, the concrete temperature at the time of placement shall be as specified in Table E.
- F. Central mixed concrete shall be plant mixed a minimum of five minutes. Agitation shall begin immediately after premixed concrete is placed in truck and shall continue without interruption until discharged. Transit mixed concrete shall be mixed at mixing speed for at least ten minutes immediately after charging truck followed by agitation without interruption until discharged. All transit mixed truck load ticket information shall include batch time, load weights of constituents, gallonage of water added and amounts of additives.
- G. Retempering of concrete, which has partially hardened by mixing with or without additional cement, aggregates, or water shall not be permitted

3.07 CONCRETE PLACEMENT

- A. Before placing concrete, forms and space to be occupied by concrete shall be thoroughly cleaned and reinforcing steel and embedded metal shall be free from dirt, oil, mill scale, loose rust, paint, and other material which might tend to reduce bond.

- B. 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.
- C. Pumping of concrete will be permitted. If selected for any portion of the work, submit the list of equipment to be provided and mix design suitable for pumping for approval.
- D. Remove excess water and foreign matter from forms and excavations. Do not place concrete on frozen soil. Provide adequate protection against frost action during freezing weather.
- E. Do not place concrete having slump outside of allowable range.
- F. Concrete which has set or partially set before placing shall not be employed. Retempering of concrete will not be permitted.
- G. Handle and store materials separately in such manner as to prevent intrusion of foreign matter, segregation, or deterioration. Do not use foreign materials or those containing frozen material. Remove improper and rejected materials immediately from point of use. Cover materials including steel reinforcement and accessories during construction period. Stockpile concrete constituents properly to assure uniformity throughout project.
- H. Transport concrete from mixer to place of final deposit as rapidly as practical by methods which prevent separation of ingredients and displacement of reinforcements, and which avoid rehandling. Do not deposit partially hardened concrete. When concrete is conveyed by chutes, equipment shall be of such size and shape to ensure continuous flow in chute. Flat (coal) chutes shall not be used. Chutes shall be of metal or metal lined and uniformly sloped. Slope shall not be less than 25 degrees nor more than 45 degrees from horizontal. Discharge end of chute shall be provided with baffle plate or spout to prevent segregation. If discharge end of chute is more than five feet above surface of concrete in forms, a spout shall be used. Concrete shall be lowered and maintained as near to the surface of deposit as practicable. When operation is intermittent, the chute shall discharge into hopper. The chute shall be thoroughly cleaned before and after each use and debris and any water shall be discharged outside of the forms. Concrete shall not be allowed to flow horizontally over distances exceeding 10 feet or dropped vertically over 6 feet.
- I. Vertical lifts shall not exceed 36 inches. Vibrate completely through successive lifts to avoid pour lines. Vibrate first lift thoroughly until top of lift glistens to avoid stone pockets, honeycomb, and segregation.
- J. Segregation of the concrete shall be prevented during handling; should segregation occur, the concrete shall be remixed before it is placed. Concrete shall be placed in the forms in horizontal layers not over 1 to 2 feet thick. Concrete shall not be allowed to drop freely more than 4 feet. If the free drop to the point of placement must exceed 4 feet., the Contractor shall obtain the approval of the Owner's Representative for the proposed method of depositing the concrete. The concrete shall not be required to flow over distances greater than 3 feet. in any direction in the forms or on the ground, unless otherwise permitted by the Owner's Representative.
- K. Concrete shall be thoroughly spaded, and tamped, and vibrated to secure a solid and homogeneous mass, thoroughly worked around reinforcement and into corners of forms.
  - 1. Apply vibration at point of deposit and in area of freshly placed concrete. Vibrate enough to accomplish thorough compaction and complete embedment of reinforcement and fixtures. Supplement vibration by hand spading in corners and angles of forms to prevent honeycombing.
- L. When joining fresh concrete to concrete which has attained full set, latter shall be cleaned of foreign matter, and mortar scum and 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 in. thick, shall be well scrubbed into thoroughly dampened concrete base. New concrete shall be placed immediately, before grout has dried or set.

- M. Concrete surfaces which act as a seat for structural members (other than those resting on grout) shall be troweled to an extremely flat and level surface. If necessary, such surfaces shall be ground off to achieve the required flatness and level.
1. Cold joints, particularly in exposed concrete, including "honeycombs", are unacceptable. If they occur in concrete surfaces exposed to view, the Owner's Representative will require that entire section in which blemish occurs be removed and replaced with new materials at the Contractor's expense.
  2. When placing exposed concrete in walls or columns, strike corners of forms rapidly and repeatedly from outside along full height while depositing concrete and vibrating. Care shall be taken to thoroughly vibrate the concrete below and around wall penetrations.
  3. Chutes, hoppers, spouts, adjacent work, etc., shall be thoroughly cleaned before and after each use, and water and debris shall be discharged outside form.
  4. Sloped floors shall be placed with the use of pipe screeds for grade control. Pipe screeds shall be in place prior to placing the concrete for the floors.

### 3.09 EMBEDDED METALS

- A. Anchor bolts, anchor slots, reglets, sleeves, edge angles, and similar embedded items will be provided, delivered to the site, under other sections of the specification, for installation under this section.
- B. Where edge angles, etc., have nuts welded on to receive machine screws, the threads of the nuts shall be protected from concrete, and the concrete shall be excluded from the space to be occupied by the screw, by use of wood plugs or other effective means.
- C. Conform to requirements of ACI 318, paragraph 6.3, "Conduits and Pipes Embedded in Concrete", and as specified below.

### 3.10 PIPE TO WALL PENETRATION SLEEVES

- A. Sleeves shall be accurately set to required elevation and slope.
- B. Installation shall conform to the pipe sleeve manufacturer's instructions.

### 3.11 VAPOR BARRIER

- A. Place under concrete slabs on grade prior to placing reinforcing. Lap joints min. 6 inch, with top lap in direction concrete will be spread. Cut to fit around projections through slab, tape around penetrations.
- B. Protect vapor barrier from rupture during reinforcing and concreting operations.

### 3.12 FINISHING VERTICAL CONCRETE

- A. Finish Schedule for Site Architectural Concrete:

1. Cast in Place Concrete Retaining Wall exposed to sloped walkway:
    - a. Color Additive and Form Liner Surface Finish as approved by Landscape Architect/ Owner's Representative.
  2. Cast in Place Concrete Retaining Walls beside the above:
    - a. Color Additive and Sand Blast as approved by Landscape Architect/ Owner's Representative.
- A. Exposed vertical surfaces shall be formed to produce a "smooth form finish", as defined in ACI 301. Concrete which is exposed to view on the exterior of the finished structures shall receive a smooth rubbed finish, in accordance with ACI 301 and as follows:
1. To permit satisfactory finishing, forms shall be removed from the vertical faces of the concrete as early as is possible without damaging the surface. Immediately after stripping forms, any fins or projections left by the forms shall be chipped off, and the surfaces rubbed smooth.
  2. Form tie holes and other voids and faults shall be patched. Voids, etc., shall be cleaned out, roughened, thoroughly wetted, coated with neat cement paste, and filled with mortar of cement and sand in the same proportions, materials, and color as used in the concrete. The surface of the patch shall be flush with the surrounding surface after finishing operations are complete. Surface shall be kept continuously damp until patches are firm enough to be rubbed without damage.
  3. Rubbing shall be performed while the surface is wet using a carborundum or cement sand brick, to achieve a smooth, uniform, even textured finish. Patched and chipped areas shall be blended to match as closely as possible the appearance of the rest of the surface. No cement wash or plastering will be permitted, and no mortar shall be used except as required above.
- B. Rubbed Finish: After removal of forms, patching and repairing, and while concrete is still green, spread slurry consisting of 1-part portland cement concrete and 1-1/2 part damp, loose sand by volume, over pre-dampened surface. Apply using burlap pads or sponge rubber floats. Remove surplus materials, then rub with clean burlap. Water fog completed surfaces for 7 days min.
- C. Textured finish: Abrasive blast finish, using abrasive grit, equipment, application and cleaning procedures to expose aggregate and surrounding matrix to a level approved by the Architect/Owner's Representative. Expose and reveal coarse aggregate to maximum projection of one third of the diameter, reveal 1/4 to 1/2 inch. Surface shall be rugged and consistent, as demonstrated by finish objective samples and as achieved in approved full sized sample mock-ups.
- D. As-Formed Finish: Remove fins by stoning, otherwise leave texture imparted by forms.
- D. Vertical surfaces of concrete which will be concealed in finished structure shall be formed to produce a "rough form finish", as defined in ACI301.
- B. For placement of formliner, concrete surfaces achieved shall be of an acceptable concrete finish, per manufacture's recommendations and per requirements as noted elsewhere in this section.
- 3.13 FINISHING HORIZONTAL CONCRETE
- A. Concrete slabs and pads shall be screeded off and wood-floated to a smooth surface, true to line and grade, and free of hollows and bumps. Surface shall be dense, smooth, and at exact level and slope required.

- B. Horizontal surfaces of concrete which will be exposed shall be given a light broomed finish, with direction of grooves in concrete surface perpendicular to length of concrete 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 it 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. Floated Finish: Provide at slab surfaces to precede other finishes. Begin floating after concrete has been struck off, consolidated, and leveled, surface water has disappeared, and surface is sufficiently hardened to support power driven float. Finish surface with impact type power driven float or hand float. Test surface with 10 ft. - 0 in. straightedge placed at minimum two different angles: correct irregularities exceeding 1/4 in. Refloat repaired areas.
- D. Trowel Finish: Provide at interior slab surfaces. Screed and float slabs to true and level surface, then trowel to dense, impervious surface, free from trowel marks, uniform in texture and appearance. Machine troweling is acceptable for surfaces to receive additional floor coverings and as preliminary finish on exposed surfaces. Hand trowel areas to be exposed in finished structure. Test surface with 10 ft. - 0 in. straightedge placed at minimum two different angles: correct irregularities exceeding 1/4 in. Refloat repaired areas.
- E. Curing, Sealing, and Hardening of Interior Concrete Floors/Slabs and Aprons not Scheduled to receive Finish Floor Material: Apply two applications of Ashford Formula to all concrete aprons and concrete floors/slabs (and equipment pads) not scheduled to receive other finishes in strict accordance with manufacturer's instructions and recommendations, including "working" material into concrete surfaces, as approved by the Owner's Representative. Provide the services of a technical representative of the sealer material to be on-site during application of sealer material.
- F. Control joints in floor as indicated on the Drawings shall be sawn by using a diamond blade concrete power saw. Joints shall be made as soon as possible after concrete is finished and when the surface is stiff enough to support the weight of workmen without damage to the slab. Saw shall cut into slab at least 1 in., but in no case less than 25% of slab depth. Cuts shall be clean and shall be straight and uniform.
- G. 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.
- A. For all of the finishing procedures described, the time element is important and something that must be determined during the progress of the work as conditions warrant. Normally, free water on the surface of concrete should not occur. Allow the concrete surface to dry before starting finishing operations. Do not, under any circumstance, add dry cement to wet areas in order to accelerate drying. Finishing and rubbing required for all parts of the work shall be done only by competent "Cement Finishers" trained for the work.

### 3.14 FILLING TIE ROD AND BOLT HOLES

- A. Holes resulting from the removal of bolts or tie rods shall be solidly filled with cement grout. Holes passing entirely through concrete members shall be filled from the inside face, with a plunger-type grease gun or other device that will force the mortar through to the outside face, holding a canvas sack at the exterior surface to assure complete filling. Holes which do not pass entirely through shall be filled, using tools which will permit the opening to be packed thoroughly full. Excess mortar at the faces of filled holes shall be struck off flush, with a canvas sack.



### 3.15 CURING

- A. It is essential that concrete be kept continuously damp from time of placement until end of specified curing period. It is equally essential that water 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. When concrete is placed at or below an ambient air temperature of 40°F. or whenever this temperature or lower values are likely to occur within 48 hours after placement of concrete, cold weather concreting procedures, according to ACI 306.1 and as specified herein, shall be followed. The entire area affected shall be protected by adequate housing or covering, and heating. No salt, chemicals or other foreign materials shall be used in the mix to lower the freezing point of concrete. No oil or kerosene fired heaters shall be utilized. Vent flue gases from combustion heating units to the outside of the enclosure.
- C. No frozen materials shall be used in batching concrete and any ice shall be removed from coming into contact with the concrete.
- D. Protect concrete work against injury from heat, cold, and defacement of any nature during construction operations.
- E. Concrete shall be treated and protected immediately after concreting or cement finishing is completed, to provide continuous moist curing above 50°F. for at least 7 days, regardless of ambient air temperatures.
- F. All concrete shall be cured immediately after finishing in accordance with the following requirements:
  - 1. Curing shall be accomplished by a continuous soaking process such as the use of soaker hose, sprinklers or accomplished through the use of a laminated reinforced asphalt impregnated paper which is non-staining or by use of plastic roll materials either of which shall be thoroughly wetted at least once a day or more often as required in very hot weather. Such paper or plastic shall be placed as soon as possible after finishing of concrete so that scarring of the surface will not occur. Paper or plastic shall be held in place on the surface of the concrete in such a manner and means as will not allow it to be blown off or otherwise dislodged from the concrete surface. Curing procedures shall be maintained continuously for a period of at least 7 days unless otherwise directed and approved by the Owner's Representative.
  - 2. All methods of curing shall be subject to approval of the Owner's Representative, and each method employed shall be practical and adequate for the curing required.
  - 3. Curing compounds in lieu of wet curing will not be allowed.
- G. Apply floor hardener in accordance with manufacturer's recommendations for new concrete surfaces. Spray apply immediately following the finishing operation. Keep surface wet by brooming excess material onto dry areas or by respraying. Upon drying and becoming slippery wet lightly with water. With second drying flush the surface with water to remove excess materials and surface alkali. Wet cure concrete as specified above.
- H. Keep a permanent temperature record showing date and outside temperature during concreting operations. Thermometer readings shall be taken at start of work in morning, at noon, and again late in afternoon. Locations of concrete placed during such periods shall likewise be recorded in

such manner as to show any effect temperatures may have had on construction. Copies of temperature records shall be distributed daily to the Owner's Representative.

- I. Concrete surfaces, not otherwise specified, shall be cured by being kept wet with clean water for a period of not less than seven days after placing. Each day the forms are left in place and kept wet enough to prevent the opening of joints in the forms and the drying out of the concrete, will be counted as one day of curing.
- J. Concrete surfaces shall be cured by completely covering with curing paper.
  - 1. Concrete shall be completely covered with paper with seams lapped at least 2 in. and sealed with tape. Concrete surface shall not be allowed to become moistened within 24 hours of placing concrete. During curing period surface shall be checked frequently, and sprayed with water or curing compound, as applicable, as often as necessary to prevent drying, but not earlier than 24 hours after placing concrete.
  - 2. Concrete surfaces to receive paint, waterproofing, damproofing, thin-set adhesives and coatings, and similar applied materials which require bond and adhesion to concrete surfaces, shall be cured using curing paper. The use of curing compounds on these surfaces will not be permitted.
  - 3. Unless otherwise directed by the Owner's Representative, curing period shall be seven days, minimum.

### 3.16 COLD WEATHER CONCRETING

- A. Materials for concrete shall be heated when concrete is mixed, placed, or cured when the mean daily temperature is below 40oF., or is expected to fall to below 40oF., within 72 hours, and 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 Owner's Representative. Procedures shall be in accordance with provisions of ACI 306.
- C. Protect concrete from damage and reduced strength or performance due to weather extremes during mixing, placing and curing. Unless adequate protection is provided, concrete shall not be placed during rain, sleet or snow.
- D. Carefully review phasing requirements and determine scope of cold-weather concreting required.

### 3.17 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 cold water. Every effort shall be made to minimize delays which will result in excessive mixing of the concrete after arrival on the job.
- B. During periods of excessively hot weather (95oF., or above), ingredients in the concrete shall be cooled insofar as possible and cold mixing water shall be used to maintain the temperature of the concrete at permissible levels all in accordance with the provisions of ACI 305. Any concrete with a temperature above 95oF., when ready for placement will not be acceptable, and 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.

3.18 BRACING AND SUPPORTS

- A. Concrete members shall be adequately and safely supported and braced until the permanent supports and braces (by whomever supplied) are installed.

3.19 REMOVING FORMS AND SUPPORTS

- A. Except as otherwise specifically authorized by the Owner's Representative, forms shall not be removed until the concrete has aged for at least three days and concrete has sufficient strength to support its own weight and construction loads to be placed thereon and lateral loads, or the following number of day-degrees, whichever is greater.

<u>Location</u>	<u>Day-Degrees*</u>
Beams and Slabs	500
Walls and Vertical Surfaces	100

\* The term day-degrees represents the product of the number of days elapsed since time of concrete placement and the average daily air temperature at the surface of the concrete. For example, five days at a daily average temperature of 60 deg. F. equals 300 day-degrees.

- 1. Form removal by methods other than day-degree method will not be permitted.
- B. With the exception of construction joint bulkheads and keyways, forms and supports shall remain in place for not less than the minimum time periods noted below.
  - 1. Unless specifically authorized by the Owner's Representative, forms for vertical surfaces shall not be removed before the concrete has attained a strength of not less than 30 percent of the minimum allowable prescribed compressive strength nor not less than the minimum time period specified in Table F.
  - 2. Unless specifically authorized by the Owner's Representative, forms for horizontal surfaces shall not be removed before the concrete has attained a strength of not less than 60 percent of the minimum allowable prescribed compressive strength nor not less than the minimum time period specified in Table F.
  - 3. Definition of degree-days - Total number of days times mean daily air temperature at the surface of the concrete. For example, 5 days at temperature of 60°F. equals 300 degree-days. Days or fractions of days in which temperature is below 50°F. shall not be included in calculation of degree-days except where modified by Table E.
- C. Forms for construction joint bulkheads and keyways may be removed the following day, after the concrete pour. Extreme caution must be used to avoid damage to the concrete surface, keyway, and waterstop.
- D. Form removal shall be so performed that reshores are placed at same time as stripping operations where required, and that no area larger than one-fourth of a slab panel is unsupported at any time.

- E. Any test cylinders required to verify the specified minimum strengths for form removal shall be field cured under the same conditions as the concrete they represent. Such cylinders and testing shall be at the Contractor's expense.

### 3.20 BONDING AGENT

- A. Surface shall be clean, sound, and saturated surface dry but free of standing water. Remove dust, laitance, grease, curing compounds impregnations, waxes, and other foreign matter.
- B. Sandblast existing concrete or use other mechanical means to achieve surface preparation required by bonding agent manufacturer prior to application of bonding agent.
- C. Apply bonding agent in strict accordance with manufacturer's printed instructions.

### 3.21 JOINTS - GENERAL

- A. Construction and expansion joints indicated on Drawings are mandatory and shall not be omitted. Construction joints shall conform to the following:
  - 1. All horizontal construction joints are to be treated as follows: After placing of the concrete and after initial set of the concrete has taken place, the construction joint is to be cleaned off with a jet of water, air, or a jet of air and water mixed. The jet shall have sufficient force to clean off all loose concrete, scum, and laitance. The jet shall expose and clean off aggregate but shall not undercut or loosen the aggregate.
  - 2. Before placing new concrete against concrete already in place and hardened, the surface shall again be cleaned with a jet where practical.
  - 3. Where joints other than those shown are required, they shall be made at such locations as the Owner's Representative may allow and shall in no case impair the structural strength of the structure.
- B. Joints not indicated or specified shall be placed to least impair strength of structure and shall be subject to approval of the Owner's Representative.
- C. Saw-cut joints shall be installed in the locations shown on the Drawings. Saw-cut joints shall not be substituted for formed construction joints unless approved by the Owner's Representative. Saw-cut joints shall conform to the following requirements:
  - 1. The depth of the saw cut shall be at least  $\frac{1}{4}$  of the slab thickness or a minimum depth of one inch unless otherwise shown on the Drawings.
  - 2. Do not saw cut through slab reinforcing steel unless directed to do so in writing by the Owner's Representative.
  - 3. Joints produced using conventional wet-cut process shall be completed within 4 to 12 hours after the slab has been finished - 4 hours in hot weather conditions and 12 hours in cold weather conditions.
  - 4. Joints produced using the early-entry dry cut process shall be formed using diamond-impregnated blades and shall be completed within 1 to 4 hours after the slab has been finished – 1 hour in hot weather conditions and 4 hours in cold weather conditions. The maximum depth of joints produced by the dry cut process shall not exceed 1-1/4 inches. Care should be taken to make sure that the saw does not ride up over large or hard coarse aggregates.

Regardless of the saw cutting process chosen, the saw cutting must be performed before the concrete starts to cool, as soon as the concrete surface is firm enough not to be torn or damaged by the cutting blade, and before random-drying-shrinkage cracks can form in the concrete slab.

### 3.22 PATCHING FORMED SURFACES OF EXPOSED CONCRETE

- A. After forms have been removed, inspect concrete surfaces and patch pour joints, voids, stone pockets, other defective areas and tie holes before concrete is thoroughly dry. Chip away defective areas to depth of not less than 1 in. with edges perpendicular to surface. Wet areas to be patched and space at least 6 in. wide entirely surrounding it, to prevent absorption of water from patching mortar. Do not patch concrete in freezing weather.
- B. Apply chemical bonding agent to surface in accordance with manufacturer's printed instructions, followed immediately by patching mortar. Make patch of same proportions used for concrete except omit coarse aggregate. Add only enough water consistent with requirements for handling and placing.
- C. Thoroughly compact mortar into place and screed off; leave patch slightly higher than surrounding surface. Leave undisturbed for one to two hours to permit initial shrinkage before final finishing. Finish patch to match texture and color of adjoining surface. Completely fill tie holes left by withdrawal of rods and hole left by removal of end of ties. For holes passing entirely through wall, force mortar through with plunger type grease gun. Cure all patches.

### 3.23 REPAIRING OF HARDENED CONCRETE SURFACES

- A. Defective concrete and honeycombed areas shall not be patched unless examined and approval is given by the Owner's Representative. After approval, areas involved shall be cut back to a minimum depth of 1 inch from the finished surface, or as otherwise directed, whichever is greater. Edges of areas to be repaired shall be cut square to a minimum depth of 3/4 inch. Feathered edges will not be allowed. Any voids or honeycomb around reinforcing steel shall be chipped away to provide at least 3/4-inch clearance all around to permit proper placement of repair concrete around the steel to the parent, sound concrete.
- B. Exposed surfaces shall be thoroughly cleaned of all mud, paint, grime, scum, laitance, organic matter, detritus, calcareous growth and other foreign matter by sand and water blasting or other acceptable means. Immediately after cleaning, the surface shall be checked by the Owner's Representative for proper surface preparation, including fractured concrete or loose aggregate. Any such material shall be removed using pneumatic or hand tools. The final surfaces shall be thoroughly rinsed with clean water to remove remaining dirt and dust.
- C. Premoisten the prepared surface for at least 2 hours or reduce absorption of water by the parent concrete and to provide a reservoir for moist curing at the interface of the repair. The substrate should be saturated surface dry with no standing water. While the concrete surface is still damp, apply a thin 1/16-inch coat of neat cement slurry (mixed to the consistency of a heavy paste) with a bristle brush to provide a bond coat throughout the entire cavity of the repair. Before the slurry has dried or changed color, promptly install the repair concrete or dry-pack, as may be required or selected.
- D. For relatively small areas, ram repair concrete into this portion of the formed void. This concrete shall comprise a crumbly-dry 1-1-1.5 mixture of cement, concrete sand and pea gravel (or 3/4" gravel) mixed slightly damp to the touch (just short of "balling"). The "dry-pack" consistency of the concrete shall be zero slump, but moist enough so that when it is rodded and tamped until dense, an excess of paste will appear on the surface in the form of a spider web. In cases of unformed voids of thinner section, do not build-up repair in excess of a depth which will sag with the weight of the fresh mortar or concrete. Trowel smooth with heavy pressure.

- E. Large areas may be repaired with the normal concrete mix approved for use on the project.
- F. The concrete shall be of the driest possible consistency and mix composition so that it can be worked into the corners and angles of forms and around the reinforcement, without permitting the materials to segregate or free water to collect on the surface, due consideration being given to the methods of placing and compacting. Source and mixture of concrete shall be submitted for approval.
- G. Concrete shall be deposited continuously, or in layers of such thickness that no concrete will be deposited which has hardened sufficiently to cause the formation of seams and planes of weakness within the section. Concrete shall be thoroughly consolidated and trowelled dense, smooth and plane. Avoid premature and excessive trowelling that could cause sagging.
- H. Repair areas and adjacent parent concrete surfaces shall be treated immediately after finishing providing continuous moist curing without change in color for at least 7 days. Surfaces shall be covered with damp burlap and sealed with taped polyethylene. Membrane curing compounds shall not be used.
- I. Leave finished work and adjacent concrete surfaces in a neat, clean condition with no evidence of spillovers or staining.
- J. Repairs to all leaking cracks and joints after leakage testing shall be required using a Chemical Grout Foam product.
- K. The Chemical Grout Foam shall be single component moisture curing urethane liquid designed to seal leaking cracks, fractures, joints and holes in concrete and masonry. The grout shall adhere to the concrete surface and form a flexible, tough, rubbery, closed-cell gasket that stops water.
- L. The preparation, installation and curing of the chemical grout foam shall be in accordance with the manufacturer's recommendations.
- M. Certification must also be provided in accordance with ANSI/NSF test procedure No.61 when used for repair of potable water tank.

### 3.24 CLEANING

- A. Concrete surfaces shall be cleaned of objectionable stains as determined by the Owner's Representative. Materials containing acid in any form or methods which will damage the "skin" of concrete surfaces shall not be employed, except where otherwise specified.

### 3.25 PROTECTION OF CONCRETE SURFACES

- A. Concrete surfaces shall be protected from traffic or damage until surfaces have hardened sufficiently. If necessary 1/2 in. thick plywood sheets shall be used to protect the exposed surface.

**END OF SECTION**

**SECTION 329115  
PLANTING SOILS**

**PART 1 - GENERAL**

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1.01 GENERAL PROVISIONS

- A. All of the Contract Documents, including Bidding Requirements and Contracting Requirements, and Division 1 — General Requirements, apply to the work of this Section.

1.02 SUMMARY/SCOPE OF WORK

- A. This Section specifies administrative and procedural requirements for manufactured planting soils (planting soils) including, but not limited to, the following:

1. Planting soil material acquisition.
2. Testing and analysis for specification conformance for standard soil blends.
3. Preparation of mixes and testing for conformance.
4. Mock-Ups.
5. Installation and placement of soils.
6. De-compaction and re-compaction of soils.
7. Final in-place testing of soils.
8. Coordination with other contractors.
9. Clean-up.

- B. References to other Sections are given that would duplicate provisions in this Section.

1.03 QUALITY ASSURANCE/DEFINITIONS

- A. Definitions:

1. Refer to Section 329300 Planting
2. ASA: American Society of Agronomy.
3. Subgrade: Soil material and levels resulting from the approved rough grading work.
4. Drainage Layer/Drainage Blanket: A layer of specified sand to facilitate drainage on structure, and on subgrade, and to assist with control of groundwater below planting soils.
5. Planting Soils: Planting Soils are composed of a blend of three base components: base loam, organic material and sand. The quality of the blend depends on the quality of the original components. Locate and obtain approval of sources for base loam, organic material and sand that meet the Specification requirements. Contractor is then responsible for mixing the components. Approximate mixing ratios are provided, but may require adjustment, depending on the final materials and with the approval of the Architect or their representative, in order to meet Specification requirements for each blend.

- B. Testing/Testing Agency

1. Refer to Section 329300 Planting
2. Refer to this section, 1.5
3. Refer to Soils Management Plan for testing for oil and hazardous materials (OHM) of imported soils if required.

- C. Contractor is solely responsible for quality control of the Work.

- D. The installer shall be a firm having at least 5 years of successful experience of a scope similar to that required for the Work, including the preparation, mixing and installation of custom Planting Soil and planting mixes in urban locations.
  - 1. The installing Contractor shall be the same firm that is installing planting as described in Section 329300 – Planting.
  - 2. Installer Field Supervision: Installer to maintain an experienced full-time supervisor on Project site when any Planting Soil preparation work is in progress.
  - 3. The installer's crew shall be experienced in the installation of soil, grading and interpretation of grading plans in urban areas.
- E. Soil work shall be performed by a firm that has sufficient earthwork machinery at the job site simultaneously to amply provide for the vigorous execution of the site work without interruption or delay, except for unforeseen circumstances, such as weather. Machinery operators shall be well experienced in this type of work.
- F. Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State and municipal authorities having jurisdiction. Obtain necessary approvals from all such authorities.
- G. Comply with all requirements for control of silt and sediment during soil installation work as indicated in the contract documents. Provide additional silt and sediment control to maintain silt and sediments within the working area as required by the progress of the work or as directed by the Landscape Architect and Soil Scientist.
- H. Pre-installation Conference: Conduct conference at project site prior to the start of any work related to Planting Soil preparation and shall meet the requirements of this Section, Part 3.
- I. Layout and Grading:
  - 1. Permanent benchmarks shall be established by a registered land surveyor or professional civil engineer, at the Contractor's expense. The Contractor shall maintain established bounds and benchmarks and replace them, if any are destroyed or disturbed.
  - 2. The Contractor shall maintain at the site, sufficient surveying equipment to accurately excavate to the required subgrade and install soil to the required finish grade. The Contractor shall be responsible to install soil profiles at the elevations and thickness shown on the Plans.

#### 1.04 TESTING, SUBMITTALS, MOCK-UPS AND INSPECTIONS

- A. Testing for Subgrade, Planting Soil Components and Planting Soil Mixes: Testing is required at the following intervals:
  - 1. Testing of individual components (Base Loam, Sand, and Compost) for planting soil mixes prior to blending of any soils for use at the Project Site. Tests are as described in this Section.
  - 2. After test results for components have been accepted, create sample Planting Soil Mixes of each planting soil mix and perform tests described in this Section.
  - 3. After the test results for each Planting Soil Mix have been accepted, and during the production of planting soils, test every 200 cubic yards of every Planting Soil Mix blended for: organic matter content, gradation, and pH. Before shipping of any Planting Soil Mix, the Contractor shall confirm that the Soil Scientist has accepted the mix. Testing applies to all soil layers of the planting profile. After three consecutive compliant tests, the Contractor may increase the interval of testing to 500 cubic yards.
  - 4. In-place tests: Compaction tests of each type of material (soil layer) placed shall be in accordance with this Section. Infiltration tests shall be in accordance with this Section.



5. Installation of Drainage Layer: Contractor shall notify Landscape Architect and Soil Scientist at least 5 days prior to the installation of drainage layers. Contractor shall demonstrate layout and installation of drainage lines and drainage layer. Planting soil shall not be installed until drainage layer is accepted.
- B. Test Reports: Submit certified reports for tests as described in this Section.
1. Mechanical gradation (sieve analysis) shall be performed for sand, silt, and clay content and compared to the USDA Soil Classification System using sieve size numbers: 10, 18, 35, 60, 140 and 270. The silt and clay (0.002 mm) content shall be determined by a Hydrometer Test (ASTM D-422-63) of soil passing the #270 sieve.
  2. Chemical analysis shall be undertaken for Phosphorus, Potassium, Calcium, Magnesium, Aluminum, Iron, Manganese, Lead, Cation Exchange Capacity, Soluble Salts, organic matter content, acidity (pH) and buffer pH.
  3. Tests shall be conducted in accordance with Recommended Soil Testing Procedures for the Northeastern United States, 2nd Edition, Northeastern Regional Publication No. 493; Agricultural Experiment Stations of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont and West Virginia. Tests include the following:
    - a. Test for soil Organic Matter by loss of weight on ignition, as described in Northeastern Regional Publication No. 493.
    - b. Test for soil CEC by exchangeable acidity method as described in Northeastern Regional Publication No. 493.
    - c. Test for soil Soluble Salts shall be by the 1:2 (v:v) soil:water Extract Method as described in Northeastern Regional Publication No. 493.
    - d. Test for Buffer pH by the SMP method as described in Northeastern Regional Publication No. 493.
    - e. Tests for pH shall be conducted on a 1:1 soil to distilled water ratio.
  4. Certified reports on analyses from producers of composted organic materials shall be required and new test reports shall be submitted when compost sources are changed. Analyses shall include all tests for criteria specified in this Section Part 2.
  5. Saturated Hydraulic Conductivity: Test procedure ASTM D5856-95 (2000).
    - a. Hydraulic Conductivity tests shall be performed on samples during QA/QC testing at the Soil Supplier's facility.
  6. Testing Agencies: The following firms are acceptable testing agencies for the various components and blends.
    - a. Leaf Yard Waste Compost Comprehensive and Stability Test: Woods End Research Laboratory, P.O. Box 297, Mt. Vernon, ME, 04352, tel: 201.293.2457, fax: 201.293.2488.
    - b. Mechanical Gradation, Chemical Analysis and Organic Matter Content, All Soil Components and Planting Soil Mixes: University of Massachusetts, 203 Paige Laboratory, 161 Holdsworth Way, Amherst, MA 01003, <http://soiltest.umass.edu>, tel: 413.545.2311, fax: 413.545.1931 or approved equal.
    - c. Recommended Testing Laboratory for Saturated Hydraulic Conductivity and Proctor Test: Certified Testing Labs, 155 US Route 130, Bordentown, NJ, 08505, 609-298-3255, [www.certifiedtestinglabs.com](http://www.certifiedtestinglabs.com)
  7. Laboratory Density Testing Submittal: ASTM D698 - 12 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort
    - a. Density tests shall be performed on samples collected at the Soil Supplier's facility, to obtain the optimum moisture content and maximum dry density values.
    - b. The Standard Proctor test shall have a minimum of four moisture content values to establish the moisture density relationship curve.

C. In-Place Testing

1. Density Tests: May be conducted by the Soil Scientist using a compaction probe and/or shall be conducted by the Geotechnical testing agency by ASTM D1556 Density of soil and rock in place using "Sand Cone Method" or ASTM D6938-08a Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth). ASTM D698 Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort. (Standard Proctor).
  - a. In-place density tests shall be carried out at a rate of one test per each plant bed.
  - b. Soil density shall meet the requirements specified herein, see PART 3.
2. As required, in-place infiltration tests shall be performed using Turf-Tec IN2-W Infiltrometer utilizing manufacturer's operating instructions or by using the perforated canister method provided in Section 3.5 E.
3. At the direction of the Landscape Architect and Soil Scientist, in-place planting soil blends shall be sampled and tested by the Owner for compliance with gradation and organic matter content as specified herein. Non-compliant materials shall be removed from the site or amended as specified by the Soil Scientist.

D. Samples: Prior to ordering the below listed materials, submit representative composite samples to the Landscape Architect and Soil Scientist for selection and approval. Representative composite samples shall be composed of at least five equal-sized subsamples mixed thoroughly and resampled for submittal. Do not order materials until Landscape Architect's, and Soil Scientist's acceptance has been obtained. Delivered materials shall closely match the approved samples.

1. Components Submittals
  - a. Compost: sample of 1 gallon.
  - b. Base Loam: sample of 1 gallon.
  - c. Medium to Coarse Sand : sample 1 gallon.
  - d. Perlite for Soil in Planters: sample of 1 quart.
2. Test Blends Submittals
  - a. Planter Soil with Perlite: sample of 1 gallon.

E. Sources for Base Loam, Sand, and Compost: Submit information identifying sources for all soil components and the firm responsible for mixing of planting soil mixes.

1. Landscape Architect and Owner shall have the right to reject any soil supplier or mixing facility.
2. Soil mix supplier shall have a minimum of five years-experience at supplying custom planting soil mixes.
3. Submit supplier name, address, telephone and fax numbers and contact name.
4. Submit certification that accepted supplier/ mixer is able to provide sufficient quantities and qualities of materials for the entire project.
5. Final approval of soil supplier/ mixer shall be made after on-site review of supplier's and mixer's facility(ies) by the Owner.
6. Recommended Soil Suppliers for all soil components and mixing of planting soil mixes.
7. The following Soil Suppliers are accepted for supplying Soil Blends for the project. Other Soil Suppliers may be used after meeting the criterion above and after acceptance by the Landscape Architect.
  - a. Read Custom Soils, 5 Pond Park Road, Suite L, Hingham Massachusetts, 02042 781-828-6300, sales@readcustomsoils.com Contact: Mark Pendergast.

- b. D & H Loam, 2352 Main Street, Concord, Massachusetts, 978-897-4901, sales@dhloam.com Contact: Tom Dexter
- c. New England Specialty Soils (N.E.S.S.), 435 Lancaster Street, Leominster, Mass, 978-230-2300, lauren@nesoils.com Contact: Lauren Balderelli
- d. AgreSource inc., 110 Boxford Road, Rowley, MA 01969, Tel: 978.388.5110, info@agresourceinc.com. Contact: Dave Harding

F. Subgrade Survey Submittal

- 1. Contractor shall submit for approval by the Landscape Architect a survey of final subgrade in all areas where planting soils will be placed. Placement of any drainage layer or planting soil shall not precede acceptance by the Landscape Architect.

G. Mock Up and Inspection

- 1. At the beginning of site work, the contractor shall demonstrate, in the presence of the Soil Scientist, subgrade preparations, including de-compaction and re-compaction methods or drainage board protection measures and placement of sand blanket and drain lines that achieve the requirements of this Section. All subsequent subgrade preparations shall be in accordance with approved methods.
- 2. The Contractor shall not place Planting Soil prior to inspection and approval of Landscape Architect for compliance with depth, compaction and percolation rate. The Contractor shall request inspection before proceeding at least ten working days prior to placement of soils.
- 3. The Contractor shall not plant any plant material prior to inspection and approval of Landscape Architect for compliance with soil depth and compaction specifications. The Contractor shall request inspection before proceeding at least ten working days prior to placement of soils.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Refer to Planting for overall material handling requirements.
- B. In addition, the following provision is established: Material shall not be handled or hauled, placed or compacted when it is wet as after a heavy rainfall, early spring or if frozen. Soil shall be handled only when the moisture content is compliant with Section. The Landscape Architect and Soil Scientist, the Soil Scientist and the Owner shall be consulted to determine if the soil is too wet to handle.
- C. Store and handle packaged materials in strict compliance with manufacturer's instructions and recommendations. Protect all materials from weather, damage, injury, and theft.
- D. Sequence deliveries to avoid delay. On-site storage space is permissible only with written notice from Construction Manager. Deliver materials only after preparations for placement of planting soil have been completed.
- E. Prohibit vehicular and pedestrian traffic on or around stockpiled planting soil.
- F. Planting Soil that is to be stockpiled longer than two weeks, whether on or off site, shall not be placed in mounds greater than six feet high.
- G. Vehicular access to the site is restricted. Before construction, the Contractor shall submit for approval a plan showing proposed routing for deliveries and site access.
- H. Soil Moisture Content

1. Contractor shall not move, blend or grade soil when moisture content is so great that free moisture is apparent, nor when it is so dry that dust will form in the air or that clods will not break readily, nor when it is frozen. Apply water, if necessary, or allow to dry to bring soil moisture between 60 percent of optimum moisture content and optimum moisture content as determined by ASTM D698 prior to compaction, grading or planting.
2. Field Soil Moisture Test procedure is applicable for general soil moving and placement only and shall not be considered appropriate for compaction of soils, nor is a replacement for the above testing procedure.
  - a. Form soil in palm of hand, if soil retains shape and crumbles upon touching, the soil may be worked.
  - b. If the soil will not retain shape, it is too dry and should not be worked.
  - c. If the soil retains shape and will not crumble, it is too wet and should not be worked.
  - d. If the soil glistens or free water is observed when the sample is patted in the palm of hand the soil is too wet and should not be worked.

## **PART 2 - PRODUCTS**

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### 2.01 SOIL MATERIALS

#### A. General

1. All plant mix material shall be imported and fulfill the requirements as specified and be tested to confirm the specified characteristics.
2. Samples of individual components of soil mixes in addition to blended soil mixes including mulch materials shall be submitted by the Contractor for testing and analysis to the approved testing laboratory. Comply with specific materials requirements specified.
  - a. No base component material or soil components for soil mixes shall be used until certified test reports by an approved soil testing laboratory and have been received and approved by the Landscape Architect.
  - b. As necessary, make any and all soil mix amendments and resubmit test reports indicating amendments until approved.
3. The Landscape Architect may request additional testing by Contractor for confirmation of mix quality and/or soil mix amendments at any time until completion. Changes in mix ratios may be required.
4. Testing of imported soils for oil and hazardous material (OHM) is not included in this Section. Testing and compliance of horticultural soils for OHM shall be at the direction of the Environmental Consultant or other entity designated by the Owner.

#### B. Soil Testing and Soils Testing Report Submittal

1. All testing of the soil mix components shall be carried out by the Soils Testing Laboratory. Recommendations for amending and/or correcting the soil mix will be provided to the Contractor by the Landscape Architect/
2. Failure of any material by testing and/or amendment procedure to meet Specification requirements shall require the Contractor to seek another source for the failed material and the initiation of all testing procedures for the new replacement material shall immediately take place.
3. The Contractor shall be responsible for recognizing that these critical project materials warrant timely and serious attention, that the testing process to achieve Approved

materials should be considered a lead time item, and that under no circumstance shall failure to comply with all specification requirements be an excuse for “staying on project construction schedule.”

4. Refer to the “Planting Soil Testing Protocol”, located in the Appendix of this Specification.
- C. Soil Samples: Contractor is responsible for paying costs for testing. Submit 1 gallon planting soil samples in two phases. Submit samples concurrent with horticultural soil test reports in both phases. Submit as phase one, planting soil base components for approval. Only after approval of phase one components, submit as phase two, soil blend mixes / mediums for approval. All reports must be from recent analyses, less than 90 days old, and represent materials that are available for delivery to the site.
1. Phase One Submittals of Planting Soil Base Components:
    - a. Base Loam (Imported Topsoil)
    - b. Organic Amendment Materials (Compost)
    - c. Medium to Coarse Sand for Amending Soil and as Sand Drainage Layer
    - g. Perlite
  2. Phase Two Submittals of Planting Mediums: mixing and batching of soil mediums to be submitted in the same manner as bulk soils and will be prepared prior to delivery to site.
    - a. Planter Soil: sample of 1 gallon.
  3. Phase Three Submittals shall be identical to Phase Two Submittals and be conducted initially for each 200 cubic yard of planting soil and after three consecutive compliant tests, for each 500 cubic yards of soil material prepared for the project site.
  4. Submit reports for each of the above samples: Submit sample from each proposed source for testing and approval. Deliver samples to both the testing laboratory and the project soil scientist and pay costs. Send report directly to Owner’s Representative.
  5. Soil Sample Submittals: Sampling shall be done by the Contractor. The size of the samples and method of sampling shall be as follows: Samples shall be representative of the material to be brought to the site. Each sample shall be a Composite Sample, which consists of 5 separate sub samples taken from a minimum of (5) different locations at each source and mixed together to make the test sample.
  6. The Contractor shall schedule this testing in order to permit reasonable time for testing, evaluation, and approvals prior to scheduled installation. Allow for a minimum of 4 weeks to perform testing and obtain approvals.
- D. Imported Base Loam
1. Imported Base Loam, as required for blending with sand and compost, shall be a naturally occurring A-Horizon soil formed from geologic soil forming processes without admixtures of sand or organic matter sources (composts). Base Loam, which has been contaminated by incorporation of subsoil, shall not be acceptable for use. Base Loam as required for the work shall be free of subsoil, large stones, earth clods, sticks, stumps, clay lumps, roots or other objectionable, extraneous matter or debris. Base Loam shall also be free of quack-grass rhizomes, Agropyron Repens, and the nut-like tubers of nutgrass, Cyperus Esculentus, and all other primary noxious weeds. Base Loam shall not be delivered or used for planting while in a frozen or muddy condition. Base Loam for mixing shall conform to the following grain size distribution for material passing the #10 sieve:

U.S. Sieve Size Number	Percent Passing	
	Minimum	Maximum
10	---	100
18	85	100
35	70	95
60	50	85
140	36	53
270	32	42
0.002mm	3	6

2. The ratio of the particle size for 80 percent passing (D<sub>80</sub>) to the particle size for 30 percent passing (D<sub>30</sub>) shall be 8 or less ( $D_{80}/D_{30} < 8$ ).
3. Maximum size shall be one-inch largest dimension. The maximum retained on the #10 sieve shall be 20 percent by weight of the total sample. Tests shall be by combined hydrometer and wet sieving in compliance with ASTM D422 after destruction of organic matter by ignition.
4. The organic content shall be between 4.0 and 8.0 percent by weight.
5. pH shall be between 5.8 and 7.0.
6. Chemical analysis shall be undertaken for Phosphorus, Potassium, Calcium Magnesium, Aluminum, Iron, Manganese, Lead, Cation Exchange Capacity, Soluble Salts, acidity (pH) and buffer pH.

E. Medium to Coarse Sand (for blends and as Sand drainage layer).

1. Sand for Planting Soil Blends, protection of drainage board or filter fabric and for drainage as required, shall be uniformly graded medium to coarse sand consisting of clean, inert, rounded to sub-angular grains of quartz or other durable rock free from loam or clay, mica, surface coatings and deleterious materials with the following grain size distribution for material passing the #10 sieve:

U.S. Sieve Size Number	Percent Passing	
	Minimum	Maximum
10	100	--
18	60	80
35	25	45
60	8	20
140	0	8
270	0	3
0.002mm	0	0.5

2. Maximum size shall be one-inch largest dimension. The maximum retained on the #10 sieve shall be 20 percent by weight of the total sample.
3. The ratio of the particle size for 70 percent passing (D<sub>70</sub>) to the particle size for 20 percent passing (D<sub>20</sub>) shall be 2.8 or less ( $D_{70}/D_{20} < 2.8$ ). Tests shall be by combined hydrometer and wet sieving in compliance with ASTM D422.
4. pH shall be less than 7.5.

F. Organic Amendment (Compost)

1. Organic Matter for amending planting soils shall be a stable, humus-like material produced from the aerobic decomposition and curing of Leaf Yard Waste Compost, composted for a minimum of one year (12 months). The leaf yard waste compost shall be free of debris such as plastics, metal, concrete or other debris. The leaf yard waste compost shall be free of stones larger than 1/2", larger branches and roots. Wood chips over 1" in length or diameter shall be removed by screening. The compost shall be a dark brown to black color and be capable of supporting plant growth with appropriate management practices in conjunction with addition of fertilizer and other amendments as

applicable, with no visible free water or dust, with no unpleasant odor, and meeting the following criteria as reported by laboratory tests.

- a. The ratio of carbon to nitrogen shall be in the range of 12:1 to 25:1.
- b. Stability shall be assessed by the Solvita procedure. Protocols are specified by the Solvita manual (version 4.0). The compost must achieve a maturity index of 6 or more as measured by the Solvita scale. Stability tests shall be conducted by Woods End Research Laboratory, Mt. Vernon, Maine.
- c. Organic Content shall be at least 20 percent (dry weight). One hundred percent of the material shall pass a 1/2-inch (or smaller) screen. Debris such as metal, glass, plastic, wood (other than residual chips), asphalt or masonry shall not be visible and shall not exceed one percent dry weight. Organic content shall be determined by weight loss on ignition for particles passing a number 10 sieve.
- d. pH: The pH shall be between 6.5 to 7.4 as determined from a 1:1 soil-distilled water suspension using a glass electrode pH meter American Society of Agronomy Methods of Soil Analysis.
- e. Salinity: Electrical conductivity of a one to five soil to water ratio extract shall not exceed 2.5 mmhos/cm (dS/m).
- f. The compost shall be screened to 1/2-inch maximum particle size and shall contain not more than 3 percent material finer than 0.002mm as determined by hydrometer test on ashed material.
- g. Compost shall not have phytotoxic levels of herbicides or levels of oil or hazardous material (OHM) that exceed State regulations for use in residential applications.
- h. Nutrient content shall be determined by the Soil Testing Laboratory or equivalent laboratory and utilized to evaluate soil-required amendments for the mixed soils. Chemical analysis shall be undertaken for Nitrate Nitrogen, Ammonium Nitrogen, Phosphorus, Potassium, Calcium, Aluminum, Magnesium, Iron, Manganese, Lead, Soluble Salts, Cation Exchange Capacity, soil reaction (pH), and buffer pH.

K. Perlite for Planter Soil

1. Perlite, as required for the 75%/25% Planter Soil blend, shall consist of horticultural grade Perlite with the following properties or approved equivalent:

- a. Maximum bulk density: 8 pounds per cubic foot.
- b. The gradation by volume shall be within the following limits:

<u>U.S Sieve Size</u>	<u>Percent retained by volume</u>
8	10-25
12	45-75
16	70-85
20	80-90
30	90-98
30	up to 10%

2.02 PLANTING SOIL MIXES

- A. All existing vegetation shall be removed from stockpiles prior to blending. Uniformly mix ingredients by windrowing/tilling on an approved hard surface area or by alternately processing materials through a screening plant. All soil components and Organic Amendment shall be maintained moist, not wet, during mixing. Amendments shall not be added unless approved to extent and quantity by the owner and additional tests have been conducted to verify type and quantity of amendment is acceptable. Percentages of components are approximate and will be

verified upon completion of individual test results for components of the various mixes. Due to variability of soil materials, mix ratios may require adjustment and re-submittal at the expense of the Contractor.

- B. After component percentages are determined, each planting soil mix shall be tested for physical and chemical analysis. Component percentages may be modified at any time by the soil scientist dependent upon the results of testing of the various components or final blends.
- C. Chemical analysis shall be undertaken for Phosphorus, Potassium, Calcium Magnesium, Aluminum, Iron, Manganese, Lead, Cation Exchange Capacity, Soluble Salts, acidity (pH) and buffer pH.
- D. Add perlite to the soil blend to reduce saturated weight as required to meet Specification Requirements.
- E. Planting Bed Soil
  - 1. Planting Bed Soil shall consist of a combination of approximately equal parts by volume Imported Base Loam, Coarse Sand and Organic Amendment/Compost (1S:1L:1C) to create a uniform blend which meets the following requirements.
  - 2. Gradation for material passing a Number 10 Sieve shall be achieved in the final mix.

U.S. Sieve Size No.	Percent Passing	
	Minimum	Maximum
10	100	
18	85	95
35	60	85
60	42	65
140	21	44
270	18	24
0.002 mm	2	4

- 3. Maximum size shall be one half-inch largest dimension. The maximum retained on the #10 sieve shall be 10 percent by weight of the total sample.
- 4. The ratio of the particle size for 80 percent passing (D<sub>80</sub>) to the particle size for 30 percent passing (D<sub>30</sub>) shall be 6 or less (D<sub>80</sub>/D<sub>30</sub> < 6).
- 5. The final mix shall have an organic content between 5 and 7 percent by weight.
- 6. The final mix shall have a hydraulic conductivity of not less than 1.5 inches per hour according to test procedure ASTM D5856-95 (2000) when compacted to a minimum of 86 percent Standard Proctor ASTM D 698. Tests shall be by combined hydrometer and wet sieving in compliance with ASTM D422 after destruction of organic matter by ignition.
- 7. pH shall be between 6.2 and 6.8
- 8. Chemical analysis shall be undertaken for Phosphorus, Potassium, Calcium Magnesium, Aluminum, Iron, Manganese, Lead, Cation Exchange Capacity, Soluble Salts, acidity (pH) and buffer pH.
- 9. When used on structure, the saturated unit weight of the soil blend (ASTM Method E 2399 – 05) shall not exceed 125 lbs. per cubic foot when compacted to 84 percent Standard Proctor Density. Add perlite to the soil blend to reduce saturated weight as required to meet Specification Requirements.



### **PART 3 – EXECUTION**

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#### **3.01 PRE-INSTALLATION EXAMINATION AND PREPARATION**

- A. Reference Other Sections as necessary.
- B. Coordinate activities with other project contractors so that there is no soil disturbance from traffic or other construction activities subsequent to placement.
- C. Pre-Installation Examination Required: The Contractor shall examine previous work, related work, and conditions under which this work is to be performed and shall notify Landscape Architect and Soil Scientist in writing of all deficiencies and conditions detrimental to the proper completion of this work. Beginning work means Contractor accepts substrates, previous work, and conditions. The Contractor shall not place any planting soil until all work in adjacent areas is complete and approved by the Landscape Architect.
- D. Kickoff Meeting: At least 10 working days prior to the start of work, the contractor shall request a landscape construction kickoff meeting with the Owner's representative, landscape architect, soil scientist and any other parties involved with landscape construction. The contractor must demonstrate familiarity with this Section 329115 Planting Soils, and other relevant sections of the construction documents. The contractor shall articulate the means and methods of soil blending, subgrade preparation, soil placement and other steps outlined in the Specification.
- E. Examination of Subgrade: The subgrade shall be examined by the Contractor prior to the start of subgrade preparation, soil placement and planting. Any deficiencies shall be noted and related to the Landscape Architect in writing prior to acceptance of the subgrade by the Landscape Contractor. Deficiencies include, but shall not be limited to the following:
  - 1. Construction debris present within the planting areas.
  - 2. The subgrade is at incorrect depths for installing the designed soil profile and drainage layer.
  - 3. Incomplete irrigation and/or subsurface drainage installation.
  - 4. Incomplete lighting and exterior electrical installation.
  - 5. Conflict with underground utilities.
  - 6. Subgrade contaminated with oils, compressible material, silt or clay.
  - 7. Subgrade without drainage layer must infiltrate water at the rate of at least one inch per hour.
- F. Confirm that the subgrade is at the proper elevation and compacted as required. Subgrade elevations shall slope parallel to the finished grade and/or toward the subsurface drain lines as shown on the drawings.
  - 1. Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace slopes where required and maintain sides of slopes of excavations in safe condition until completion of backfilling. Provide protection measures as required for public safety.
  - 2. All subgrade areas to be filled with Drainage Layer or Planting Soil shall be free of construction debris, refuse, vegetation, compressible or decayable materials, all stones greater than 6 inches, concrete washout or soil crusting films of silt or clay that reduces or stops drainage from the Planting Soil into the subsoil; and/or standing water. Such material shall be removed from the site.
  - 3. The subgrade must slope at a minimum of two percent towards the bottom of slopes and subdrains. Subgrade levels shall be adjusted as required to ensure that all planting areas have adequate drainage.
- G. Do not proceed with the installation of Drainage Layer or Planting Soils until all utility work in the area has been installed.

1. The Contractor shall identify the locations of underground utilities prior to proceeding with soil work and shall protect all utilities from damage.

- H. Planter Soil Preparation: Refer to this Section for planting soil and mixtures. Examine soil and remove foreign materials, stones and organic debris over 1/2" in size. Remove all vegetation from stockpiles prior to blending. Mix-in fertilizers and amendments as required by tests and as approved by the Landscape Architect. All preparation and mixing shall be accomplished when the soil moisture content is compliant with this Section and at a moisture content approved by the Landscape Architect. If lime is to be added, it shall be mixed with dry soil before fertilizer is added and mixed.

### 3.02 MIXING OF PLANTING SOIL MIXES

- A. Soil blends shall be produced with equipment that blends together each component in a thorough and uniform manner. This may be accomplished by a minimum of three handling events on a hard-surfaced area with earth moving equipment or by alternately passing soil components through a screener.
- B. Base components and Soil Mix stockpiles should be protected from wind and rain and shall not be permitted to be stored in standing water.

### 3.03 WORKING AROUND UTILITIES

- A. Carefully examine the civil, record, and survey drawings to become familiar with the existing underground conditions before digging.
- B. Known underground and surface utility lines are indicated on the utility drawings – See Civil and Architect's plans. Contact the local Dig Safe organization and give them their required time to respond and mark the property. Determine location of underground utilities and perform work in a manner that will avoid possible damage. Hand-excavate, as required. Maintain grade stakes set by others until parties concerned mutually agree upon removal.
- C. Perform work in a manner that will protect utilities from damage. Hand-excavate as required and provide adequate means of support and protection of utilities during soil installation operations. Maintain grade stakes set by others until parties concerned mutually agree upon removal. The Contractor shall repair all utilities damaged by soil operations at the Contractor's expense.
- D. Placement of Planter Soil:
  1. Planter Bed Soil shall be placed in lifts not to exceed 8 inches in thickness and compacted to meet minimum and maximum requirements as specified below:
    - a. A transition zone shall be formed between the prepared subgrade, drainage layer, Planter Soil by placing one inch of the upper-layer soil and raking into the lower soil to a two-inch thickness.
    - b. Planter Soil shall be compacted to between 82 and 84 percent Standard Proctor.
    - c. Planter Soils shall not be compacted with vibratory equipment.
  2. In all cases, the soil being placed shall be in a dry to damp condition. No wet soils shall be placed. Soil moisture content must be compliant with this Section. prior to compaction. All testing of in-place density for planting materials shall be made by the soil scientist or according to ASTM D6938-10 Nuclear Methods after conducting ASTM D698 Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort.
  3. Prevention of compacted soils can be accomplished by beginning the work in corner, against walls, or the center of isolated beds, and progressing outwards towards the borders.
  4. Planter Soils shall never be moved or worked when wet or frozen.

5. The Contractor shall place barricades or steel plates as required to prevent any unnecessary compaction of planting soil from vehicles, equipment, or pedestrian traffic.
6. After Planter Soil has been spread, it shall be carefully prepared by hand raking. Stones and debris over one inch in any direction shall be removed from the premises. Fine grade planting beds to a smooth even surface with loose uniformly fine texture. Remove ridges and fill depressions as required to meet finish grades. Limit fine grading to areas that can be planted immediately after grading. Maintain the finished surfaces at the grades shown and spread additional soil to correct settlement or erosion. Surface drainage shall be maintained. Soil shall be damp and free from frost during fine grading operations.

#### 3.04 PROTECTION

- A. The Contractor shall protect landscape work and materials from damage due to landscape operations, operations by other Contractors or trespassers. Maintain protection during installation until acceptance. Treat, repair or replace damaged Planting Soil installation work immediately.
- B. Provide all means necessary, including fences, to protect all soil areas from compaction and contamination by trash, dust, debris, and any toxic material harmful to plants or humans after placement. Any area that becomes compacted, shall be de-compacted and tilled to the extent determined by the soil scientist and recompressed to the density ranges specified. Any uneven or settled areas shall be filled, re-graded and re-compacted to meet the requirements of this Specification. Soil that becomes contaminated shall be removed and replaced with specified soil material.
- C. Phase the installation of the planting soil blends such that equipment does not have to travel over already installed planting soil. Use of haul roads is acceptable provided that the haul road is completely re-worked to meet the requirements of this Specification.
- D. Apply filter fabric covering and planking or other engineering controls over soil to minimize compaction and collect dust and debris in any area where the Contractor must work after the installation of Planting Soil.
- E. Till compacted Planting Soil and replace Planting Soil that has become contaminated as determined by the Landscape Architect. Planting Soil shall be tilled or replaced by the Contractor at no expense to the Owner.

#### 3.05 CLEAN-UP

- A. During installation, keep pavements clean and work area in an orderly condition.
- B. Keep the site free of trash and debris at all times. Immediately dispose of wrappings or waste materials associated with products necessary for the completion of the work.
- C. All trash and debris shall be kept in a central collection container. Do not bury trash and debris in back-fill.
- D. Once installation is complete, remove any excess soil from pavements or embedded in fixtures.

#### 3.06 COORDINATION AND EXCESS MATERIALS

- A. Coordinate activities with other project contractors so that there is no soil disturbance from traffic or other construction activities subsequent to placement.

- B. Excess Planting Soil Mixtures and Materials: Remove the excess planting soil mixture and materials from the site at no additional cost to the Owner unless otherwise requested.

3.07 POST-INSTALLATION TESTING

- A. In-place density testing is required in all areas. Placed planter soils must be inspected for compaction level by the soil scientist or by the following acceptable Density Test Methods: ASTM D1556 Density of soil and rock in place using Sand Cone Method, ASTM D6938-10 Nuclear Methods, ASTM D2167-08 Rubber Balloon method, after ASTM D698 Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort.
- B. Placed Planting Soils must be capable of infiltrating water at the minimum rate provided in this Specification for each type of planting soil.

END OF SECTION

**SECTION 329300  
PLANTING**

**PART 1 – GENERAL**

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1.1 GENERAL PROVISIONS

- A. All of the Contract Documents, including Bidding Requirements and Contracting Requirements, and Division 1 — General Requirements, apply to the work of this Section.

1.2 DESCRIPTION OF WORK

- A. Provide labor, materials, equipment, services and transportation required to complete work.
  - 1. Planting including trees, shrubs, groundcovers, and other woody and herbaceous plant materials.
  - 2. Tree stabilization.
  - 3. Incorporating of planting additives, biostimulants, pruning, mulching, fertilizing and watering plantings.

1.4 REFERENCES

- A. Comply with applicable requirements of:
  - 1. Commonwealth of Massachusetts, MassDOT Standard Specifications and Supplements, latest edition, Boston, Massachusetts.
  - 2. American Standard for Nursery Stock, Z-60.1
  - 3. ASTM: American Society of Testing Materials.
  - 3. AAN: American Horticulture Industry Association
  - 5. ISA: International Society of Arboriculture.
  - 6. ANSI: American National Standards Institute.
  - 7. AOAC: Association of Official Agricultural Chemists.
  - 8. USDA: United States Department of Agriculture.

1.5 DEFINITIONS

- A. Balled and Burlapped Stock: Exterior plants dug with firm, natural balls of earth in which they are grown, with ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of tree or shrub required; wrapped, tied, rigidly supported, and drum-laced as recommended by ANSI Z60.1.
- B. Container-Grown Stock: Healthy, vigorous, well-rooted exterior plants grown in a container with well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for kind, type, and size of exterior plant required.
- C. Finish Grade: Elevation of finished surface of planting soil.

- D. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing planting soil.

#### 1.6 SUBMITTALS

- A. Submittals: in accordance with Division 01 – General Requirements.
- B. Product Data: Submit most recent printed information from manufacturers for:
  - 1. Antidesiccant
  - 2. Liquid Seaweed Concentrate
  - 3. Plant Growth Biostimulant
  - 4. Mycorrhizae Granules
  - 5. Tree Staples for staking
  - 6. Non-biodegradable flagging tape for marking Tree Staples.
- C. Samples: Submit samples of:
  - 1. Organic Mulch: Submit one cubic foot sample and manufacturer/supplier's name.
  - 2. Tree Stabilization System.
- D. Certificates:
  - 1. Submit manufacturer's certificates of compliance listing analysis for:
    - a. Bulb Booster
  - 2. Submit certification of Massachusetts state arborist.
- E. Landscape Contractor:
  - 1. Submit in writing planting subcontractor including name, address and telephone number.
  - 2. Submit written proof of at least ten years' experience with projects similar in size with a similar level of complexity in material, design and detailing.
  - 3. Submit a complete list of projects completed over the past two years with project construction value, contact names and phone numbers.
  - 4. Submit a list of current project backlog.
  - 5. Submit a description of the largest project completed in scale and construction budget.
  - 6. Submit evidence of Contractor's safety record
  - 7. Submit a list of three reference and name of supervisor for landscape subcontractor.
  - 8. Submit Experience Modification Rate number
- F. Plant List:
  - 1. Within 30 days of award of Contract, submit plant list for review by Owner's Representative which includes:
    - a. plant materials proposed for project and corresponding nursery source where plants are to be selected.

- b. written documentation indicating nursery(s) have available the plants in the species, quantity and size(s) shown on Drawings.
  - c. for plants indicating names of plants in accordance with American Joint Committee on Horticultural Nomenclature.
2. Schedule for review at nursery source by Owner's Representative with Contractor present.
  3. Substitutions: plant list shall indicate unavailable materials and document a thorough search for materials. For unavailable materials list sources contacted with telephone number, date and person's name at source.

G. Schedules

1. Submit planting schedule for approval.

1.7 QUALITY ASSURANCE

- A. Planting shall be performed by a certified landscape contractor with a minimum of five years planting work experience on projects of a similar size, quality, complexity, construction detailing and schedule and under full time supervision of a qualified supervisor.
- B. Pruning shall be performed by a Massachusetts certified and/or an International Society of Arboriculture certified arborist. Pruning shall comply with ANSI A300 pruning standards.

1.8 PRE-CONSTRUCTION MEETING

- A. At the project pre-construction meeting, the following items relating to the work of this Item shall be specifically discussed:
  1. Nursery sources for plant materials.
  2. Schedule of plant tagging, delivery and installation.
  3. Review benchmark dates at which time Owner's Representative's designated Landscape Architect should make site visits.

1.9 SELECTION AND INSPECTION OF PLANTS

- A. Plants shall be selected by Owner's Representative at place of growth for conformity to specification requirements as to quality, size and variety prior to purchase and planting. Such approval shall not impair right of inspection and rejection upon delivery at site or during progress of work. Cost of replacement shall be borne by Contractor.
- B. Source Limitations:
  1. Plants shall come from the same nursery.
  2. Plants shall have been grown under climatic conditions similar to those in the locality of the project for at least the previous two years. Unless approved by the Owner's Representative, plants shall have been grown at a latitude not

more than 325 km (200 miles) north or south of the latitude of the project unless the provenance of the plant can be documented to be compatible with the latitude and cold hardiness zone of the planting location.

3. B&B plants shall have been freshly dug (during the most recent favorable harvest season).
4. Initial sources for procuring of trees shall be as follows. If the Owner's Representative deems trees from these sources unacceptable, the Contractor must find alternate nursery sources of un-dug plant material.
  - a. Select Horticulture, Lancaster, MA (T 978-365-6555)
  - b. Halka Nursery, Englishtown, NJ (T 732-462-8450).
  - c. Kaneville Tree Farms, Inc. 3 S 320 Harter Road, Kaneville, Illinois 60144 (T 630- 557-2793)
  - d. Millican Nurseries, LLC, 187 Pleasant Street, Chichester, New Hampshire 03258 (T 603-435-6660)
5. Color photographs of representative plant material shall be submitted for initial review of alternate nursery sources. Photographs are to include a scale rod or other measuring device and be taken from an angle that depicts the size and condition of the typical plant to be furnished. Photographs must show actual plant material available for selection at that time.

C. Plant Selection / Coordination

1. For trees, within 90 days of the Notice to Proceed, submit tree sources and schedule selection and tagging of trees so Owner's Representative can tag trees for project at place of growth. Owner's Representative will perform on trip to the nursery(s) to select and tag trees and a second trip to the nursery(s) to review and confirm the acceptability of the trees immediately prior to digging for delivery to the site. Source information shall state the place of growth and the approximate quantity of trees available for inspection. The Owner's Representative may refuse inspection at this time if, in his or her judgment, sufficient quantities of plants are not available for inspection.
2. For shrubs and other plants, submit plant sources by January 1 of the planting year for Spring plantings, and July 1 for Fall plantings, schedule selection and tagging of shrubs so Owner's Representative can tag representative shrubs for project at place of growth. Source information shall state the place of growth and the approximate quantity of trees available for inspection. The Owner's Representative may refuse inspection at this time if, in his or her judgment, sufficient quantities of plants are not available for inspection.
3. Inform Owner's Representative of selection schedule a minimum of one month (30 day minimum) in advance of selection/tagging dates so Owner's Representative can make proper travel arrangements. If Contractor fails to provide one month (30 day minimum) notice, any additional travel expenses shall be back-charged to Contractor. If Owner's Representative has to make additional trips to select/tag plants in the event that inadequate, insufficient or unacceptable plant material was available at the inspection location, then additional travel expenses to be back charged to Contractor.
4. If nurseries and/or stock submitted for review are not acceptable to Owner's Representative, submit alternate sources within seven (7) business days.



5. If Contractor cannot locate the plant material specified in the Drawings, Contractor shall enlist a plant broker to locate the material. Submit a report from the plant broker describing alternate sources of availability or lack thereof for the specified plant material and sizes.
  - a. Trips to nurseries shall be efficiently arranged to allow Owner's Representative to maximize his/her viewing time. Four (2) days of viewing/tagging have been allotted for the materials listed on the Drawings. Only undug trees (trees that are in the ground) shall be considered for approval. Owner's Representative may choose to attach their seal to each plant, or representative samples. Each tree may have a specific location and orientation on the proposed plan that the Contractor shall follow closely during installation.
  - b. Plant material that has been sealed shall be secured by Contractor within ten (10) business days of Owner's Representative having reviewed or sealed the material.
  - c. Landscape Architect's seals shall not be removed until plantings have been approved by Owner's Representative. Removal of seals prior to Landscape Architect's review of plantings shall be considered grounds for rejection of plant material.

D. Expenses

1. Contractor to pay for Owner's Representative travel expenses: air fare, car rental, automobile mileage and tolls; meals and overnight accommodations, if necessary, for Owner's Representative during time period required to select and tag plant material. Planting subcontractor shall provide representative to travel with Owner's Representative while tagging plant material.

E. Plant Shipment to Site/ On Site Review

1. Notify Owner's Representative a minimum of five business days prior to each shipment of proposed arrival of plant material on site.
2. Layout tree locations, bed outlines and individual planting on site for inspection by Owner's Representative prior to planting. Arrange for adequate manpower and equipment on site at time of plant material inspection and installation to provide complete staked layout and to unload, open and handle plant material during inspection.

1.10 DELIVERY, STORAGE AND HANDLING OF FERTILIZER AND MULCH

- A. Packing and Shipping: deliver materials in unopened containers bearing manufacturer's name and guaranteed statement of analysis. Transport materials without damage. Protect finishes from abrasion, dirt, oils, grease, and chemicals. Pack materials to protect from weather.
- B. Acceptance at Site: verify in writing that delivered materials conform to specifications and approved submittals.

C. Storage and Protection:

1. Materials shall be uniform in composition, dry and free flowing. Store materials in dry place, on pallets, off ground; protect from sun. Store materials in a manner, which does not diminish their usability and effectiveness.
2. Protect materials from theft, damage, weather, dirt, oils, grease, and construction.

1.11 DELIVERY, STORAGE AND HANDLING OF PLANTS

- A. Plants during shipping and delivery and plants requiring storage on site shall be properly wrapped and covered to prevent wind drying and desiccation of branches, leaves, or buds. Plant balls shall be firmly bound, unbroken, and reasonably moist to indicate watering prior to delivery and during storage. Trees shall be free from fresh scars and damage in handling. Root masses of container grown plants shall be kept moist and containers screened from direct sun.
- B. Wrap tree trunks at nursery prior to shipping then unwrap for inspection by Owner's Representative prior to installation. Report damaged plants to Architect/ Owner's Representative.
- C. Apply antidesiccant to plants before digging at nursery and/or as directed by Owner's Representative once plants are delivered to site.

1.12 PROJECT/SITE CONDITIONS

- A. Environmental Requirements: do not deliver or handle soils when dry, wet, or frozen.
  1. Field Test
    - a. Form soil in palm of hand, if soil retains shape and crumbles upon touching, the soil may be worked.
    - b. If the soil will not retain shape, it is too dry and should not be worked.
  - B. If the soil retains shape and will not crumble, it is too wet and should not be worked.
  - C. Planting Season: planting seasons shall be those indicated below. Plants planted out-of-season shall receive special attention as directed. Out-of-season planting and or transplanting shall be at Contractor's risk and expense. No planting shall be done in frozen or muddy ground or when snow covers ground, or soil is otherwise in an unsatisfactory condition for planting.
    1. Seasons for Planting:

Spring:	Deciduous materials – April 1 to June 15
	Evergreen Materials – April 1 to June 15
Fall:	Deciduous materials – September 1 - October 15

Evergreen Materials – September 1 - October 15

2. Variance: If special conditions exist that warrant a variance in the above planting dates, a written request shall be submitted to the Owner's Representative a minimum of 4 weeks prior to the scheduled planting date stating the special conditions and the proposed variance. Permission for the variance will be given if warranted in the opinion of the Owner's Representative and upon condition that the Guarantee Period be extended for an additional period of up to 24 months at no additional cost to the Owner.

1.13 SEQUENCING AND SCHEDULING

- A. Plant after acceptance of fine grading.
- B. Trees to be installed first.
- C. Shrubs to be located by architect prior to arrival of perennials/groundcovers on site.
- D. Perennials to be located by architect after installation of shrubs.

1.14 SUBSTANTIAL COMPLETION

- A. Upon completion of planting, request Architect/ Owner's Representative's review to determine if work is Substantially Complete. If work is determined to be Substantially Complete, Landscape Architect will issue a Letter of Substantial Completion that establishes the effective date of the start of the two-year Maintenance Period and one year Guaranty Period.
  1. If work is not substantially complete, Landscape Architect will make a list of outstanding work to be done on a timely schedule agreed upon by Contractor and Architect/ Owner's Representative.
  2. Contractor shall notify Landscape Architect when outstanding work is accomplished and ready for review. When outstanding work is complete, in the judgment of Engineer, a Letter of Substantial Completion will be issued.

1.15 MAINTENANCE

- A. Maintenance beyond Substantial Completion shall be by the Owner based on review of Landscape Maintenance requirements by the Contractor.

1.16 ACCEPTANCE

- A. After the (1) one-year Guaranty Period, plantings will be reviewed for acceptance.
- B. Plantings shall be in thriving and vigorous condition at the time of review for Final Acceptance. If plantings are acceptable, Owner's Representative will issue a Letter of Final Acceptance.
  1. If plantings are not thriving, in the judgment of Owner's Representative, remedial actions by Contractor will be required to replace plantings.
  2. Remedial work shall be done immediately and in accordance with related work of other sections.

- C. At the conclusion of remedial work, Landscape Architect will review work and extend the Guaranty Period until plantings are deemed acceptable.

#### 1.17 MAINTENANCE AND GUARANTY PERIOD

- A. Start of Maintenance and Guaranty Period: when Owner's Representative issues Letter of Substantial Completion.
- B. Term: one year
- C. Requirements: plant material to be alive and in healthy, vigorous condition.
  - 1. Quarterly reviews will be made with Contractor and Owner's Representative during guaranty period. Reviews will assess condition of installed plant materials.
  - 2. Replace plants that are dead or, as determined by Owner's Representative, are in an unhealthy or unsightly condition, and have lost their natural shape due to dead branches, or other causes.
- D. If a Planting Season Variance is granted, the Guarantee Period for the affected plant materials shall extend through the spring (June 30) of the 12-month period following the initial Guarantee Period, without further cost to the City.

#### 1.18 END OF MAINTENANCE AND GUARANTY PERIOD/ FINAL ACCEPTANCE

- A. End of Maintenance and Guaranty Period: One year from date of Letter of Substantial completion, Owner's Representative reviews work and finds it complete and in accordance with Drawings and Specifications.
- B. Owner's Representative will issue a letter of Final Acceptance, at which time project becomes responsibility of Owner.

### **PART 2 - PRODUCTS**

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#### 2.1 PLANTS

- A. Plant Identification and Standards: Nomenclature conforms to current edition of Standardized Plant Names, published by American Joint Committee on Horticultural Nomenclature. Plants conform to varieties and sizes specified in plant list, and to code of standards set forth by American Horticulture Industry Association. in American Standard for Nursery Stock, ANSI Z60.1 - latest edition. Substitutions shall not be permitted without consent of Architect/ Owner's Representative. Plants shall be properly identified with plant labels securely attached to plants, in order to identify plants on site. Information regarding sources of plant material shall be furnished to Architect/ Owner's Representative.

- B. Plant List: If there are discrepancies between the quantities shown on plant list and work shown on Drawings, Contractor shall supply plants necessary to complete work as intended on Drawings. Where size of plant on the plant list is a variation between a minimum and maximum dimension, the sizes of plants furnished shall be equal to average of two dimensions. Where a single dimension is given, dimension represents the minimum size of plants to be furnished.
  
- D. General Plants: Unless specified otherwise, plants shall be nursery grown under climatic conditions similar to those in locality of project and shall have previously been transplanted or root pruned at least once in last three years. Plants shall possess a normal balance between height and spread. Plants shall be typical of their species and variety with a normal habit of growth, densely foliated when in leaf, and a well-developed branch structure with a fibrous, healthy root system with no girdling roots. Plants shall be sound and healthy, free from dead wood, defects, disfiguring knots, sun scald, injuries or abrasions of roots or bark. Plants shall be freshly dug. No heeled-in plants or plants from cold storage shall be used. Parts of plant shall be moist and show active green cambium when cut. Plants shall be free of plant diseases, insects, pests, eggs, larvae, and forms of infestations.
  
- E. Plant relationship between Root Flare and Finished Grade: nursery source shall properly plant, maintain and dig plants to maintain the natural relationship of the plants root flare slightly above the soil of the root ball. Plants which have or show signs of previously having soil placed over their root flares from planting too deep when initially lined out, maintenance practices that turn over and mound up the soil to keep down weeds and or placing excavated soils over original root flare and root ball soil level will be rejected.
  
- E. Balled and Burlapped Plants: Plants designated on plant list as "B&B" shall be dug with root systems as solid units. Diameter and depth of balls of soil must be sufficient to encompass fibrous and feeding root system necessary for healthy development of plants. Balls shall be wrapped firmly with biodegradable material and bound carefully with twine or cord. Tree balls may also be placed in a wire basket of diameter suitable for the size of the root ball. No plant shall be accepted when ball of earth surrounding roots has been badly cracked or broken, either before or during process of planting, or after burlap, ropes, etc., required for transplanting have been unfastened. Plants and root balls shall remain intact as a unit during operations. Plants that cannot be planted at once must be protected and watered.
  
- F. Bare Root Plants: Plants designated "BR" on the plant list shall be dug while dormant. Bare root plants shall be maintained in a healthy condition during storage, transportation, and operations.
  
- G. Container-Grown Plants: Container plants shall have been acclimatized for one growing season in container. Container plants shall be well established in container and shall have sufficient roots to hold earth intact after removal, without being in a rootbound condition. Plants shall remain in container until planted.
  
- H Trees:
  - 1. tree branching height to begin at 7' above finished grade without adversely impacting the overall appearance of the tree.

2. Tree canopies, except when a clump form is designated should be straight and symmetrical with a crown having a persistent single, main leader, tapered trunk free of co-dominant stems and growing from a single, unutilized crown of roots, and typical of the species or cultivar. No part of trunk shall be conspicuously crooked as compared with normal trees of same variety. Crown shall be free of large voids and not be significantly deformed by wind, pruning practices, pests, or other factors. Live crown ratio (distance which supports healthy foliage from bottom of canopy to the top/tree height) should be at least 60%.
  3. Trunk shall be free of wounds (except for properly healed pruning wounds), damaged bark or branches, abrasions, disfiguring knots, sunscald, conks, bleeding, galls, signs of insects or disease, and girdling ties, sunscald, frost cracks, or wounds resulting from abrasions, fire, or other causes. No pruning wounds shall be present having diameter of more than two inches (2") and wounds must show vigorous bark on edges. Pruning wounds over 3/4 inch in diameter must be completely calloused over.
  4. Trees shall stand erect without a supporting stake.
  5. Main scaffold branches shall be less than 2/3 the trunk diameter, free of bark inclusions (places where bark is embedded within the crotch preventing the formation of a normal branch bark ridge), and well-spaced. They should be distributed radially around and vertically along the trunk, forming a generally symmetrical crown typical for the species.
  6. Evergreen trees shall be branched to within one foot of ground. Height of trees, measured from crown of roots to top of top branch, and caliper, measured as specified herein, shall not be less than minimum size designated in plant list.
  7. Take caliper measurements 6 in. above ground on trees up to and including 4 in. caliper, and at 12 in. above ground for larger sizes.
- I. Shrubs and Small Plants: Shrubs and small plants, unless otherwise designated, shall be well-formed and bushy with well-spaced side branches, and shall have a crown and stem(s) typical of species and variety. Plants shall be well-branched to ground. Plants shall meet requirements for spread and/or height stated in Plant List. Measurements for height are to be taken from ground level to average height of top of shrub and not to longest branch. Thickness of each shrub shall correspond to trade classification "No. 1". Single stemmed or thin plants will not be accepted.
  - J. Plants larger than those specified in the Plant List may be used if approved by Architect/ Owner's Representative, but use of such plants shall not increase the Contract Price. If use of larger plants is approved, spread of roots or ball of earth shall be increased in proportion to size of plant.

## 2.2 PLANTING ADDITIVES

- A. Liquid Seaweed Concentrate: Dry, water soluble seaweed extract powder from *Ascophym nodosum*. Stress-X as manufactured by North Country Organics, Bradford, Vermont 05033, ph# 802.222.4277, or equal.
- B. Plant Growth Biostimulant: Dry, water-soluble plant growth biostimulant made from beneficial bacteria humic extracts, cold water sea kelp extract, essential amino acids,

vitamins, root growth factors and sugars. Bio- Magic as manufactured by North Country Organics, Bradford, Vermont 05033, ph# 802.222.4277, or equal.

- C. Mycorrhizae granules: transplant granules for inoculating plants with beneficial mycorrhizal fungi prior to planting. Myco-Magic as manufactured by North Country Organics, Bradford, Vermont 05033, ph# 802.222.4277, or equal.

### 2.3 BULB BOOSTER

- A. Bulb booster: fine ground, organic source of phosphate and shall contain the following available plant food by weight:

<u>Nitrogen</u> %	<u>Phosphorus</u> 12%	<u>Potash</u> 0%2.05	MULCH
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- A. Mulch: 1/8" toprock as specified in Section 319113 – Planting Soils.

### 2.4 POST PLANTING FERTILIZER

- A. Post Planting Fertilizer:
  1. Complete, fertilizer made from all-natural ingredients complying with State and Federal fertilizer laws. Fertilizer shall contain the following available plant food by weight, unless soils test indicates a need for different composition
  2. Pro Start 5-3-4 manufactured by North Country Organics, Bradford, Vermont 05033, ph# 802.222.4277.
  3. Fertilizer to be delivered in original unopened standard size bags showing weigh, analysis ingredients and manufacturer's name.

### 2.5 WATER

- A. Water: furnished by Contractor, unless otherwise specified, and suitable for irrigation and free from ingredients harmful to plant life. Hose and other watering equipment required for work shall be furnished by Contractor.

### 2.6 TREE STABILIZATION MATERIALS

- A. Tree Stabilization: Contractor responsible for providing a subsurface tree stabilization system which uses below grade shed anchors/ ground stakes at four corners augured to a 4' minimum depth with straps located below grade over the root ball, connected to the anchors/ stakes to secure the tree and root ball in place. Maintain planting in plumb condition and in order to withstand the environmental conditions of the site. Submit system to Owner's Representative for approval.

### 2.7 ANTIDESSICANT

- A. Antidessicants: emulsions or materials which provide a protective film over plant surfaces permeable enough to permit transpiration and specifically manufactured for

that purpose. Antidesiccant shall be delivered in manufacturer's containers and used according to manufacturer's instructions.

## 2.8 CHEMICALS, HERBICIDES, FUNGICIDES AND INSECTICIDES

- A. Provide chemicals, herbicides, fungicides and insecticides as needed for fungus or pest control. Chemicals and insecticides shall be approved by Massachusetts Department of Environmental Protection for intended use and application rates. No pesticides shall be used on site without knowledge and approval of Owner's Representative. Pesticides shall be handled by State licensed operators only.

## 2.09 PLANT LABELS

- A. Plant labels shall be provided by Contractor and shall be durable, legible labels, stating correct plant name and size, in weather-resistant ink or embossed process lettering, and are easily removable.

## **PART 3 - EXECUTION**

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### 3.01 EXAMINATION

- A. Verification of Conditions: in the event field conditions are not in conformance with Contract Documents, notify Owner's Representative in writing.
  - 1. Spot and Invert Elevations: verify field elevations of site improvements such as drainage and utility fixtures, pavements, existing plantings, and subsurface piping conform to Drawings.
  - 2. Finish Grade: verify specified elevations and prior grading operations have shaped, trimmed, and finished gradients.

### 3.02 PREPARATION

- A. Protection:
  - 1. Contact "Dig Safe" prior to doing excavation on site. If work is to be done around underground utilities, appropriate authority of utility must be notified of impending work. Hand excavates areas adjacent to utilities. Contractor shall be responsible for damages done by himself or his personnel to existing utilities, which shall be repaired or paid for by Contractor.
  - 2. Dust Control: upon acceptance of finish grades provide dust control.
  - 3. Erosion Control: upon acceptance of finish grades provide erosion control.
  - 4. Agricultural Chemicals: protect site improvements from contact with agricultural chemicals, soil amendments, and fertilizers.



### 3.03 DIGGING, HANDLING, AND PROTECTION OF PLANTS

- A. Dig balled and burlapped (B & B) plants with firm natural balls of earth, of sufficient diameter and depth to include fibrous roots and conforming to standards of American Nurserymen Association. No synthetic burlap will be accepted. No plant moved with a ball will be accepted if ball is cracked or broken before or during planting operations.
- B. Protect roots or balls of plants from sun and drying winds.
- C. Set plants on ground in shady location and protect with soil, bark mulch, or other acceptable materials, balled and burlapped plants which cannot be planted immediately upon delivery. Water stored plants and regularly verify rootballs are moist. Owner's Representative will reject stored plants found with dried rootballs.
- D. Open bundles of plants immediately and plants and separate before roots are covered. Care shall be taken to prevent air pockets among roots. During planting operations, bare roots shall be covered with canvas, hay or other suitable material. No plant shall be bound with wire or rope as to damage the bark or break branches.

### 3.04 OBSTRUCTIONS BELOW GROUND OFF STRUCTURE

- A. If rock, underground construction work, or other obstructions are encountered in plant pit excavation work, alternate locations may be selected by Owner's Representative at no additional cost to Owner.
- B. Where locations cannot be changed, obstruction shall be removed, subject to Owner's Representative's approval, to a depth of not less than three feet (3') below grade and no less than six inches (6") below bottom of ball or roots when plant is properly set at required grade.
- C. Removal of rock and underground obstructions encountered as specified in Section 312300 – Earthwork.

### 3.05 PREPARATION AND PLACEMENT OF PLANTING SOILS

- A. See Section 319115 – Planting Soils.

### 3.06 PLANTING OPERATIONS

- A. Stake out locations of plants and secure Owner's Representative's approval before excavating plant pits.
- B. Excavating
  - 1. Place tree next to tree pit excavation and remove burlap from top of root ball. If trunk flair is not visible gently loosen and remove soil with a blunt tool or air spade until trunk flair and large horizontal lateral roots are located. Use care not to damage root system. Following removal of excess soil over root ball measure depth of root ball to determine depth of tree pit excavation.

2. Dig tree pits and plant pits by hand and take care not to disturb utilities. If utilities are disturbed during planting operation, Contractor shall repair damage at Contractor's expense.
3. Excavate plant pits with sloping sides so planting hole is saucer shaped. Plant pit shall be no deeper than root ball.
4. Tree pits shall be four times diameter of soil ball in width.

C. Setting, Backfilling and Fertilizing

1. In the event trees are containerize in wire baskets, lay tree on its side and cut the bottom of the cage off, roll the tree into the hole and remove the sides of the wire basket.
2. Solar Orientation: Trees marked on the north side of the trunk while growing at the Nursery shall be planted with the same orientation as they originally grew to reduce trunk damage due to sun-scald, wherever feasible.
3. Set plants in center of pits plumb, straight and at an elevation where after settlement the root flare and lateral roots of plant will be at surrounding finished grade. Root ball shall not be broken. When trees are set, compact base material under the root balls to fill voids and support plants at proper height. Remove burlap and rope from upper two thirds of balls and have Owner's Representative inspect removal prior to backfilling.
4. Remove groundcovers and perennials from containers immediately before planting. Handle plants carefully to prevent damaging roots. Groundcover plants may be planted after bark mulch is placed.
5. Following removal of top 1/3 of burlap in accordance with manufacturer's recommendations, sprinkle michorrhizal granules continuously around perimeter of root ball as well as incorporating granules into top of rootball.
6. Mix liquid seaweed concentrate or plant growth bio-stimulant with water at a rate of 3 grams of liquid seaweed concentrate powder per gallon of water or 1 teaspoon of plant growth biostimulant per gallon of water.
7. Before backfilling around root balls and with the burlap removed, roughen the surface of the nursery ball sides. This action will serve to break and score any glazing of the nursery soil which frequently occurs through digging and handling. The micro-fissures so created help to decrease hydraulic barriers between these soils.
8. Backfill hole around plants to two-thirds full, sprinkle michorrhizal granules continuously around perimeter of root ball and on top of rootball, firm soil, flood with water mixed with additives, after water has drained away backfill to finished grade without additional firming. Immediately after plant pit is backfilled, a shallow basin slightly larger than pit shall be formed with ridge of soil to facilitate and contain water. After planting, cultivate soil in shrub beds between shrub pits, rake smooth and outline beds neatly.

### 3.07 DRAINAGE TEST FOR PLANTING AREAS

- A. Perform drainage test on trees and in representative shrub beds.
  - 1. After excavation, fill pit twice successively with water.
  - 2. Water shall drain out of plant pit minimum 2 inches per hour.
  - 3. Plant pits draining slower than 2 inches per hour will require provision for drainage.
- B. Documentation: note on the planting plan, pits that pass drainage test and plants that fail drainage test.

### 3.08 FIELD QUALITY CONTROL

- A. Observation:
  - 1. Owner's Representative to review plant pits without positive drainage.
  - 2. Owner's Representative to review plant pit excavation and planting.

### 3-9 GUYING, AND STAKING

- A. Guying and staking plants is required and the Contractor responsible for maintaining plants in upright, vertical position and for maintaining guying and staking materials. If Contractor determines below grade guying and staking is preferred, Contractor shall submit recommendations for Owner's Representative's approval.

### 3.10 PRUNING

- A. Pruning to be performed to American Nurserymen's' Association Standards to and will be overseen by an MCLP or certified Arborist. Pruning to preserve natural character of plant and as directed by Owner's Representative. No leaders shall be cut.
- B. Prune trees and shrubs only with approval of Owner's Representative to remove limbs that are below 7' above finished grade to maintain pedestrian clearance, dead, broken and crossing branches. Plants shall not be heavily pruned at the time of planting. In no case shall more than one-quarter of the branching structure be removed.
- B. Pruning is required at planting time to correct defects in the tree structure, including removal of injured branches, double leaders, waterspouts, suckers, and interfering branches. Healthy lower branches and interior small twigs should not be removed except as necessary to clear walks and roads. Retain the normal or natural shape of the plant.
- C. Prune according to American Nurserymen's' Association Standards to preserve natural character of plant and as directed by Owner's Representative. No leaders shall be cut.

- D. Prune with clean, sharp tools. Dead wood or suckers and broken or badly bruised branches shall be removed back to live bud, branch, or stem.
- E. Pruning above head height shall be done from a hydraulic man-lift or using other mechanisms such that it is not necessary to climb the tree.

### 3.11 MULCHING

- A. After planting operations are completed, provide top rock mulch between tree trunk and metal tree edging.

### 3.12 WATERING

- A. Flood plants with water twice within first 24 hours of time of planting, and water plants during the maintenance period at least twice per week. At each watering thoroughly saturate the soil around each tree or shrub. If sufficient moisture is retained in soil, as determined by Owner's Representative, required watering may be reduced. Each tree will require a minimum of ten gallons of water.

### 3.13 POST PLANTING FERTILIZER

- A. Apply uniform application of Post Planting Fertilizer (5-3-4) at rate of 5 lbs. per 1000 square feet, 30 days after planting.

### 3.19 CLEANING

- A. Wash and sweep clean paving, site improvements and building surfaces. Clean spills and oversprays immediately. Remove and dispose off-site excess planting mixture, soil and debris.
- B. Following Acceptance at the end of 90 Maintenance Period of planting areas, remove materials and equipment not required for other planting or maintenance work. Materials and equipment remaining on site shall be stored in locations which do not interfere with Owner's maintenance of accepted lawns or other construction operations.

END OF SECTION