PROJECT MANUAL

# LANDSCAPE CONSTRUCTION DOCUMENTS

 for

City of Wellford

Florence Chapel Community Park Phase 1

Wellford, South Carolina

TECHNICAL PROVISIONS FOR:

City of Wellford

280 North Craft Street

Wellford, SC 29385

Released for Bidding Date: 03/01/2024

PREPARED BY:



City of Wellford Project No. 20054-01

 Florence Chapel Community Park Phase 1

Wellford, South Carolina L a n d A r t D e s i g n G r o u p , I n c .

## TABLE OF CONTENTS

|  |  |  |  |
| --- | --- | --- | --- |
| **Issue Date**  | **Section Number**  | **SECTION TITLE**  | **SECTION DESCRIPTION**  |

### DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS

|  |  |  |  |
| --- | --- | --- | --- |
| 03/01/24  | 00 11 16  | INVITATION TO BIDDER  |   |
| 03/01/24  | 00 21 13  | INSTRUCTIONS TO BIDDER  |   |
| 03/01/24  | 00 41 43  | BID FORM  |   |
| 03/01/24  |   | UPS  |   |

### DIVISION 32 – EXTERIOR IMPROVEMENTS

|  |  |  |  |
| --- | --- | --- | --- |
| 03/01/24  | 32 13 13  | CONCRETE  |   |
| 03/01/24  | 32 84 00  | IRRIGATION SYSTEMS  | Heads, pipes, and controls.  |
| 03/01/24  | 32 93 00  | PLANTS  | Nursery-grown trees and other plants, pesticides, tree stabilization, tree watering devices, landscape edgings, and tree grates.  |

### DIVISION 13 – EXTERIOR FOUNTAIN

|  |  |  |  |
| --- | --- | --- | --- |
| 03/01/24  | 13 12 13  | EXTERIOR FOUNTIAN  | Spray components, electrical components, mechanical and support equipment, control panel.  |

### DIVISION 13 34 – FABRICATED PRE-ENGINEERED PRECAST CONCRETE STRUCTURES

|  |  |  |  |
| --- | --- | --- | --- |
| 03/01/24  | 13 34 00  | SKYLINE 1222 MULTI-USER FLUSH TOILET W/ CHASE GABLED ROOF RESTROOM  | Materials, accessories, and fixtures.  |

TABLE OF CONTENTS 1 of 1 City of Wellford Project No. 20054-01

 Florence Chapel Community Park Phase 1

Wellford, South Carolina L a n d A r t D e s i g n G r o u p , I n c .

### SECTION 00 11 16 INVITATION TO BIDDER

You are invited to bid on the construction of Florence Chapel Community Park Phase 1 located at 280 North Craft Street in the City of Wellford, South Carolina. The general scope of the construction will include: rough/fine and final grading; the coordination of removal and/or burial of utilities; the installation of concrete walks, colored concrete, prefabricated restrooms, splash pad, water and drain lines, electrical services, trees, mulch, sod, and irrigation.

A mandatory pre-bid meeting will be held on site at 280 North Craft Street, Wellford, SC 29385 on Friday, March 15, 2024 at 10:00am. Sealed bids will be received by The City of Wellford at Wellford City Hall, 127 Syphrit Road, Wellford, SC 29385 until 12pm noon (local time) on March 29, 2024 for the construction of Florence Chapel Community Park Phase 1 in accordance with Drawings, Specifications, and other Contract Documents prepared by The LandArt Design Group, Inc. Bids shall be submitted in duplicate on the Form of Proposal included herein.

Copies of the Drawings, Specifications, and other Contract Documents are enclosed. All questions concerning the Drawings and Specifications should be directed to LandArt Design Group, Inc. no later than 03/15/2024. Additional copies of the drawings and specifications may be obtained from the ARC Document Solutions at 7092 Howard Street Site K, Spartanburg, SC 29303 phone number: (864) 585-8388

In case the bidder finds discrepancies or ambiguities in any of the Drawings or Specifications, the bidder should request an interpretation by the L.A. Such requests shall be made in writing and interpretations will be made in the form of written addendum which will be sent to all bidders. All addenda will become part of the Contract Documents and shall be listed by number. Neither the Owner nor the Landscape Architect assumes responsibility for any oral interpretations which are not confirmed by written addendum.

The Owner reserves the right to reject any or all Bids and to waive any technicalities in any Bid in the interest of the Owner.

 END OF SECTION 00 11 16

INVITATION TO BIDDER 00 11 16 - 1 of 2 City of Wellford Project No. 20054-01

 Florence Chapel Community Park Phase 1

Wellford, South Carolina L a n d A r t D e s i g n G r o u p , I n c .

THIS PAGE INTENTIONALLY BLANK

 INVITATION TO BIDDER 00 11 16 - 2 of 2

City of Wellford Project No. 20054-01

 Florence Chapel Community Park Phase 1

Wellford, South Carolina L a n d A r t D e s i g n G r o u p , I n c .

### SECTION 00 21 13

### INSTRUCTIONS TO BIDDER

|  |  |
| --- | --- |
| **IB-01**  **IB-02**   **IB-03**  **IB-04**   | **GENERAL** All proposals must be presented in a sealed envelope, addressed to the Owner. The proposal must be filed with the Owner on or before the time stated in the Invitation for Bids. Mailed proposals will be treated in every respect as though filed in person and will be subject to the same requirements. All bids will be opened at the designated time and place and will be read aloud.  Proposals received subsequent to the time stated will be returned unopened. Prior to the time stated any proposal may be withdrawn at the discretion of the bidder, but no proposal may be withdrawn for a period of thirty (30) days after bids have been opened, pending the execution of a contract with successful bidder. **EXAMINATION OF WORK** Each bidder shall, by careful examination, satisfy himself as to the nature and location of the work, the conformation of the ground, the character, quality and quantity of the facilities needed preliminary to and during the execution of the work, the general and local conditions, and all other matters which can in anyway affect the work or the cost thereof under the contract. No verbal agreement or conversation with any officer, agent, or employee of the Owner, either before or after the execution of the contract, shall affect or modify any of the terms or obligations therein. **ADDENDA AND INTERPRETATIONS** No interpretation of the meaning of the plans, specifications or other pre-bid documents will be made to any bidder orally.  Every request for such interpretation should be in writing to Elaina at elaina@landartdesigngroup.com and to be given consideration must be received at least five days prior to the date fixed for the opening of bids. Any and all such interpretations and any supplemental instructions will be in the form of written addenda to the specifications which, if issued, will be sent by email with return receipt requested to all prospective bidders (at the respective address furnished for such purpose), not later than three days prior to the date fixed for the opening of bids. Failure of any bidder to receive any such addendum or interpretation shall not relieve such bidder from any obligation under this bid as submitted. All addenda so issued shall become part of the Contract Document. **PREPARATION OF BIDS** Bids shall be submitted on the forms provided and must be signed by the bidder or his authorized representative. Any corrections to entries made on bid forms should be initialed by the person signing the bid.  Bidders must quote on all items appearing on the bid forms.  Alternate bids will not be considered unless specifically called for.  Faxed bids will not be considered. Modifications to bids already submitted will be allowed if submitted by fax prior to the time fixed in the Invitation for Bids. Modifications shall be submitted as such and shall not reveal the total amount of either the original or reversed bid.   |
| INSTRUCTIONS TO BIDDER 00 21 13 - 1 of 2  |

City of Wellford Project No. 20054-01

 Florence Chapel Community Park Phase 1

Wellford, South Carolina L a n d A r t D e s i g n G r o u p , I n c .

Bids by wholly owned proprietorships or partnerships will be signed by all Owners. Bids of corporations will be signed by an officer of the firm and his signature attested by the secretary thereof who will affix the corporate seal to the proposal.

|  |  |
| --- | --- |
|   |  |
| **IB-05**    | **BASIS OF AWARD** The bids will be compared on the basis of a lump sum price, which will include and cover the furnishing of materials and the performance of all labor requisite or proper and completing of all the work called for under the accompanying contract, and in the manner set forth and described in the specifications.  The proposed quantities as shown in certain items of the proposal are for the purpose of comparing bids and awarding payment of monthly estimates for items of construction complete in place. It is the responsibility of the Contractor to check all items of construction since final payment will be rendered according to the lump sum amount as bid in the proposal. In case of error in the quantities as shown, the lump sum amount as stated in the proposal will prevail at the end of the job when final payment is rendered except as set forth in the specifications. Should an error in the quantities be noted, the prospective bidder should notify immediately the Landscape Architect who will check the quantity and issue addendum to all prospective bidders correcting the faulty quantity. The bid will indicate that the bidder agrees completely with quantities as shown and is willing to accept the total lump sum bid as payment in full for all work as shown on the plans or covered in the specifications.  |
| **IB-06**    | **BIDDER’S QUALIFICATIONS** The Owner may make such investigations as are deemed necessary to determine the ability of the bidder to perform the work and the bidder shall furnish to him all such additional information and data for this purpose as may be requested. The Owner reserves the right to reject the bid if the information submitted by the bidder, or investigation of the bidder fails to satisfy the Owner that such bidder is properly qualified to carry out the obligations of the Contract and to complete the work contemplated therein. Part of the evidence required above shall consist of a list of the names and addresses of not less than five (5) firms or owners for whom the bidder has done similar work.  |
| **IB-07**   | **PAYMENT AND PERFORMANCE BOND** None Required.  |
| **IB-08**   | **REJECTIONS OF BIDS**  |

These proposals are asked for in good faith, and awards will be made as soon as practicable, provided satisfactory bids are received. The right is reserved, however, to waive informalities in bidding, to reject any or all proposals, or to accept a bid other than the lowest submitted if such action is deemed to be in the best interest of the Owner.

END OF SECTION 00 21 13

 INSTRUCTIONS TO BIDDER 00 21 13 - 2 of 2

City of Wellford Project No. 20054-01

 Florence Chapel Community Park Phase 1

Wellford, South Carolina L a n d A r t D e s i g n G r o u p , I n c .

### SECTION 00 41 43 BID FORM

PROJECT: Florence Chapel Community Park Phase 1

DATE: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

TO: The City of Wellford

280 North Craft Street Wellford, SC

SUBMITTED BY: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The undersigned, as Contractor hereby declares that the only person or persons interested in the proposal as principal or principals is or 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, company, or parties making a proposal; and that it is in all respects fair and in good faith without collusion or fraud.

BASE BID:

The undersigned, having carefully examined the Drawings and Project Manual entitled Florence Chapel Community Park Phase 1 for the City of Wellford all dated 03/01/2024 and the following:

|  |  |
| --- | --- |
| Addendum No.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   | dated \_\_\_\_\_\_\_\_\_  |
| Addendum No.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   | dated \_\_\_\_\_\_\_\_\_  |
| Addendum No.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  | dated \_\_\_\_\_\_\_\_\_  |

as well as the premises and conditions affecting the work, proposes to furnish all services, labor and materials called for by them for the entire work in accordance with Contract Documents for the LUMP SUM of

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Dollars ($\_\_\_\_\_\_\_\_\_\_\_\_\_), which sum is hereinafter called the "Base Bid".

UNIT PRICE SUBMISSION:

The undersigned proposes that the unit price submissions on the attached Unit Price Schedule are to be used as a basis for pricing change orders and approving pay requests for work completed and in place. The unit price includes all labor, materials, equipment, profit and overhead.

BID HOLDING TIME:

The undersigned hereby agrees that the bid may not be revoked or withdrawn after the time set for opening of bids but shall remain open for acceptance for a period of thirty (30) calendar days following the opening of bids.

COMPLETION DATE:

The undersigned hereby agrees to commence actual physical work on the site with an adequate force and equipment five (5) calendar days from date of "Notice to Proceed".

The undersigned agrees to complete the Work of this Contract within 90 calendar days (day determined by the City of Wellford) after the "Notice to Proceed".

BID FORM 00 41 43 - 1 of 2 City of Wellford Project No. 20054-01

 Florence Chapel Community Park Phase 1

Wellford, South Carolina L a n d A r t D e s i g n G r o u p , I n c .

QUANTITY VERIFICATION:

Material quantities have been carefully calculated; however, the contractor is responsible for his own quantity calculations as the Landscape Architect assumes no responsibility for quantities. Significant discrepancies shall be reported to the Landscape Architect.

We, the undersigned, hereby declare that we have the legal status checked below:

1.  Individual

1.  Partnership, having the following partners.

a.

b.

c.

1.  Corporation, Incorporated under the state laws of

Respectfully submitted,

COMPANY:

ADDRESS:

By:

TITLE:

L.S.

DATE:

Seal if Bidder is a Corporation.

S.C. Bidder's License No.

S.C. Contractor's License No.

Witness:

Date:

 BID FORM 00 41 43 - 2 of 2

**UNIT PRICE SCHEDULE**

**FLORENCE CHAPEL COMMUNITY PARK PHASE 1 CITY OF WELLFORD, SOUTH CAROLINA**

**PREPARED BY:**

**DATE:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **#** |  | **ITEM** | **SIZE** | **QTY** | **UNIT** | **UNIT PRICE** | **EXTENSION** |
| **GENERAL CONDITIONS** |  |  |  |  |  |  |

1. Project Setup & Mobilization 1 LS @
2. Staking 1 LS @
3. Construction Fencing 1 LS @
4. Signage & Barriers 1 LS @

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  | **Subtotal** |
| **DEMOLITION - EARTHWORK** |  |  |  |

1. Rough/Fine Grading 1 LS @
2. Final Grading 1 LS @

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  | **Subtotal** |
| **EROSION CONTROL/DRAINAGE** |  |  |  |

1. Misc. Erosion Control Measures 1 LS @
2. Silt Fencing 1 LS @
3. Inspection / Maintenance / Repairs 1 LS @

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  | **Subtotal** |
| **GENERAL CONSTRUCTION** |  |  |  |

1

4

" Concrete Broom Finished Walks

4,582

SF

@

2

" Concrete

6

1,341

SF

@

3

" Colored Concrete

6

549

SF

@

4

Splash Pad

1

LS

@

5

Restrooms

1

LS

@

6

Water Lines

563

LF

@

7

Drain Lines

678

LF

@

8

Electrical Service

1,656

LF

@

**Subtotal**

**LANDSCAPE**

1

*ACER BUERGERIANUM 'MULTI-STEM'*

B & B/3" Cal

2

EA

@

2

*CHIONANTHUS RETUSUS*

**`CHINA SNOW`**

B & B/3" Cal

3

EA

@

3

QUERCUS PHELLOS 'HIGHTOWER'

B & B/3" Cal. 16' Min.

3

EA

@

4

*CYNODON DACTYLON '419 HYBRID'*

SOD

15,533

SF

@

5

TRIPLE HAMMERED HARDWOOD MULCH

Mulch

2.09

CY

@

**`**

**Subtotal**

**IGATION**

**IRR**

1

Irrigation Systems/Irrigation Meters

1

LS

@

2

Sleeving

1

LS

@

**Subtotal**

### TOTAL BID

|  |  |  |
| --- | --- | --- |
| **OT** | **HER ITEMS** |  |

 1 Any Other Items 1 LS @

**Subtotal**

**TOTAL**

Florence Chapel-UPS

#### SECTION 32 13 13 CONCRETE

PART 1 - GENERAL

 1.1 SUMMARY

1. Section Includes:

* + 1. Formwork.

* + 1. Reinforcing and accessories.

* + 1. Concrete walks, and paving.

* + 1. Concrete bases.

* + 1. Cast-in-place concrete foundations, retaining walls, and miscellaneous structural concrete.

1. Related Sections:

* + 1. Division 1: General Requirements.

* + 1. Section 32 22 00 Earthwork.

* + 1. Section 32 11 00: Base Courses.

 1.2 REFERENCES

 A. American Concrete Institute, ACI.

 1.3 SUBMITTALS

1. Product Data:

* 1. Submit complete materials list of items proposed for the work. Identify materials source.

1. Quality Control Submittals:

* 1. Submit concrete mix designs. Obtain approval before placing concrete.

* 1. Submit copies of concrete test reports. Test results shall be reported in writing to Landscape Architect and Owner on same day that tests are made. Reports of compressive strength shall contain the following:

* + 1. Project identification name and number

* + 1. Date of concrete placement

* + 1. Name of concrete testing service

* + 1. Concrete type and class

* + 1. Location of concrete

* + 1. Design compressive strength at 28 days

* + 1. Concrete mix proportions and materials

* + 1. Compressive breaking strength and type of break for both 7-day tests and 28-day tests.

* 1. Submit material certifications for aggregates, reinforcing, and joint fillers.

 D. Submit concrete delivery tickets. Show the following:

* 1. Batch number.

* 1. Mix by class or sack content with maximum size aggregate.

* 1. Admixtures.

* 1. Air content.

* 1. Slump.

* 1. Time of loading.

 1.4 QUALITY ASSURANCE

1. Testing and Inspection: Performed by a qualified independent testing laboratory that meets ASTM E329 standards.

1. Provide and pay for testing and inspection during concrete operations. Laboratory shall be acceptable to the Landscape Architect.

1. Maintain field records of time, date of placing, curing, and removal of forms of concrete in portion of work.

1. Field Samples: Before installing concrete work, provide a sample panel, minimum 4'-0" x 4'-0" and minimum 4 inches thick, using specified materials. Show color, texture, pattern, edging, and joint treatments. Correct and rebuild sample panel until Landscape Architect's acceptance of the work. Retain panel during construction as a standard for completed concrete work.

* + 1. The approved sample panel may be a portion of the Work and remain in place at Contractor's own risk. Location as directed by the Landscape Architect.

* + 1. Provide a sample panel for each type of concrete surface finish required in Work.

1. Do not change source or brands of cement and aggregate materials during the course of the Work.

1.5 DELIVERY, STORAGE, AND HANDLING

1. Store decorative exposed aggregates in segregated area to prevent mixing with foreign materials.

1. Deliver curing materials, admixtures, and retarders in manufacturer's standard unopened containers with labels legible and intact. Store and protect from freezing and damage.

1. Store cement, aggregates, and other materials in such a manner as to prevent deterioration or contamination with foreign matter. Each size aggregate is to be stored separately. Cement which has caked, partially set, or otherwise deteriorated shall not be used in the concrete.

1. Do not subject concrete to any procedure which will cause segregation.

1. Do not use concrete which becomes nonplastic and unworkable, or does not meet the required quality control limits, or which has been contaminated by foreign materials.

1.6 PROJECT CONDITIONS

1. Work Notification: Notify Landscape Architect at least 24 hours prior to installation of concrete.

1. Environmental Requirements:

* + 1. Do not place concrete over wet, saturated, muddy, or frozen subgrade.

* + 1. Do not install concrete when air temperature is below 40 degrees Fahrenheit and falling or when the temperature is projected to drop below 25 degrees Fahrenheit within 48 hours. Use of calcium chloride, salt, or any other admixtures to prevent concrete from freezing is prohibited.

* + 1. Protect concrete from physical damage or reduced strength due to weather extremes during mixing, placing, and curing. After concrete placement, concrete shall be maintained between 50 and 100 degrees F. for a minimum of 3 days.

* + - 1. In cold weather comply with ACI 306, "Recommended Practice for Cold Weather Concreting". Cold weather concreting is defined as a period when for more than 3 successive days the mean daily temperature drops below 40 degrees F. When temperatures above 50 degrees F. occur during more than half of any 24 hour period, the concrete should no longer be regarded as cold weather concreting.

* + - 1. In hot weather comply with ACI 305, "Recommended Practice for Hot Weather Concreting.".

PART 2 - PRODUCTS

2.1 MATERIALS

1. Portland Cement: ASTM C150, Type 1, natural color. Provide white Portland cement for integrally colored concrete.

1. Aggregate: Provide ASTM C33 Grading #57 clean, uncoated, crushed stone or gravel coarse aggregate free of materials which cause staining or rust spots.

1. Fine Aggregate: Natural sand or a combination of natural sand and manufactured sand conforming to ASTM C33.

1. Water: Clean, fresh, and potable.

2.2 MIXES

1. Provide ASTM C94 ready-mixed concrete. Batch mixing at site is not acceptable.

 1. Strength:

* + - 1. 4,000 psi minimum 28-day compressive strength; 611 lbs. cement per cu. yd. minimum; water/cement ratio, 0.44 maximum.

* + - 1. 3,000 psi minimum 28-day compressive strength; 517 lbs. cement per cu. yd. minimum; water/cement ratio, 0.58 maximum.

* + - 1. 2500 psi minimum 28-day compressive strength; 470 lbs. cement per cu. yd. minimum; water/cement ratio, 0.65 maximum.

1. Provide an approved water-reducing admixture in all concrete.

1. Provide an air-entraining admixture in all concrete. Air content 4 to 7 percent.

1. Indicate water added to mix at job site on each delivery ticket. Show quantity of water added. Site water tempered mixes exceeding specified slump range will be rejected as not complying with specification requirements.

2.3 ACCESSORIES

1. Forms: Wood or metal of sufficient strength to resist concrete placement pressure and to maintain horizontal and vertical alignment during concrete placement. Provide forms straight, free of defects and distortion, and height equal to full depth of concrete work. Minimize joints by using largest practical sizes.

* + 1. Paving Forms: Provide 2 inch nominal thickness, surfaced plank wood forms for straight sections. Use flexible metal, 1 inch lumber or plywood forms to form radius bends.

* + 1. Wood: Provide S4S surfaced plank wood forms where board form finish is scheduled, member sizes indicated by Drawings.

* + 1. Provide formwork accessories and anchorages of size required and of sufficient strength to maintain formwork in proper alignment and tolerances while placing concrete.

1. Joint Filler: ASTM D1752 premolded resilient non-extruding non-staining closed cell foam polyethylene, PVC foam or sponge rubber, 25 percent wider than joint width, thickness indicated.

1. Joint Sealants: Two-component polysulfide or polyurethane elastomeric type complying with FS TTS-00227, self-leveling, designed for foot traffic.

1. Concrete Reinforcement: Reinforcing steel for concrete shall consist of the following. Type, size, and quantity are specified on Drawings.

* + 1. Reinforcing steel: ASTM A615, A616, or A617, Grade 40, new domestic deformed steel bars, sizes indicated.

* + 1. Welded Wire Fabric: ASTM A185, welded plain cold-drawn steel wire fabric, 6" x 6" - 10 gauge x 10 gauge, or as indicated on Drawings.

* + 1. Wire Ties: ASTM A82, plain, cold-drawn, steel.

1. Exposed aggregate concrete finish treatment: Clear, non-yellowing acrylic emulsion type, semi-gloss sealer formulated for use on exposed aggregate concrete.

1. Surface retarding agent: Water-insoluble concrete surface retarder.

PART 3 - EXECUTION

3.1 EXAMINATION

1. Examine subgrades and installation conditions. Do not start concrete work until unsatisfactory conditions are corrected.

1. All proposed grades on the Drawings have been calculated to achieve desired drainage and visual effect; the Contractor shall verify existing elevations and grades and notify the Landscape Architect if the existing conditions vary from the existing conditions shown by the Drawings and the desired effect cannot be achieved.

3.2 PREPARATION

1. Provide center line grade stakes of walks for review by Landscape Architect prior to excavation and construction. Contractor shall be responsible for positive drainage conforming to the intent of the Drawings.

1. Subgrade preparation: Provide compacted subgrade to the lines and grades indicated on the Drawings as specified in Section 31 22 00.

1. Granular subbase: Provide compacted granular base material at walks and paving. Place granular base as specified in Section 32 11 00.

1. Formwork:

* 1. Verify lines, levels, and locations of formed concrete work. Verify that form dimensions comply with Drawing dimensions.

* 1. Design, erect, support, brace, and maintain formwork to support all applied vertical and lateral loads. Construct formwork to provide correct size, shape, alignment, elevation, and position of concrete work shown on Drawings.

* 1. Flexible or curved forms shall be used on curves as necessary to prevent a chord effect in the alignment of the finished work.

* 1. Design and erect formwork to permit removal without damage to cast-in-place concrete surfaces and adjacent materials during stripping.

* 1. Footings: Earth cuts may be used as foundation forms, when excavations are straight and true, not exposed in the finished structure and acceptable to the Landscape Architect. Any indication of excessive slope or failure of earth cuts will require side formwork. Hand-trim sides and bottoms of earth cuts and remove loose dirt before placing concrete.

* 1. Chamfer exposed corners and edges, as indicated on Drawings, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

* 1. Install, align, and level forms. Support and brace forms in place. Maintain following maximum tolerances:

* + 1. Finished surface shall not vary more than 1/2 inch above or below the plan grade lines or elevations established and approved at the job site. Deviation of 1/2 inch from the approved grade lines and elevations will not be permitted in areas where closer conformance with planned grade and elevation is required for proper functioning of surface drainage.

* + 1. Finish Surface Smoothness: 1/4 inch in 10'-0".

* + 1. Cross sectional dimensions of slabs and walls: Plus or minus 1/4 inch.

* + 1. Footings:

* + - 1. Dimensions: Minus 1/2 inch or plus 2 inches.

* + - 1. Misplacement or Eccentricity: 2 percent of footing width in direction of misplacement but not more than 2 inches.

* 1. Coat form surfaces in contact with concrete with form release agent. Clean forms after each use and coat with form release agent as necessary to assure separation from concrete without damage. Apply prior to placing reinforcing steel, anchoring devices, and embedded items. Remove excess form release agent prior to placing concrete.

* 1. Retighten forms and bracing after concrete placement to eliminate cement paste leaks and maintain proper alignment.

1. Reinforcement:

* 1. Reinforcement shall be protected by the thickness of concrete indicated in the Drawings. Where thickness of concrete protection is not indicated, the thickness of concrete over the reinforcement shall be as follows:

* + 1. Bars larger than #5: 2 inches.

* + 1. Bars #5 and smaller: 1-1/2 inches.

In any event reinforcing will be placed in the bottom 1/3 of the slab.

* 1. Clean reinforcement to remove loose rust and mill scale, earth, and other materials which will reduce or destroy bond with concrete.

* 1. Provide welded wire fabric at locations indicated on Drawings. Install in as long lengths as practicable. Lap adjoining pieces at least one full mesh. Offset end laps in adjacent widths to prevent continuous laps in either direction.

* 1. Provide reinforcing bars at locations indicated on Drawings, adequately supported and secured to prevent displacement.

* + 1. Splices: Provide standard reinforcement splices by lapping ends, placing bars in contact, and tightly wire tying. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

* + 1. Splice overlaps shall be according to the following schedule:

 BAR SIZE LAP LENGTH

1. 1'-4"
2. 1'-8"
3. 2'-0"
4. 2'-6"
5. 3'-3"

* + 1. Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by cast-in-place concrete.

* + 1. Install weep holes in walls at spacing indicated on Drawings.

* + 1. Install, set, and build-in items furnished by other trades. Provide adequate notification for installation of necessary items.

* + 1. Install pipe sleeves for irrigation system furnished under Section 32 80 00. Stake location of irrigation sleeve.

3.3 INSTALLATION

A. Concrete Placement:

* + - 1. Comply with ACI 304 "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete", and as specified.

* + - 1. Do not place concrete in footings until subgrade bearing surface passes compaction tests specified in Section 31 22 00.

* + - 1. Do not place concrete until subbase and forms have been checked for line and grade by Landscape Architect.

* + - 1. Paving:

* + - * 1. Moisten base to provide a uniform dampened condition at the time concrete is placed. Verify manholes or other structures are at required finish elevation and alignment before placing concrete.

* + - * 1. Place and spread concrete to the full depth of the forms. Use only square-end shovels or concrete rakes for hand-spreading and consolidating concrete.

* + - * 1. Place concrete in one course, monolithic construction, for the full width and depth of concrete work.

* + - * 1. Place concrete in a continuous operation between expansion joints. Provide construction joints when sections cannot be placed continuously.

* + - * 1. When adjacent pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained sufficient strength to carry loads without injury.

5. Footings: Place footings full thickness in one operation, without change in proportions, screeded to proper elevation, and float surface.

B. Joints:

* + - 1. Construct control, expansion, and construction joints properly aligned with face perpendicular to concrete surface.

* + - 1. When adjoining existing structures, place traverse joints to align with previously placed joints, unless otherwise indicated on Drawings.

* + - 1. Construction Joints:

* + - * 1. Locate and install construction joints, which are not shown on Drawings, so as not to impair strength and appearance of the structure, as acceptable to Landscape Architect.

* + - * 1. Provide standard keyed-section construction joints where indicated on Drawings. Keyways shall be at least 1-1/2 inch deep unless indicated otherwise. Provide keyed-section in construction joints in walls, slabs, and between footings and walls.

* + - * 1. Construct joints as shown on Drawings or, if not shown, use standard metal keyway-section forms.

* + - * 1. Place construction joints perpendicular to the main reinforcement. Continue reinforcement across construction joints.

 4. Control Joints:

* + - * 1. Tooled Joints: Provide tooled control joints, sectioning concrete into areas indicated on

Drawings. Tool joints to depth equal to not less than one-fifth of the concrete thickness. Hand tool control joints in pattern and at spacing indicated on Drawings. When not indicated, provide spacing equal to slab width and not greater than 10'-0" on center.

* + - * 1. Sawed Joints: Provide sawed control joints, sectioning concrete into areas indicated on Drawings. Saw joints to a depth equal to not less than one-fifth of the concrete thickness and of 1/4 inch width maximum. Saw cut joints as soon as surface is firm enough not to be torn or damaged by the cutting blade. Cut joints in pattern and at spacing indicated on Drawings. When not indicated, provide spacing equal to slab width and not greater than 10'-0" on center.

* + - 1. Isolation Joints: Provide 1/4 inch thick expansion joints using premolded joint filler at concrete work abutting curbs, walls, structures, walks, and other fixed objects. Install according to expansion joint filler procedures below.

* + - 1. Expansion Joints:

* + - * 1. Locate expansion joints as indicated on Drawings.

* + - * 1. Install joint fillers full-width and depth of joint. Recess top edge below finished surface where joint sealants are indicated on Drawings. Recess filler not less than 1/2 inch or more than 1 inch below finished surface.

* + - * 1. Provide joint fillers in single lengths for the full slab width, whenever possible. Fasten joint filler sections together when multiple lengths are required.

* + - * 1. Protect top edge of the joint filler during concrete placement.

3.4 Formed Surfaces Finishes:

* + 1. Apply finishes to surfaces indicated on Drawings.

* + 1. Rough Form Finish:

* + - 1. Provide as-cast rough form finish to formed concrete surfaces that are to be concealed in the finish Work or by any other construction.
			2. Standard rough form finish shall be the concrete surface having the texture imparted by the form facing material used, with tie holes and defective areas repaired and patched, and all fins and other projections exceeding 1/4 inches in height rubbed down or chipped off.

C. Smooth Form Finish:

* + - 1. Provide as-cast smooth form finish for formed concrete surfaces that are to be exposed to view, or that are to be covered with a coating material other than cement plaster applied directly to concrete.

* + - 1. Produce smooth form finish by selecting form material to impart a smooth, hard, uniform texture and arranging them orderly and symmetrically with a minimum of seams.

* + - 1. Repair and patch defective areas with all fins and other projections completely removed and smoothed.

D. Brick forms

* + - 1. Install brick edging forms as indicated on Drawings.

* + - 1. Allow to set for 48 – 72 hours.

* + - 1. Cover brick forms with visqueen plastic (2 - 3mil.) and allow to extend 12” into concrete form area.

* + - 1. Once concrete slabs are finished and cured, cut off protective plastic, burn with blow torch to remove all excess plastic to a point below the surface.

3.5 Concrete Slab Finishes:

* + 1. Apply finishes to surfaces indicated on Drawings.

* + 1. After floating, test surface for trueness with a 10 foot straightedge. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide a continuous smooth finish.

* + 1. Upon completion of floating, and after bleed water has disappeared and concrete can sustain foot pressure with nominal indentation, cut concrete away from forms. Work edges with an edging tool.

Round edges to 1/2 inch radius unless otherwise indicated on Drawings. Eliminate tool marks on concrete surface.

3.6 Curing:

* + 1. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Maintain concrete between 50 and 100 degrees F. for minimum of 3 days.

* + 1. Curing Formed Surfaces: Moist cure formed concrete surfaces with forms in place for 7 days. If forms are removed prior to 7 days, apply curing compound according to manufacturer's recommendations.

* + 1. Curing Slab and Unformed Surfaces:

1. The entire exposed surface shall be wetted with a fine spray of water and then covered with moisture-retaining cover. Sheets shall be light colored side up and overlapped 12 inches when a continuous sheet is not used. The curing medium shall be not less than 18 inches wider than the concrete surface to be cured, and shall be securely weighted down at edges and laps in the sheets. Sheets shall be satisfactorily repaired or replaced if torn or otherwise damaged during curing. The curing medium shall remain on the concrete surface for not less than 7 days. Curing compounds will not be allowed.

3.7 Joint Sealants:

* + 1. Install joint sealants where indicated on Drawings in accordance with manufacturer's installation instructions. Clean and prime joints. Remove dirt and loose coatings.

* + 1. Apply sealants in continuous beads, without open joints, voids, or air pockets. Hand tool and finish all joints.

* + 1. Confine materials to joint areas with masking tape or other precautions.

* + 1. Remove excess compound promptly as work progresses and clean adjoining surfaces.

* + 1. In rough surfaces or joints of uneven widths, install joint sealant well back into joints.

3.8 Removal of Paving Forms:

A. Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point-up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by Landscape Architect.

3.9 Concrete Surface Repairs:

* + 1. Patch and repair defective areas to match adjacent surfaces. Materials and finishes shall be consistent with installed work.

* + 1. Cut out honeycomb, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts, down to solid concrete but in no case to a depth of less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water and brush-coat the area to be patched with specified bonding agent. Place patching mortar after bonding compound has dried.

* + 1. Surfaces exposed to view: Provide sample repair patches, in locations acceptable to the Landscape Architect for approval of materials, procedures, and finish results.

* + 1. Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Landscape Architect. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets; fins and other projections on surface; and stains and discolorations that cannot be removed by cleaning.

3.10 FIELD QUALITY CONTROL

* + 1. Provide field quality control testing and inspection during concrete operations.

* + 1. Sampling from Concrete: ASTM C172, except modified for slump to comply with ASTM C94.

* + 1. Testing:

* + - 1. Slump Test: ASTM C143. Maximum 4 inches and 2 inches minimum. One test per each day’s pour per class of concrete, and for each 100 cubic yards or major fraction thereof.

* + - 1. Provide air indicator tests and air meter tests for all air-entrained concrete.

* + - * 1. Perform air indicator test with a "Chase" AE35 or equal air indicator, and air meter test in accordance with ASTM C231 or C173. Test first load of concrete delivered each day.

* + - * 1. Furnish copies of field records and tests reports as listed for strength tests.

 3. Strength Testing:

* + - * 1. Provide 1 set of 3 test specimens per each days pour per class of concrete, and for each 100 cubic yards or major fraction thereof. Secure samples in accordance with ASTM C172 and mold specimens in accordance with ASTM C31.

* + - * 1. Test 1 specimen at 7 days and 2 specimens at 28 days in accordance with ASTM C39.

* + - * 1. Furnish copies of field records and test reports as follows:

2 copies to Landscape Architect

1 copy to Contractor

1 copy to Ready Mix Supplies

* + - 1. Record the exact location of the concrete in the work represented by each set of cylinders and show on test reports.

* + - 1. Provide an insulated moist box for protection of the test cylinders until shipped to the laboratory.

3.11 PROTECTION

* + 1. Protect concrete work from damage due to construction and vehicular traffic until final acceptance. Exclude construction and vehicular traffic from concrete pavements for at least 14 days.

* + 1. After curing, backfill, grade, and compact soil to conform to the surrounding area in accordance with the lines and grades indicated shown on Drawings. Perform earthwork operations as specified in Section 31 22 00.

* + 1. The Contractor shall repair damaged concrete and clean concrete discolored during construction. At no additional cost to the Owner, damaged concrete or wood dividers shall be removed and reconstructed for the entire length (between regularly scheduled joints). Removed damaged portions shall be removed from the site.

3.12 CLEANING

* + 1. Perform cleaning during installation of the work and upon completion of the Work. Remove from the site all excess materials, debris, and equipment. Repair damage resulting from concrete operations.

* + 1. Sweep concrete sidewalks and pavement, wash free of stains, discoloration, dirt, and other foreign material immediately prior to final acceptance.

* + 1. Use of muriatic acid for cleaning is permitted only after concrete has cured for 2 weeks and only after approval by Landscape Architect.

* + - 1. Pre-wet concrete surface with water prior to applying acid.

* + - 1. Brush the surface free of standing water and wash the surface with acid solution.

* + - 1. Flush concrete surface several times to remove acid solution residue.

 END OF SECTION 03 30 53

#### SECTION 32 84 00 IRRIGATION SYSTEMS

SECTION 32 84 00– IRRIGATION SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

1. This Section includes piping, valves, sprinklers, controls and wiring for automatic control irrigation systems.
2. Extent of the underground irrigation system is shown in the plans, schedules and notes.
3. Provide all labor. Materials and equipment required or inferred from the Drawing and Specifications to complete the Work of this Section.
4. Provide a complete and operable system for the irrigation of all landscapes areas on the project site, unless indicated otherwise. The Drawings and specifications are intended to include all items obviously necessary and requisite for the proper irrigation of the project.
5. The contractor shall be responsible for adjusting head locations, nozzle type and size, and any other system components so that the irrigation system layout is coordinated with actual field conditions. Such adjustments shall be made at no cost to the Owner except, when authorized in writing, such adjustments which will be compensated for at an agreed upon cost.

1.3 DEFINITIONS

1. Lateral Piping: Downstream from control valves to sprinklers, specialties, and drain valves. Piping is under pressure during flow.
2. Drain Piping: Downstream from circuit-piping drain valves. Piping is not under pressure.
3. Mainline Piping: Downstream from point of connection to water distribution piping to, and including, control valves. Piping is under water-distribution-system pressure. D. The following are industry abbreviations for plastic materials:
	* 1. ABS: Acrylonitrile-butadiene-styrene plastic.
		2. FRP: Fiberglass-reinforced plastic.
		3. PA: Polyamide (nylon) plastic.
		4. PE: Polyethylene plastic.
		5. PP: Polypropylene plastic.
		6. PTFE: Polytetrafluoroethylene plastic.
		7. PVC: Polyvinyl chloride plastic.
		8. TFE: Tetrafluoroethylene plastic.
		9. HDPE: High Density Polyethylene plastic.

1.4 PERFORMANCE REQUIREMENTS

1. Head to head coverage irrigation system for lawns and exterior plants as shown or indicated on associated plans.
2. Drawings are diagrammatic and generally indicate the Work to be installed. The Drawings do not indicate all off-set fittings that may be necessary. The Contractor shall furnish such items as may be required to complete the work.
3. Location of Sprinklers and Specialties: Design location is approximate. Make minor adjustments necessary to avoid plantings and obstructions such as signs and light standards. Maintain 100 percent irrigation coverage of areas indicated.
4. Minimum Working Pressures: The following are minimum pressure requirements for piping, valves, and specialties unless otherwise indicated:
	* 1. Irrigation Main Piping: 200 psi.
		2. Lateral Piping: 200 psi.

1.5 SUBMITTALS

1. Approval: Obtain approval from Landscape Architect for all submittals prior to the beginning of Work, unless otherwise approved.
2. Product Data: Individual copies for product data shall be submitted with each product identified within the data by highlighting, circling or other method of identification. Include pressure ratings, rated capacities, and settings of selected models, if applicable, for the following:
	* 1. Electrical Control Valves.
		2. Quick Coupler Valves.
		3. Isolation Valves.
		4. Valve boxes.
		5. Sprinklers.
		6. Controllers and associated communication equipment.
		7. Control cables. Include splice kits.
		8. Decoders.
		9. Grounding equipment.
		10. Master Valve
		11. Flow Sensor
		12. PVC fittings.
		13. PVC Primer and Cement.
		14. Mainline, Lateral and Sleeve piping.
		15. Mainline and Lateral pipe fittings.
		16. Inline Drip Tubing and Fittings.
3. As-Built Drawings: Any changes in the layout and or arrangements of the proposed irrigation system, or any other differences between the proposed system and actual installed conditions are to be recorded by the Irrigation Contractor in the form of an “As-Built” Drawing. As-Built Drawing to be produced in an electronic format using AutoCAD. Provide the Owner and the Landscape Architect and AutoCAD & PDF

file along with five (5) hard copies of the As-Built Drawings before Work under this Contract will be considered for Acceptance. All automatic and manual valves, hose bibs or quick couplers, wire splice, and pressurized mainline locations shall be show with actual field dimensions in feet and inches from tow permanent reference points so they may be located easily in the field. Submittals of approved As-Built Drawing will precede any Application for Final Payment by the Contractor.

1. Operation and Maintenance Data: For irrigation systems, to include in emergency, operation, and maintenance manuals, including data for the following:
	* 1. Automatic control valves.
		2. Isolation valves.
		3. Sprinklers.
		4. Control systems.
2. Test Reports: Field test results of the irrigation supply well to include flow rates, and recovery rates.

1.6 QUALITY ASSURANCE

1. Installer Qualifications: Engage a firm or firms specializing in irrigation system installation. Installer shall have successfully completed five 2 wire control system projects similar in material, size, scope and complexity to that indicated for this Project that have resulted in construction with a record of successful in-service performance.
2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a qualified testing agency, and marked for intended use.
3. Codes and Standards: Perform the work in compliance with applicable requirements of governing authorities having jurisdiction. County regulations supersede these specifications. Notify Landscape Architect in writing of all discrepancies immediately.
4. Approval and Selection of Materials and Work: The selection of all materials and the execution of all operations required under the Drawings and Specifications is subject to the approval of the Owner and Landscape Architect. The have the right to reject any and all materials and any and all work which, in their opinion, does not meet the requirements of the Contract Documents at any state of the operations. Remove rejected Work and or materials from the project site and replace promptly.
5. Do Not Make Substitutions: If the Contractor desires to make substitutions of materials, sufficient descriptive literature and material samples must be furnished to establish the material as an equal substitute. In addition, the Contractor must state his reasons for desiring substitute materials and any potential cost savings. Submit this request and information to the Landscape Architect.

1.7 DELIVERY, STORAGE, AND HANDLING

1. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
2. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.8 PROJECT CONDITIONS

1. The irrigation system is designed to operate under the following conditions. A minimum of 50 psi water pressure at the tap, and at least a 21 gpm available water supply.
2. Insurance on irrigation materials or equipment stored or installed is the responsibility of the Contractor. Such insurance shall cover fire, theft and vandalism. Should the Contractor elect not to provide for such insurance, he will in no way hold the Owner responsible for any losses incurred by the aforementioned acts. The Contractor is responsible for all costs incurred in replacing damaged or stolen materials or equipment prior to Substantial Completion of the Work.
3. Obtain all required permits and pay all required fees, at no additional cost to the Owner. Any penalties imposed due to the failure to obtain permits or pay fees are the responsibility of the Contractor.
4. Provide and maintain all passageways, guard fences, warning lights and other protective devices required by the local authorities.
5. Existing grades: Existing grades will be within .2 feet of grades shown on the Civil Engineering Drawings at the time of work. Determine conditions of existing grades prior to beginning the Work. When irregular or incomplete grading conditions are encountered, notify the Owner in writing before beginning the Work. Determine location of existing drainage patterns and maintain patterns in completed Work. Perform Work in a manner which will avoid damage to finished grading and drainage patterns. All damage to finished grading and drainage resulting from Work covered in these Contract Documents shall be repaired at the Contractor’s expense.
6. Existing Utilities: Determine location of underground utilities. Perform Work in a manner which will avoid possible damage. Excavate as required. Maintain grade stakes set by other unless removal is mutually agreed upon by parties concerned. All damage to utilities resulting from Work covered in these Contract Documents shall be repaired at the Contractor’s expense.
7. Existing Conditions: Perform irrigation Work in Tree Protection zones and in existing or previously completed landscape areas to avoid damage and disturbance to these areas. Limit work in these areas to only that necessary to perform work specified herein and shown on the Drawings. Return and repair any areas damaged or disturbed while performing the Work to the existing conditions encountered prior to the Work.
8. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:
	* 1. Notify Owner’s Representative no fewer than two (2) days in advance of proposed interruption of water service.
		2. Do not proceed with interruption of water service without Owner's Representative’s written permission.
9. Removal of Hardscape: Do not remove hardscape surface unless permitted under the following conditions:
	* 1. Coordinate with Owner’s Representative no fewer than two (2) days in advance of proposed hardscape removal.
		2. Hardscape removal must not interrupt normal traffic flow on hardscape area.
		3. Area of removal must be useable prior to close of work day and completely repaired within 2 days of removal.

1.9 COORDINATION

A. Coordinate installation of irrigation system with Owner’s Representative and/or all other trades on site to insure irrigation system or other work on site will not be damaged. Should contractor fail to coordinate and damages occur it will be the contractor’s responsibility to repair damages at his own costs.

1.10 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents:

* 1. Rotary Sprinkler Units: Equal to two (2) percent of amount installed for each type and size indicated, but no fewer than 10 units.
	2. Spray Sprinkler Units: Equal to two (2) percent of amount installed for each type and size indicated, but no fewer than 10 units.
	3. Electric Control Valve Units: Equal to five (5) percent of amount installed for each type indicated, but no fewer than ten (5) units of each size and type.
	4. Isolation Valves: Equal to five (5) percent of amount installed for each type indicated, but no fewer than two (2) units of each type.
	5. Inline Drip Tubing: 100LF of each type of inline drip tubing used on the site.

1.11 PRE-INSTALLATION MEETING

A. Conduct a conference\meeting at the Project site. Review methods and procedures related to the site landscape irrigation system including, but not limited to the following:

* 1. The General Contractor is to contact the Irrigation Consultant and Owner Representative a minimum of 60 days prior to the schedule date of commencement of the irrigation installation.
	2. Meet with Owner Representative and Irrigation Consultant to review Contract documents.
	3. Verify current drawing release date with contractor’s documents.
	4. Review submittal procedure including codes, substitutions, product data, qualifications, and AsBuilt procedures and formats.
	5. Review project conditions including tap & meter Size, permits, utility locations and water conditions.
	6. Review methods and procedures related to irrigation installation.
	7. Review and finalize construction schedule and verify availability of materials, contractor’s personnel, equipment, and facilities needed to make progress and avoid delays.
	8. Review warranty guidelines.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

* 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
	2. Manufacturers: Subject to compliance with requirements, provide and warrantee products by one of the manufacturers specified.

2.2 PIPES, TUBES, AND FITTINGS

 A. Steel Pipe: ASTM A 53/A 53M, Schedule 40, Type S or E, Grade A or B, galvanized with threaded ends.

* 1. Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106/A 106M,

Standard Weight, seamless-steel pipe with threaded ends.

* 1. Malleable-Iron Unions: ASME B16.39, Class 150, hexagonal-stock body with ball-and-socket, metal-to-metal, bronze seating surface, and female threaded ends.
	2. Gray-Iron Threaded Fittings: ASME B16.4, Class 125, galvanized, standard pattern.
	3. Cast-Iron Flanges: ASME B16.1, Class 125.
	4. Cast-Iron Flanged Fittings: ASME B16.1, Class 125, galvanized. B. Soft Copper Tube: ASTM B 88, Type L, water tube, annealed temper.
	5. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper solder-joint fittings. Furnish wrought-copper fittings if indicated.
	6. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end.
	7. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends. C. Hard Copper Tube: ASTM B 88, Type L, water tube, drawn temper.
	8. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought- copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
	9. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end.
	10. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends. D. PVC Pipe: ASTM D 1785, PVC 1120 compound, SCH 40.
	11. PVC Socket Fittings, Schedule 40: ASTM D 2466, 3” and smaller
	12. PVC Threaded Fittings: ASTM D 2464.

2.3 GENERAL DUTY VALVES

1. AWWA, Cast-Iron Gate Valves: AWWA C509, resilient-wedge nonrising-stem, gray- or ductile-iron body and bonnet gate valve, epoxy coated; with steel stem and 2”operating nut.
	* 1. Minimum: Working Pressure: 200 psig.
		2. End Connections: Mechanical join flanged or ring-tite.
		3. Interior Coating: Complying with AWWA C550.
		4. Manufacturers:
			1. Matco.
			2. Leemco.
			3. Approved Equal.
2. Isolation Valve Boxes: Ten inch circular valve box with 6” SDR 21 PVC pipe riser from top of valve to center line of valve box. Pipe to be centered on operating nut to allow easy access.

1. Operating Wrenches: Furnish total of two (2) steel, tee-handle operating wrenches with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.

1. Bronze Gate Valves: MSS SP-80, Class 125, Type 1, non-rising stem, bronze body with solid wedge, threaded ends, and malleable-iron hand wheel.

 1. Manufacturers:

* + - 1. NIBCO, Inc.
			2. Approved Equal.

2.4 SPECIALTY VALVES

A. Quick-Couplers: Factory-fabricated, bronze or brass, two-piece assembly. Include coupler water-seal valve; removable upper body with spring-loaded or weighted, rubber-covered cap; hose swivel with ASME B1.20.7, 3/4-11.5NH threads for garden hose on outlet; and operating key.

* 1. Locking-Top Option: Vandal-resistant, locking feature. Include four matching keys with hose swivel for each key.
	2. Manufacturers:
		1. Rain Bird.
		2. Or Approved Equal

2.5 CONTROL VALVE BOXES

A. Plastic Control-Valve Boxes: Box and cover, with open bottom and openings for piping; designed for installing flush with grade. Size for all valves to be standard 14” rectangular.

* 1. Shape: Rectangular.
	2. Sidewall Material: ABS or HDPE.
	3. Cover Material: ABS or HDPE.
		1. Lettering: IRRIGATION.
		2. Green in color.
		3. Lockable with hex key mechanism or similar.

 4. Manufacturers:

* + 1. Rain Bird.
		2. Or Approved Equal.

2.6 SPRINKLERS

A. Description: Plastic housing and corrosion-resistant interior parts designed for uniform coverage over entire spray area indicated, at available water pressure.

 1. Manufacturers: :

* + 1. Rain Bird
		2. Hunter Industries for the MP Rotator nozzles.
		3. Or Approved Equal.
	1. Pop-up Spray Sprinklers: Fixed or adjustable pattern with screw-type flow adjustment, stainlesssteel retraction spring, drain check valve, pressure regulation, co-molded riser seal that seals cap to body and pop-up heights of 6”, 12”.
	2. Pop-up, Rotary Sprinklers: Gear drive, full-circle and adjustable part-circle types with screw-type flow adjustment, stainless-steel retraction spring, stainless steel riser, drain check valve, flow stop valve, minimum of 8 nozzles available, integral rubber cover, adjustable from the top of the sprinkler and pop-up heights of 6”, 12”.

2.7 ELECTRIC CONTROL VALVES

 A. Description: Electrically controlled hydraulically actuated control valves.

 1. Manufacturers:

* + 1. Rain Bird.
		2. Or Approved Equal.

2.8 AUTOMATIC CONTROL SYSTEM

1. Manufacturers:
	* 1. Rain Bird.
		2. Or Approved Equal.
2. Exterior Control Enclosures: NEMA 250, Type 4, weatherproof, with locking cover and two matching keys; include provision for grounding.
	* 1. Material: Enameled-steel or stainless steel.
		2. Mounting: Surface type for wall mounting, concrete mounting base for pedestal.
3. Control Transformer/Decoder Output: 24VAC 4A secondary, with overload protection and or primary

fuse.

* + 1. Decoder Line Output: 32 VAC RMS over 2-wire path
		2. Solenoid Capacity: 2 standard 24VAC solenoids per output, maximum output of 15 simultaneously.
1. Controller Stations for Automatic Control Valves: Each station is variable from approximately 1 minute to 23.9 hours. Include switch for manual or automatic operation of each station.
2. Timing Device: Adjustable, 24-hour, 365 day clock, with automatic operations to skip operation any day in timer period, to operate every other day, odd-even days, interval days, to operate 8 or more times daily.
	* 1. Manual or Semi-automatic Operation: Allows this mode without disturbing preset automatic operation.
		2. Minimum 30 day internal power storage: Automatically powers timing device during power outages.
		3. Eight (8) start times.
		4. Simultaneous program operation.
		5. Test program.
		6. One button manual start.
		7. Seasonal adjust 25% to 200%.
		8. Internal self-diagnostics of controller, bicoders and solenoids.
		9. Ten (10) independent programs.
		10. Surge Protection: Metal-oxide-varistor type on each station and primary power.
		11. Climate Sensor compatible with over-ride capabilities.
		12. Remote control capabilities. F. Wiring:

 1. Manufacturers:

* + - 1. Rain Bird
			2. Or Approved Equal
		1. Feeder-Circuit Cables: No. 14 AWG minimum, between building and controllers.
		2. Decoder Output Cable: No. 14 Rain Bird “Maxi” cable.
		3. Splicing Materials: 3M DBR-Y6 as required by manufacturer.

2.9 DRIP IRRIGATION SPECIALTIES

1. Drip Irrigation Emitters: Inline self-cleaning, pressure compensating variety with individual check valves as indicated. In-line emitters will be spaced as per Irrigation Schedule on center. Manual flush valves will be required at all locations necessary for maintenance flush and winterization blow out to assure water has been evacuated prior to freezing temperatures that would cause damage to the tubing or inline emitters.

 1. Acceptable Manufacturers:

* + - 1. Rain Bird XFCV
			2. Or Approved Equal
1. Drip Control Zone Kit: Electric control valve, in-line pressure regulator and wye or disc filter, preassembled by the manufacture, as shown in the irrigation schedule.

 1. Acceptable Manufacturers:

* + - 1. Rain Bird
			2. Or Approved Equal
1. Manual Flush Valves: All drip zones shall be installed with manual flush valve(s), number of valves will be based on the zone size and the number of dead ends. D. Drip Tubes with Direct-Attach Emitters:
	* 1. Tubing: Flexible PE with plugged ends
		2. Emitters: Devices to deliver water at approximately 15 psi.
			1. Body Material: PE or vinyl, with flow control.
			2. Mounting: Inserted directly into tubing at set intervals, on emitter stake, on PE riser.

PART 3 - EXECUTION

3.1 GENERAL

1. Observation of Work in Progress: During the installation the Landscape Architect\Irrigation Consultant will make regular site visits and reject any work and materials which do not meet the requirements called for in the Contract Documents.
2. Inspect project site prior to start of Work to determine that all site conditions are acceptable for Work to begin. Inform Landscape Architect\Irrigation Consultant of unsuitable conditions. Do not proceed with installation of the irrigation system until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.
3. Locate all existing underground utilities prior to trenching and\or boring operations and protect them against damage during the Work. Obtain utility location from Owner and\or General Contractor and utilize utility locating services when necessary.

3.2 EXAMINATION

1. Investigate and determine available water supply, water pressure and flow characteristics.
2. When unanticipated utilities that conflict with the intended function or design are encountered, investigate and measure the nature and extent of the conflict. Promptly submit a written report to the Owner for action.

3.3 EARTHWORK

1. Install warning tape directly above pressure piping, 12 inches below finished grades, except 6 inches below subgrade under pavement and slabs.
2. Install piping and wiring in sleeves under sidewalks, roadways, parking lots, and railroads.
	* 1. Install piping sleeves prior to hardscape sub-base being installed if possible.
		2. Sleeving installed in open trench to be completely backfilled crushed limestone, approved by owners representative and compacted to insure no future settling.
		3. Pipe sleeves are to be a minimum of two times the diameter of the pipe in the sleeve. C. Provide minimum cover over top of underground piping according to the following:
		4. Irrigation Main Piping: Minimum depth of 18 inches from top of pipe to finished grade.
		5. Circuit Piping: 12 inches from top of pipe to finished grade within general landscape areas, piping to be a minimum of 3 inches laterally from mainline at all times.
		6. Drain Piping: 12 inches.
		7. Sleeves: 10 inches from top of pipe for mainlines and 10 inches from top of pipe for laterals.

3.4 EXCAVATION PREPARATION

1. Set stakes to identify locations of proposed irrigation system. Obtain Owner’s Representative’s approval before excavation.
2. Excavate area for pipe installation 4” wider than diameter of pipe.
	* 1. Level trench base to insure consistent contact of pipe to trench bottom.
		2. Remove all rocks and other sharp objects.
		3. Place pipe in trench snaking from side to side if possible.
		4. Backfill to the top of pipe compacting the sides.
		5. Backfill in 8” lifts compacting to 90% between lifts until complete.
		6. All trenches greater than 4” in width to be restored to grade, +- ¼”, with sod as approved by Owner’s Representative.
		7. All trenches 4” or small in width to be restored to grade, +- ¼” with a minimum of 3” of topsoil as approved by Owner’s Representative.
		8. Whenever possible trenching should be outside of a tree dripline. If trenching is done within the dripline it should be at least 10’ from existing tree, if 10’ is not possible the trenching must be done by hand and all tree roots greater than 1” to be left in place. All tree roots 1” or less may be removed by saw cutting root on either side of the excavation and root removal.

3.5 PIPING APPLICATIONS

1. Install components having pressure rating as shown on the plan.
2. Piping above ground may be joined with flanges instead of joints indicated.
3. Aboveground Irrigation Main Piping: Use the following piping materials for each size range:
	1. NPS 3 and Larger: Steel pipe; malleable-, gray-, or cast-iron fittings; and threaded joints.
	2. NPS 25 and Smaller: Hard copper tube, wrought- or cast-copper fittings, and soldered joints. D. Underground Irrigation Main Piping: Use the following piping materials for each size range:
	3. NPS 25 and Smaller: SCH 40, PVC, pressure-rated pipe; Schedule 40, PVC socket fittings; and solvent-cemented joints.
	4. NPS 3 and larger: SCH 40, pressure rated pipe with gasket joint ends, Ductile Iron gasket joint fittings with manufacturer’s recommended joint restraint.
4. Circuit Piping: Use the following piping materials for each size range:

1. NPS 4 and Smaller: SCH 40, PVC, pressure-rated pipe; Schedule 40, PVC socket fittings; and solvent-cemented joints.

1. Underground Branches and Offsets at Sprinklers and Devices: 1. Option: Plastic piping manufactured for this application may be used on sprinkler inlets of 1/2” or smaller instead of pipe and fittings specified, “swing pipe and spiral barbed elbows). If this is to be used the offset must be more than 12” and less than 18” as per detail.
2. Risers to Aboveground Sprinklers and Specialties: Type L hard copper tube, wrought-copper fittings, and soldered joints.
3. Sleeves: SCH 40 PVC pipe and socket fittings; and solvent-cemented joints.
4. Transition Fittings: Use transition fittings for plastic-to-metal pipe connections according to the following:

 1. Couplings:

* + - 1. Underground Piping NPS 2-1/2 and Smaller: Manufactured fitting or coupling.
			2. Underground Piping NPS 3 and Larger: PVC Flange with stainless steel bolts and rubber gasket.

 2. Fittings:

* + - 1. Aboveground Piping: Plastic-to-metal transition fittings.
			2. Underground Piping: Union with plastic end of same material as plastic piping.
1. Dielectric Fittings: Use dielectric fittings for dissimilar-metal pipe connections according to the following:

 1. Underground Piping:

* + - 1. NPS 2 and Smaller: Dielectric coupling or dielectric nipple.
			2. NPS 2-1/2 and Larger: Prohibited except in control-valve box.

 2. Aboveground Piping:

* + - 1. NPS 2 and Smaller: Dielectric couplings or dielectric nipples.
			2. NPS 2-1/2 to NPS 4: Dielectric flange.

 3. Piping in Valve Boxes or Vaults:

* + - 1. NPS 2 and Smaller: Dielectric union.
			2. NPS 2-1/2 to NPS 4: Dielectric flange.

3.6 VALVE APLICATIONS

 A. Aboveground, Shutoff-Duty Valves:

* 1. NPS 2-1/2 and Smaller: Bronze gate valve.
	2. NPS 3 and Larger: Cast-iron, non-rising stem gate valve. B. Isolation Valves:
	3. NPS 2-1/2 and Smaller: Bronze non-rising stem gate valve.
	4. NPS 3 and Larger: Cast-iron, non-rising stem gate valve with 2” operating nut.

3.7 PIPING INSTALLATION

A. Location and Arrangement: Drawings indicate location and arrangement of piping systems. Install piping as indicated unless deviations are approved on Coordination Drawings. B. Install piping free of sags and bends.

1. Install groups of pipes parallel to each other with a space between minimum of 4”, spaced to permit single valve removal and or servicing.
2. Install fittings for changes in direction and branch connections.
3. Install dielectric fittings to connect piping of dissimilar metals.
4. Install underground thermoplastic piping according to ASTM D 2774 and ASTM F 690.
5. Lay piping on solid sub-base, uniformly sloped without humps or depressions.
6. Install PVC piping in dry weather when temperature is above 32 deg F. Allow joints to cure at least 24 hours at temperatures above 32 deg F before testing unless otherwise recommended by manufacturer.
7. Install water regulators with shutoff valve and strainer on inlet and pressure gage on outlet. Flush the line prior to installation to remove debris. Install the valve so that the flow arrow marked on the valve body tag corresponds to the flow through the line. Install shutoff valve on outlet.

3.8 VALVE INSTALLATION

1. Electrical Control Valves: Install in valve box with top flush with and perpendicular to grade.
	* 1. Electrical control valve boxes to be 14” rectangular valve box for standard valves and “Jumbo” valve boxes for drip zone kits.
		2. From bottom of valve to a depth of 6” install washed stone or gravel sized between ¾” and 1” in diameter to create sump and stabilize valve box.
		3. Install valve box extensions as necessary to bring lid level with finished landscape grade.
		4. Control Valves to be installed with center line of valve 12” below finished grade.
2. Underground, Manual Control Valves: Install with 6” SDR 21 PVC riser from top of pipe to center line of valve box finishing with 10” round valve box level with finished landscape grade.

1. Install valves and PVC pipe with restrained, gasketed joints as necessary at the same depth as the mainline pipe.

3.9 SPRINKLER INSTALLATION

1. Flush circuit piping with full head of water prior to installing sprinklers.
2. Install sprinklers at manufacturer's recommended heights perpendicular to grade.
3. Locate part-circle sprinklers to maintain a minimum distance of 4 inches from walls and 2 inches from other boundaries unless otherwise indicated.
4. Adjust all sprinklers to irrigated plant material indicated for the station.

3.10 AUTOMATIC CONTROL SYSTEM INSTALLATION

1. Obtain approval of controller location from owner’s representative prior to installation. Install wall mount controllers approximately 48” -60” above FFE. Securely fasten controller to wall with metallic fasteners appropriate for wall type or install pedestal controller on concrete pad with all necessary conduit installed through the pad to accommodate all wire to controller. All irrigation control wire between controller and control valves to be in 1” SCH 40 PVC electrical conduit.
2. Install control wire conduit in same trench as mainline piping and at least 4 inches to the side of the piping. Provide conductors of size not smaller than recommended by controller manufacturer. All wire splices not in a valve box to be located in minimum 10” round valve box.

3.11 CONNECTIONS

1. Drawings indicate general arrangement of piping, fittings, and specialties.
2. Ground equipment according to ASIC Grounding Guidelines www.aisc.org. Resistance readings to ground to be as recommended by the manufacturer. If there are no manufactures requirements then the controller should have a resistance of 10 ohms or less.
3. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.12 FIELD QUALITY CONTROL

 A. Perform the following field tests and inspections and prepare test reports:

* 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
	2. Operational Test: After electrical circuitry has been energized, operate controllers and automatic control valves to confirm proper system operation.
	3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
	4. Remove and replace units and retest and re-inspect as specified above.

3.13 STARTUP SERVICE

1. Engage a factory-authorized service representative to perform startup service of control system.
2. Verify that controllers are installed and connected according to the Contract Documents.
3. Verify that electrical wiring installation complies with manufacturer's submittal and installation requirements in Division 16 Sections.
4. Complete startup checks according to manufacturer's written instructions.

3.14 ADJUSTING

1. Program controller(s) to insure adequate moisture is available for the root zone of the plant. Insure there is no run-off, over watering or deep percolation. Insure controller operates within irrigation window as defined by Owner’s Representative or local governing authorities. See additional controller programming notes on plans provided.
2. Adjust automatic control valves to provide flow rate at rated operating pressure required for each sprinkler circuit. Use pressure regulation for each control valve if pressure is higher than recommended for the sprinklers in the circuit.
3. Adjust sprinklers so they will be 1/8 inch above finish grade in sodded lawns and 1/2 inch above grade in seeded lawns. In shrub beds adjust sprinklers to insure top of sprinkler is at finished mulch levels. D. Adjust sprinklers arc and radius to insure no water is sprayed outside of the irrigated area.

3.15 CLEANING

 A. Flush dirt and debris from piping before installing sprinklers and other devices.

3.16 DEMONSTRATION

A. It is contractors’ responsibility to train Owner's maintenance personnel to adjust, operate, and maintain sprinklers, isolation valves, controllers and automatic control valves.

3.17 OBSERVATION AND ACCEPTANCE

1. Periodic site visits will be made by the Landscape Architect\Irrigation Consultant to review the quality and progress of the work. Work found to be unacceptable must be corrected within five (5) calendar days. Remove rejected materials promptly from the project.
2. Upon completion of the Work, the Contractor shall notify the Landscape Architect and Owner at least ten (10) days prior to requested date of the site visit for Substantial Completion of all portions of the Work. Landscape Architect\Irrigation Consultant will issue a punch list for all work to be corrected. All work on the punch list must be complete within five (5) working days from the date of the site visit. Where Irrigation Work does not comply with the requirements, replace rejected Work. If such replacements are not completed within the time specified, the Irrigation Contractor may be considered to be in default of the Contract, and the Owner may use the Contract Retainage to hire other Contractors to finish the work.
3. It will be the responsibility of the Irrigation Contractor to provide reliable communication system (remote control or two way radios) for Substantial Completion and all periodic site visits.
4. If a site visit to verify Substantial Completion has been scheduled and the Landscape Architect\Irrigation Consultant arrives at the site and determines that the irrigation system is not substantially complete (all system components in place, operational and checked) the Contractor will be responsible for all expenses included but are not limited to the following: mileage, airfare, consultant’s time, parking fees, meals, car rental, etc. All incurred expenses will be deducted from the final contract amount.

END OF SECTION 328400

#### SECTION 32 93 00 PLANTS

PART 1 – GENERAL

1.1 SUMMARY

1. Section Includes:

* + 1. Soil Preparation.

* + 1. Planting mixes.

* + 1. Trees, shrubs, and groundcovers.

* + 1. Mulch and planting accessories.

* + 1. Maintenance of Trees, Shrubs, and Groundcovers.

1. Related Sections:

* + 1. Division 1: General Requirements

* + 1. Section 31 22 00: Earthwork

 1.2 REFERENCES

1. "Standardized Plant Names" as adopted by the latest edition of the American Committee of Horticultural Nomenclature.

1. American Standard for Nursery Stock, ANSI Z60.1. American Nursery and Landscape Association, 1250 Eye Street. NW, Suite 500, Washington, D.C. 20005

1. Standards of Practice of the American Association of Nurserymen.

1. All standards shall include the latest additions and amendments as of the day of the advertisement for bids.

* 1. QUALIFICATIONS

**Landscape planting and related work shall be performed by a firm with a minimum of five years experience specializing in this type of work. All contractors and their sub-contractors who will be performing any landscape work included in this section of the specification shall be approved by the landscape architect.**

* 1. SUBMITTALS

1. Quality Control Submittals:

* 1. Submit the following materials certification:

 a. Plant fertilizer(s) analysis.

* 1. Submit subsurface investigation reports.

* 1. Submit photographs of "specimen" plant materials.

1. Contract Closeout Submittals:

1. Prior to plant material acceptance, submit written maintenance instructions recommending adequate and reasonable procedures for maintenance of plant materials.

1. Provide plant material record drawings:

* + 1. Legibly mark drawings to record actual construction.

* + 1. Indicate horizontal locations, referenced to permanent surface improvements.

* + 1. Identify field changes of dimension and detail and changes made by Change

 Order.

 1.5 QUALITY ASSURANCE

1. Provide stock true to botanical name and legibly tag plants with botanical name to include variety or cultivar and size in accordance with the Standards of Practice of the American Association of Nurserymen.

1. Comply with sizing and grading standards of the latest edition of "American Standard for Nursery Stock."

1. Plants may be inspected and approved at the place of growth, for compliance with specification requirements for quality, size, and variety.

1. Such approval shall not impair the right of inspection and rejection upon delivery at the site or during the progress of work.

1. Qualifications: Planting shall be performed by experienced workers familiar with planting procedures.

1.6 DELIVERY, STORAGE, AND HANDLING

1. Deliver fertilizer materials in original, unopened, and undamaged containers showing weight, analysis, and name of manufacturer. Store in manner to prevent wetting and deterioration.

1. Moving and Storage of Plant Materials: Take all precautions customary in good trade practice in preparing plants for moving. Workmanship that fails to meet the highest standards will be rejected.

* + 1. Dig, pack, transport, and handle plants with care to ensure protection against injury. Fully protect plants from damage by sun, wind, drought, water and other injurious conditions during transportation to site and during temporary storage before planting.

* + 1. Inspection certificates required by law shall accompany each shipment invoice or order to stock and on arrival, the certificate shall be filed with the Landscape Architect.

* + 1. No plant shall be bound with rope or wire in a manner that could damage or break the branches.

1.7 PROJECT CONDITIONS

1. Protect existing utilities, paving, and other facilities from damage caused by landscaping operations.

1. The irrigation system will be installed prior to planting. Locate, protect, and maintain the irrigation system during planting operations. Repair irrigation system components, damaged during planting operations, at Contractor's expense.

1.8 SCHEDULING

A. Time of Planting: Plant under favorable weather conditions and recommended season for survival and establishment. At option of, and under full responsibility of Contractor, planting operations may be conducted under unseasonable conditions, but without additional compensation.

1.9 WARRANTY

1. Warrant plant material to remain alive and be healthy, vigorous condition for a period of one year after final acceptance of entire project.

1. Contractor's Inspection of Owner's Maintenance:

* + 1. During Warranty Period, Contractor shall make periodic visits to site (especially during times of unusually severe weather conditions) to inspect plants installed and guaranteed by him. If he should determine that conditions such as Owner's maintenance, which are not directly under his control, are insufficient to sustain plants, he shall promptly file written notice with Owner and Landscape Architect stating his findings and recommendations for correction.

* + 1. If Landscape Architect concurs with Contractor after inspection of site, or if he should not be authorized to promptly inspect the site at Owner's expense, Contractor then may file written notice with Owner and Landscape Architect that unless proper maintenance, or other necessary work has been completed by a reasonable given date, and sustained thereafter, the terms of Plant Warranty will become null and void for all or stated portions of the work.

1. Remove from site, promptly upon discovery during periodic visits, dead or other unsatisfactory plants. Mark location safely with stake to facilitate future replacement.

1. Replace, in accordance with the Drawings and Specifications, all plants that are dead or, as determined by the Landscape Architect, are in an unhealthy or unsightly condition, and have lost their natural shape due to dead branches, or other causes due to Contractor's negligence.

* + 1. The cost of such replacement(s) is at Contractor's expense.

* + 1. Replace during earliest favorable weather and season unless directed otherwise by Landscape Architect.

* + 1. Warrant all replacements plants for 1 year after installation.

1. Warranty shall not include damage or loss of plants caused by fires, floods, freezing, rains, lightning storms, winds over 75 miles per hour, or winter kill caused by extreme cold and severe winter conditions not typical of planting area; acts of vandalism or negligence on the part of the Owner.

1. Failure to Remedy Defects: If Contractor fails to remedy any defects in workmanship, materials, or performance that he is responsible for within reasonable length of time as specified in notice from Landscape Architect to Contractor, the Owner may have work done and charge the cost to the Contractor.

1. Satisfaction of Warranty:

* + 1. Contractor shall request by written notice inspection of final acceptance to take place within one week before or after end of warranty period.

* + 1. If plants are in satisfactory condition, the Contractor shall receive a written notice of Warranty Compliance.

* + 1. Replace rejected work and continue maintenance until work is reinspected by Landscape Architect and found acceptable.

PART 2 - PRODUCTS

2.1 MATERIALS

1. Plants shall be true to species and variety specified and nursery-grown in accordance with good horticultural practices under climatic conditions similar to those in the locality of the project for at least two years. They shall have been freshly dug (during the most recent favorable harvest season).
	* + 1. All plant names and descriptions shall be as defined in *Hortus Third*.
			2. All plants shall be grown and harvested in accordance with the *American Standard for Nursery Stock*.
			3. Unless approved by the landscape architect, 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.
2. Unless specifically noted, all plants shall be of specimen quality, exceptionally heavy, symmetrical, and so trained or favored in development and appearance as to be unquestionably and outstandingly superior in form, compactness, and symmetry. They shall be sound, healthy, vigorous, well branched, and densely foliated when in leaf; free of disease and insects, eggs, or larvae; and shall have healthy, well-developed root systems. They shall be free from physical damage or other conditions that would prevent vigorous growth.

1. Trees with multiple leaders, unless specified, will be rejected. Trees with a damaged or crooked leader, bark abrasions, sunscald, disfiguring knots, insect damage, cuts of limbs over 20 mm (3/4 in.) in diameter that are not completely closed or flush pruning cuts that do not preserve the collar at the base of the branch will be rejected.

1. Plants shall conform to the measurements specified, except that plants larger than those specified may be used if approved by the landscape architect. Use of larger plants shall not increase the contract price. If larger plants are approved, the root ball shall be increased in proportion to the size of the plant.

1. Caliper measurements shall be taken on the trunk 150 mm (6 in.) above the natural ground line for trees up to and including 100 mm (4 in.) in caliper, and 300 mm (12 in.) above the natural ground line for trees over 100 mm (4 in.) in caliper. Height and spread dimensions specified refer to the main body of the plant and not from branch tip to branch tip. Plants shall be measured when branches are in their normal position. If a range of sizes is given, no plant shall be less than the minimum size, and no less than 50 percent of the plants shall be as large as the maximum size specified. Measurements specified are minimum sizes acceptable after pruning, where pruning is required. Plants that meet measurements but do not possess a standard relationship between height and spread, according to the *American Standards for Nursery Stock*, shall be rejected.

1. Substitutions of plant materials will not be permitted unless authorized in writing by the landscape architect. If proof is submitted in writing that a plant specified is not obtainable, consideration will be given to the nearest available size or similar variety, with a corresponding adjustment of the contract price.
2. The plant list at the end of this section, or on the drawing, is for the contractor's information only, and no guarantee is expressed or implied that quantities therein are correct or that the list is complete. The contractor shall ensure that all plant materials shown on the drawings are included in his or her bid.
3. All plants shall be labeled by plant name. Labels shall be attached securely to all plants, bundles, and containers of plant materials when delivered. Plant labels shall be durable and legible, with information given in weather-resistant ink or embossed process lettering.
4. Selection and Tagging
	* + 1. Plants shall be subject to inspection for conformity to specification requirements and approval by the landscape architect at their place of growth and upon delivery. Such approval shall not impair the right of inspection and rejection during progress of the work.
			2. All field grown deciduous trees shall be marked to indicate the trees north orientation in the nursery. Place a 1-in. diameter spot of white paint onto the north side of the tree trunk within the bottom 12 inches of the trunk.

1. Balled and Burlapped (B&B) Plant Materials

1. Trees designated B&B shall be properly dug with firm, natural balls of soil retaining as many fibrous roots as possible, in sizes and shapes as specified in the *American Standard for Nursery Stock*. Balls shall be firmly wrapped with nonsynthetic, rottable burlap and secured with nails and heavy, nonsynthetic, rottable twine. The root collar shall be apparent at surface of ball. Trees with loose, broken, processed, or manufactured root balls will not be accepted, except with special written approval before planting.

NOTE: Some nurseries practice result in the root flare being buried several inches deep. The top of the root ball may be at ground level, but the root flare actually is too deep. Remove the excess soil on the top of the root ball. Proper planting depth requires the root flare to be at or slightly above the finished grade.

1. Container Plants
	* + 1. Plants grown in containers shall be of appropriate size for the container as specified in the most recent edition of the *American Standard for Nursery Stock* and be free of circling roots on the exterior and interior of the root ball.
			2. Container plants shall have been grown in the container long enough to have established roots throughout the growing medium.
2. Bareroot and Collected Plants
	* + 1. Plants designated as bareroot or collected plants shall conform to the *American Standard for Nursery Stock*.
			2. Bareroot material shall not be dug or installed after bud break or before dormancy.
3. Immediately after harvesting plants, protect from drying and damage until shipped and delivered to the planting site. Rootballs shall be checked regularly and watered sufficiently to maintain root viability.
4. Transportation and Storage of Plant Material
	* + 1. Branches shall be tied with rope or twine only, and in such a manner that no damage will occur to the bark or branches.
			2. During transportation of plant material, the contractor shall exercise care to prevent injury and drying out of the trees. Should the roots be dried out, large branches broken, balls of earth broken or loosened, or areas of bark torn, the landscape architect may reject the injured tree(s) and order them replaced at no additional cost to the owner. All loads of plants shall be covered at all times with tarpaulin or canvas. Loads that are not protected will be rejected.
			3. All bareroot stock sent from the storage facility shall be adequately covered with wet soil, sawdust, woodchips, moss, peat, straw, hay, or other acceptable moisture-holding medium, and shall be covered with a tarpaulin or canvas. Loads that are not protected in the above manner may be rejected.
			4. Plants must be protected at all times from sun or drying winds. Those that cannot be planted immediately on delivery shall be kept in the shade, well protected with soil, wet mulch, or other acceptable material, and kept well watered. Plants shall not remain unplanted any longer than three days after delivery. Plants shall not be bound with wire or rope at any time so as to damage the bark or break branches. Plants shall be lifted and handled with suitable support of the soil ball to avoid damaging it.
5. Mechanized Tree Spade Requirements

Trees may be moved and planted with an approved mechanical tree spade. The tree spade shall move trees limited to the maximum size allowed for a similar B&B root-ball diameter according to the *American Standard for Nursery Stock* or the manufacturer's maximum size recommendation for the tree spade being used, whichever is smaller. The machine shall be approved by the landscape architect prior to use. Trees shall be planted at the designated locations in the manner shown in the plans and in accordance with applicable sections of the specifications.

2.2 ACCESSORIES

A. Planting Soil Mix:

* + - 1. Topsoil: As specified in Section 31 22 00.

* + - 1. Pine Bark: Commercial horticultural preparation, finely ground, free of extraneous and harmful matter.

B. Soil Conditioning Materials:

* + - 1. Aluminum Sulfate: Unadulterated, in manufacturer's original, unopened container labeled with analysis and net weight. Use to acidify soil (lower pH) as recommended by soils test report.

* + - 1. Limestone: Raw, ground agricultural limestone, containing at least 90 percent calcium carbonate; 90 percent shall pass No. 10 sieve and 50 percent shall pass No. 50 sieve. Use to decrease acidity of soil (raise pH) as recommended by soils test report.

C. Fertilizer:

* + - 1. Superphosphate: Soluble mixture of treated minerals; 20% available phosphoric acid.

* + - 1. Commercial Fertilizers: Conforming to applicable Federal and State law, uniform as to composition, dry, free-flowing, and delivered to site in original unopened containers. Application rate and minimum analysis shall be as recommended by soils test report.

D. Mulch:

1. Hardwood Mulch: Material shall be mulching grade, uniform in size, and free of foreign matter. Submit sample for approval.

* + 1. Edging Materials:

NONE PERMITTED

* + 1. Miscellaneous Materials:

1. Water: Clean, free from toxic amounts of salt, oil, acid, alkali, organic matter or other substances harmful to plants.

PART 3 - EXECUTION

3.1 EXAMINATION

* + 1. Examine proposed planting areas and conditions of installation. Do not start planting work until unsatisfactory conditions are corrected and fine grading has been approved by Landscape Architect.

* + 1. Subsurface Drainage Investigation:

1. Required Tests: Subsurface drains have not been included as part of project; therefore, Contractor shall make such reasonable percolation tests, approved by Landscape Architect, as may be necessary to determine if subsurface drainage conditions in landscape areas are so poor as to support moisture conditions potentially fatal to plantings. The following procedure is recommended:

* + - * 1. Wait at least twenty-four (24) hours after rain and dig test pit twelve (12) inches square or 131/2 inches in diameter to depth of bottom of plant bed, trench or pit. Remove all loose soil (if standing water is visible, notify the Landscape Architect).

* + - * 1. Quickly fill pit bottom with six (6) inches (approximately 3-1/4 gallons) of water.

* + - * 1. Record length of time from filling until disappearance of water and divide the number of minutes by six (6) to give average time of one (1) inch fall.

* + - * 1. Compare one (1) inch fall time with following table: - 1 inch in 0-3 min. indicates rapid absorption.

1 inch in 3-5 min. indicates medium absorption.

1 inch in 5-30 min. indicates slow absorption.

1 inch in 30-60 min. indicates semi-impervious soil. - 1 inch in over 60 min. indicates impervious soil.

* + - * 1. If soil is indicated to be semi-impervious or impervious, or if water is initially found in test pit, notify Landscape Architect before proceeding further.

* + - * 1. If Contractor does not make test at representative locations and file records of results with Owner and Landscape Architect, or if he plants in areas shown to have poor drainage without written release from Owner, he shall be liable for any future guaranteed replacements due to subsurface water damage.

* + - * 1. If Contractor makes proper tests and files complete records indicating no semi-impervious or worse conditions, he will not be held responsible for future subsurface water damage to work of Contract within Guaranty Period. Owner or Landscape Architect may supervise testing at any time.

 2. Relocation or Omission of Plants:

* + - * 1. Where subsurface conditions provide inadequate drainage and subsurface drainage system is not to be used as remedy, make reasonable relocation of plants as directed by Landscape Architect.

* + - * 1. Drainage conditions necessitating omission of plants shall be covered by Change Order.

3. Authorization of Drain as Extra Work: Owner may authorize installation of subsurface drains to alleviate moisture problems at locations determined by Landscape Architect. Perform work at negotiated extra cost; begin work only upon receipt of Change Order. Locations, appropriate materials, and construction techniques shall be as directed by Landscape Architect.

3.2 PREPARATION

A. Utility Verification: **Contractor will be responsible for damages to any unmarked utility.**

1. The contractor shall contact the local utility companies for verification of the location of all underground utility lines in the area of the work. The contractor shall be responsible for all damage resulting from neglect or failure to comply with this requirement.

B. Soil Conditioning:

* + - 1. Coordinate soil conditioning with soil testing and fine grading operations specified in Section 02200.

* + - 1. Adjustment of pH: If the pH range of the soil samples from the proposed planting sites is not acceptable, the Contractor shall, upon receipt of authorization to proceed by Change Order, adjust the pH of the existing soils within the unacceptable areas. Adjust pH by uniformly incorporating required soil conditioning materials at the rate determined by the analysis of the soil test done by the Soils Testing Laboratory.

* + 1. Location of Plants: Place individual plants and stake plant beds as indicated on Drawings. Notify Landscape Architect for approval prior to planting. Contractor shall make reasonable adjustment of plant locations as recommended by Landscape Architect.

* + 1. Obstructions:

* + - * 1. Obstructions at or below grade shall be removed where possible; obstructions such as functioning utilities or objects too massive to be removed with tractor mounted backhoe will require plant relocations as directed by Landscape Architect.

* + - * 1. Above Ground: Report overhead interference such as wires, overhangs, etc., to Landscape Architect and relocate plantings as directed.

* + - * 1. Repairs: Contractor shall familiarize himself with the location of all underground and aboveground improvements and take care not to disturb improvements during his installation operations. Contractor shall repair or replace at Contractor's sole expense improvements damaged by his installation operations.

E. EXCAVATION FOR TREES AND SHRUBS

1. Locations for plants and/or outlines of areas to be planted are to be staked out at the site. Locate and mark all subsurface utility lines. Approval of the stakeout by the landscape architect is required before excavation begins.
2. Tree, shrub, and groundcover beds are to be excavated to the depth and widths indicated on the drawings. If the planting area under any tree is initially dug too deep, the soil added to bring it up to the correct level should be thoroughly tamped.
	1. The sides of the excavation of all planting areas shall be sloped at a 45 degrees. The bottom of all beds shall slope parallel to the proposed grades or toward any subsurface drain lines within the planting bed. The bottom of the planting bed directly under any tree shall be horizontal such that the tree sits plumb.
	2. Maintain all required angles of repose of the adjacent materials as shown on the drawings. Do not excavate compacted subgrades of adjacent pavement or structures.
3. For trees and shrubs planted in individual holes in areas of good soil that is to remain in place and/or to receive amendment in the top 150-mm (6 in.) layer, excavate the hole to the depth of the root ball and to widths shown on the drawing. Slope the sides of the excavation at a 45 degree angle up and away from the bottom of the excavation.
	1. In areas of slowly draining soils, the root ball may be set up to 75 mm (3 in.) or 1/8 of the depth of the root ball above the adjacent soil level.
	2. Save the existing soil to be used as backfill around the tree.
	3. On steep slopes, the depth of the excavation shall be measured at the center of the hole and the excavation dug as shown on the drawings.
4. Detrimental soil conditions: The landscape architect is to be notified, in writing, of soil conditions encountered, including poor drainage, which the contractor considers detrimental to the growth of plant material. When detrimental conditions are uncovered, planting shall be discontinued until instructions to resolve the conditions are received from the landscape architect.
5. Obstructions: If rock, underground construction work, utilities, tree roots, or other obstructions are encountered in the excavation of planting areas, alternate locations for any planting shall be determined by the landscape architect.

1. Planting Mixture:

 1. Mixture for shrubs, trees and groundcovers: Clean friendly native top soil.

* + - 1. Add soil amendments necessary to adjust soil to required pH for plant material, as recommended in soil test report.

* + - 1. Add 1/2 lb. superphosphate per cubic yard for planting mixture.

* + 1. Place and compact mixture to 6-inch depth in bottom of pit. Reserve enough mixture for backfill.

* + 1. Groundcover Beds: Till and pulverize soil to a depth of 6 inches below grade. Mix by tilling the material as described above.

3.3 INSTALLATION

1. Plants shall be set on flat-tamped or unexcavated pads at the same relationship to finished grade as they were to the ground from which they were dug, unless otherwise noted on the drawings. Plants must be set plumb and braced in position until topsoil or planting mix has been placed and tamped around the base of the root ball. Improper compacting of the soil around the root ball may result in the tree settling or leaning. Plants shall be set so that they will be at the same depth and so that the root ball does not shift or move laterally one year later.

NOTE: Proper planting depth requires the root flare to be at or slightly above the finished grade. It is important to determine how deep the root flare is in the ball before it is placed in the planting hole. Sometimes the top of the ball may need to be raised until the root flare is at the proper planting depth and/or soil must be removed from the top of the ball.

* + - 1. Determine the elevation of the root flare and ensure that it is planted at grade. This may require that the tree be set higher than the grade in the nursery.
			2. If the root flare is less than 50 mm (2 in.) below the soil level of the root ball, plant at the tree the appropriate level above the grade to set the flare even with the grade. If the flare is more than 50 mm (2 in) at the center of the root ball the tree shall be rejected.
1. Lift plants only from the bottom of the root balls or with belts or lifting harnesses of sufficient width not to damage the root balls. Do not lift trees by their trunk or use the trunk as a lever in positioning or moving the tree in the planting area.
2. Remove plastic, paper, or fiber pots from containerized plant material. Pull roots out of the root mat, and cut circling roots with a sharp knife. Loosen the potting medium and shake away from the root mat. Immediately after removing the container, install the plant such that the roots do not dry out. Pack planting mix around the exposed roots while planting.
3. The roots of bare-root trees shall be pruned at the time of planting to remove damaged or undesirable roots (those likely to become a detriment to future growth of the root system). Bare-root trees shall have the roots spread to approximate the natural position of the roots and shall be centered in the planting pit. The planting-soil backfill shall be worked firmly into and around the roots, with care taken to fill in completely with no air pockets.
4. Cut ropes or strings from the top of shrub root balls and trees smaller than 3 in. caliper after plant has been set. Remove burlap or cloth wrapping and any wire baskets from around top half of balls. Do not turn under and bury portions of burlap at top of ball.
	* + 1. Do not immediately remove the ropes and burlap from trees larger than 3 in. caliper. Return to each tree three months after planting (six months for fall-planted material), and cut all ropes around the trunks and tops of the root balls of these trees.
			2. Completely remove any waterproof or water-repellant strings or wrappings from the root ball and trunk before backfilling.
5. Set balled and burlapped trees in the hole with the north marker facing north unless otherwise approved by the landscape architect.
6. Place native soil, topsoil, or planting mix into the area around the tree, tamping lightly to reduce settlement.
	* + 1. For plants planted in individual holes in existing soil, add any required soil amendments to the soils, as the material is being backfilled around the plant. Ensure that the amendments are thoroughly mixed into the backfill.
			2. For plants planted in large beds of prepared soil, add soil amendments during the soil installation process.
			3. Ensure that the backfill immediately around the base of the root ball is tamped with foot pressure sufficient to prevent the root ball from shifting or leaning.
7. Thoroughly water all plants immediately after planting. Apply water by hose directly to the root ball and the adjacent soil.
8. Remove all tags, labels, strings, etc. from all plants.
9. Remove any excess soil, debris, and planting material from the job site at the end of each workday.
10. Form watering saucers 100 mm (4 in.) high immediately outside the area of the root ball of each tree as indicated on the drawings.

M. Pruning

* + - * 1. Plants shall not be heavily pruned at the time of planting. 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. In no case should more than one-quarter of the branching structure be removed. Retain the normal or natural shape of the plant.
				2. All pruning shall be completed using clean, sharp tools. All cuts shall be clean and smooth, with the bark intact with no rough edges or tears. All pruning cuts shall be made just outside of the collar at the base of the branch.
				3. Except in circumstances dictated by the needs of specific pruning practices, tree paint shall not be used. The use of tree paint shall be only upon approval of the landscape architect. Tree paint, when required, shall be paint specifically formulated and manufacturing for horticultural use.
				4. Pruning of large trees shall be done from a hydraulic man-lift such that it is not necessary to climb the tree.

N. Tree Guying, and Staking

* + - * 1. Staking and guying shall not be required unless conditions exist (such as high wind exposure, loose soil conditions, small/rounded root balls, etc.) that warrant stabilizing the plant materials. This decision shall be made by the contractor and approved by the owner’s representative. Staking may weaken the initial tree development. If required or recommended, staking shall be completed immediately after planting. Trees up to two inches (5 cm) caliper are to be staked with two wood stakes and separate flexible ArborTies. For larger trees use three strands of guying material and ground anchors. Ground anchors are to be driven at approximately a 45° angle to ground plane in line with guying material and distributed at 120° intervals around the trunk. Anchors shall be driven to 2 – 3” above finish grade. Tie guying material to anchor and cap anchor with safety cap.

* + - * 1. Stakes and guys shall be installed immediately upon approval or planting, and shall be removed at the end of the first growing season. Any trees that is not stable at the end of this time shall be rejected.

* + - * 1. Leave enough slack in the guy cords to allow the tree to sway. The cords shall be tied loosely above a branch or crotch.

O. Fertilizing

* + - * 1. Time of Application: Apply at time of planting or promptly thereafter. Do not apply during period of August 16th through March 15th.

* + - * 1. Methods of Application: Uniformly spread on soil surface prior to mulching at specified rate.

* + - * 1. Rates of Application: Apply fertilizer at rate and ratio according to recommendations from soil tests. Fertilizer rates listed below are general rates, which may be altered due to specific soil requirements:

Trees: 16-4-8 at 2 pounds per inch of caliper.

Shrubs: 5-10-10 at 20 pounds per 100 square feet.

Groundcovers: 5-10-10 at 2 pounds per 100 square feet.

Vines: 5-10-10 at 2 pounds per 100 square feet.

Herbaceous Plants: 5-10-10 at 2 pounds per 100 square feet.

P. Mulch

* + - * 1. Areas to receive mulch: all plant beds and other areas as designated on Drawings shall be mulched.

* + - * 1. Placement: Place mulch to required uniform depth soon after planting to prevent drying of planting soil around roots. When other operations such as fertilizing do not necessitate delay, mulch promptly after planting; do not delay more than 3 days after plants have been set.

a. Apply Hardwood Mulch at a uniform depth of 3 inches, except in groundcover beds where it shall be a uniform depth of 2 inches. Work mulch neatly down among plants to give good appearance.

3.4 MAINTENANCE

* + - 1. Maintenance shall begin immediately after each plant is planted and continue until its acceptance has been confirmed by the landscape architect.
			2. Maintenance shall consist of pruning, watering, cultivating, weeding, mulching, tightening and repairing guys and stakes, resetting plants to proper grades or upright position, restoring of the planting saucer, and furnishing and applying such sprays or other materials as necessary to keep plantings free of insects and diseases and in vigorous condition.
			3. Planting areas and plants shall be protected at all times against trespassing and damage of all kinds for the duration of the maintenance period. If a plant becomes damaged or injured, it shall be treated or replaced as directed by the landscape architect at no additional cost.
			4. Watering: Contractor shall irrigate as required to maintain vigorous and healthy tree growth. Overwatering or flooding shall not be allowed. The contractor shall monitor, adjust, and use existing irrigation facilities, if available, and furnish any additional material, equipment, or water to ensure adequate irrigation. Root balls of all trees and large shrubs shall be spot watered using handheld hoses during the first four months after planting, as required to ensure adequate water within the root ball.
			5. During periods of restricted water usage, all governmental regulations (permanent and temporary) shall be followed. The contractor may have to transport water from ponds or other sources, at no additional expense to the owner when irrigation systems are unavailable..

3.5 ACCEPTANCE

* + - 1. Standard for Acceptance of Plantings: Each plant shall be as specified, properly installed and maintained in good healthy condition. All water saucers and beds shall be neatly formed and mulched. Beds shall be free of weeds and erosion damage.

* + - 1. Work may be accepted in parts when the landscape architect and contractor deem that practice to be in their mutual interest. Approval must be given in writing by the landscape architect to the contractor verifying that the work is to be completed in parts. Acceptance of work in parts shall not waive any other provision of this contract.

* + - 1. Upon acceptance, the Owner will assume plant maintenance.

3.6 CLEANING

A. Remove from site all excess materials, soil, debris, and equipment. Repair damage resulting from planting operations.

 3.7 GUARANTEE PERIOD AND REPLACEMENT

* + - 1. The guarantee period for trees and shrubs shall begin at the date of acceptance.
			2. The contractor shall guarantee all plant material to be in healthy and flourishing condition for a period of one year from the date of acceptance.
			3. When work is accepted in parts, the guarantee periods extend from each of the partial acceptances to the terminal date of the guarantee of the last acceptance. Thus, all guarantee periods terminate at one time.
			4. The contractor shall replace, without cost, as soon as weather conditions permit, and within a specified planting period, all plants determined by the landscape architect to be dead or in an unacceptable condition during and at the end of the guarantee period. To be considered acceptable, plants shall be free of dead or dying branches and branch tips and shall bear foliage of normal density, size, and color. Replacements shall closely match adjacent specimens of the same species. Replacements shall be subject to all requirements stated in this specification.
			5. The guarantee of all replacement plants shall extend for an additional period of one year from the date of their acceptance after replacement. In the event that a replacement plant is not acceptable during or at the end of said extended guarantee period, the landscape architect may elect subsequent replacement or credit for that item.
			6. At the end of the guarantee, the contractor shall reset grades that have settled below the proposed grades on the drawings.
			7. The contractor shall make periodic inspections, at no extra cost, during the guarantee period to determine what changes, if any, should be made in the maintenance program. If changes are recommended, they shall be submitted in writing to the landscape architect. **Claims by the contractor that the owner’s maintenance practices or lack of maintenance resulted in dead or dying plants will not be considered if such claims have not been documented by the contractor during the guarantee period**.

 3.8 FINAL ACCEPTANCE

A. At the end of the guarantee period and upon written request of the contractor, the landscape architect will inspect all guaranteed work for final acceptance. The request shall be received at least ten calendar days before the anticipated date for final inspection. Upon completion and re-inspection of all repairs or renewals necessary in the judgment of the landscape architect at that time, the landscape architect shall certify, in writing, that the project has received final acceptance.

END OF SECTION 32 93 00

THIS PAGE INTENTIONALLY BLANK

**SECTION 13 12 13**

EXTERIOR FOUNTAIN

### PART 1 – GENERAL

1.1 SUMMARY

A. The general, supplementary, and special conditions as well as the general requirements form a part of this section as if written herein. The intention of these specifications is to ensure that a single fountain equipment manufacturer provides a system with single source responsibility for the components in the fountain system.

1.2 SCOPE OF WORK

1. All labor, materials, equipment and services necessary for the completion of the designed fountain system to meet the design criteria specified in the operation statement for each fountain shall be supplied by the fountain contractor.

1. The fountain contractor shall integrate all work associated with the fountain system with the other sections of the specifications which may apply to the proper installation of the fountain.

1. The work shall include but not be limited to the proper installation and connection of:
	* 1. GEFCO and GEFCO SELECT specified Spray Equipment.
		2. GEFCO and GEFCO SELECT specified Electrical Support Equipment.
		3. GEFCO and GEFCO SELECT specified Fountain Mechanical System.
		4. GEFCO and GEFCO SELECT specified Control Panel Equipment.

1.3 APPLICABLE CODES AND STANDARDS

1. The materials shall be installed in accordance with:
	* 1. ANSI and ASTM.
		2. Underwriter's Laboratory.
		3. National Electric Code.
		4. National Fire Protection Agency.
		5. Occupational Safety and Health Act.
		6. Other state or local codes which are applicable.

1. The above-mentioned guidelines shall be considered minimum standards for the materials or the installation practices applicable for the fountain system.

1. The fountain contractor shall obtain the equipment specified in fountain system from a single, qualified fountain equipment manufacturer. The manufacturer must have at least twenty (20) years’ experience in the design and manufacturing processes of pumping system packages and necessary fountain basin equipment.

1. Pumping systems and support fountain equipment shown on the drawings meet the specified qualifications for a fountain system mechanically and electrically as well as aesthetically. .

1.4 FOUNTAIN EQUIPMENT MANUFACTURER'S RESPONSIBILITY

1. The fountain equipment manufacturer shall provide proper engineering design which relates directly to the fountain system. This design shall include the mechanical (hydraulic) and electrical design, which shall include sizing, selecting, and assembling of the fountain systems; spray effects; the fountain pool equipment.

1. If so desired, the fountain equipment manufacturer shall provide a factory representative for the initial start-up and adjustment of the fountain system along with the orientation of proper operation and maintenance techniques to the maintenance staff.

1.5 DRAWINGS AND SUBMITTALS

1. The fountain contractor shall obtain from the fountain manufacturer drawings showing the sizes, locations, and installation details of the interconnecting piping, fountain jets, pool equipment, submersible lights and junction boxes.

1. Three complete sets of drawings and operation and maintenance manuals shall be supplied by the fountain contractor on the equipment installed by the contractor. The drawings and manuals shall be provided to the fountain contractor by the manufacturer.

1.6 SUBSTITUTIONS

1. Proposed equipment substitutions shall meet or exceed the standards established for the original designed and specified equipment.

1. The intention of these specifications is to ensure that a single fountain equipment manufacturer provides a system with single source responsibility for the components in the fountain system.

1. Any proposal for substitutions of materials and/or equipment must be made in writing to the Architect by the last day for RFI requests along with narratives detailing why any proposed substitution proves substantially viable and provides economic impact to the owner.

1. All material suppliers or fountain contractors offering bids on substitute systems must also submit a bid

on the “as specified” system.

1. Material suppliers or contractors desiring to substitute the specified items shall submit (3) three copies of the following data for review and approval.
	* 1. A complete fountain system isometric schematic to include a complete bill of materials.
		2. A written description of the fountain’s operation.
		3. Specification and original manufacturer’s cut sheets of all components.
		4. A written performance guarantee certifying that the alternate system will produce the specified water effects.
		5. Pertinent data on substitute systems, including engineering performance calculations on the pumping system, jets, pool equipment, and electrical system, diagrams and schematics shall be provided to the fountain consultant.

1. Submitting party shall be responsible for all consulting and engineering cost associated with reviewing and approval of the substitute component.

1. Submitting party shall be held responsible for any project delay resulting from the submission of substitute components.

1.7 DELIVERY AND HANDLING OF THE FOUNTAIN SYSTEM

1. The products shall be delivered in the manufacturer's original packaging.

1. The fountain contractor shall inspect the fountain system and all other equipment in the shipment upon arrival to ascertain any damage incurred of repair or replacement of equipment if necessary.

1.8 GUARANTEE

1. The fountain contractor shall guarantee that any equipment found defective within one year of the final acceptance shall be replaced at no cost to owner.

1. The guarantee does not extend to damage incurred through operation and maintenance by the owner. The owner shall assume full responsibility for the proper operation and maintenance of the fountain upon final acceptance.

1. The fountain contractor shall be responsible for the purchase of service contracts to extend through the guarantee period if the manufacturer's guarantee should expire within the designated guarantee period.

### PART 2 - PRODUCT

2.1 SCOPE

1. The fountain contractor is to provide all necessary labor, materials, equipment, and services for the proper installation of the fountain mechanical and electrical systems.

1. All equipment and products in the fountain system shall be new and meet the standards provided in but not limited to these specifications.

1. Pumping systems and equipment manufactured by Georgia Fountain Company, Inc., 2513 Royal Place; Tucker, GA 30084; Telephone: (770) 934-3297 Fax: (770) 934-8770[; www.georgiafountain.com](http://www.georgiafountain.com/) ; meet the specified qualifications for a fountain system mechanically as well as aesthetically.

2.2 GEFCO AND GEFCO SELECT FOUNTAIN SPRAY COMPONENTS

1. GEFCO Select #SE105-812-1 Stream Jet: cast bronze base and machined brass nozzle; 15 degree adjustable from vertical; 0.472" orifice size; 3/4" male N.P.T. connection; with custom tripod stand assembly.

1. GEFCO Custom Pop/Stream Jet Sleeve Can: made of all PVC construction; with slotted stainless steel cover; with 3/4" NPT bottom incoming water line and (1) 2" NPT bottom side drain line; overall size dimension is 8" diameter and 8" long.

1. GEFCO #PE105-2 Niche Air Vent: cast brass body; Brass slotted grate with 5 sq. in. open area; 3" x 6" rectangular face; bonding screw; 2" female N.P.T. connection.

2.3 GEFCO AND GEFCO SELECT FOUNTAIN ELECTRICAL COMPONENTS

1. GEFCO Select Emergency Stop Button:

1. GEFCO Custom Touch and Go Pole: made of 4" type 304 stainless steel, schedule 10 pipe with base will consist of 3/4" type 304 stainless steel plate with 1/2 - 13 tamper resistant 18/8 stainless steel; with 1/8"

flat neoprene gasket; with Push Button Activator Switch mounted to top; 12 volt, DC or 24 volt, DC; supplied with 50 feet of #18/3 STOW cable; finished color is a powder coated finish.

1. GEFCO Custom Touch and Go Pole Anchor Base: made of 4" type 304 stainless steel with 3/4" NPT side connection; two sets of anchor bolts 1/2" x 12" x 4" 18/8 stainless steel W/2N2W

2.4 GEFCO AND GEFCO SELECTMECHANICAL AND SUPPORT EQUIPMENT

A. Design Requirements: The equipment and the material specified in this section shall be installed by the fountain contractor in accordance with the fountain manufacturer's recommendation to form a complete renovated operating interactive fountain pumping system and to produce the desired effects in the design statement written and shown on the drawings.

The fountain will consist of an overall dry 40’-0” diameter play area constructed out of the colored concrete with a “Compass Rose” motif. The water feature shall include a series of (17) Stream/Pop Jets throughout the plaza area.

The interactive plaza shall consist of a total of (17) GEFCO Select #SE105-821-1 Pop/Stream Jets operating at a maximum spray height of 6’-0” and located in circular patterns. Located in the center of the 40’-0” diameter splash area will be one (1) GEFCO Select Stream/Pop Jet. Located at a 5’-0” radius form the center jet shall be eight (8) Stream/Pop Jets equally spaced on that 10’-0” diameter circumference. Located at a 10’-0” radius form the center jet shall be eight (8) Stream/Pop Jets equally spaced on that 20’-0” diameter circumference. That would leave a 10’-0” area from the jets toward the edge of the splash pad.

The Pop/Stream Jets will create a clear stream effect of water either in a small diameter ball or at any given length. Each of the (17) Pop/Stream Jets can operate independently (on or off) or in any combination along with the other jets. Children shall be able to play around the plaza area guessing which nozzle shall be activated next in the program. The water from the Pop/Stream Jets shall fall toward the ground and immediately flow back toward the jet cans that will take the spent water toward the storm sewer drain line

No illumination is designed for up lighting of the nozzles for this project

Each jet can combination will have a slotted open stainless-steel cover so as to allow for drainage as well as a way for the spray jet to emit from below. These slotted covers will be installed flush on to the jet cans that installed into the concrete surface on the plaza area.

The total gallons of water required to operate everything at the same time is 187 GPM.

The display system requires a manifold that will have (17) individual valves to control each of the (17) Pop/Stream Jets. The valve manifold, solenoid valves shall be installed inside a valve box that has drainage supplied by other. The control panel and programmer will be installed in a NEMA Outdoor Weatherproof UL Enclosure.

An incoming water supply of 1" at 50 psi maximum is to be brought to the Solenoid Manifold.. The incoming power requirement for the control panel is 115/230 volt, 1 phase, 30 amps. The fiberglass vault shall be equipped with a sump pit floor drain and a 1/4 HP ventilation system in order to turn over the volume of air with in the room once every 2-3 minutes.

The electrical control panel supplied shall be no less than a UL Listed assembly with industrial application rating, NEMA 3R enclosure construction, containing all required disconnects, starters, relays, timing devices, control switches and all indicating pilot lights for local and/or remote automatic operation, pre-wired to field terminals. The UL Listed assembly shall contain all additionally required protection per 2021 NEC section 680.

B. Fountain Mechanical Equipment

1. Also included in the system, there shall be a manifold system. Above 3" in diameter, the manifold shall be constructed out of Schedule 80 PVC. Connections, threaded and flanged, shall be welded or glued into the manifold to provide the appropriate discharge arrangements. The manifold shall be pressure tested, and all leaks shall be repaired as necessary. Pipe and fitting materials shall conform to the following criteria:

* + 1. All suction lines and discharge piping 4" and under shall be type "L" copper or Schedule 40 PVC.
		2. Discharge piping 6" and above shall be Schedule 80 PVC.
		3. All suction and discharge fittings 4" and under shall be wrought copper, cast brass or Schedule 40 PVC.
		4. Discharge fittings 6" and above shall be Schedule 80 PVC.
		5. Flexible electrical conduit shall be liquid tight copper with a PVC coating.
		6. Rigid electrical conduit shall be schedule 40 PVC.
		7. Reducers on the suction side of the pump shall be eccentric. Above 4", they shall be of cast iron 125# flanged construction.
		8. Reducers on the discharge side of the pump shall be concentric. Above 4", they shall be of cast iron 125# flanged construction.
			1. PVC slip connections shall be made using the manufacturer's recommendations and using the industry's standards.
			2. Flanged connections shall be made using stainless steel bolts or studs.

2. Valve Selection:

* + 1. Throttling operation: 2" and under shall be ball valves, 150# cast bronze body, neoprene seats and seals, infinite position vinyl covered handle.
		2. Throttling operation: 3" and over shall be butterfly valves; 150# cast bronze construction; infinite position.
		3. On-off operation: 3" and under shall be gate valves, 150# cast bronze construction.
		4. On-Off operation: 4" and over shall be butterfly valves; 150# cast bronze construction; 10 position.
		5. Check Valves: Spring or swing check valves shall be made of cast bronze construction; bronze discs, neoprene seats.
		6. Solenoid Valves: 2" and under shall be 150# cast iron constructed body; pilot controls and molded epoxy coils rated at 115 V., 60 cycles.
	1. Discharge Manifold, PVC, Sch. 80 construction; 2" log with (17) 1" lines; (17) 1" Ball Valve, true union, PVC, S x S, (17) 1" In-Line Strainer, PVC, S x S; (17) 1" Solenoid Valve, bronze, 120 volt, T x T.
	2. GEFCO #PM800-0 Water Control Manifold: Automati1c Fill/Level Control Manifold; miscellaneous copper tube and fittings; 1" pressure reducing valve, bronze; T x T; (1) 1" ball valves, bronze; 1" backflow preventer, bronze; 1/2" water hammer arrestor; 3/4" hose bibb, bronze.

2.5 GEFCO AND GEFCO SELECT FOUNTAIN CONTROL PANEL

1. The control panel shall consist of an enclosure, control devices, circuit breakers, switches, relays, terminal strips, and inter-connecting wiring as necessary.

1. The ENTIRE control panel assembly shall be U.L. Listed (per U.L. 508) and shall be equipped with a flush mounted door.

1. The enclosure shall be NEMA 4 rated steel construction. Sized for the application and shall include gasket hinge mounted door.

1. Main Disconnect Switch shall be provided and installed integral to the enclosure. The disconnect switch shall be door mounted interlocking red handle; padlock capable device. The disconnect switch shall be UL Listed, (I.E.C. IP55).

1. Hands Off Automatic (HOA) selector switch shall be provided and installed integral to the enclosure. The HOA switch shall be horsepower rated non-teasing heavy duty cam switches with the required number of contacts. These HOA switches shall be UL Listed, (I.E.C. IP55).

1. Pilot lights shall be full voltage, UL Listed, (I.E.C IP55).

1. All control relays shall be horsepower rated and have contacts that are rated at 20 amps continuous operation and shall have a minimum of two normally open and two normally closed contacts.

1. Control voltage to external pilot devices and solenoid valves shall be 120VAC isolated.

1. All control components shall be pre-wired to a master terminal located at the top or bottom of the control panel.

1. Daily start/stop timing functions shall be provided by programmable (manual or digital) timing devices.

1. GEFCO 24 HR Time Clock Operation: 1 min. interval actuators; 7 day skip-a-day feature; 120V power supply; 2 ea. SPDT contact set; 2 channel digital operation.

1. The following controls and pilot lights shall be mounted on front of the control panel enclosure and shall indicate and perform specified operations.

1. 1 ea. 24VDC 10 amp regulated power supply system

1. Control Panel internal wiring color code shall be:
	1. Load wiring: black (neutral – white)
	2. AC control wiring: red (neutral – white)
	3. DC control wiring: blue
	4. Wire type: Machine assembly per NEC.
	5. Solenoid field terminals: Fusible disconnect type.

1. GEFCO Select #EE140-2010 PLC Fountain Programmer (17) On/Off Pop/Stream Jets.(1) PLC Programmable Controller with (8) 24VDC inputs on master unit with (6) 24VDC outputs on master unit; master unit complete with built-in EE-prom communication shall be RS232 standard; software shall be provided and pre-programmed as a complete running system.

### PART 3 - EXECUTION

3.1 INSTALLATION OF THE FOUNTAIN SYSTEM

1. The fountain component system shall be installed in compliance to the fountain system's manufacturer's recommendations and codes that may apply.

1. Job site visits by a representative of the fountain manufacturer shall be available during certain construction phases of the project.

* 1. Pre-construction meeting is arranged for the coordination of the trades involved in the fountain installation. This allows for a detailed explanation of the suggested installation techniques and the sequence of the installation.
	2. Final start-up and adjustment meeting is provided for the proper adjustments to be made to the fountain system to meet the performance levels established. It is also the time to orientate the maintenance staff of the correct procedures in operating the equipment in the fountain system. Before the arrival of the manufacturer's representative, all the following work needs to be complete: a. Electrical connections need to be made and tested.
		1. Spray effect devices such as jets, weirs, bars, rings, etc., should be installed. Hydraulic piping and fittings need to be complete and tested for leaks, repaired if necessary, and flushed clean.
		2. The fountain pool(s) needs to be cleaned and filled to the correct water depth.

### END OF SECTION 13 12 13

**SECTION 13 34 00**

**FABRICATED PRE-ENGINEERED PRECAST CONCRETE STRUCTURES**

**SKYLINE 1222 MULTI-USER FLUSH TOILET W/ CHASE**

 **GABLED ROOF RESTROOM**

**SECTION 1 – GENERAL**

#### 1.1 WORK INCLUDED

Contractor shall furnish a precast concrete transportableRestroom to be delivered and placed on owner-prepared crushed stone foundation in accordance with manufacturer’s recommendations. Precast building to be EASI-SET**®** brand Restroom Model Skyline 1222 Flush Toilet with Gabled Roof as manufactured by a *licensed producer of Easi-Set Buildings*. Building shall be provided by manufacturer with all necessary openings as specified by contractor in conformance with manufacturer’s structural requirements.

#### 1.2 REFERENCES

1. ACI-318-11: Building Code Requirements for Structural Concrete and Commentary

1. ASCE/SEI 7-10: Minimum Design Loads for Buildings and Other Structures

1. IBC 2012: International Building Code

1. PCI Design Handbook, 7th Edition

1. Concrete Reinforcing Institute, Manual of Standard Practice

1. UL-752 (Test Method level 5) for bullet resistance certified by a military approved laboratory.

1. 2010 ADA Standards for Accessible Design

1. International Plumbing Code (IPC) and National Electrical Code (NEC)

#### 1.3 SYSTEM DESCRIPTION

DESIGN REQUIREMENTS

**A.** Building Dimensions:

Exterior: 12’ x 22’ x 9’-11 ½”

Interior: 11’-6” x 21’-6” x 7’-6 ½”

***Design case to be selected to correspond to the design criteria indicated in the aforementioned codes for the geographical location of the project or as specified.***

#### CASE 1: Typical

**B.** Design Loads:

1. Seismic Design Category ‘C’, Risk Design Category II

1. Roof Live Load (Snow) – 30 PSF

1. Floor Live Load – 100 PSF

1. Wind Loading\* – 115 MPH

\*Design loads relate to precast components only, not accessories (i.e. doors, windows, vents, etc.)

#### CASE 2: Heavy

1. Design Loads:

* 1. Seismic Design Category ‘D’, Risk Design Category III

* 1. Roof Live Load (Snow) – 150 PSF

* 1. Floor Live Load – 150 PSF

* 1. Wind Loading\* – 165 MPH

\*Design loads relate to precast components only, not accessories (i.e. doors, windows, vents, etc.)

1. Roof: Gabled Style Roof. Roof panel shall slope approximately 24” from left to right in the 12’ direction. The roof shall extend a minimum of 6” beyond the wall panel all around. An optional turndown feature is available where the design extends ½” below the top edge of the wall panels to further prevent water migration into the building along top of wall panels. Roof standard finish is broom finish or simulated standing seam metal. Other finishes are available.

1. Roof, floor, and wall panels must each be produced as single component monolithic panels. No roof, floor, or vertical wall joints will be allowed, except at corners, peak of the roof and along perimeter. Wall panels shall be set on top of floor panel.

1. Floor panel must have ½” step-down around the entire perimeter to prevent water migration into the building along the bottom of wall panels. Wall-to-Floor interior surface joints along the perimeter of each restroom and partitions (if precast) must contain the locked-in, easy clean-out radius coving. The 3/8” (recessed) x 2” cove must be continuous around the interior of the restroom and along the sides of any precast partitions. Apply 5,000 PSI (minimum) non-shrink, non-metallic grout to the cove, finishing the grout to form a flush 1” minimum radius.

#### 1.4 SUBMITTALS

1. Engineering calculations that are designed and sealed by a professional engineer, licensed to practice in the state where the project is located, shall be submitted for approval.

1. Manufacturers’ product literature shall be provided for any plumbing, electrical, and miscellaneous installed fixtures demonstrating compliance with these specifications.

#### 1.5 QUALITY ASSURANCE

1. The precast concrete building producer shall be a plant-certified member of either the National Precast Concrete Association (NPCA), The Precast/Prestressed Concrete Institute (PCI), or equal.

1. The precast concrete building producer shall demonstrate product knowledge and must have a minimum of 5 years experience manufacturing and setting precast concrete.

1. The manufacturer must be a licensed producer of Easi-Set Buildings

1. No alternate building designs to the pre-engineered EASI-SET**®** building will be allowed unless pre-approved by the owner 10 days prior to the bid date.

**SECTION 2 – PRODUCTS**

#### 2.1 MATERIALS

1. Concrete: Steel-reinforced, 5000 PSI minimum 28-day compressive strength, airentrained (ASTM C260).

1. Reinforcing Steel: ASTM A615, grade 60 unless otherwise specified.

Welded Wire Fabric: ASTM 185, Grade 65

1. Post-tensioning Strand: 41K Polystrand CP50, ½” 270 KSI Seven-Wire strand, enclosed within a greased plastic sheath (ASTM A416). Roof and floor each shall be posttensioned by a proprietary, second generation design using a single, continuous tendon. Said tendon is placed in the concrete slab to form a perimeter loop starting from one corner of the slab to a point where the cable entered the slab. The tendon then turns 90 degrees and follows the cable member(s) in the periphery to a point midway along the “X” axis of the concrete building panel and then turns 90 degrees along the “Y” axis of the concrete building panel. This bisects the concrete building panel and crosses the opposite parallel portion of the cable member and exits from an adjacent side of the concrete building panel. This creates a cable pattern with no less than 2.5 parallel cables in any direction. To ensure a watertight design, no alternate methods shall be substituted for the post-tensioning.

1. Sealant: All joints between panels shall be caulked along the exterior and interior surface of the joints. Exterior sealant shall be DOW CORNING 790 silicone sealant or equal. Interior sealant shall be SIKAFLEX-1A elastic sealant (paintable) or equal. Exterior caulk reveals to be 3/8”x 3/4” deep so that sides of the joint are parallel for proper caulk adhesion. Back of the joint to be taped with bond breaking tape to ensure adhesion of caulk to parallel sides of joint and not the back.

1. Panel Connections: All panels shall be securely fastened together utilizing cast-in stainless steel embeds and welding. All welding shall be done in conformance with AWS, Structural Welding Code latest revision. Steel is to be of structural quality, hotrolled carbon complying with ASTM A304. No floating-in of connection plates shall be allowed.

1. **Stain and Paint:**

* 1. Interior concrete surfaces (toilet rooms)
		1. Interior floors will be a two component, water based polyamide epoxy floor coating (gray, unless otherwise specified). Approved manufacturers: Sherwin Williams (Floor-Plex 7100), Armorpoxy or equal.
		2. Interior walls and ceilings will be a pre-catalyzed water based epoxy. Approved manufacturers: Sherwin Williams or equal.
	2. Exterior concrete surfaces
		1. Exterior slab top surface (if selected) will be a two component, polyamide epoxy floor coating (gray, unless otherwise specified).

Approved manufacturers: Sherwin Williams, Armorpoxy or equal. ***ii.*** Exterior walls and roof will be a water-based acrylic, water-repellent penetrating stain. Approved manufacturers: United Coatings (Canyon

Tone Stain), Sherwin Williams (H&C Concrete stain) or equal ***iii.*** Clear Acrylic anti-graffiti sealer (if selected)

#### 2.2 ACCESSORIES AND FIXTURES

1. **Doors and Frames**: Shall comply with Steel Door Institute “Recommended

Specifications for Standard Steel Doors and Frames” (SDI-100) and as herein specified. All door and frame galvanizing shall be in accordance with ASTM A924 and A653, minimum coating thickness shall be A60.

* + 1. The buildings shall be equipped with 3’-0” x 6’-8” x 1-3/4” (restroom entry doors and chase door) thick insulated, 18 gauge, metal doors with 16-gauge frames (to meet wall thickness). Doors shall have a flush top cap. Doors and frames shall be factory bonderized and painted with one coat of rust-inhibitive primer and one finish-coat of enamel paint; color to be BOLT BROWN unless otherwise specified.
		2. Doors and frames shall meet SDI standard Level 2, 1¾” heavy duty. *Approved manufacturers: Republic, Steelcraft, Ceco, Black Mountain, Pioneer,*

*Curries, Mesker, MPI, Door components or equal*

*Approved distributor: Integrated Entry Systems*

1. **Door Hardware**:

* 1. **Cylindrical Lock**: Commercial grade, shall meet requirements of ANSI A156.2, series 4000, UL listed and ADA approved. Zinc dichromate chassis with cast solid zinc levers to resist corrosion. Furnish locks with 6-pin solid brass keyway. Exterior locks and unlocks by key, interior push button lock, released when lever is turned. Manufacturer shall provide a limited lifetime warranty on this product.

*Approved manufacturers: Design Hardware, or equal*

* 1. **Hinges**: Self-Closing (spring) Hinges. Shall comply with ANSI A156.17 Grade 1 self closing hinges (3 per door). Hinges shall be Stainless Steel Grade 304 (ANSI K81071F) US32D brushed satin finish. Manufacturer shall provide a lifetime limited warranty. *Approved manufacturers: Design Hardware, or equal*

* 1. **Door Sweep**: Nylon brush door sweep, ANSI/BHMA certified. Sweeps shall have an integral drip edge to repel water from base of door. Sweeps shall be approved for UL 10C positive pressure and suitable for use with fire doors up to three hours.

*Approved manufacturers: National Guard Products or equal*

* 1. **Drip Cap**: Aluminum drip cap with minimum projection of 2 ½” shall be furnished. *Approved Manufacturers: Design Hardware, National Guard Products, or equal*

* 1. **Door Stop**: ANSI 156.16 approved wall mounted door stop with keeper constructed of a corrosion resistant cast brass material. Finish US26D (626) brushed chrome finish.

*Approved manufacturers: Don-Jo, Rockwood, or equal*

1. **Wall Vent:** Wall vents will be extruded aluminum, minimum thickness of .125”, 6063-T5 alloy. Vents to be supplied with aluminum mesh insect screen and 204-R1 clear anodized finish. Approved manufactures: Sunvent Industries or equal.

1. **Signs:** Signs to have braille, characters, and pictograms to meet ADA requirements.

1. **Windows:** Frames shall be constructed from stainless steel. Window glazing will be ¼” translucent Lexan.

1. **Grab Bars:** Stainless steel tubing, 18 gauge, type 304 stainless steel, mounted 1-1/2 inches from wall. Approved manufacturers: Bobrick or equal.

1. **Toilet Paper Dispenser:** Dispenser will be constructed of 3/16” to 1/4” thick 304 stainless steel. Dispenser will be capable of holding three (3) standard rolls of toilet paper. Approved manufacturers: Aslin Industries, Bobrick or equal.

1. **Plumbing:** All fixtures will meet ASME A112.19.3
	* 1. Waste and vent piping: ABS or PVC plastic
		2. Water piping: Copper tubing Type L, hard drawn. A gate or ball valve will be provided at the inlet end of the water line. Size water lines to provide proper flushing action based on a nominal water pressure of 40 psi.
		3. A main shut-off valve and drain will be provided with plumbing
		4. Toilets and urinal: ADA compliant, type 304 stainless steel, wall hung, with siphon or blowout jet action. Provide back spud for concealed flush valve connection, unless otherwise specified.
		5. Flush valve: Concealed toilet flush valve with integral vacuum breaker and a nonhold-open pushbutton or handle. Constructed of bronze or brass with water saver flow of 1.6 gallons per flush.
		6. Lavatory: ADA compliant, type 304 stainless steel with backsplash.
		7. Lavatory valve will be pneumatically operated pushbutton valve. Valve to be nonhold open type with a vandal resistant pushbutton requiring less than 5 lbs.

pressure to activate.

* + 1. Hose bib to be provided in chase area.
		2. Floor drain: (Optional)-Floor drains to be provided in each room of the restroom building if selected.
		3. Hammer arrester to be installed on water line
		4. Trap primer distribution unit to be installed

1. **Electrical:** All components UL shall be listed
	* 1. A 100-amp breaker panel will be provided
		2. All electrical wiring will be encased in conduit. All wire to be copper.
		3. Light Fixtures:
			1. Chase(service area): 4-foot (48”) fluorescent fixture, switch controlled
			2. Toilet rooms: 4-foot (48”) fluorescent fixture, motion detector activated
			3. Exterior: 35-watt minimum high pressure sodium light, polycarbonate vandal resistant.
		4. Hand dryer: Surface-mounted ADA compliant, universal type motor, with adjustable sensor operation.
		5. One GFCI outlet located next to the lavatory
		6. Two restroom area exhaust fans with 270 CFM speed controllable, occupancy/motion sensor controlled.

#### 2.3 Finishes

1. **Interior of Building**: Smooth form finish on all interior panel surfaces unless exterior finish is produced using a form liner, then smooth hand-troweled finish.

1. **Exterior of Building (standard)**: Split-face block finish on all exterior wall surfaces with a simulated standing seam metal roof finish.

1. **Exterior of Building (Option #1)**: Architectural precast concrete brick finish: Finish must be imprinted in top face of panel while in form using an open grid impression tool similar to EASI-BRICK**®**. Finished brick size shall be 2 3/8” x 7 5/8” with vertical steel float or light broom finish. Joints between each brick must be 3/8” wide x 3/8” deep. Back of joint shall be concave to simulate a hand-tooled joint.

1. **Exterior of Building (Option #2):** Additional finishes for walls and roof are available and will vary by local producer

**SECTION 3 – EXECUTION**

#### 3.1 SITE PREPARATION (MANUFACTURER’S RECOMMENDATION)

Work under this section relates to placement of the building by Easi-Set licensed producer on the customer’s prepared foundation and site.

Water, electrical, and waste site connections to be located corresponding to the drawings. Connections must allow for easy installation and hookup to building.

1. EASI-SET**®** Restroom building shall bear fully on a crushed stone base that is at least two feet larger than the length and width of building.

1. Stone shall be a minimum of 4” thick and down to firm subgrade. The vertical soil capacity under stone shall be compacted to have minimum bearing of 1,500 pounds per square foot. Stone shall be 3/8” or smaller and must be screeded level within ¼” in both directions. Stone shall be placed within a perimeter form having a flat and level top edge for screeding. Forming material shall remain around stone until after the building is set.

1. The crushed stone base shall be kept within the confines of the soil or perimeter form. Do not allow the base to become unconfined so that it may wash, erode, or otherwise be undermined.

1. Provide positive drainage around the building.

#### 3.2 SITE ACCESS

Contractor must provide a level, unobstructed area large enough for a crane and a tractortrailer to park adjacent to the pad. Crane must be able to place outriggers within 5’-0” of edge of pad; truck and crane must be able to get side by side under their own power. No overhead lines may be within 75’ radius of center of pad. Firm roadbed with turns that allow 65’ lowbed tractor-trailer must be provided directly to site. No building shall be placed closer than 2’-0” to an existing structure unless specifically permitted.