Conservatory Park
Manatee County, Florida

Prepared for: Manatee County,
Property Management Department

TECHNICAL SPECIFICATIONS
REVISED: APRIL 2012

DESIGN TEAM:

IBI GROUP, INC.

1421 5th Street, Suite B
SARASOTA, FLORIDA 34236
PHONE: 941/954-1718
FAX: 941/954-0231

Notes:
1. Plant Material and Turf Grasses specification information are contained on the “Landscape Specifications” drawing in the construction document set.

2. Orienting Signage specification information is contained on the L-Series Detail and Plan Sheets in the construction set.

3. Utility specification information is contained in the Measurement and Payment specification section, the C-series and E-series drawings.

DOCUMENT 004323 - ALTERNATES FORM

1.1 BID INFORMATION

A. Bidder: _____.

B. Prime Contract: _____.

C. Project Name: Conservatory Park

D. Project Location: Manatee County, Florida

E. Owner: Manatee County Government

F. Landscape Architect: IBI Group (Florida), Inc.

G. Architect Project Number: 21110

1.2 BID FORM SUPPLEMENT

A. This form is required to be attached to the Bid Form.

1.3 DESCRIPTION

A. The undersigned Bidder proposes the amount below be added to or deducted from the Base Bid if particular alternates are accepted by Owner. Amounts listed for each alternate include costs of related coordination, modification, or adjustment.

1. Cost-Plus-Fee Contract: Alternate price given below includes adjustment to Contractor's Fee.

B. If the alternate does not affect the Contract Sum, the Bidder shall indicate "NO CHANGE."

C. If the alternate does not affect the Work of this Contract, the Bidder shall indicate "NOT APPLICABLE."

D. The Bidder shall be responsible for determining from the Contract Documents the affects of each alternate on the Contract Time and the Contract Sum.

E. Owner reserves the right to accept or reject any alternate, in any order, and to award or amend the Contract accordingly within 60 days of the Notice of Award unless otherwise indicated in the Contract Documents.

F. Acceptance or non-acceptance of any alternates by the Owner shall have no affect on the Contract Time unless the "Schedule of Alternates" Article below provides a formatted space for the adjustment of the Contract Time.

1.4 SCHEDULE OF ALTERNATES

A. Alternate No. 1: Provide all labor, materials, tools, services and incidentals to provide electrical service, lines and connections to power entry signage uplighting and entry-gates vehicular at the Conservatory Park entrance.

1. ADD____ DEDUCT____ NO CHANGE____ NOT APPLICABLE____.

2. Lump Sum: _____ Dollars ($_____).

3. ADD____ DEDUCT____ calendar days to adjust the Contract Time for this alternate.

1.5 SUBMISSION OF BID SUPPLEMENT

Respectfully submitted this ____ day of _____, 2010.

Submitted By: _____
(Name of bidding firm or corporation)

Authorized Signature: _____
(Handwritten signature)

Signed By: _____
(Type or print name)

Title: _____
(Owner/Partner/President/Vice President)

END OF DOCUMENT 004323

SECTION 008000 - MEASUREMENT, PAYMENT AND COMPLETION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Specification Sections, apply to this Section.

1.2 SUMMARY

A. The scope of this section of the Contract Documents is to further define the items included in each Bid Item in the Bid Form section of the Contract Documents. Payment will be made based on the specified items included in the description in this section for each bid item.

B. All contract prices included in the Bid Form section will be full compensation for all shop drawings, working drawings, labor, materials, tools, equipment and incidentals necessary to complete the construction as shown on the Drawings and/or as specified in the Contract Documents to be performed under this Contract. Actual quantities of each item bid on a unit price basis will be determined upon completion of the construction in the manner set up for each item in this section of the Specifications. Payment for all items listed in the Bid Form will constitute full compensation for all work shown and/or specified to be performed under this Contract.

C. The quantities shown are approximate and are given only as a basis of calculation upon which the award of the Contract is to be made. The Owner/Engineer docs not assume any responsibility for the final quantities, nor shall the Contractor claim misunderstanding because of such estimate of quantities Final payment will be made only for satisfactorily completed quantity of each item.

D. No payment will be made for work constructed outside the authorized limits of work.

E. Unless otherwise specified for the particular items involved, all measurements of distance shall be taken horizontally or vertically.

F. Where payment for items is shown to be paid for on a lump sum basis, no separate payment will be made for any item of work required to complete the lump sum items. Lump sum contracts shall be complete, tested and fully operable prior to request for final payment. Contractor may be required to provide a break-down of the lump sum totals.

G. Access to the site is provided by two entrances to the property. The final design for the Conservatory Park entrance is sized to allow for van access (per Manatee County school board for educational activities at the park).

1.3 UNIT PRICE

A. Separate payment will be made for the items of work described herein and listed on the

Bid Form. Any related work not specifically listed, but required for satisfactory completion of the work shall be considered to be included in the scope of the appropriate listed work items.

B. No separate payment will be made for the following items and the cost of such work shall be included in the applicable pay items of work. Final payments shall not be requested by the Contractor or made by the Owner until as-built (record) drawings have been submitted and approved by the Engineer.

I. Shop Drawings, Working Drawings.
2. Clearing, grubbing and grading except as hereinafter specified.
3. Trench excavation, including necessary pavement removal and rock removal, except as otherwise specified.
4. Dewatering and disposal of surplus water.
5. Structural fill, backfill, and grading.
6. Replacement of unpaved roadways, and shrubbery plots.
7. Cleanup and miscellaneous work.
8. Foundation and borrow materials, except as hereinafter specified.
9. Testing and placing system in operation.
10. Any material and equipment required to be installed and utilized for the tests.
11. Pipe, structures, pavement replacement, asphalt and shell driveways and/or appurtenances included within the limits of lump sum work, unless otherwise shown.
12. Maintaining the existing quality of service during construction.
13. Maintaining or detouring of traffic.
14. Appurtenant work as required for a complete and operable system.
15. Seeding and hydromulching.
16. As-built Record Drawings.

1.4 BID ITEM DESCRIPTIONS

A. Bid Items are described in a greater detail below.

Bid Item No. 1: SITE ELECTRIC Payment for all work under SITE ELECTRIC shall be paid for at a lump sum price. The contract price paid shall include all work and materials per plans and specifications including but not limited to electric service (attachment to existing electric service point of connection, electric lines, meter, wires, conduit, handholds spaced 400’ o.c.), electric to restrooms, electric to the lift station, blank electric and telephone conduits to run at the trail’s edge and to the small picnic pavilion, electric outlets to the deck in elevated waterproof boxes. Sum shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in this item. This sum shall be inclusive per plans and specifications for materials, installation/labor, storage, maintenance, testing and all other aspects of work associated with this item. See drawings and specifications for complete scope of work.

Bid Item No. 2: WATER SERVICE Payment for all work under WATER SERVICE shall be paid for at a lump sum price. The contract price paid shall include all work and materials per plans and specifications including but not limited to tap, meter, backflow, piping and complete water

service to drinking fountain and restrooms at the restroom/picnic pavilion, water service to the lift station, and stubbed water service lines to the small picnic pavilion and the deck. Sum shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in this item. This sum shall be inclusive per plans and specifications for materials, installation/ labor, storage, maintenance, testing and all other aspects of work associated with this item. See drawings and specifications for complete scope of work.

Bid Item No. 3: FIRE SYSTEM Payment for all work under FIRE SYSTEM shall be paid for at a lump sum price. The contract price paid shall include all work and materials per plans and specifications including but not limited to tap, hydrants, meter, backflow, piping, hose cabinet and complete fire line service line to the pavilion with yard hydrant. Sum shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in this item. This sum shall be inclusive per plans and specifications for materials, installation/ labor, storage, maintenance, testing and all other aspects of work associated with this item. See drawings and specifications for complete scope of work.

Bid Item No. 4: SITE SOLAR Payment for all work under SITE SOLAR shall be paid for at a lump sum price. The contract price paid shall include all work and materials per plans and specifications including but not limited to solar panels mounted on 20’ aluminum poles (designed to withstand current hurricane codes per Florida Building Code), converter, batteries and electric lines to connect to and power the solar system to the entry signage uplighting and entry gates-vehicular at both the Conservatory Drive and Desoto Woods Drive entrances. Sum shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in this item. This sum shall be inclusive per plans and specifications for materials, installation/ labor, storage, maintenance, testing and all other aspects of work associated with this item. See drawings and specifications for complete scope of work.

Bid Item No. 5: MOBILIZATION/DEMOBILIZATION Payment for all work under MOBILIZATION/ DEMOBILIZATION shall be paid for at a lump sum price The contract price paid for MOBILIZATION/DEMOBILIZATION shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work in this category. MOBILIZATION shall include but not be limited to: obtaining bonds, insurance and financing, movement of equipment, materials and personnel, supervision, field office, certificates, permits, submittals, utilities, site maintenance, cleanup, dust control and all other work incidental to the contract per drawings and specifications. The cost for MOBILIZATION/DEMOBILIZATION shall not exceed five (5) percent of the total bid.

Bid Item No. 6: TEMPORARY TREE AND PLANT PROTECTION Payment for all work under TEMPORARY TREE AND PLANT PROTECTION shall be paid for at a lump sum price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install, maintain, and remove all required tree and plant protection as may be required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 7: EROSION AND POLLUTION DISCHARGE CONTROL Payment for all work under EROSION AND POLLUTION DISCHARGE CONTROL shall be paid for at a lump sum price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install, maintain, and remove all required items. EROSION AND POLLUTION DISCHARGE CONTROL, including drainage inlet protection, erosion

control fencing, construction entrances, and any other temporary erosion control measures as may be required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 8: SEDIMENT BARRIER (COIR ROLLS) Payment for all work under SEDIMENT BARRIER (COIR ROLLS) shall be paid for at a linear foot price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install, maintain, and remove all required items, including fiber rolls as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 9: SITE CLEARING Payment for all work under SITE CLEARING shall be paid for at a per acre price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to remove all required items, vegetation to be removed, clear and grub, removal of below-grade foundations, protection of site work and adjacent structures, disconnect, cap and removal of utilities, as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 10: EARTHMOVING Payment for all work under EARTHMOVING shall be paid for at a lump sum price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install, maintain, and remove all required items, including preparing subgrades for slabs, walks, pavements, turf, grasses and plants, excavating and backfilling, drainage course for concrete slabs on grade, subbase course for concrete walks and pavements, subsurface drainage backfill for trenches, excavating and backfilling trenches for utilities and pits for buried utility structures and items required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 11: ASPHALT PAVING-TRAILS Payment for all work under ASPHALT PAVING-TRAILS shall be paid for at a square foot price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install all required items, including but not limited to asphalt paving, preparation of base and subbase, geotextiles and accessories as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 12: ORNAMENTAL FENCING (AT TWO ENTRIES) Payment for all work under ORNAMENTAL FENCING (AT TWO ENTRIES) shall be paid for at a linear foot price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install all required items, including but not limited to fencing, footers, anchorage devices and accessories as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 13: ORNAMENTAL PEDESTRIAN GATE (AT TWO ENTRIES) Payment for all work under ORNAMENTAL GATE (AT TWO ENTRIES) shall be paid for at a per each price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install all required items, including but not limited to gates, footers, anchorage devices and accessories as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 14: DECORATIVE COLUMNS (AT TWO ENTRIES) Payment for all work under DECORATIVE COLUMNS (AT TWO ENTRIES) shall be paid for at a per each price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install all required items, including but not limited to decorative columns, footers, anchorage devices and accessories as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 15: POROUS UNIT PAVING (AT TWO ENTRIES) Payment for all work under POROUS UNIT PAVING (AT TWO ENTRIES) shall be paid for at a square foot price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install all required items, including but not limited to pavers, preparation of base and subbase, geotextiles, anchorage devices and accessories as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 16: PERVIOUS CONCRETE (AT TWO ENTRIES) Payment for all work under PERVIOUS CONCRETE (AT TWO ENTRIES) shall be paid for at a square foot price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install all required items, including but not limited to pervious concrete, preparation of base and subbase, geotextiles, anchorage devices and accessories as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 17: ASPHALT PAVING-CONSERVATORY DRIVE ENTRY ROAD AND PARKING LOT Payment for all work under ASPHALT PAVING-CONSERVATORY DRIVE ENTRY ROAD AND PARKING LOT shall be paid for at a square foot price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install all required items, including but not limited to asphalt paving, preparation of base and subbase, geotextiles and accessories as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 18: ASPHALT PATCHING FOR ENTRY DRIVES Payment for all work under ASPHALT PATCHING FOR ENTRY DRIVE shall be paid for at a square foot price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install all required items, including but not limited to asphalt patching and accessories as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 19: WHEEL STOPS Payment for all work under WHEEL STOPS shall be paid for at a per each price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install all required items, including but not limited to concrete wheel stops, rebar and accessories as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 20: DETECTABLE WARNING SURFACE Payment for all work under DETECTABLE WARNING SURFACE shall be paid for at a per each price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and

incidentals to install all required items, including but not limited to detectable warning mat and accessories as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 21: HANDICAPPED PARKING SIGN Payment for all work under HANDICAPPED PARKING SIGN shall be paid for at a per each price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install all required items, including but not limited to signage, footer, anchorage devices and accessories as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 22: PAVEMENT MARKING PAINT (PARKING LOT AND HANDICAPPED SYMBOL) Payment for all work under PAVEMENT PARKING PAINT (PARKING LOT AND HANDICAPPED SYMBOL) shall be paid for at a linear foot price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install all required items, including but not limited to parking and handicapped striping pavement marking paint and accessories as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 23: WOODEN BOLLARDS Payment for all work under WOODEN BOLLARDS shall be paid for at a per each price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install all required items, including but not limited to wooden bollards, footer, anchorage devices and accessories as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect. Note: Bollards are to be purchased from Manatee County.

Bid Item No. 24: WOODEN FOOTBRIDGES Payment for all work under WOODEN FOOTBRIDGES shall be paid for at a per each price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install all required items, including but not limited to the deck, substructure, footings, timber piles, handrails, structural timbers, PVC wood wrapping, anchorage devices and accessories as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 25: WOODEN DECK Payment for all work under WOODEN DECK shall be paid for at a per each price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install all required items, including but not limited to the deck, substructure, footings/piles, handrails, structural timbers, PVC wood wrapping, deck safety ladder (to be selected and installed per the County), anchorage devices and accessories as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 26: CONSERVATION EASEMENT SIGN Payment for all work under CONSERVATION EASEMENT SIGN shall be paid for at a per each price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install all required items, including but not limited to signage, footer, anchorage devices and accessories as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 27: DOG WASTE STATION/SIGN Payment for all work under DOG WASTE STATION/ SIGN shall be paid for at a per each price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install all required items, including but not limited to signage, footer, anchorage devices and accessories as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 28: INFORMATIVE SIGN Payment for all work under INFORMATIVE SIGN shall be paid for at a per each price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install all required items, including but not limited to signage, footer, anchorage devices and accessories as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 29: INTERPRETIVE SIGN Payment for all work under INTERPRETIVE SIGN shall be paid for at a per each price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install all required items, including but not limited to signage, footer, anchorage devices and accessories as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 30: RULES SIGN Payment for all work under RULES SIGN shall be paid for at a per each price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install all required items, including but not limited to signage, footer, anchorage devices and accessories as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 31: IDENTITY SIGN Payment for all work under IDENTITY SIGN shall be paid for at a per each price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install all required items, including but not limited to signage, footer, anchorage devices and accessories as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 32: REGULATORY SIGN Payment for all work under REGULATORY SIGN shall be paid for at a per each price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install all required items, including but not limited to signage, footer, anchorage devices and accessories as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 33: ORIENTING SIGN Payment for all work under ORIENTING SIGN shall be paid for at a per each price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install all required items, including but not limited to signage, footer, anchorage devices and accessories as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 34: ENTRY SIGNAGE Payment for all work under CONSERVATION EASEMENT SIGN shall be paid for at a per each price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install all required items, including but not limited to signage, footer, anchorage devices and accessories as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 35: MURAL Payment for all work under MURAL shall be paid for at a per each price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install all required items, including but not limited to preparing mural surface, paint, anchorage devices and accessories as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 36: ENTRY SIGNAGE UPLIGHTING Payment for all work under ENTRY SIGNAGE UPLIGHTING shall be paid for at a per each price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install all required items, including but not limited to lighting, conduit, wiring, anchorage devices and accessories as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 37: BENCHES Payment for all work under BENCHES shall be paid for at a per each price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install all required items, including but not limited to bench, footer, anchorage devices and accessories as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 38: BIKE RACKS Payment for all work under BIKE RACKS shall be paid for at a per each price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install all required items, including but not limited to bike racks, footer, anchorage devices and accessories as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 39: TRASH/RECYCLING RECEPTACLES Payment for all work under TRASH/ RECYCLING RECEPTACLES shall be paid for at a per each price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install all required items, including but not limited to trash/recycling receptacles, footer, anchorage devices and accessories as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 40: ENTRY GATES-VEHICULAR Payment for all work under ENTRY GATES-VEHICULAR shall be paid for at a per each price. The contract lump sum price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install all required items, including but not limited to entry gates, footers, anchorage devices and accessories as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 41: CAST-IN-PLACE (CONCRETE WALK) Payment for all work under CAST-IN-PLACE (CONCRETE WALK) shall be paid for in a lump sum fashion. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install all required items, including but not limited to concrete walk, reinforcement, jointing and accessories as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 42: CAST-IN-PLACE (CONCRETE PADS) Payment for all work under CAST-IN-PLACE (CONCRETE PADS) shall be paid for at a square foot price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install all required items, including but not limited to concrete pads, reinforcement, jointing and accessories as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 43: SEGMENTAL RETAINING WALL Payment for all work under SEGMENTAL RETAINING WALL shall be paid for in a lump sum fashion. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install all required items, including but not limited to the concrete segmental retaining wall (where the walk meets the deck), reinforcement and cap as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect.

Bid Item No. 44: LOBLOLLY BAY Payment for all work under LOBLOLLY BAY shall be paid for at a per each price. The contract price paid shall include all work and materials per plans and specifications. Sum shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in this item. This sum shall be inclusive per plans and specifications for materials, installation/labor, storage, maintenance, testing and all other aspects of work associated with this item. See drawings and specifications for complete scope of work. The Contractor shall guarantee the life and condition of the plant material during installation and for a minimum of one calendar year after the certification of acceptability.

Bid Item No. 45: BUDDLEI DAVIDII (BUTTERFLY BUSH), 3 GALLON SIZE Payment for all work under BUDDLEI DAVIDII (BUTTERFLY BUSH), 3 GALLON SIZE shall be paid for at a per price. The contract price paid shall include all work and materials per plans and specifications. Sum shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in this item. This sum shall be inclusive per plans and specifications for materials, installation/labor, storage, maintenance, testing and all other aspects of work associated with this item. See drawings and specifications for complete scope of work. The Contractor shall guarantee the life and condition of the plant material during installation and for a minimum of one calendar year after the certification of acceptability.

Bid Item No. 46: ECHINOPS RITRO (SMALL GLOBE THISTLE), 3 GALLON SIZE Payment for all work under ECHINOPS RITRO (SMALL GLOBE THISTLE), 3 GALLON SIZE shall be paid for at a per each price. The contract price paid shall include all work and materials per plans and specifications. Sum shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in this item. This sum shall be inclusive per plans and specifications for materials, installation/labor, storage,

maintenance, testing and all other aspects of work associated with this item. See drawings and specifications for complete scope of work. The Contractor shall guarantee the life and condition of the plant material during installation and for a minimum of one calendar year after the certification of acceptability.

Bid Item No. 47: HAMELIA PATENS (FIREBUSH), 3 GALLON SIZE Payment for all work under HAMELIA PATENS (FIREBUSH), 3 GALLON SIZE shall be paid for at a per each price. The contract price paid shall include all work and materials per plans and specifications. Sum shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in this item. This sum shall be inclusive per plans and specifications for materials, installation/labor, storage, maintenance, testing and all other aspects of work associated with this item. See drawings and specifications for complete scope of work. The Contractor shall guarantee the life and condition of the plant material during installation and for a minimum of one calendar year after the certification of acceptability.

Bid Item No. 48: HYPERICUM FASCICULATUM (ST. JOHN'S WART), 3 GALLON SIZE Payment for all work under HYPERICUM FASCICULATUM (ST. JOHN'S WART), 3 GALLON SIZE shall be paid for at a per each price. The contract price paid shall include all work and materials per plans and specifications. Sum shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in this item. This sum shall be inclusive per plans and specifications for materials, installation/labor, storage, maintenance, testing and all other aspects of work associated with this item. See drawings and specifications for complete scope of work. The Contractor shall guarantee the life and condition of the plant material during installation and for a minimum of one calendar year after the certification of acceptability.

Bid Item No. 49: ILEX GLABRA (INKBERRY), 3 GALLON SIZE Payment for all work under ILEX GLABRA (INKBERRY), 3 GALLON SIZE shall be paid for at a per each price. The contract price paid shall include all work and materials per plans and specifications. Sum shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in this item. This sum shall be inclusive per plans and specifications for materials, installation/labor, storage, maintenance, testing and all other aspects of work associated with this item. See drawings and specifications for complete scope of work. The Contractor shall guarantee the life and condition of the plant material during installation and for a minimum of one calendar year after the certification of acceptability.

Bid Item No. 50: ILEX VOMITORIA (SCHILLING'S DWARF HOLLY), 3 GALLON SIZE Payment for all work under ILEX VOMITORIA (SCHILLING'S DWARF HOLLY), 3 GALLON SIZE shall be paid for at a per each price. The contract price paid shall include all work and materials per plans and specifications. Sum shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in this item. This sum shall be inclusive per plans and specifications for materials, installation/labor, storage, maintenance, testing and all other aspects of work associated with this item. See drawings and specifications for complete scope of work. The Contractor shall guarantee the life and condition of the plant material during installation and for a minimum of one calendar year after the certification of acceptability.

Bid Item No. 51: LYONIA LUCIDA (FETTERBUSH), 3 GALLON SIZE Payment for all work under LYONIA LUCIDA (FETTERBUSH), 3 GALLON SIZE shall be paid for at a per

each price. The contract price paid shall include all work and materials per plans and specifications. Sum shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in this item. This sum shall be inclusive per plans and specifications for materials, installation/labor, storage, maintenance, testing and all other aspects of work associated with this item. See drawings and specifications for complete scope of work. The Contractor shall guarantee the life and condition of the plant material during installation and for a minimum of one calendar year after the certification of acceptability.

Bid Item No. 52: SPARTINA BAKERI (SAND CORDGRASS), 3 GALLON SIZE Payment for all work under SPARTINA BAKERI (SAND CORDGRASS), 3 GALLON SIZE shall be paid for at a per each price. The contract price paid shall include all work and materials per plans and specifications. Sum shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in this item. This sum shall be inclusive per plans and specifications for materials, installation/labor, storage, maintenance, testing and all other aspects of work associated with this item. See drawings and specifications for complete scope of work. The Contractor shall guarantee the life and condition of the plant material during installation and for a minimum of one calendar year after the certification of acceptability.

Bid Item No. 53: VACCINUM MYRSINITES (SHINY BLUEBERRY), 3 GALLON SIZE Payment for all work under VACCINUM MYRSINITES (SHINY BLUEBERRY), 3 GALLON SIZE shall be paid for at a per each price. The contract price paid shall include all work and materials per plans and specifications. Sum shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in this item. This sum shall be inclusive per plans and specifications for materials, installation/labor, storage, maintenance, testing and all other aspects of work associated with this item. See drawings and specifications for complete scope of work. The Contractor shall guarantee the life and condition of the plant material during installation and for a minimum of one calendar year after the certification of acceptability.

Bid Item No. 54: OSMUNDA CINNAMOMEA (CINNAMON FERN), 3 GALLON SIZE Payment for all work under OSMUNDA CINNAMOMEA (CINNAMON FERN), 3 GALLON SIZE shall be paid for at a per each price. The contract price paid shall include all work and materials per plans and specifications. Sum shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in this item. This sum shall be inclusive per plans and specifications for materials, installation/labor, storage, maintenance, testing and all other aspects of work associated with this item. See drawings and specifications for complete scope of work. The Contractor shall guarantee the life and condition of the plant material during installation and for a minimum of one calendar year after the certification of acceptability.

Bid Item No. 55: PENTAS LANCEOLATA 'GRAFFITI PINK' (PENTAS), 1 GALLON SIZE Payment for all work under PENTAS LANCEOLATA 'GRAFFITI PINK' (PENTAS), 1 GALLON SIZE shall be paid for at a per each price. The contract price paid shall include all work and materials per plans and specifications. Sum shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in this item. This sum shall be inclusive per plans and specifications for materials, installation/labor, storage, maintenance, testing and all other aspects of work associated with this item. See drawings and

specifications for complete scope of work. The Contractor shall guarantee the life and condition of the plant material during installation and for a minimum of one calendar year after the certification of acceptability.

Bid Item No. 56: PENTAS LANCEOLATA 'GRAFFITI RED' (PENTAS), 1 GALLON SIZE Payment for all work under PENTAS LANCEOLATA 'GRAFFITI RED' (PENTAS), 1 GALLON SIZE shall be paid for at a per each price. The contract price paid shall include all work and materials per plans and specifications. Sum shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in this item. This sum shall be inclusive per plans and specifications for materials, installation/labor, storage, maintenance, testing and all other aspects of work associated with this item. See drawings and specifications for complete scope of work. The Contractor shall guarantee the life and condition of the plant material during installation and for a minimum of one calendar year after the certification of acceptability.

Bid Item No. 57: PENTAS LANCEOLATA 'GRAFFITI WHITE' (PENTAS), 1 GALLON SIZE Payment for all work under PENTAS LANCEOLATA 'GRAFFITI WHITE' (PENTAS), 1 GALLON SIZE shall be paid for at a per each price. The contract price paid shall include all work and materials per plans and specifications. Sum shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in this item. This sum shall be inclusive per plans and specifications for materials, installation/labor, storage, maintenance, testing and all other aspects of work associated with this item. See drawings and specifications for complete scope of work. The Contractor shall guarantee the life and condition of the plant material during installation and for a minimum of one calendar year after the certification of acceptability.

Bid Item No. 58: LICANIA MICHAUXII (GOPHER APPLE), 1 GALLON SIZE Payment for all work under LICANIA MICHAUXII (GOPHER APPLE), 1 GALLON SIZE shall be paid for at a per each price. The contract price paid shall include all work and materials per plans and specifications. Sum shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in this item. This sum shall be inclusive per plans and specifications for materials, installation/labor, storage, maintenance, testing and all other aspects of work associated with this item. See drawings and specifications for complete scope of work. The Contractor shall guarantee the life and condition of the plant material during installation and for a minimum of one calendar year after the certification of acceptability.

Bid Item No. 59: MIMOSA STRIGILLOSA (SUNSHINE MIMOSA), 1 GALLON SIZE Payment for all work under MIMOSA STRIGILLOSA (SUNSHINE MIMOSA), 1 GALLON SIZE shall be paid for at a per each price. The contract price paid shall include all work and materials per plans and specifications. Sum shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in this item. This sum shall be inclusive per plans and specifications for materials, installation/labor, storage, maintenance, testing and all other aspects of work associated with this item. See drawings and specifications for complete scope of work. The Contractor shall guarantee the life and condition of the plant material during installation and for a minimum of one calendar year after the certification of acceptability.

Bid Item No. 60: STENOTAPHRUM 'PALMETTO', (PALMETTO ST. AUGUSTINE SOD) Payment for all work under STENOTAPHRUM 'PALMETTO', (PALMETTO ST. AUGUSTINE SOD) shall be paid for at a square foot price. The contract price paid shall include all work and materials per plans and specifications. Sum shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in this item. This sum shall be inclusive per plans and specifications for materials, installation/labor, storage, maintenance, testing and all other aspects of work associated with this item. See drawings and specifications for complete scope of work. The Contractor shall guarantee the life and condition of the plant material during installation and for a minimum of 90 days after the certification of acceptability.

Bid Item No. 61: MULCH (PINE STRAW) Payment for all work under MULCH (PINE STRAW) shall be paid for at a cubic yard price. The contract price paid shall include all work and materials per plans and specifications. Sum shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in this item. This sum shall be inclusive per plans and specifications for materials, installation/labor, storage, maintenance, testing and all other aspects of work associated with this item. See drawings and specifications for complete scope of work.

Bid Item No. 62: ONE YEAR ESTABLISHMENT PERIOD WATERING FOR LANDSCAPE PLANTS Payment for all work under ONE YEAR ESTABLISHMENT PERIOD WATERING FOR LANDSCAPE PLANTS shall be paid for at a lump sum price. The contract price paid shall include all work and materials per plans and specifications. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to water required items including, but not limited to watering truck, water and conveyance necessary to insure a healthy condition of the plant material as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect. The Contractor shall guarantee the life and condition of the plant material during installation and for a minimum of one calendar year after the certification of acceptability. The Contractor will be required to provide a watering schedule and plan for review by the County within one week of award of contract. See drawings and specifications for complete scope of work.

Bid Item No. 63: 90-DAY ESTABLISHMENT PERIOD WATERING FOR SOD Payment for all work under 90-DAY ESTABLISHMENT PERIOD WATERING FOR SOD shall be paid for at a lump sum price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to water required items including, but not limited to watering truck, water and conveyance necessary to insure a healthy condition of the plant material as required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Landscape Architect. The Contractor shall guarantee the life and condition of the plant material during installation and for a minimum of 90 calendar days after the certification of acceptability. The Contractor will be required to provide a watering schedule and plan for review by the County within one week of award of contract. See drawings and specifications for complete scope of work.

Bid Item No. 64: ALTERNATE #1-ELECTRIC WORK-CONSERVATORY DRIVE: Payment for all work under ELECTRIC WORK-CONSERVATORY DRIVE shall be paid for at a lump sum price. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to establish the electric service, run the appropriate

wiring and provide electric power to the entry signage uplighting and entry gates-vehicular at the Conservatory Drive entrance. Sum shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in this item. This sum shall be inclusive per plans and specifications for materials, installation/labor, storage, maintenance, testing and all other aspects of work associated with this item. See drawings and specifications for complete scope of work.

1.5 APPLICATIONS FOR PAYMENT

A. Applications for payment shall be made at approximately 30 day intervals in accordance with the dates established in the Standard Form of Agreement Between Owner and Contractor. At least 15 days before each progress payments falls due, the Contractor shall submit to the Architect, in quintuplet, an itemized Application for Payment, supported by such data sustaining the Contractor's right to payment as the Owner, or the Architect may require. The form of Application for Payment shall be AIA Document G702- Application and Certification for Payment, supported by AIA Document G703 - Continuation Sheet. No other forms of Application for Payment will be acceptable. Continuation Sheet G703 shall be prepared the same as in the Schedule of Values submitted by the Contractor. Contractor's payment will be made within twenty-five (25) days after the Contractor's payment application is approved by the County.

B. Contractor shall submit with each monthly Application for Payment, 1) an affidavit that payrolls, bills for materials and equipment, and other indebtness connected with the Work for which the previous Application, was submitted and the Owner or his property might in any way be responsible, have been paid or otherwise satisfied, and 2) release or waivers of liens arising out of the Contract from each Subcontractor, materialmen, supplier, and laborer of the Contractor in the form of Partial Lien Waiver provided with the Contract Documents or such other form as may be approved by the Architect and Owner, and 3) County of Manatee Claims Form available from the city/county Clerk's office.

C. Unless otherwise indicated in Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site. If previously agreed upon by the Owner, payments may similarly be made for materials and equipment stored off the site at a location previously agreed upon in writing. Contractor shall comply with all conditions of off site storage agreement as indicated by the Owner prior to proceeding with arrangements for such conditions. Payment to Contractor for materials stored off site is discouraged. Where circumstances indicate that the Owner's best interest is served by off-site storage, the Contractor shall make written request to the Architect for approval to include such material costs in his next progress payment. The Contractor's request shall include the following information:

1. A list of the fabricated materials consigned to the project (which shall be clearly identified), giving the place of storage, together with copies of invoices and reasons why materials cannot be delivered to the site.

2. Certification that items have been tagged for delivery to the project and that they will not be used for another purpose.

3. A letter from the Bonding Company indicating agreement to the arrangements and that payment to the Contractor shall not relieve either party or their responsibility to complete the facility.

4. Evidence of adequate insurance covering the material in storage, which shall name the Owner as additionally insured.

5. Costs incurred by the Architect to inspect material in off-site storage shall be paid by the Contractor.

6. Subsequent pay requests shall itemize the materials and their cost which were approved on previous pay requests and remain in off-site storage

E. The Contractor warrants the title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment and is free and clear of all liens and encumbrances. The Contractor will indemnify the Owner and the Owner's property from any liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors or their Sub-subcontractors, regardless of tier, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials, equipment, services or supplies relating to the Work, and from all cost and expenses, including attorneys' and consultants' fees incurred by the Owner in evaluating or defending against such liens, claims, security interests or encumbrances.
Partial payments to the Contractor for labor performed under either a unit or lump sum price Contract shall be made at the rate of 90 percent (90%) of the Contract Sum.

F. When the payment is made on account of materials or equipment not yet incorporated into the Project, such materials and equipment will become the property of the Owner; provided that if such materials or equipment are stolen, destroyed, or damaged before being fully incorporated into the Project, the Contractor will be required to replace them at its own expense, if not covered by builder’s risk policy.

G. A retainage of 10 % of the total contract amount shall be withheld from payments until 50% completion of the Work. After 50% completion, the retainage shall be reduced to 5% of the total contract amount until final completion and acceptance of the work by the County. Upon final acceptance, the remaining retainage shall be included in the final payment.

1.6 CERTIFICATES FOR PAYMENT

A. The Architect will, within fifteen days, after receipt of the Contractor’s Application for Payment, either issue to the owner a Certificate for Payment, with a copy to the Contractor, for such amounts as the Architect deems is properly due, or notify the Contractor and the Owner of the Architect’s reason for withholding certification in whole or in part as provided in paragraph .1, section 3 of ARTICLE 6.

B. The insurance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect’s evaluation of the Work and the data in the Application for Payment that to the best of the Architect’s knowledge, information,

and belief , the Work has progressed to the point indicated on the Application for Payment. The issuance of a Certificate for Payment will not be a representation that the Architect has (a) made exhaustive or continuous on site inspections to check the quality or quantity of the Work, (b) reviewed construction means, methods, techniques, sequences or procedures, (c) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (d) made examination to ascertain how or for what purpose the Contractor has used the money previously paid on account of the Contract Sum.

1.7 DECISIONS TO WITHHOLD CERTIFICATION

A. The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in Architect's opinion the representation to the Owner required by the above section cannot be made. If an Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as indicated above. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in specifications and because of:

1. The Contractor is in default of the performance of any of its obligations under the Contract Documents, including, but not limited to: failure to provide sufficient skilled workers; work, including equipment or materials, which is defective or otherwise does not conform to the Contract Documents; failure to conform to the Project Time Schedule; or failure to follow the directions of or instructions from the Architect or Owner.

2. The Contractor is in default of the performance of any of its obligations under another Contract, which it has with the Owner.

3. The filing of the third party claims or reasonable evidence that third party claims have been or will be filed.

4. The Work has not proceeded to the extent set forth in the Application for Payment.

5. Representations made by the Contractor are untrue.

6. The failure of the Contractor to make payments to its Subcontractors, materialmen, or laborers.

7. Damage to the Owner's property or the property of another Contractor or person.

8. The determination by the Architect that there is a substantial possibility that the

Work cannot be completed for the unpaid balance of the Contract Sum.

9. Liens filed or reasonable evidence indicating the probable filing of such liens with respect to the Project.

B. When the above reasons for withholding certifications are removed, certification will be made for the amounts previously withheld. If the Owner makes payments by joint check, the Owner shall notify the Architect in order to reflect such payments on the next Certification for Payment.

C. Contractor's application for a payment shall reflect an equal percentage amount (within 2-3 percent) for labor and materials for Work completed. The Architect may adjust applications where labor exceeds materials or where materials exceed labor quantities in the Work completed columns.

D. If the Contractor disputes a determination by the Architect with regard to Certificate of Payment, and during any related dispute resolution, litigation, or other proceeding, the Contractor nevertheless shall continue to execute the Work as described in the Contract Documents.

1.8 PROGRESS PAYMENTS

A. After issuance of Certificate for Payment, Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall notify the Architect.

B. The Contractor shall pay each Subcontractor no later than seven days after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

C. The Owner has the right to request written evidence that the Contractor has paid all Subcontractors and material and equipment suppliers amounts paid by the Owner to the Contractor. If the Contractor does not provide adequate evidence within seven days, Owner shall have the right to contact the Subcontractors and obtain the information required. Neither an Owner or Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law. Payments to material and equipment suppliers shall follow similar rules as stated above.

D. A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work.

1.9 FAILURE OF PAYMENT

A. If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within fourteen days after receipt, or if the Owner does not pay the contractor within fourteen days after the date established in the Contract the amount certified by the Architect the Contractor may upon fourteen additional days of written notice to the Owner and Architect stop the Work until payment of the owed amount is received. The Contract

time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable cost of shut down, delay, start up, plus interest as provided for in the Contract.

1.10 SUBSTANTIAL COMPLETION

A. Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents and when all required occupancy permits, if any, have been issued so that the Owner can occupy or utilize the Work for its intended use.

B. When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work. The time fixed by the Architect for the completion of all items on the list accompanying the Certificate of Substantial Completion shall not be greater than 30 days. The Contractor shall complete items on the list within such 30 day period. If the Contractor fails to do so, the Owner in its discretion may perform the Work by itself or others and the cost thereof shall be charged against the Contractor. If more than one inspection by the Architect for the purpose of evaluating corrected work is required by the subject list of items to be completed or corrected, it will be performed at the Contractor's expense.

C. Upon the receipt of the Contractor's list, the Architect will make an inspection and designate the Work qualified to be substantially complete. If any Work on the list or any additional Work required for utilization of the Work by the Owner is incomplete or not correct, the Contractor shall complete such Work before issuance of the Certificate of Substantial Completion. In such case the Contractor shall submit a request for another inspection by the Architect upon completion of the Work required for Substantial Completion.

D. At the time the Architect commences the Substantial Completion Inspection, if the Architect discovers excessive additional items requiring completion or correction, the Architect may decline to continue the inspection, instructing the Contractor as to the general classification of deficiencies which must be corrected before the Architect will resume the Substantial Completion Inspection. If the Contractor fails to pursue the Work so as to make it ready for Substantial Completion Inspection in a timely fashion, the Architect shall, after notifying the Contractor, conduct inspections and develop a list of items to be completed or corrected. This list of items shall be furnished to the Contractor who shall proceed to correct such items within 7 days. The Architect will conduct additional inspections. The Architect will involve the Owner for 1) The cost of inspections between the termination of the initial Substantial Completion Inspection and the commencement of the satisfactory Substantial Completion Inspection, 2) The cost of inspection or review after the 7 day period established for the completion of the list by the Contractor. The Contractor shall reimburse the Owner for such cost, and the Owner may offset the amounts payable to the Architect for such services from the amounts due the Contractor under the Contract Documents.

E. When the Work is designated portion thereof is substantially complete, the Architect shall prepare a Certificate of Substantial Completion that shall establish the date of Substantial completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and determine the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

F. The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon acceptance, the Owner shall make payment of retainage applying to such Work or designated portion thereof.

G. The Contractor shall fully complete all Work under its Contract within thirty (30) days of receiving a Certificate of Substantial Completion with attached list of items required to be completed or corrected. Failure to do so may serve as cause for the Owner to declare the Contractor in default and terminate the Contractor pursuant to ARTICLE 10 of these Supplementary General Conditions.

1.11 PARTIAL OCCUPANCY OR USE

A. Owner shall have an option for partial occupancy or use upon a written agreement between the Contractor and Owner to determine the responsibilities of each party. Partial occupancy does not constitute acceptance of Work not complying with the requirements of the Contract Documents.

B. Immediately prior to such partial occupancy or use, Owner, Architect, and Contractor shall inspect the area to be occupied to record the conditions of the Work.

C. Agreements as to the acceptance of the Work not complying with the requirements of the Contract Documents shall be in writing.

1.12 FINAL COMPLETION AND FINAL PAYMENT

A. Upon receipt of Contractor’s written notice that the Work is ready for final inspection and upon receipt of the final Application for Payment the Architect shall timely make such inspection determine if the Work is acceptable per Contract Documents. If the Work is acceptable, the Architect shall issue a final Certificate for Payment stating that to the Architect’s best knowledge and presented information the work has been completed in accordance to the Contract Documents.

B. Final payment and all remaining retainage shall become due only when the following items are submitted to the Architect:

1. An Affidavit that all payrolls, bills for all items connected with the Work, and any other indebtedness have been paid (less amount owed by the final Payment and retainage withheld by the Owner).

2. Evidence in writing or a certificate that the required insurance by the Contract Documents will not be canceled or that the insurance will not expire until at least thirty (30) days written notice has been given to the Owner.

3. Written notice that the Contractor knows of no potential reasons that the insurance will not be renewable to fulfill the Contract Document requirements.

4. Consent of surety to final payment.

5. Any other documents, releases and waivers of liens, claims, receipts, copies of the expenditure, or any other items required by the Owner to assure no legal problems shall follow the Completion of the Contract. If a subcontractor refuses to furnish such a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unresolved for the Owner after the payments have been made, the Contractor shall refund the Owner all money associated with resolution of such lien including all costs and reasonable attorney's fees.

C. The Contractor shall furnish such evidence as may be necessary to show that any out-of-state subcontractor or supplier has fully met the requirements of payment of taxes as established in any law of the State or local subdivision thereof which may be in effect at the time of final payment. The Owner will require the submission of such proof or evidence before final payment will be approved or made. The following must be submitted to the Architect before approval of final payment:

1. Affidavit of payment as required under this Paragraph shall be in the form of AIA Document G706 - Contractor's Affidavit of Payment of Debt and Claims.

2. Release of liens as required under this Paragraph shall be in the form of AIA Documents G706A - Contractor's Affidavit of Release of Liens, or as may otherwise be reasonably requested or required to comply with Florida law.

3. Consent of Surety as required under this Paragraph shall be in the form of AIA Document G707 - Consent of Surety Company to Final Payment.

4. Submit releases and final unconditional waivers of lien from major subcontractor and supplier.

5. Submit certification stating that no materials containing asbestos were incorporated into the Work.

6. Submit certification that all punch list items have been completed.

D. If upon Substantial Completion final completion is delayed through no fault of the Contactor or by issuance of change orders adjusting/affecting the final completion date and if the Architect confirms the conditions be eligible for payment for Work completed without termination of the Contract. Final Payment, constituting the unpaid balance of the Contract Sum, shall be paid to the Contractor in full, including retainage or escrowed

principal and escrowed income by the escrow agent, no less than 61 days following the date of Substantial Completion. If at that time there are remaining uncompleted items, an amount equal to 200 percent of the value of each item as determined by the Architect shall be withheld until said items are completed, and a Final Certificate of Payment issued by the Architect.

E. Making of the final payment shall constitute a waiver of claims by the Owner except those arising from liens, claims, security interest, failure to comply with the Contract Documents or terms of special warranties.

1.13 REQUEST FOR PAYMENT

A. Submit Applications f or Payment to the Project Manager or as directed at the preconstruction meeting, in accordance with the schedule established by Conditions of the Contract and Agreement between Owner and Contractor.

B. Submit payment requests in the form provided by the Owner with itemized data typed in accordance with the Bid Form .

C. Provide construction photographs in accordance with Contract Documents.

D. Submit Applications for Payment to the Project Manager or as directed at the preconstruction meeting, in accordance with the schedule established by Conditions of the Contract and Agreement between Owner and Contractor.

E. Submit three (3) copies of each application; all signed and certified by the Contractor.

1.14 SUBSTANTIATING DATA FOR PROGRESS PAYMENTS

A. When the Owner or the Engineer requires substantiating data, Contractor shall submit suitable information with a cover letter.

B. Submit one copy of data and cover letter for each copy of application.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

SECTION 010100 – SUMMARY OF WORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.02 SUMMARY OF WORK

A. The completed work will provide the Owner with improvements to Conservatory Park. The work of the contract consists of improvements to the park including: site electric, pole mounted solar panels and lines to provide power for the entry signage uplighting and entry gates (at both Conservatory Drive and Desoto Woods Drive entrances) water service, fire system, mobilization and demobilization, temporary tree and plant protection, erosion and pollution discharge control, sediment barrier (coir rolls), site clearing earthmoving, asphalt trails, ornamental fencing and pedestrian and vehicular gates, decorative columns, porous pavers, porous concrete, asphalt paving and patching, wheel stops, detectable warning surfaces, handicapped parking signs, pavement marking paint, wooden bollards, wooden footbridges, wood deck, signage (conservation easement, informative, interpretive, rules, identity, regulatory, orienting and entry), dog waste stations, benches, bike racks, trash/recycling receptacles, concrete walks, concrete pads, segmental retaining wall, trees, shrubs, grasses, ferns, perennials groundcovers, sod, mulch and establishment period water (landscape plants) and establishment period (sod).

As part of the potential work, there is an alternate for providing electrical work at the Conservatory Drive entry signage uplighting and entry gates-vehicular.

B. The Contractor shall furnish all shop drawings, working drawings, labor, materials, equipment, tools, services and incidentals necessary to complete all work required by these Specifications and as shown on the Contract Drawings.

C. The Contractor shall perform the work complete, in place and ready for continuous service and shall include any repairs, replacements, and/or restoration as required as a result of damages caused prior to acceptance by the Owner.

D. The Contractor shall furnish and install all material, equipment and labor which is reasonably and properly inferable and necessary for the proper completion of the work, whether specifically indicated in the Contract Documents or not.

PART 2 - MATERIALS (Not Applicable)

PART 3 – INSTALLATION (Not Applicable)

END OF SECTION 010100

SECTION 015639 - TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes general protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.

B. Related Sections:
   1. Division 31 Section "Site Clearing" for removing existing trees and shrubs.

1.3 DEFINITIONS

A. Caliper: Diameter of a trunk measured by a diameter tape at 6 inches (150 mm) above the ground for trees up to, and including, 4-inch (100-mm) size; and 12 inches (300 mm) above the ground for trees larger than 4-inch (100-mm) size.

B. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction.

C. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by a circle concentric with each tree with a radius 1.0 time the diameter of the drip line unless otherwise indicated.

D. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated (submitted to county for approval):

B. Samples for Verification: For each type of the following:

   1. Organic Mulch: 1-pint (0.5-L) volume of organic mulch; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch.
   2. Protection-Zone Fencing: Assembled Samples of manufacturer's standard size made from full-size components.

C. Tree Pruning Schedule: Written schedule detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.

1. Species and size of tree.
2. Location on site plan. Include unique identifier for each.
3. Reason for pruning.
4. Description of pruning to be performed.
5. Description of maintenance following pruning.

D. Qualification Data: For certified arborist and tree service firm.

E. Certification: From arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.

F. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.

G. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.

1. Use sufficiently detailed photographs or videotape.
2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

1.5 QUALITY ASSURANCE

A. Arborist Qualifications: A licensed arborist in jurisdiction where Project is located is a requirement.

B. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed temporary tree and plant protection work similar to that required for this Project and that will assign an experienced, qualified and licensed arborist to Project site during execution of the Work. Firm is to submit three projects of a similar scope completed within the last five years (information to include: Client name, contact information, size of project in acres, project description and images/graphics of completed projects)

C. Preinstallation Conference: Conduct conference with Manatee County, the contractor and the architect at the project site.

1. Review methods and procedures related to temporary tree and plant protection including, but not limited to, the following:

a. Construction schedule. Verify availability of materials, personnel, and equipment needed to make progress and avoid delays.
b. Enforcing requirements for protection zones.
c. Arborist's responsibilities.
d. Field quality control.

1.6 PROJECT CONDITIONS

A. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

B. Do not direct vehicle or equipment exhaust toward protection zones.

C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Topsoil: Natural or cultivated top layer of the soil profile or manufactured topsoil; containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 1 inch (25 mm) in diameter; and free of weeds, roots, and toxic and other nonsoil materials. See landscape specifications on drawings for further topsoil specification information.

1. Obtain topsoil only from well-drained sites where topsoil is 4 inches (100 mm) deep or more; do not obtain from bogs or marshes.

B. Topsoil: Stockpiled topsoil from excavated stormwater ponds on site. If additional topsoil is required it is to comply with ASTM D 5268.

C. Organic Mulch: Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of one of the following:

1. Type: Shredded Melaluca is preferable. Shredded eucalyptus is an acceptable alternative if submitted to Owner for approval prior to ordering.
2. Size Range: 3 inches (76 mm) maximum, 1/2 inch (13 mm) minimum.
3. Color: Natural.

D. Protection-Zone Fencing: Fencing fixed in position and meeting the following requirements. Previously used materials may be used when approved by Owner.

1. Plastic Protection-Zone Fencing: Plastic construction fencing constructed of high-density extruded and stretched polyethylene fabric with 2-inch (50-mm) maximum opening in

pattern and weighing a minimum of 0.4 lb/ft. (0.6 kg/m); remaining flexible from minus 60 to plus 200 deg F (minus 16 to plus 93 deg C); inert to most chemicals and acids; minimum tensile yield strength of 2000 psi (13.8 MPa) and ultimate tensile strength of 2680 psi (18.5 MPa); secured with plastic bands or galvanized-steel or stainless-steel wire ties; and supported by tubular or T-shape galvanized-steel posts spaced not more than 8 feet (2.4 m) apart.

a. Height: 4 feet (1.2 m).
b. Color: High-visibility orange, nonfading.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion and sedimentation control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

B. For the record, prepare written report, endorsed by arborist, listing conditions detrimental to tree and plant protection.

3.2 PREPARATION

A. Locate and clearly identify trees, shrubs, and other vegetation to remain. Tie a 1-inch (25-mm) blue-vinyl tape around each tree trunk at 54 inches (1372 mm) above the ground.

B. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

C. Tree-Protection Zones: Mulch areas inside tree-protection zones and other areas indicated.

1. Apply 4-inch (100-mm) average thickness of organic mulch. Do not place mulch within 6 inches (150 mm) of tree trunks.

3.3 TREE- AND PLANT-PROTECTION ZONES

A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones before materials or equipment are brought on the site and construction operations begin in a manner that will prevent people from easily entering protected area except by entrance gates. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.

B. Maintain protection zones free of weeds and trash.

C. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Landscape Architect.

D. Maintain protection-zone fencing in good condition as acceptable to Owner and remove when construction operations are complete and equipment has been removed from the site.

1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.
2. Temporary access is permitted subject to preapproval in writing by arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.

3.4 EXCAVATION

A. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to requirements in Division 31 Section "Earth Moving."

B. Trenching near Trees: Where utility trenches are required within protection zones, hand excavate under or around tree roots or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning.

C. Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches (75 mm) back from new construction and as required for root pruning.

D. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

3.5 ROOT PRUNING

A. Prune roots that are affected by temporary and permanent construction. Prune roots as follows:

1. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
2. Cut Ends: Do not paint cut root ends.
3. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
4. Cover exposed roots with burlap and water regularly.
5. Backfill as soon as possible according to requirements in Division 31 Section "Earth Moving."

B. Root Pruning at Edge of Protection Zone: Prune roots 6 inches (150 mm) outside of the protection zone, by cleanly cutting all roots to the depth of the required excavation.

C. Root Pruning within Protection Zone: Clear and excavate by hand to the depth of the required excavation to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.

3.6 CROWN PRUNING

A. Prune branches that are affected by temporary and permanent construction. Prune branches as follows:

1. Prune trees to remain to compensate for root loss caused by damaging or cutting root system. Provide subsequent maintenance during Contract period as recommended by arborist.
2. Pruning Standards: Prune trees according to ANSI A300 (Part 1)
3. Cut branches with sharp pruning instruments; do not break or chop.
4. Do not apply pruning paint to wounds.

B. Chip removed branches and stockpile and spread over areas identified on drawings for mulch by Architect.

3.7 REGRADING

A. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

B. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

3.8 FIELD QUALITY CONTROL

A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

3.9 REPAIR AND REPLACEMENT

A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.

1. Submit details of proposed root cutting and tree and shrub repairs.
2. Have arborist perform the root cutting, branch pruning, and damage repair of trees and shrubs.
3. Treat damaged trunks, limbs, and roots according to arborist's written instructions.
4. Perform repairs within 24 hours.

5. Replace vegetation that cannot be repaired and restored to full-growth status, as determined by Architect.

B. Trees: Remove and replace trees indicated to remain that are more than 25 percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Owner determines are incapable of restoring to normal growth pattern.

1. Provide new trees of same size and species as those being replaced for each tree that measures 4 inches (100 mm) or smaller in caliper size.
2. Provide two new tree(s) of 6-inch (150-mm) caliper size for each tree being replaced that measures more than 4 inches (100 mm) in caliper size.
   a. Species: Species selected by Owner.
3. Plant and maintain new trees as specified in landscape specifications by Architect on drawings.

C. Damage Compensation: Any damage occurring to trees to remain or protected areas or removal of trees to remain in the protected areas caused by neglect, unauthorized encroachment and/or inadequate protection enforcement as determined by the Landscape Architect shall be the responsibility of the General Contractor.

1. Financial compensation for said damage or removal shall be determined by the Landscape Architect and Owner as per the following guidelines on a per occurrence basis:
   a. A $2,500.00 fine shall be assessed for inadequate protection or tagging of protected areas, unauthorized encroachment of protected areas by construction machinery or other vehicular equipment.
   b. A $5,000.00 fine shall be assessed for stockpiling, dumping, disposal of materials, grubbing, clearing or grading not in accordance with Specifications for Tree Preservation Section 02100.

2. Removal of any protected tree without previous written authorization from both the Landscape Architect and the Owner shall be assessed a fine equal to $250.00 per caliper inch of removed tree.

D. Soil Aeration: Where directed by Architect, aerate surface soil compacted during construction. Aerate 10 feet (3 m) beyond drip line and no closer than 36 inches (900 mm) to tree trunk. Drill 2-inch (50 mm) diameter holes a minimum of 12 inches (300 mm) deep at 24 inches (600 mm) o.c. Backfill holes with an equal mix of augered soil and sand.

3.10 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove excess excavated material, displaced trees, trash and debris, and legally dispose of them off Owner's property.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT AND PAYMENT

A. Measurement and payment will be as specified in the Contract Documents and under the pay item “Temporary Tree and Plant Protection”.

B. The term “lump sum” when used as a unit of measurement shall include all work necessary to complete that entire component, including all necessary products and installation.

END OF SECTION 015639

SECTION 024120 – EROSION AND POLLUTION DISCHARGE CONTROL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.02 SCOPE

A. This Section governs procedures to be followed by Contractors to control discharge of sediment, petroleum products, sewage, vegetation, and other contaminants which may be associated with construction of the project. The scope of work the Contractor will prepare and submit the applications and any associated support information, including any associated fees or graphics, for the following construction permits: NPDES Permit, SWFWMD Permit and Manatee County Stormwater Permitting.

PART 2 - MATERIALS (Not Applicable)

PART 3 - INSTALLATION

3.01 SOIL EROSION AND SEDIMENTATION PLAN

A. Site specific plans for runoff, erosion and sediment control shall be furnished, amended with construction schedules (See Contract Drawings) and submitted by Contractor to appropriate local governing agency within ten days of receiving a Notice to Proceed on the Overall Project in accordance with Paragraph 3.08 of this Section.

B. Contractor to note that the Sarasota Bay which surrounds this site is an Outstanding Water of Florida and requires the Contractor’s full attention to detail in providing an erosion and sediment plan that meets the SWPP plans and specifications.

3.02 RESPONSIBILITIES

A. Contractor shall submit the names and telephone numbers of Contractor personnel responsible for various components of the Plan.

3.03 DRAINAGE OF DETENTION BASINS, PONDS AND OTHER WATER BODIES

A. Owner reserves right to disapprove of the Contractor's compliance with soil erosion and pollution discharge control drainage plans and terminate drainage operations at any time. Where interruptions in drainage operations occur or more than five days are required to commence such operations after notification to terminate operations, Contractor may request a time extension and reimbursement of additional related costs, provided such interruptions or delays are not due to Contractor negligence. Contractor shall justify all claimed expenses associated with termination. A time extension will only be granted if Contractor can show to satisfaction of Owner that termination or disapproval of drainage plans will delay entire project.

B. No dewatering activities are to take place on this site per SWFWMD permit.

3.04 PETROLEUM AND SEWAGE SPILL CONTROL

A. Petroleum products, sewage and other chemicals shall be kept out of the detention ponds and waterways. Therefore, the following practices shall be followed:

1. Maintenance, parking and storage shall be located at elevations above water surface elevations and at locations approved by Owner. Each of these areas shall be bermed to contain the amount of liquid from largest container in storage areas.
2. All wheeled equipment shall be serviced in approved vehicle maintenance areas.
3. All used crank case oil and hydraulic fluid shall be collected and disposed of at an approved off-site facility at Contractor's expense.
4. Soil outside vehicle maintenance area contaminated by petroleum products or other hazardous spills shall be excavated within 24 hours of contamination and removed to an approved disposal site at Contractor's expense.
5. Detention ponds or other facilities shall be provided for removing surface oil in runoff from maintenance, parking, and storage areas.
6. In the event that petroleum products, sewage or hazardous chemicals enter drainage features or more than 50 gallons of such material spills on ground, Contractor shall notify Owner and the following:
   a. Florida Department of Environmental Protection
7. The parties shall be told what was spilled; how much was spilled; when it was spilled; how much entered the drainage features; and corrective measures being taken.

3.05 CONTROL OF SEWAGE

A. Direct discharge of sanitary wastes to water courses shall not be allowed.

B. Sanitary facilities shall be conveniently located and adequately maintained in order to prevent runoff of sanitary wastes to the watercourses.

C. Owner shall have the authority to suspend operations at any time when sanitary provisions do not meet local sanitary regulations or these Specifications.

D. Owner shall not incur any additional costs from suspended operations due to failure to meet sanitary provisions.

3.06 RUNOFF, EROSION, AND SEDIMENT CONTROL

A. Any combination of structural and vegetative practices described in these Specifications may be used provided such practices are implemented in manner specified and further provided such measures shall prevent accumulation in sediment basin of sediment in excess of one-half the volume of such basin over life of the Project.

B. Waste waters directly derived from fill material processing, aggregate processing, concrete curing, and foundation and concrete lift cleanup and any other source in the construction activities shall not be allowed to enter water areas. These wastewaters shall be collected and placed in retention ponds where suspended material can be settled-out or water evaporates so that pollutants are separated from water.

3.07 DISPOSAL OF VEGETATION

A. Organic matter shall not be placed in ditches, gullies, drainage courses, streams, or other locations where portions of the matter can be washed into lakes by runoff or other drainage.

B. Disposal of waste soils, cleared and grubbed materials and all materials which are in excess of or are unsuitable for use in the permanent Work shall be disposed of in accordance with the requirements of federal, state and local requirements.

3.08 POLLUTION CONTROL

A. Comply with all requirements of local and state authorities having jurisdiction over pollution control issues and as noted on the drawings.

3.09 SCHEDULES

A. For each phase or stage of land-disturbing activity, a schedule shall be submitted. Schedule shall be submitted to the county and show the anticipated starting and completion date for all construction activities including:

1. Clearing operations
2. Grubbing operations
3. Rough and finished grading
4. Pollution Control
5. Temporary and permanent sediment control measures
6. Storm water management facilities
7. Temporary sediment control structure removal.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT AND PAYMENT

A. Measurement and payment will be as noted in the Contract Documents and under the pay item “Erosion and Pollution Discharge Control”.

B. The term “lump sum” when used as a unit of measurement shall include all work necessary to complete that entire component, including all necessary products and installation.

END OF SECTION 024120

SECTION 024121 – SEDIMENT BARRIER

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.02 SCOPE

A. Sediment barriers are temporary barriers or diversions that are constructed of coir rolls.

1.03 PURPOSE

A. The purpose of a sediment barrier is to prevent sediment from leaving the site and entering natural drainage ways or storm drainage systems by slowing storm water runoff and causing the deposition of sediment at the structure. Sediment barriers shall be constructed as needed to control erosion and sediment runoff.

PART 2 - MATERIALS (Not Applicable)

PART 3 - INSTALLATION

3.01 COIR ROLLS (Note: Manatee County prefers the use of this sediment barrier. Contractor to coordinate sediment barrier selection with County prior to commencement of job)

A. A fiber roll consist of wood excelsior, rice or wheat straw, or coconut fibers that is rolled or bound into a tight tubular roll and is used to remove sediment from runoff.

B. Fiber rolls material shall be either: (1) Prefabricated rolls; (2) Rolled tubes of erosion control blanket.

C. Assembly of field rolled fiber roll: (1) Roll length of erosion control blanket into a tube of minimum 200 mm (8 in) diameter; (2) Bind roll at each end and every 1.2 m (4ft) along length of roll with jute-type twine.

C. Fiber roll is to be installed flush with grade and is to be staked only as necessary to prevent gaps between rolls.

D. Removal of fiber rolls is typically not performed. If fiber rolls are removed, collect and dispose of sediment accumulation, and fill and compact any other ground disturbance to blend with adjacent ground.

E. For maintenance and inspection include repair or replacement of split, torn, unraveling, or slumping fiber rolls. Inspect fiber rolls when rain is forecast. Perform maintenance as needed or as required. Maintain fiber rolls to provide an adequate sediment holding capacity. Sediment shall be removed when the

sediment accumulation reaches three quarters (3/4) of the barrier height. Removed sediment shall be incorporated in the project or disposed of outside the project in conformance with the Standard Specifications.

3.03 MAINTENANCE

A. Sediment barriers are targets for vandals; frequent inspections are required. Repair or replacement shall be made promptly as needed.

B. Clean-out trapped sediment when needed.

3.04 REMOVAL

A. Upon acceptance of the completed work, the contractor shall be responsible for the complete removal of the all coir rolls and turbidity barriers unless otherwise noted by the Engineer. Following removal, all materials shall become the property of the contractor.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT AND PAYMENT

A. Measurement and payment will be as specified in the Contract Documents and under the pay items “Sediment Barrier-Coir Rolls”.

B. The term “linear feet” when used as a unit of measurement shall include all work necessary to complete that entire component, including all necessary products and installation.

END OF SECTION 024121

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK

A. Extent of concrete work is shown on Drawings.

B. Obtain permits as required by Local, State and Federal authorities with jurisdiction over this project.

C. Furnish all materials, including water, forms, reinforcing steel, etc., and all labor required to complete all reinforced and plain concrete work shown on the drawings, as hereinafter specified, or reasonably implied, in a workmanlike and acceptable manner subject to the approval of the Landscape Architect.

D. This section includes, but is not limited to specifications for cast-in-place concrete sidewalks, concrete transitions, curbs and footings.
   1. Joint fillers and sealers are specified in Section 321373.

1.03 QUALITY ASSURANCE

A. Codes and Standards:
   1. Comply with provisions of following codes, specifications and standards, except where more stringent requirements are shown or specified:
      a. ACI 318 "Building Code Requirements for Reinforced Concrete".
      b. Concrete Reinforcing Steel Institute, "Manual of Standard Practice".
      c. Standards of the American Associations of State Highway Officials; referred to in this section by the abbreviation "AASHO"

B. Work specified by reference to the published standards or specifications of a manufacturer or organization shall comply with the requirements of the specifications listed.
   1. In case of conflict between referenced specifications or standards, the one having the more stringent requirements shall govern.

C. Concrete Testing Service:
   1. The Contractor shall engage a testing laboratory to perform material evaluation tests and to test design concrete mixes.
   2. Sample cylinders shall be taken at the site under the direction of the Owner's representative.
   3. These tests are for Contractor's, Owner's and Landscape Architect's needs.
      a. This does not relieve Contractor from responsibility of verifying site conditions and maintaining Contract requirements.

D. Materials and installed work may require testing and retesting, as directed by Owner, at any time during progress of work.
   1. Allow free access to material stockpiles and facilities.

2. Retesting of rejected materials and installed work shall be done at Contractor's expense.

1.04 SUBMITTALS

A. Product Data:
1. Submit data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, joint systems, curing compounds, and others as requested by Owner.

B. Shop Drawings, Reinforcement:
1. Submit shop drawings for fabrication, bending, and placement of concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of concrete reinforcement.
a. Include special reinforcement required and openings through concrete structures.

C. Laboratory Test Reports:
1. Laboratory test reports for concrete materials and mix design test will be distributed to Contractor, Owner and Landscape Architect.

D. Material Certificates:
1. Provide materials certificates in lieu of materials laboratory test reports when permitted by Owner.
2. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.

1.05 TRAFFIC CONTROL

A. Maintain access for vehicular and pedestrian traffic as required for other construction activities.
1. Utilize flagmen, barricades, warning signs and warning lights as required.

PART 2 - PRODUCTS

2.01 FORM MATERIALS

A. Forms for Exposed Finish Concrete:
1. Unless otherwise indicated, construct formwork for exposed concrete surfaces with plywood, metal, metal-framed plywood faced or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces.
2. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.
3. Provide form material with sufficient thickness to withstand pressure of newly-placed concrete without bow or deflection.
a. Patented concrete-forming systems may be used.
4. Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood", Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.

B. Forms for Unexposed Finish Concrete:
   1. Form concrete surfaces which will be unexposed in finished structure with plywood, lumber, metal or other acceptable material.
   2. Provide lumber dressed on at least 2 edges and one side for tight fit.

C. Form Coatings:
   1. Provide commercial formulation form-coating compounds that will not bond with, stain nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.

2.02 REINFORCING MATERIALS

A. Reinforcing Bars:
   1. ASTM A 615, Intermediate Grade, deformed, galvanized or epoxy coated.
   2. Unless otherwise noted, ANSI/ASTM A615, Grade 40, deformed for ties, stirrups.

B. Supports for Reinforcement:
   1. Provide supports for reinforcement including bolsters, chairs, spacers and other devises for spacing, supporting and fastening reinforcing bars and welded wire fabric in place.
   2. Use wire bar type supports complying with CRSI specifications, unless otherwise acceptable.
   3. For slabs-on-grade, pull welded wire fabric up in slab with special hook rods as slab is placed.
   4. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).

2.03 CONCRETE MATERIALS

A. Portland Cement:
   1. ASTM C 175, Type I, unless otherwise acceptable to Owner’s Representative.
   2. Use one brand of cement throughout project, unless otherwise acceptable to Owner’s Representative.

B. Normal Weight Aggregates:
   1. ASTM C 33, and as herein specified.
   2. Provide aggregates from a single source for exposed concrete.
   3. For exterior exposed surfaces, do not use fine or coarse aggregates containing spalling-causing deleterious substances.

C. Water:
   1. Drinkable.

D. Air-Entraining Admixture:
   1. ASTM C 260.

   2. Products: Subject to compliance with requirements, provide one of the following:
      a. "Sika Aer"; Sika Corp.
      b. "MB-VR or MB-AE"; Master Builders.
      c. "Dorex AEA"; W.R.Grace.

d. "Edoco 2001 or 2002; Edoco Technical Products.

E. Water-Reducing Admixture:
1. ASTM C 494, Type A, and contain not more than 0.1% chloride ions.
2. Products: Subject to compliance with requirements, provide one of the following:
a. "Eucon WR-75"; Euclid Chemical Co.
b. "Pozzolith 344"; Master Builders.
c. "Plastocrete 160"; Sika Chemical Corp.
d. "Chemtard"; Chem-Masters Corp.

F. High-Range Water-Reducing Admixture (Super Plasticizer):
1. ASTM C 494, Type F or Type G and contain not more than 0.1% chloride ions.
2. Products: Subject to compliance with requirements, provide one of the following:
a. "WRDA 19"; W.R.Grace
b. "PSP"; Protex Industries Inc.
c. "Super P"; Anti-Hydro.
d. "Sikament"; Sika Chemical Corp.
e. "Eucon 37"; Euclid Chemical Co.
f. "PSI Super"; Gifford-Hill
g. "Pozzolith 400"; Master Builders.

G. Calcium chloride or admixtures containing more than 0.1% chloride ions are not permitted.

2.04 RELATED MATERIALS

A. Anchor Bolts:
1. ASTM A307

B. Liquid Membrane Forming Curing Compound:
1. Liquid type membrane-forming curing compound complying with ASTM C 309, Type I, Class A unless other type acceptable to Landscape Architect/Engineer.
2. Moisture loss not more than 0.055 gr./sq.cm. when applied at 200 sq.ft./gal.
3. Products
a. "Masterseal; Master builders
b. "Ecocure"; Euclid Chemical Co.
c. "Kure-N-Seal"; Sonneborn-Contech

C. Expansion Joint Materials:
1. Comply with requirements of applicable Division 32 sections for preformed joint fillers and sealers.

D. Anti-Spalling Compound:
1. 50% (by volume) boiled linseed oil and 50% (by volume) mineral spirits, complying with AASHTO M-233.

E. Bonding Compound:
1. Polyvinyl acetate or acrylic base, rewettable type.

2.05 CONCRETE MIX, DESIGN, AND TESTING

A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301.
   1. If trial batch method is used, use an independent testing facility acceptable to Owner for preparing and reporting proposed mix designs.
      a. The testing facility shall not be the same as used for field quality control testing unless otherwise acceptable to Owner.

B. Submit written reports to Landscape Architect/Engineer and Owner of each proposed mix for each class of concrete at least 15 days prior to start of work.
   1. Do not begin concrete production until mixes have been reviewed by Owner.

C. Design mixes to provide normal weight concrete with the following properties:
   1. Compressive strength:
      a. 4000 psi, minimum at 28 days, unless otherwise indicated.
   2. Slump Range:
      a. 6" for concrete containing HRWR admixture (super plasticizer), 5" for other concrete.
   3. Air Content:
      a. 2% to 5% for Florida.

D. During Hot Weather:
   1. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 may be required.
   2. When air temperature is between 85^{o} F (30^{o} C) and 90^{o} F (32^{o} C), reduce mixing and delivery time from 1 1/2 hours to 75 minutes, and when air temperature is above 90^{o} F (32^{o} C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.01 SURFACE PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

B. Proof roll prepared subbase surface to check for unstable areas and need for additional compaction.

C. Do not begin paving work until conditions have been corrected and are ready to receive paving.

3.02 FORMS

A. Preparation of form surfaces:
   1. Clean re-used forms of concrete matrix residue, repair and patch as required to return forms

to acceptable surface condition.

B. Coat contact surfaces of forms with a form-coating compound before reinforcement is placed.

C. Thin form-coating compounds only with thinning agent of type, and in amount, and under conditions of form-coating compound manufacturer's directions.
   1. Do not allow excess form-coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed.
   2. Apply in compliance with manufacturer's instructions.

D. Design, erect, support, brace and maintain formwork to support vertical and lateral loads that might be applied until such loads can be supported by concrete structure.
   1. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation and position.

E. Design formwork to be readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials.

F. Construct forms to sizes, shapes, lines and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures.
   1. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustifications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work.
   2. Use selected materials to obtain required finishes.
   3. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.

G. Fabricate forms for easy removal without hammering or prying against concrete surfaces.
   1. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces.
   2. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only.
   3. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and for easy removal.

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

I. Form Ties:
   1. Factory-fabricated, adjustable-length, non-corrosive removable or snapoff metal form ties, shall be designed to prevent form deflection, and to prevent spalling concrete surfaces upon removal.

J. Cleaning and Tightening:
   1. Thoroughly clean forms and adjacent surfaces to receive concrete.
   2. Remove chips, wood, sawdust, dirt or other debris just before concrete is placed.

   3. Retighten forms and bracing after concrete placement as required to eliminate mortar leaks and maintain proper alignment.

3.03 PLACING REINFORCEMENT

A. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as herein specified.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.

C. Accurately position, support and secure reinforcement against displacement by formwork, construction, or concrete placement operations.
   1. Locate and support reinforcing by metal chairs, concrete bricks, runners, bolsters, spacers, and hangers, as required.

D. Place reinforcement to obtain at least minimum coverage for concrete protection as shown in the Drawings.
   1. Arrange, space and securely tie bars (weld where noted) and bar supports to hold reinforcement in position during concrete placement operations.
   2. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

3.04 JOINTS

A. General:
   1. Construct expansion, contraction joint, and construction joints true-to-line with face perpendicular to surface of concrete.
   2. Construct transverse joints at right angles to the centerline, unless otherwise indicated.

B. When joining existing structures, place transverse joints to align with previously placed joints, unless otherwise indicated.

C. Contraction Joints:
   1. Provide contraction (weakened-plane) joints, sectioning concrete into areas shown on drawings.
   2. Locate so as not to impair the strength and appearance of the structure, as acceptable by the Owner.
   3. Tooled Joints:
      a. Form contraction joints in fresh concrete by grooving top portion with a recommended cutting tool and finishing edges with a jointer.
   4. Saw-cut Joints:
      a. Contraction joints may be cut to the proper depth with a concrete saw only as approved by the Landscape Architect.

D. Construction Joints:
   1. Place construction joints at end of placements and at locations where placement operations are stopped for a period of more than 1/2-hour, except where such placements terminate at expansion joints.
   2. Construction joints should be located so as to occur at the same location as a contraction joint.
   3. Construct joints using standard metal key-way-section forms or significantly deform end of placed concrete to allow gripping of next pour.

E. Expansion Joints:
   1. Place expansion joints, sectioning concrete into areas shown on drawings.
   2. Locate so as not to impair the strength and appearance of the structure, as acceptable by the Landscape Architect/Engineer and Owner.
   3. In addition, place expansion joints at points of contact between slabs on ground and vertical surfaces, such as column pedestals, foundation walls, grade beams and elsewhere as indicated.
   4. Joint Filler and Sealant materials are specified in Division 32 sections of these specifications.
   5. Removable expansion board cap (i.e. Greenstreak or equal) shall be utilized during placement of all expansion joints.

3.05 CONCRETE PLACEMENT

A. Preplacement Inspection:
   1. Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast-in.
   2. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work.
   3. Moisten wood forms immediately before placing concrete where form coatings are not used.

B. Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel.

C. Comply with ACI 304 "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete", and as herein specified.
   1. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness.
   2. If a section cannot be placed continuously, provide construction joints as herein specified.
   3. Deposit concrete as nearly as practicable to its final location to avoid segregation.
   4. Form new concrete to match existing profiles where noted and make a smooth transition where the new construction work meets existing materials.
   5. All surfaces shall be carefully pitched to drain and free of any low spots permitting ponding of water.
      a. Pitch as directed.

D. Placing Concrete in Forms:
   1. Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction joints.

   2. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

E. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping.
   1. Use equipment and procedures for consolidation of concrete in accordance with ACI recommended practices.

F. Do not use vibrators to transport concrete inside forms.
   1. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine.
   2. Place vibrators to rapidly penetrate placed layer and at least 6" into preceding layer.
   3. Do not insert vibrators into lower layers of concrete that have begun to set.
   4. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.

G. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.

H. Maintain reinforcing in proper position during concrete placement operations.

I. Cold Weather Placing:
   1. Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 and as herein specified.

   2. When air temperature has fallen to or is expected to fall below 40 deg. F (4 deg. C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg. F (20 deg. C), and not more than 80 deg. F (27 deg. C) at point of placement.

J. Do not use frozen materials or materials containing ice or snow.
   1. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

K. Do not use calcium chloride, salt and other materials containing antifreeze agents or chemical accelerators, unless otherwise accepted in mix designs.

L. Hot Weather Placing:
   1. When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.
   2. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 deg. F (32 deg. C).
      a. Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing water.
      b. Use of liquid nitrogen to cool concrete is Contractor's option.
   3. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.
      a. Fog spray forms, reinforcing steel and subgrade just before concrete is placed.

M. Use water-reducing retarding admixture (Type D) when required by high temperatures, low humidity, or other adverse placing conditions.

3.06 CONCRETE FINISHING

A. General:

1. After striking-off and consolidating concrete, smooth surface by screeding and floating.
   a. Use hand methods only where mechanical floating is not possible.
   b. Adjust floating to compact surface and produce uniform texture.

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

C. Work edges of gutters, back top edge of curb, and formed joints with an edging tool, and round to 1/2" radius, unless otherwise indicated.
   1. Eliminate tool marks on concrete surface.

D. After completion of floating and troweling when excess moisture or surface sheen has disappeared, complete surface finishing, as follows:
   1. Exposed Concrete Paving:
      a. Broom finish by drawing a medium-hair broom across concrete surface perpendicular to line of traffic.
      b. Repeat operation if required to provide a texture acceptable to Owner.
      c. See drawings for finish detail.

E. Protect and monitor concrete surface to guard against vandalism.
   1. Do not remove forms for 24 hours after concrete has been placed.
   2. After form removal, clean ends of joints and point-up any minor honeycombed areas.
   3. Remove and replace areas or sections with major defects, as directed by Owner.

3.07 CONCRETE SURFACE REPAIRS

A. Patching Defective Areas:
   1. Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Landscape Architect/Engineer and Owner.
   2. Cut out honeycomb, rock pockets, voids over 1/4" 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".
   3. Make edges of cuts perpendicular to the concrete surface.
   4. Thoroughly clean, dampen with water and brush-coat the area to be patched with specified bonding agent.
   5. Place patching mortar after bonding compound has dried.

B. For exposed-to-view surfaces, blend white portland cement and standard portland cement so that, when dry, patching mortar will match color surrounding.
   1. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching.
   2. Compact mortar in place and strike-off slightly higher than surrounding surface.

C. Repair of exposed Formed Surfaces:
   1. Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Landscape Architect and Owner.
      a. These include surface defects, such as, cracks, spalls, air bubbles, honeycomb, rock

pockets; fins and other projections on surface.
2. Flush out form tie holes, fill with Epoxy patching cement.

D. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete.
1. If defects cannot be repaired, remove and replace concrete.

E. Drill test cores where directed by Landscape Architect/Engineer and Owner, when necessary to determine magnitude of cracks or defective areas.
1. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.

F. Protect concrete from damage until acceptance of work.
1. Exclude traffic from pavement for at least 14 days after placement.
2. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

G. Sweep concrete pavement and wash free of stains, discolorations, dirt and other foreign material just prior to final inspection.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT AND PAYMENT

A. Measurement and payment will be as specified in the Contract Documents and under the pay items “Cast-in-Place (Concrete Walk)” and “Cast-in-Place (Concrete Pads)”.

END OF SECTION 033000

SECTION 033001 – PAVEMENT MARKING PAINT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This section includes the following:
   1. Pavement marking over concrete pavement.

1.03 RELATED SECTIONS

A. Section 02520, "Portland Cement Concrete Paving".

1.04 SUBMITTALS

A. Submit manufacturer's product specification and installation instructions for marking paint in accordance.

1.05 JOB CONDITIONS

A. Do not apply marking paint when weather is foggy or rainy, or ambient or pavement temperatures are below 40 degrees F., nor when such conditions are anticipated during eight hours after application.

PART 2 - PRODUCTS

2.01 MARKING PAINT

A. Non-bleeding pigmented copolymer latex emulsion traffic marking paint with non-volatiles by weight of not less than: 49% - White, 50% - Yellow.
   1. Fire Lanes — Yellow
   2. Parking Spaces — White
   3. Handicapped Parking Symbol — White
   4. Crosswalk — White

2.02 EQUIPMENT

A. Exterior pavements:
   1. Pressurized, self-contained paint machine capable of applying a straight line from 2 in. to 6 in. wide, with consistent coverage of a minimum of 150 sq. ft. per gallon.

PART 3 - EXECUTION

3.01 INSPECTION AND PREPARATION

A. Locate markings as shown on drawings.

1. Provide qualified technician to supervise equipment and application of markings.
2. Lay out markings using guide lines, templates, and forms.

B. Thoroughly clean surfaces free of dirt, sand, gravel, oil and other foreign materials.

C. Allow concrete to cure before painting as recommended by manufacturer of marking paint.

3.02 APPLICATION

A. Apply two coats of marking paint at rate of one gallon per 200 sq.ft. (equivalent to approximately one gallon for 450 lineal feet of 4 in. wide stripe).

B. Apply marking paint straight and uniform.

C. Apply second coat of paint after first coat has dried completely. Maintain the exact same placement of lines for second coat as first coat.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT AND PAYMENT

A. Measurement and payment will be as specified in the Contract Documents and under the pay item “Pavement Marking Paint (Parking Lot)” and “Pavement Marking Paint (Handicapped Parking Symbol)”.

END OF SECTION 033001

SECTION 051200 – STRUCTURAL STEEL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Provide steel framing shown or noted on Structural or Architectural Drawings.
   2. Structure design is based on shown steel sections. Intent of Contract Documents is that designated shapes, thickness, arrangements and grades of material be provided.
      a. If for any reason sections shown are not readily available, substitute sections may be proposed for use. Registered Design Professionals shall approve Substitutions before submission of shop drawings.
      b. Coordinate fit of proposed substitution with Architectural details and structural capacity.
      c. Incorporate approved substitute members in structures at no additional cost to Owner.

B. Related Work Specified Under Other Sections
   1. Concrete bearing surfaces, setting of Anchor Rods in concrete.
   2. Fasteners for anchorage of wood nailers.

C. Products Furnished But Not Installed Under This Section
   1. Anchor Rods for columns.
   2. Anchor Rods for beams supported on concrete construction.

D. Measurement And Payment
   1. Payment will be made on total weight of structural steel furnished, erected and accepted, per Contract Unit Prices. Weight of structural steel shall be calculated per Section 9 of AISC Code of Standard Practice. Calculate total weight upon which payment shall be made from approved shop drawings and bills of materials only, modified as specified in Paragraph 1.1.A2.

1.2 REFERENCES

A. AISC References
   1. AISC “Manual of Steel Construction - Allowable Stress Design”, Ninth Edition, including:
      a. “Specification for Structural Steel Buildings - Allowable Stress Design and Plastic Design”, June 1, 1989.
      b. “Code of Standard Practice for Steel Buildings and Bridges”, March 7, 2000 except as indicated otherwise in Contract Documents.

c. "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts", approved by Research Council on Structural Connections, June 23, 2000, and endorsed by AISC.

2. AISC "Manual of Steel Construction Volume II Connections - ASD 9th Edition/LRFD 1st Edition", 1993.
3. AISC "Hollow Structural Sections Connection Manual", 1st Edition, 1997.
4. AISC "Engineering for Steel Construction", 1984, except where superseded by provisions of the AISC "Specification for Structural Steel Buildings", RCSC "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" and AWS "Structural Welding Code".
5. AISC "Detailing for Steel Construction", 2002.

B. Other References
1. ANSI/AWS "Structural Welding Code", D1.1.
2. SSPC "Steel Structures Painting Manual", Volume 2, Third Edition.

1.3 SYSTEM DESCRIPTION

A. Design Requirements
1. Design connections and fabricate work per Reference Standards, except where specifically amended in this Section or superseded by local or State building code requirements.
2. Provide high strength bolted, slip critical or bearing type connections as shown. Bolt design values for bearing type connections shall assume threads in shear planes. Fully pre-tension bolts in bearing type connections. Do not use bolted and welded connections in combination. Make connections of main members per referenced AISC Standards. Use minimum of two bolts for bolted connections.

1.4 SUBMITTALS

A. Furnish submittals for items that are identified in this Section by different typeface and a bracketed code (e.g., *Item [L]*). Refer to Section 01340 for definition of codes, types of submittals and administrative requirements governing submittal procedure. Additional submittal requirements about this Section are specified under this Article.

B. Shop drawings shall be submitted with completed shop drawing transmittal sheet attached at end of this Section.

C. *Shop drawings [D]:* Show items to be provided per AISC's Structural Steel Detailing Manual. Shop drawings not checked by Contractor will be returned marked "Not Approved".

D. Submit Structural Steel Shapes and Plates mill test reports to substantiate that steel conforms to specification. Organize and summarize documentation.

E. Show complete details for cutting, fabricating and connecting of pieces, on shop drawings. Provide separate drawings for erection. Indicate marks for pieces on shop and erection

drawings. Use marking system compatible with, and referenced to, marking system noted on Contract Drawings.

F. Indicate welding by using AWS symbols, showing type, size and location of welds. Prepare welding procedure specifications and diagrams for each weld joint, and use specified weld in work. Assign each joint procedure designation number or code. Show number or code in tail of each welding symbol on shop drawings. Where standard weld type is repeated throughout work, its procedure designation or code may be shown by general note or reference on each shop drawing where that weld type appears. Provide auxiliary views of welds to clarify welded connections.

G. Differentiate between shop connections and field connections by appropriate symbols on shop drawings. Show location, type and size of connections and connection components. Indicate members or portion of members that shall not be shop painted.
   1. Submit calculations for both top and bottom chord end connections of trusses, allowing for prying action as described in AISC Structural Steel Detailing Manual.
   2. Submit weld design and procedures for welds not pre-qualified by ANSI/AWS D1.1-96.

H. Submit separate setting plans and shop drawings for Anchor Rods. Show, on shop drawings, complete information about bolts, nuts and accessories, identification marking, and setting instructions, including dimensioned locations and elevations. Furnish two copies of Registered Design Professional approved shop drawings, to installer of bolts.

I. *Welder Qualifications [Q]:* Submit summary sheets showing welder, welding operator and tacker qualifications and welding connection workmanship per ANSI/AWS D1.1-96. Do not submit individual certifications. Certifications shall be kept at manufacturer’s plant for Inspector’s use.

J. *Method of Repair [D]:* Submit drawings and description for proposed repair of defective material or improper workmanship as an alternate to removal and replacement. Include method of repair.

K. TESTING AGENCY SUBMITTALS

L. *Tests and Audits [T]:* Submit reports on completed tests and audits showing conformance or non-conformance with Contract Documents. Include visual and non-destructive testing of welds. Testing Agency shall send duplicate copies of tests and audits to Registered Design Professional and to Contractor.

M. Record Documents
   1. *As-Built Drawings [D]:* Upon completion of erection of steel, and before Final Payment, furnish two certified CD’s with drawings (in .pdf format) of as-built structural steel shop, erection, and anchor bolt setting drawings to Registered Design Professional. Drawings used shall be void of marks and stamps and shall show as-built conditions.
   2. Refer to Section 01720 for additional requirements.

1.5 QUALITY ASSURANCE

A. Defective Material or Improper Workmanship
   1. Defective material or improper workmanship found at mill, shop, or project site, at any time, will be rejected regardless of previous inspections.
      a. Remove rejected material or work and provide new materials or work that conforms to Contract Documents.
      b. Alternatively, rejected material or work may be repaired. Submit written request as specified under Article “Submittals”, but do not proceed until Registered Design Professional has approved repair and method. If submittal is not approved by Registered Design Professional, remove and rejected material or work and provide new materials.
   2. Provide removal and replacement, or repair, at no additional cost to Owner, and pay costs attributable to delay caused by rejection and corrective action.

B. Welder, Welding Operator And Tack Welder Qualifications
   1. Employ on this project only welders, welding operators and tack welders who have been tested and qualified per Section 4, ANSI/AWS-D1.1-96 and other applicable provisions of ANSI/AWS-D1.1-96.
   2. Requalify welder, welding operator, or tack welder who has not been performing this particular welding process (for which he was qualified) for six months before employment on this project.
   3. Registered Design Professional reserves may require retesting and requalifying of welder, welding operator, or tack welder.

C. Testing Agency
   1. Owner will engage and pay for services of qualified, unbiased, commercial Testing Agency to do shop inspections. Owner intends that inspection will be full-time and at each location of fabrication.
   2. Testing Agency duties shall include preliminary audit of fabrication shop and equipment to evaluate production and scheduling capabilities of Contractor to comply with intent of Contract Documents, spot audits of work during fabrication, final audit of work before shipment to site, and determination that materials have been furnished and fabricated per Contract Documents requirements. Acceptance of material and work by Testing Agency shall not relieve Contractor from fulfilling requirements of Contract.
   3. Welds shall be visually inspected by Testing Agency. Acceptance of welds shall be based on Section 5 and 6 of ANSI/AWS D1.1-96 and other parts of AWS D1.1 as specified. Inspector shall identify accepted welds with distinguishing mark.
   4. Besides visual inspection, non-destructive testing of welds shall be done by Testing Agency per Section 6 of ANSI/AWS-D1.1-96 for compliance with Contract Documents and ANSI/AWS-D1.1-96. Personnel performing non-destructive testing shall be qualified as Level II per American Society for Non-Destructive Testing. Test 10 percent of non-fillet welds. Test additional welds or re-test repaired welds selected by Registered Design Professional. Depending upon kind of rejected welds encountered during Testing, use one or more of the following methods:

a. Liquid Penetrant Testing per ASTM E 165 for detecting discontinuities that are open to surface inspection. Standards of acceptance shall be in accordance with Section 6 Part C, of AWS D1.1, whichever is applicable.
b. Magnetic Particle Testing per ASTM E 709, using an external source for magnetization method, for detecting cracks and other discontinuities at or near surface. Standards of acceptance shall be in accordance with Section 6 Part C, of AWS D1.1, whichever is applicable.
c. Radiographic Testing per Part E of Section 6 of ANSI/AWS D1.1-96 for detecting porosity and other discontinuities by X-ray or gamma-ray testing. Acceptance per applicable parts of Article 6.12 OF ANSI/AWS D1.1-96.
d. Ultrasonic Testing per Part F of Section 6 of ANSI/AWS D1.1-96 for detecting lamellar discontinuities by pulse echo type using oscillating transducers. Acceptance per Article 6.13 of ANSI/AWS D1.1-96.

5. To assist Testing Agency, provide the following, at no extra cost:
   a. Labor and handling equipment to manipulate members and to provide ready and convenient access for testing and audit work.
   b. One copy each of mill orders, mill test certificates, paint invoices and accepted shop drawings.
   c. Office space for Testing Agency's administrative duties and free and ready access to fabricating shop.

D. Project Meeting for Structural Steel Detailing
   1. At least 7 days before beginning shop drawings, hold meeting in Registered Design Professional's office to discuss detailing procedures.
   2. Invite representatives concerned with structural steel detailing. Attendees shall include, but not be limited to, the following:
      a. Contractor's superintendent
      b. Structural steel fabricator
      c. Structural steel detailer
      d. Registered Design Professional
      e. Owner
   3. Registered Design Professional shall distribute an agenda in advance, chair meetings, and provide minutes of meeting to attendees and Owner.

E. Steel Fabricator shall be certified in Category I per AISC "Qualification Certification Program".

F. At least 14 days before meeting submit proposed connections, procedures, calculations, and alternatives to Registered Design Professional for review.

1.6 DELIVERY, STORAGE AND HANDLING

A. Block and tie material securely during transportation to prevent damage.

B. Ship small, loose items required for field connections in separate, substantial containers to prevent loss and damage during shipping. Items include clips, ties, lugs, separators, bolts, connectors, shims, and miscellaneous pieces. Identify items for location and use.
   1. Ship Anchor Rods and other bolts and connectors to be embedded in concrete or set in masonry per concrete and masonry construction schedules.
   2. Ship bolts and connectors with each shipment of steel members as needed for erection.

C. Store steel members at site in locations agreed upon with Registered Design Professional.

D. Store on shores or blocking to keep steel free from dirt, mud and other foreign materials.

E. Clean steel to remove contaminants, before erection.

F. Replace warped or bent members that cannot be properly and satisfactorily straightened by approved procedures, with new members at no extra cost to Owner.

G. Properly store and transport galvanized steel per American Galvanizers Association's recommended procedures to prevent wet storage stain.

1.7 PROJECT CONDITIONS

A. Existing Conditions
   1. Verify location and elevation of steel bearing or setting locations and Anchor Rods before proceeding with erection and in time to permit necessary corrections without delaying erection of steel. Immediately report to Registered Design Professional discrepancies found; otherwise, pay entire cost of removing and resetting incorrectly placed Anchor Rods and cost of repairing or replacing construction damaged during relocation of incorrectly placed Anchor Rods and plates. Alternatively, where approved by Registered Design Professional, pay cost of changes in steel work required to fit incorrectly placed Anchor Rods. If repair or replacing of concrete construction is permitted, perform work by methods acceptable to Registered Design Professional.
   2. Verify existing conditions including existing column spacing, heights, and interference of new and existing work. Check given dimensions, and make measurements necessary to fit new Work or alterations to existing structure. Check sections and connections of existing structure with respect to new Work or alterations. If actual conditions deviate from those shown, immediately advise Owner's Resident Construction Engineer. Submit necessary changes for approval before proceeding with steel fabrication.
   3. Where existing columns are out of plumb, make necessary provisions in new Work to take care of actual conditions. Use connections with slotted holes, shims, or fills, seated connections, or other suitable means approved by Registered Design Professional to accommodate deviations between assumed and actual conditions. Provide welded connections at slotted hole connections after structural steel is erected and plumbed. Shop weld fills in place. Provide bolts or welds to account for maximum eccentricity of connections. Submit details to provide adjustment to Registered Design Professional for approval before preparation of shop drawings.

B. Protection
   1. Assume full responsibility for correct plumbing, alignment, and setting of structural steel members. Provide temporary guys, braces, falsework, connections, etc., necessary to maintain structural framing plumb and in proper alignment until time as permanent connections are made, succeeding work is in place, and temporary work is no longer necessary. In addition, provide temporary bracing, shoring and other work to prevent damage to adjacent work or construction attributable to erection procedures and operation of erection equipment. At completion, remove and dispose of temporary work and facilities, off-site.

PART 2 PRODUCTS

2.1 MATERIALS

A. Structural Steel Shapes and Plates: Submit mill test reports to substantiate that steel conforms to specification.
   1. Wide flanges and structural tees, provide per ASTM A 992, rolled from new steel billets, unless otherwise noted on the Drawings
   2. All other shapes and plates, provide per ASTM A 36, rolled from new steel billets, unless otherwise noted on the Drawings.

B. Bolts and Accessories: Submit test reports and certificates. Furnish bolts and nuts as assemblies manufactured by one source.
   1. High-Strength Bolts: Heavy hex structural per ASTM A 325, of lengths required for thickness of members joined and for the type of connection.
      a. Type 1 or 2, plain bolt.
      b. Bolts for Slip Joints and Vertically Slotted Connections: Unthreaded length of bolt shall exceed the grip of the joint plus washers by 1/16 inch.
      c. Manufacturers: Any manufacturer fabricating bolts and matching nuts per ASTM A 325 and with proper identification on bolt.
      d. Direct Tension Indicator Bolt Manufacturers: Fabricated per ASTM A 325 and with proper identification on bolt:
         1) LeJeune Bolt Company
         2) Lohr Structural Fasteners Inc.
         3) NSS Industries
   2. Nuts for High-Strength Bolts: Heavy hexagon per ASTM A 563.
      a. For type 1 or 2 plain bolt - Grade C, plain nut.
      b. For slip joint bolting - Standard nut plus jam nut or locking nut.
   3. Washers for High-Strength Bolts: Hardened steel per ASTM F 436.
      a. For type 1 or 2 plain bolt - Finished washer, plain.
   4. Anchor Rods: ASTM F1554, Grade 55, with weldability supplement S1 (with the carbon equivalent formula in ASTM F1554 Section S1.5.2.1), threaded and nutted top and bottom, unless otherwise noted, with ASTM A563,Grade A, heavy hexagon carbon steel nuts, and ASTM F436, Type 1, hardened carbon steel washers. ASTM AF1554 steel

rod, threaded and of lengths noted, but to project not less than 1 inch above nut unless otherwise noted.

5. Common Bolts: Unfinished bolts per ASTM A 307, Grade A, with hexagon heads. Furnish of lengths required to suit thickness of materials joined, but to project not more than ¼ inch beyond nut.
6. Nuts for Common Bolts: Grade A, hexagon, per ASTM A 563.

C. Structural Steel Primer Paint: A white, flat finish, lead and chromate free, rust inhibitive alkyd primer meeting or exceeding the performance requirements of SSPC-Paint 25.
   1. Tnemec “99W White”
   2. Sherwin Williams “Universal Metal Primer B50WW8”
   3. PPG/Pittsburgh Paints “2.8 VOC Alkyd Primer UC87019”
   4. International Coatings, Inc. “Interlac 260FD”

2.2 MANUFACTURED UNITS

A. Trusses
   1. Fabricate of span, depth, and panel point spacing shown, using members of types and sizes noted, with properly sized, welded connections. In general, align members so that center of gravity or gage lines of various members intersect at panel points. Where center of gravity lines do not intersect at panel points, make provisions for stresses resulting from eccentricity.
   2. Connect truss members with gusset plates at intersections. Design gusset plates to sustain 100 percent of maximum vertical and horizontal shear components per referenced AISC “Detailing Manual”, unless otherwise noted. Oversize gusset plates to provide sufficient length for welding. Arrange gusset plates at ends of single member verticals symmetrical to gauge line of members.
   3. Shop fabricate trusses in single units without splices in top and bottom chords. Where trusses are too large for shipment, fabricate trusses in sections with approved splices located outside the middle third of truss. Do not splice top and bottom chord members at points of maximum stress. Detail splices in members to develop full strength of members.
   4. Do not make holes in bottom chord members except for splicing. Provide reinforcing to compensate for reduction of area caused by bolt holes in tension members.

2.3 COMPONENTS

A. Steel Structural Tubing: Hollow structural square or rectangular shapes, cold-formed per ASTM A 500 Grade B except where higher strength is noted or specified on Drawings.

B. Steel Pipe: Hollow structural round shapes per ASTM A 53, Type S, Grade B or cold-formed per ASTM A 500, Grade B except where higher strength is noted or shown on Drawings.

C. Columns:
   1. Furnish columns in single lengths, without splices, except where multiple lengths are shown. Fabricate columns straight and true for full length per referenced AISC Specifications.
   2. Fabricate columns with base and cap plates. Cut and finish column ends square at base plates, cap plates, and splices. Provide slotted holes for connections at top of wind columns to permit deflection of framing member above.
   3. Fabricate base and cap plates from rolled steel plates. Press, flatten, or mill plates to obtain proper bearing per AISC requirements. Weld plates to columns at both web and flanges of column. Provide anchor bolt holes and grout holes in plates, oversized per AISC recommendations, to permit slight adjustment in column location.

D. Girders and Beams
   1. Fabricate with natural camber up. Natural camber shall not exceed 1/8-inch for every 10 feet of span.
   2. Provide double angle connections for beams and girders to develop not less than:
      a. 50 percent of total allowable uniform load for non-composite members.
      b. Loads shown on Drawings.
   3. Connections need not exceed 100 percent of allowable web shear of member.

E. Miscellaneous Framing
   1. Fabricate bracing so as to provide draw for alignment of framing. Fabricate connections at both ends of bracing members to develop not less than 100 percent of full strength of member.

2.4 FABRICATION

A. Furnish and fabricate per the design and details shown and per approved shop drawings.
   1. Fabricate shop connections for welding or high-strength bolting.
   2. Fabricate field connections for high-strength bolting.
   3. Fabricate field connections as follows:
      a. Main members, members in braced bays, and purlins aligned with sway frames. High strength bolting.
      b. Other members: Either high-strength or common bolting.
   4. Fabricate field connections that cannot be bolted for welding.

B. Provide holes for bolted connections during shop fabrication. Do not burn or torch-cut holes. Drill, do not punch, holes in material 7/8-inch thick or greater.

C. Provide holes, 1/16 inch-diameter larger than bolt diameters for connection of wood nailers. Locate and space holes as noted; otherwise space holes 24-inches on center.

D. Fabricate items built or anchored into adjacent concrete construction with anchorage devices, bolts and anchors.

E. Provide clips, ties, lugs, separators, bolts, fittings, shims, fillers, connectors, weld electrodes, and miscellaneous items required for fabrication and erection of field-connected materials.

F. Furnish members of proper length and assemble without excessive use of fillers. Join and assemble members without sharp projections, serrated edges, sharp edges, or sharp corners at joints. Cope, block, miter, and grind edges with care. Furnish members free from twists, bends, distortions and open joints. Mark pieces with same identifying number or symbol as used to identify pieces on shop drawings.

G. Welding
1. Perform welding with specified electrodes and qualified welders, welding operators, and tack welders per specified Reference Standards. Provide necessary jigs and holding devices for shop welding. Dog or clamp down work to prevent distortion during welding. Control welding sequence to minimize residual stresses and member distortion.
2. Where possible design weld details and procedures to permit welding in flat and horizontal position using ANSI/AWS prequalified welds. Avoid undercut, insufficient throat or leg, lack of fusion, and weld spatter. Repair defective welds immediately or remove and install new welds conforming with Specifications, at no extra cost to Owner. Qualify non-prequalified welds per ANSI/AWS D1.1-96.
3. Place “SMAW” fillet welds larger than 5/16-inch in not less than two passes. Remove slag coating before starting succeeding pass. Weld lengths shall be net effective lengths. Add approximately ¾-inch to theoretical length of intermittent welds to allow for craters. Fill craters.
4. Conform to minimum thickness, preheat, and interpass requirements. Minimum weld size shall be based on material thickness and shall not be reduced by preheating.
5. For welds exposed to weather, make continuous welds so as to be weather tight and grind smooth.
6. Welding Electrodes:
   a. Shielded Metal Arc Welding: E70 series electrodes per ANSI/AWS A5.1 or A5.5.
   b. Submerged Arc Welding: Flux and F7 series electrodes per ANSI/AWS A5.17 or A5.23.
   c. Gas Metal Arc Welding: Solid ER07 series electrodes per ANSI/AWS A5.18.
   d. Flux Cored Arc Welding: E7 series electrodes per ANSI/AWS A5.20.

2.5 FINISHES

A. Surfaces not to be shop painted include:
1. Contact surfaces at slip critical connections.
2. Surfaces at field welds to 2-inches beyond weld areas.
3. Steel members to be galvanized.
4. Steel surfaces in contact with concrete or steel members embedded in concrete.

B. Surfaces to be shop painted include:
1. All surfaces except as defined under “Surfaces not to be shop painted”.
2. Surfaces inaccessible after shop assembly.

3. Surfaces at bearing-type connections.

C. Surfaces to be painted after connections are made include:
1. Surfaces at slip critical connections.
2. Surfaces at welded connections.

D. Preparation, Cleaning
1. Except as otherwise specified in later paragraphs, clean steel to be shop-painted by power tool cleaning per SSPC-SP3. Standard for surface preparation to be achieved by cleaning shall be B, C, D St 3, or B, C, D Sa 1, per SSPC-Vis1-67T.
2. For slip critical connections, clean shop-contact surfaces per Paragraph A above and to Class A surface condition per Table 3 of "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts".
3. For field-contact surfaces, clean surfaces per Paragraph 1 above.
4. Clean remaining steel per SSPC-SP3 or SSPC-SP7.
5. Definition of cleaning and its visual aspects are as follows:

	Specification and Subject	Photo SSPS-Vis 1	Purpose
SSPC-SP3	Power Tool Cleaning	B,C,D St 3	Removal of loose rust, loose mill scale, and loose paint to degree specified, by power tool chipping, descaling sanding, wire brushing and grinding.
SSPC-SP7	Brush-Off Blast Cleaning	B,C,D Sa 1	Removal of loose rust, loose mill scale, and loose paint to degree specified by brush-off blast cleaning. Tightly adhered mill scale, rust and paint may remain on surface.
SSPC-SP6	Commercial Blast Cleaning	B,C,D Sa 2	Blast cleaning until at least two-thirds of each element of surface area is free of visible residues.
SSPC-SP10	Near White Blast Cleaning	B,C,D Sa 2-1/2	Blast cleaning nearly White Metal cleanliness, until at least 95 percent of each element of surface area is free of visible residues.
SSPC-SP5	White Metal Blast Cleaning	B,C,D	Removal of visible rust, mill scale, paint and foreign matter by blast cleaning by wheel or nozzle using sand, grit or shot.

6. Clean steel to be shop-painted by commercial blast cleaning per SSPC-SP6. Standard for surface preparation to be achieved by cleaning shall be B, C, D Sa 2 if appropriate, per SSPC-Vis1-67T.

7. The definition of cleaning and its visual aspects are as follows:

	Specification and Subject	Photo SSPS-Vis 1	Purpose
SSPC-SP6	Commercial Blast Cleaning	B,C,D Sa 2	Blast cleaning until at least two-thirds of each element of surface area is free of visible residues.

E. Shop Priming
1. Apply one coat of priming paint, unless otherwise specified or noted on Drawings.
2. Priming Paint (VOC Compliance):
   a. Standard “Stano-Primer Rust Inhibitive Primer”
   b. Tnemec “Azeron Primer FD88”
   c. Sherwin Williams “Kem Kromik Universal Metal Primer B50WZ1”
   d. Devoe “Devguard 4160 Multi-Purpose Primer”
3. Touch-up Paint on Galvanized Steel (VOC Compliance):
   a. Devoe Paint “All Purpose metal and Galvanized Primer (5229)”
   b. Standard Detroit Paint “Hydro Grip W.R. Primer White”.
   c. Sherwin-Williams “Recoatable Epoxy Primer B67R5”.
4. Apply paint to clean, dry surfaces by brush, spray, or roller. Do not use dipping process.
5. Apply paint coating evenly and uniformly, without skips or runs, to produce dry paint film thickness of not less than 2.0 mils.
6. Allow paint to dry before handling or loading steel work for shipment. Apply erection marks on members after painting in same location and of same design as shown on approved erection drawings.

F. Galvanizing
1. Galvanize members exposed to weather when in final location, unless otherwise noted, and members specifically noted on Drawings as galvanized.
   a. Galvanized rolled, pressed and forged steel shapes, plates, bars and strips per ASTM A 123 with an average weight of zinc coating of 2.0 ounces per square foot of actual surface for members less than ¼-inch thick, and 2.3 ounces per square foot of actual surface for members ¼-inch and thicker.
   b. Galvanized iron and steel hardware per ASTM A 153 with minimum weight of zinc coating, in ounces per square foot of surface per TABLE 1 of ASTM A 153, for various classes of materials used on project.
2. Apply galvanizing after built-up members are completely fabricated. Straighten shapes and assemblies true to line and plane after galvanizing. Repair damage to galvanized surfaces with galvanized touch-up paint.
3. Remove excess zinc from bolt holes and shop fit specified bolts in holes.

4. Follow proper detailing and fabrication procedures per ASTM A 143, A 384 and A 385 to provide optimum hot dip galvanizing.

PART 3 EXECUTION

3.1 ERECTION

A. Erect and install members accurately to lines and elevations shown. Unless otherwise noted, erect vertical members plumb, horizontal members level, and intersections of members at right angles. Make connections after members have been plumbed, leveled, and aligned properly.

B. Connect members temporarily with sufficient bolts to insure safety of structure until permanent connections are made. Use bolts of same size and type as used for permanent connections. Remove temporary bolts as permanent connections are made and install permanent bolts of type specified.

C. Tension bracing while aligning framing. Clamp horizontal bracing to beams at intersections. Where shown, join bracing intersections with splice plates.

D. Members that do not fit together during erection because of errors in shop fabrication shall be reported to Registered Design Professional. Correct minor misfits as part of field erection. Only light drifting shall be permitted to draw members together. Drifting to match unfair holes shall not be permitted. Reaming to match unfair holes shall be permitted provided that quantity of reaming does not exceed 1/16-inch and that reaming to be done does not decrease critical edge distance beyond amount considered minimum by referenced AISC Specification. Where necessary to enlarge holes, criteria specified for holes made in shop shall apply to holes made in field, and proper size bolt shall be used. Where misfitting members cannot be corrected as specified above, provide new members. Correct misfit members, including replacement, at no additional cost to Owner and without altering Contract Schedule and Completion Date.

E. Do not cut or alter any members in the field without prior written consent from Registered Design Professional. Use hacksaw to cut members in the field. Do not burn or flame cut members in the field without prior written consent of Registered Design Professional. If consent is given, burned members shall be free from serrations and gouges at radius burns and at re-entrant corners. Occasional serrations not exceeding 1/16 -inch in depth shall be permitted along straight cuts. Grind burned edges to remove sharp edges and corners. Burning of holes shall not be permitted.

F. Place grout under steel column bases and elsewhere as shown. Mix and place grout per manufacturers directions. Place grout to fill voids and to make full contact with underside of bearing surfaces. Place grout as soon as possible and before installation of enclosure systems.

G. Apply protective coating to structural members including base plates and anchor rods that occur in fill areas below floor slabs where members are not encased in concrete. Clean surfaces and apply coating per manufacturer's recommendations to minimum one-coat dry film thickness of 5 mils.

3.2 CONNECTIONS

A. Welding
   1. Complete field welding per requirements specified for shop welding.

B. High Strength Bolting
   1. Install high strength steel bolts per referenced "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts". Tension each bolt by "turn-of-nut tightening" method or "alternate design bolt" method to a total not less than that stated in referenced "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts" for type and size of bolt used.
   2. Install bolt in properly sized hole and place washer under turned element. Tension bolt assembly as specified until required tension is obtained. Do not loosen and reuse bolt assembly after it has been tensioned.
   3. Before bolting members, clean faying surfaces of defects, coatings, and contaminants that would prevent solid seating of parts or that would interfere with development of friction between parts for slip-critical connections.

C. Common Bolting
   1. Where bolts shall be exposed in finished work, install bolts so that nut end shall not be exposed to view. Draw connections up tight using impact wrenches. Use lock washers for common bolting.

3.3 REPAIR/RESTORATION

A. Degrease, clean and field paint portions of bolts, washers, faying surfaces, adjacent surfaces that remain exposed after assembly, unpainted splice plates, cover plates, welded areas and paint surfaces damaged during shipment and erection. Paint with one coat of same type prime paint used in shop.

B. After erection of steel, shop coat of paint on exposed framing shall be suitable to receive General Painter's field coats. Where surfaces are damaged during erection or where necessary for General Painter to scrape off shop coat and repaint same, or to remove clay, mud and other foreign materials, cost of this work shall be borne by Contractor.

C. It is the intent that shop coat of paint serve as finish coat for steel members, with no additional coats being applied to members (except that columns and door frames shall receive an additional finish coat applied by General Contractor.) After erection, examine shop coat and touch-up paint damaged and bare areas (including welds and fasteners). If surfaces are not adequately covered, as determined by Resident Construction Engineer, apply further coats to achieve complete coverage of surfaces at no additional cost to Owner. Completed surfaces

shall be clean, free of dirt, mud and other foreign matter; if surfaces are soiled, clean and repaint same as directed.

D. After erection of steel, clean galvanized surfaces to be free from clay, mud, and other foreign matter. Apply zinc rich touch-up paint per ASTM A 780 to surfaces damaged during shipment and erection.

3.4 FIELD QUALITY CONTROL

A. The Owner will provide for field inspection of work, at his expense. Requirements shall be similar to those specified for shop inspection. Besides testing of welds, high strength bolted connections shall be tested and checked by Testing Agency using calibrated torque wrench per referenced “Specification for Structural Joints Using ASTM A 325 or A 490 Bolts”. If one or more bolts in any connection are found to be below minimum tension, bolts in that connection shall be checked. Retorque bolts found to be below minimum tension. Bolts shall be rechecked for conformance to Specification.

B. Framing shall be inspected for plumb of vertical members, level or slope of horizontal members, alignment and plane of vertical and horizontal members, angle of intersection of members, defective members, efficiency of common bolt connections, primer coating, touch-up painting, and to ascertain that materials are furnished and erected in accordance with requirements of Contract Documents.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT AND PAYMENT

A. Measurement and payment will be as specified in the Contract Documents and under the pay item “Wooden Footbridge”.

END OF SECTION

SECTION 055000 – METAL FABRICATIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF THE WORK

A. The extent of miscellaneous metals includes, but is not necessarily limited to, the following:
   1. reinforcing steel for concrete walks and concrete pads.

1.03 SUBMITTALS

A. Product Data:
   1. Submit manufacturer's product specifications, handling/installation/curing instructions, and performance tested data sheets for each elastomeric product required.

PART 2 - PRODUCTS

2.01 REINFORCING STEEL

A. Grade 60 new billet or rail steel, epoxy coated or galvanized by the manufacturer.

B. This reinforcing steel shall be of American manufacture, per state requirements.

PART 3 - EXECUTION

3.01 GENERAL

A. Install all items per manufacturer's installation requirements or as shown on the drawings.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT AND PAYMENT

A. Measurement and payment will be as specified in the Contract Documents and under the pay item “Cast-in-Place (Concrete Walk)” and “Cast-in-Place (Concrete Pads)”.

END OF SECTION

SECTION 061063 - EXTERIOR ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Wood decking and support framing for Wood Footbridges.

1.3 DEFINITIONS

A. Boards: Lumber of less than 2 inches nominal (38 mm actual) in thickness and 2 inches nominal (38 mm actual) or greater width.

B. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) or greater but less than 5 inches nominal (114 mm actual) in least dimension.

C. Timber: Lumber of 5 inches nominal (114 mm actual) or greater in least dimension.

D. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. NeLMA: Northeastern Lumber Manufacturers' Association.
2. NLGA: National Lumber Grades Authority.
3. RIS: Redwood Inspection Service.
4. SPIB: The Southern Pine Inspection Bureau.
5. WCLIB: West Coast Lumber Inspection Bureau.
6. WWPA: Western Wood Products Association.

1.4 ACTION SUBMITTALS

A. Product Data: For preservative-treated wood products

1. For preservative-treated wood products, include chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material. Also include copies of warranties from chemical treatment manufacturers for each type of treatment.

B. Treatment Certificates: Submit certificates for preservative treated lumber when requested by the governmental authority having jurisdiction. Certificate to be from an independent accredited testing agency having re-examination inspection service at the treating plant.

1.5 INFORMATIONAL SUBMITTALS

A. Material Certificates:

1. For lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by ALSC's Board of Review.
2. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained

B. Certificates of Inspection: Issued by lumber grading agency for exposed wood products not marked with grade stamp.

C. Evaluation Reports: For the following, showing compliance with building code in effect for the project

1. Preservative-treated wood products.
2. Decking fasteners.

1.6 QUALITY ASSURANCE

A. Experience:

1. Contractor is required to prove a work history with no less than ten (10) years experience in design and construction of bridges and boardwalks in similar conditions using deck-level construction methods. Contractor to provide five references to Client for projects completed within the last five years. Projects to be of a similar size, scope and within southwest Florida.

2. Contractor is to provide engineered drawings, calculated and sealed by a professional engineer licensed in the state of the project.

A. Requirements for Preservative Treatment.

1. Preservative pressure treated lumber and plywood shall be clean and free of surface deposits.
2. Each piece shall be indelibly ink stamped with the quality mark of an approved independent third party inspection agency having a follow-up testing and inspection service at the treating plant over the quality of the treated product, and whose service is certified by an approved overview agency such as American Wood Preservative Association (AWPA).

B. Requirements for Loading

1. All boardwalks shall be designed for a minimum uniform live load of 100 pounds per square foot (per ADA requirements).

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials under cover and protected from weather and contact with damp or wet surfaces. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

B. Deliver and store lumber at the project site in a manner to minimize exposure to moisture migration and damage.

C. Exercise special care in storing, handling and installation of preservative treated lumber as to prevent moisture absorption of such items.

PART 2 - PRODUCTS

2.1 LUMBER, GENERAL

A. Lumber: Comply with DOC PS 20 and with applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by ALSC's Board of Review. Provide lumber graded by an agency certified by ALSC's Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each item with grade stamp of grading agency.
2. For items that are exposed to view in the completed Work, mark grade stamp on end or back of each piece.
3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry wood products.
4. Provide dressed lumber, S4S, unless otherwise indicated.

B. Certified Wood: Wood products shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

2.2 DIMENSION LUMBER

A. Maximum Moisture Content: 19 percent.

B. Exposed Lumber: Provide material hand selected for freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot holes, shake, splits, torn grain, and wane.

C. Deck Framing: Structural No. 1 grade and the following species:

1. Southern pine; SPIB.

D. Deck Framing: Required species and grade with a modulus of elasticity of at least 1,500,000 psi (10 350 MPa) and an extreme fiber stress in bending of at least 100 psi for 2-inch nominal (38-mm actual) thickness and 12-inch nominal (286-mm actual) width for single-member use.

E. Dimension Lumber Posts: No. 2 grade and the following species:

1. Mixed southern pine; SPIB.

F. Dimension Lumber Decking: No. 2 grade and the following species:

1. Mixed southern pine; SPIB.

G. Dimension Lumber Railing Members: Structural No. 1 grade and the following species:

1. Mixed southern pine; SPIB.

2.3 BOARDS

A. Maximum Moisture Content: 19 percent.

B. Provide boards hand selected for freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot holes, shake, splits, torn grain, and wane.

C. Board Decking: 1-1/4-inch- (32-mm-) thick radius-edged decking of the following species and grades:

1. Southern pine, Premium, SPIB.

D. Railing Boards:

1. Southern pine, B & B finish; SPIB.

2.4 TIMBER

A. Maximum Moisture Content: 19 percent.

B. Dressing: Provide timber that is rough sawn (Rgh) unless otherwise indicated.

C. Timber Posts: Southern pine; No. 1, SPIB.

2.5 ROUND WOOD POLES

A. Round Wood Poles: Clean-peeled wood poles complying with ASTM D 3200; with at least 80 percent of inner bark removed and with knots and limbs cut flush with the surface.

B. Species: Southern Pine.

2.6 PRESERVATIVE TREATMENT

A. Pressure treat boards and dimension lumber with ammoniacal copper quat (ACQ) type D in accordance with the American Wood Preservers Association (AWPA) standard P5-02 and A9-01. All lumber and timbers shall be pressure impregnated under AWPA standards C1-02, C2-02 and C18-99 where applicable. All piling shall be pressure preservative treated with Chromated Copper Arsenate (CCA) Type C in accordance with AWPA Standards: C1-02, C3-99 or C18-99 where applicable.

B. Minimum retention's and penetrations for lumber and timber:

Application	Retention (Lb. Oxide/Cu/Ft.)	Penetration
Above ground	.40	2.5" or 85% of sapwood
Soil contact	.40	2.5" or 85% of sapwood
Fresh water	.60	2.5" or 85% of sapwood
Salt splash	.40	2.5" or 85% of sapwood

Minimum Retention and Penetration for Pilings:

Application	Retention (Lb. Oxide/Cu/Ft.)	Penetration
Land and Fresh Water	.80	3.5" or 90% of Sapwood
Salt Water	2.5	3.5" or 90% of Sapwood

C. After treatment, redry boards, dimension lumber, timber and poles to 19 percent maximum moisture content.

D. Mark treated wood with treatment quality mark of an inspection agency approved by ALSC's Board of Review.

1. For items indicated to receive a stained or natural finish, mark each piece on surface that will not be exposed.se will

E. Application: Treat all exterior rough carpentry unless otherwise indicated.

2.7 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches (38 mm) into wood substrate.

1. For pressure-preservative-treated wood, use stainless-steel fasteners, fabricated from Type 304 stainless steel (AISI).

B. Nails: ASTM F 1667.

C. Power-Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

E. Lag Screws: ASME B18.2.1 (ASME B18.2.3.8M).

F. Stainless-Steel Bolts: ASTM F 593, Alloy Group 1 (ASTM F 738M, Grade A1); with ASTM F 594, Alloy Group 1 (ASTM F 836M, Grade A1) hex nuts and, where indicated, flat washers.

G. Postinstalled Anchors: Stainless-steel anchors with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry assemblies and equal to four times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Stainless-steel bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 (ASTM F 738M and ASTM F 836M, Grade A1).

H. Bar or Strap Anchors: Stainless steel, Type 304 or 316.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Contractor shall perform all work from the deck level (“build as you go”) and all foot traffic will be contained within six feet from the bridges.

C. Owner or general contractor is to provide correct elevations and center lines before commencement of work, for all bridges and/or walls.

D. Owner or general contractor is to provide adequate access to the site for construction materials and equipment.

E. Site preparation for the construction of all boardwalk work must be substantially completed prior to commencement of boardwalk work. All site preparation, backfilling and finish grading is the responsibility of the boardwalk contractor.

F. Boardwalk contractor is responsible for obtaining the City of Bradenton building permitting and any submittals, costs, fees, taxes or other charges as required by state or local agencies.

G. Boardwalk construction does not include any irrigation or waterline work, electrical-related work, concrete work, or any type of wood finishing or treatment, unless specified herein.

H. Boardwalk construction will not be delayed or hindered by the owner, general contractor, other sub-contractors, without advance and sufficient notice. Boardwalk contractor will not be held responsible or liable for work stoppage due to inclement weather or natural disasters.

I. Contractor shall procure necessary information about the site and soil conditions. Soil tests shall be procured by Contractor.

J. Proceed with installation only after unsatisfactory conditions have been corrected.

K. Contractor shall completely remove all scrap, debris and unused material from the site and haul to an approved disposal area.

L. Contractor is required to have the boardwalks inspected by a third party at commencement of pile setting and after construction is complete to provide for quality assurance.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Prime lumber to be painted, including both faces and edges. Cut to required lengths and prime ends.

3.3 INSTALLATION, GENERAL

A. Set exterior rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit exterior rough carpentry to other construction; scribe and cope as needed for accurate fit.

B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction" unless otherwise indicated.

C. Install wood decking with crown up (bark side down).

D. Do not splice structural members between supports unless otherwise indicated.

E. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with

function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

F. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use copper naphthenate for items not continuously protected from liquid water.

G. Securely attach exterior rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
3. Table 23-II-B-1, "Nailing Schedule," in ICBO's Uniform Building Code.
4. Table 2305.2, "Fastening Schedule," in BOCA's BOCA National Building Code.
5. Table 2306.1, "Fastening Schedule," in SBCCI's Standard Building Code.
6. Table R602.3(1), "Fastener Schedule for Structural Members" and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.

H. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads unless otherwise indicated.

I. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.

J. Field curring (ripping) along the grain is not allowed for preservative treated lumber.

3.4 DECK JOIST FRAMING INSTALLATION

A. General: Install joists with crown edge up and support ends of each member with not less than 1-1/2 inches (38 mm) of bearing on wood or metal, or 3 inches (76 mm) on masonry. Attach joists where framed into wood supporting members by using wood ledgers as indicated or, if not indicated, by using metal joist hangers. Do not notch joists.

B. Frame openings with headers and trimmers supported by metal joist hangers; double headers and trimmers where span of header exceeds 48 inches (1200 mm).

C. Lap members framing from opposite sides of beams or girders not less than 4 inches (102 mm) or securely tie opposing members together. Provide solid blocking of 2-inch nominal (38-mm actual) thickness by depth of joist over supports.

3.5 RAILING INSTALLATION

A. Balusters: Fit to railings, glue, and screw in place. Countersink fastener heads, fill flush, and sand filler.

B. Newel Posts: Secure to stringers and risers with countersunk-head wood screws and glue.

C. Railings: Secure wall rails with metal brackets. Fasten freestanding railings to newel posts and to trim at walls with countersunk-head wood screws or rail bolts and glue.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT AND PAYMENT

D. Measurement and payment will be as noted in the Contract Documents and under the pay items “Wooden Footbridge”.

END OF SECTION 061063

SECTION 061323 - HEAVY TIMBER CONSTRUCTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes framing using timbers and wood poles for Wooden Footbridge.

B. Related Sections:
   1. Division 06 Section "Wood Decking" for wood decking.
   2. Division 06 Section “Timber Piles” for timber pile foundations.

1.3 DEFINITIONS

A. Timbers: Lumber of 5 inches nominal (114 mm actual) or greater in least dimension.

B. Poles: Wood members, called either "poles" or "posts" in the referenced standards.

C. Inspection agencies, and the abbreviations used to reference them, include the following:

   1. NeLMA - Northeastern Lumber Manufacturers Association.
   2. NHLA - National Hardwood Lumber Association.
   3. NLGA - National Lumber Grades Authority.
   4. SPIB - Southern Pine Inspection Bureau.
   5. WCLIB - West Coast Lumber Inspection Bureau.
   6. WWPA - Western Wood Products Association.

1.4 ACTION SUBMITTALS

A. Product Data: For preservative-treated wood products and timber connectors.

   1. For preservative-treated wood products, include chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
   2. For timber connectors, include installation instructions.

1.5 INFORMATIONAL SUBMITTALS

A. Material Certificates:

1. For heavy timber construction specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by ALSC's Board of Review.
2. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

B. Certificates of Inspection: Issued by lumber grading agency for exposed timber not marked with grade stamp.

C. Shop Quality: For heavy timber construction show layout, dimensions of each member and details of construction.

1.6 QUALITY ASSURANCE

A. Timber Standard: Comply with AITC 108, "Standard for Heavy Timber Construction."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Schedule delivery of heavy timber construction to avoid extended on-site storage and to avoid delaying the Work.

B. Store materials under cover and protected from weather and contact with damp or wet surfaces. Provide for air circulation within and around stacks and under temporary coverings.

PART 2 - PRODUCTS

2.1 TIMBER

A. General: Comply with DOC PS 20 and with grading rules of lumber grading agencies certified by ALSC's Board of Review as applicable.

1. Factory mark each item of timber with grade stamp of grading agency.
2. For exposed timber indicated to receive a stained or natural finish, apply grade stamps to surfaces that will not be exposed to view, or omit grade stamps and provide certificates of grade compliance issued by grading agency.

B. Certified Wood: Timber shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

C. Timber Species and Grade: Southern pine; Dense Select Structural, SPIB.

D. Moisture Content: Provide timber with 19 percent maximum moisture content at time of dressing.

E. Dressing: Provide dressed timber (S4S) timber that is rough sawn (Rgh) unless otherwise indicated.

F. End Sealer: Manufacturer's standard, transparent, colorless wood sealer that is effective in retarding the transmission of moisture at cross-grain cuts and is compatible with indicated finish.

G. Penetrating Sealer: Manufacturer's standard, transparent, penetrating wood sealer that is compatible with indicated finish.

H. Low-Emitting Materials: Sealers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 WOOD POLES

A. Wood Poles: Clean-peeled wood poles complying with ASTM D 3200; with at least 80 percent of inner bark removed and with knots and limbs cut flush with the surface.

B. Species: Southern Pine.

2.3 PRESERVATIVE TREATMENT

A. All lumber and timbers shall be pressure treated with ammoniacal copper quat (ACQ) type D in accordance with the American Wood Preservers Association (AWPA) standard P5-02 and A9-01.

B. All lumber and timbers shall be pressure impregnated under AWPA standards C1-02, C2-02 and C18-99 where applicable.

C. Use process that includes water-repellent treatment.

D. After treatment, redry timber and poles to 19 percent maximum moisture content.

E. Mark treated timber and poles with treatment quality mark of an inspection agency approved by ALSC's Board of Review.

1. For exposed items indicated to receive a stained or natural finish, mark each piece on surface that will not be exposed.

F. Application: Treat all heavy timber construction unless otherwise indicated.

2.4 TIMBER CONNECTORS

A. General: Unless otherwise indicated, fabricate from the following materials:

1. Structural-steel shapes, plates, and flat bars complying with ASTM A 36/A 36M.
2. Round steel bars complying with ASTM A 575, Grade M 1020.
3. Hot-rolled steel sheet complying with ASTM A 1011/A 1011M, Structural Steel, Type SS, Grade 33.
4. Stainless-steel plate and flat bars complying with ASTM A 666, Type 304.
5. Stainless-steel bars and shapes complying with ASTM A 276, Type 304.
6. Stainless-steel sheet complying with ASTM A 666, Type 304.

B. Fabricate beam seats from stainless steel with 3/16-inch (8-mm), 3/8-inch (9.5-mm) bearing plates, 3/4-inch- (19-mm-) diameter-by-12-inch- (300-mm-) long deformed bar anchors, and 0.239-inch (6-mm) side plates.

C. Fabricate beam hangers from stainless steel with 0.179-inch (4.6-mm) stirrups and 0.239-inch (6-mm) top plates.

D. Fabricate strap ties from stainless steel, 2-1/2 inches (63 mm) wide by 0.179 inch (4.6 mm) thick.

E. Fabricate tie rods from round steel bars with upset threads connected with forged-steel turnbuckles complying with ASTM A 668/A 668M.

F. Provide bolts, 3/4 inch (19 mm) unless otherwise indicated, complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); provide nuts complying with ASTM A 563 (ASTM A 563M); and, where indicated, provide flat washers.

G. Provide shear plates, 2-5/8 inches (66.7 mm) in diameter, complying with ASTM D 5933.

H. Finish steel assemblies and fasteners with rust-inhibitive primer, 2-mil (0.05-mm) dry film thickness.

1. Primer shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.5 FABRICATION

A. Camber: Fabricate horizontal members and inclined members with a slope of less than 1:1, with natural convex bow (crown) up, to provide camber.

B. Shop fabricate members by cutting and restoring exposed surfaces to match specified surfacing. Finish exposed surfaces to remove planing or surfacing marks, and to provide a finish equivalent to that produced by machine sanding with No. 120 grit sandpaper.

C. Predrill for fasteners and assembly of units.

D. Where preservative-treated members are indicated, fabricate (cut, drill, surface, and sand) before treatment to greatest extent possible. Where fabrication must be done after treatment, apply a field-treatment preservative to comply with AWPA M4.
   1. Use copper naphthenate treatment for members in contact with the ground or not continuously protected from liquid water.

E. Coat crosscuts with end sealer.

F. Seal Coat: After fabricating and surfacing each unit, apply a saturation coat of penetrating sealer on surfaces of each unit except for treated wood where the treatment included a water repellent.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Erect heavy timber construction true and plumb. Provide temporary bracing to maintain lines and levels until permanent supporting members are in place.

   1. Install heavy timber construction to comply with Shop Drawings.
   2. Install horizontal and sloping members with crown edge up and provide not less than 4 inches (102 mm) of bearing on supports. Provide continuous members unless otherwise indicated; tie together over supports if not continuous.
   3. Handle and temporarily support heavy timber construction to prevent surface damage, compression, and other effects that might interfere with indicated finish.

B. Cutting: Avoid extra cutting after fabrication. Where field fitting is unavoidable, comply with requirements for shop fabrication.

C. Fit members by cutting and restoring exposed surfaces to match specified surfacing. Predrill for fasteners and assembly of units.

   1. Finish exposed surfaces to remove planning or surfacing marks, and to provide a finish equivalent to that produced by machine sanding with No. 120 grit sandpaper.
   2. Coat crosscuts with end sealer.
   3. Where preservative-treated members must be cut during erection, apply a field-treatment preservative to comply with AWPA M4.
      a. Use copper naphthenate treatment for members in contact with the ground or not continuously protected from liquid water.

D. Install timber connectors as indicated.

   1. Unless otherwise indicated, install bolts with same orientation within each connection and in similar connections.
   2. Install bolts with orientation as indicated or, if not indicated, as directed by Architect.

3.2 ADJUSTING

A. Repair damaged surfaces and finishes after completing erection. Replace damaged heavy timber construction if repairs are not approved by Architect.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT AND PAYMENT

A. Measurement and payment will be as specified in the Contract Documents and under the pay item “Wooden Footbridge”.

END OF SECTION 061323

SECTION 061505 – PVC WOOD DECK WRAPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. PVC sheet used as a barrier for wrapping wood piles.

B. Related Sections:

1. Division 06 Section "Exterior Rough Carpentry" for wood decking for elevated decks.

1.3 ACTION SUBMITTALS

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

1. For polyvinyl chloride sheet, include chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.

B. Samples: 4” x 4” inches, showing the thickness, color and finish on the sheet.

1.4 QUALITY ASSURANCE

A. Comply with ASTM Standards D822, Method A, D792, D1004, D1203 and D1204.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Schedule delivery of product to avoid extended on-site storage and to avoid delaying the Work.

B. Store materials under cover and protected from weather and contact with damp or wet surfaces.

PART 2 - PRODUCTS

2.1 POLYVINYL CHLORIDE SHEET, GENERAL

A. General: Polyvinyl chloride sheet shall be used as the barrier and it shall be new, seamless, nonrigid, domestic, virgin homopolymer material. The sheet shall be uniform throughout; free from dirt, oil, and other foreign matter and commercially free from cracks, creases, bubbles, pits, tears, holes, and any defect that may affect its service.

B. The plasticizer system shall be such as to insure stability and adequate resistance to fungal and bacterial degradation. Suitable stabilizers shall be incorporated into the resin to impart durability. The use of water-soluble compounds ingredients is prohibited.

C. A black pigment shall be dispersed to produce and even color which is fade resistant in sunlight.

D. The polyvinyl chloride sheet shall be of width ample to encircle each pile and allow for a minimum of 1-1/2 revolutions of the pole pieces for final fastening.

E. The thickness of the sheet shall be 0.060” with a plus tolerance of 0.005” and no minus tolerance, and the sheet shall conform to the following mechanical and physical re quirements as tested by reference ASTM Standards:

Property	**Requirement**	**Test Method**
Tensile Strength		
Machine Direction	2,500 psi, min.	D882, Method A
Transverse Direction	2,000 psi, min.	D882, Method A
Elongation	300% Both Directions	D882
Volatility	1.5% man. Weight loss	D1203
Graves Tear	300 lb/in	D1004
Shrinkage	5% max. (30min @ 212°)	D1204
Specific Gravity	1.20 – 1.35	D792

F. Water extraction shall be determined in accordance with ASTM D543, Method I, using sea water as the reagent, except that the Specimens shall be dried for 6 hours at 70° C (158° F), 1 hour at 100° C (212° F) and overnight at the conditioning temperature before reweighting. The weight loss shall be not more than 0.75 percent.

G. Flexibility test shall be in accordance with ASTM D747. A stiffness value of 2100 psi ± 10% is acceptable.

H. Fungal degradation shall be determined in accordance with Method No. 5760 of Federal Test Method Standard No. 191, using a quantitative evaluation. The tensile strength of the exposed specimens, in both the machine and transverse directions, shall be no more than 20% below the tensile strength of non-exposed specimens determined in accordance with ASTM D882, Method A. Fungal test results completed within the previous 3 years will be acceptable.

2.2 INTERTIDAL SEALS

A. Intertidal seals shall consist of 0.75" by 3" flexible polymer-type polyurethane foam conforming to the requirements of the following tests:

Tests	**Requirements**
Density (ASTM D1564, Sec. 68 – 73)	1.85 - 2.1 lb/ft^3
Indentation-load-deflection (ASTM D1564, Method "A"; Sec. 19-25)	42 ± 4
Compression Set (ASTM D1564, Sec. 12 - 18) 50% constant deflection – set based upon original thickness	10% maximum
Steam autoclave (ASTM D1564; Condition "B"; Sec. 5 – 11)	
Compression-load-deflection loss (ASTM D1564, Sec. 32 – 37)	± 12%
Tension (ASTM D1564, Sec. 81 – 87): Tensile strength Tensile elongation	 15 lb/inch^2, Min. 200% Min.
Tear Resistance (ASTM D1564, Sec. 74 – 80)	2.0 lb/inch Min.

2.3 STRAPS

A. Straps shall be 0.030" to 0.032" aluminum alloy 5052, H – 34 work hardened. They shall be of sufficient length to completely encircle the pile over the seal area and provide for an additional 12", minimum, for the strapping operation.

2.4 CLIPS

A. Clips will be made from 5052 aluminum tubing, 1½" long by .030" wall thickness, by 1" O.D., pressed to shape with a hole in the middle. Manufacturer will provide clips.

2.5 NAILS

A. Nails shall be of two types:
(1) Type I shall be aluminum alloy 5056 roofing nail with screw shank, 0.150" minimum diameter, 1½" long with ½" minimum head diameter, and equipped with a 3/32" flat neoprene washer.

(2) Type II shall be aluminum alloy 5056 straight 0.215" minimum diameter shank common nail, 4" long, with 13/32" minimum diameter flat head.

2.6 POLE PIECES

A. Pole pieces shall be kiln dried, select heart grade Apitong, clear, straight grain, pitch free, and without slash, knots, splits, checks, or any other defects. It shall be milled to a half round section approximately 1 inch in diameter. The length of each pole piece shall be 2 feet shorter than the length of the wrap to be applied in order to provide a 12" long poly vinyl chloride skirt at each end.

2.7 CREOSOTE MEMBRANE

A. Creosote seal membrane shall be 0.006" thick polyethylene film attached to the inside of the wrap.

2.8 HYDRAULIC GROUTING MORTAR

A. Hydraulic grouting mortar shall be a non-shrinking type of grouting mortar with a minimum compressive strength of 1,500 psi. An approved standard commercial grouting mortar may be used. The approved product shall be delivered to the site of the work in the original sealed containers, each bearing the trade name of the material and the name of the manufacturer.

2.9 SPECIALTY TOOLS

A. Specially designed ratchet wrench sets for spindling the wraps and tensioning tools for tightening the aluminum straps will be provided by the Manufacturer.

2.10 FABRICATION

A. Polyvinyl chloride sections are to be fabricated in modular lengths not to exceed 16' lengths to conform to the pile taper for the full barrier length. A 0.006 mil polyethylene liner shall come preattached when required.

B. Modular units to be installed in the intertidal zone shall have polyurethane foam strips stapled or glued at 3" intervals, ½" extension over the top and bottom edges of the unit.

PART 3 - EXECUTION

3.1 PILE WRAPPING

A. Since this site is tidally influenced, all wooden piles are to be wrapped.

3.2 CLEANING AND SURFACE PREPARATION

A. The entire surface of each pile shall be thoroughly cleaned for the entire length that is to be covered. Cleaning does not require the removal of surface growths from cavities or other indentations that do not come in contact with the plastic barrier; but does require removal of all surface projections such as nails, bolts, large splinters, fouling organisms, and other surface conditions that would either penetrate the PVC or cause undue deformation.

B. Cleaning operations may be done manually or with mechanized equipment. It is not necessary to remove minor surface bumps or other similar unevenness, provided these are smooth, as the plastic material has sufficient elasticity to pass over these surface defects without interfering with the snugness of the overall length.

C. Any depressions or longitudinal cracks in the piles at the top and bottom terminations of the wraps that make it difficult or impossible to attain an effective seal shall be filled with a hydraulic mortar or other material approved by the engineer necessary to obtain the "tightness" or seal specified hereinafter.

D. Creosoted piling to be wrapped shall require a 0.006 mil polyethylene film (creosote membrane) to be specified when ordering.

E. Intertidal wraps when installed shall extend from a point 24" above the highest point of borer attack to a point 36" below the lowest anticipated low tide. The Contractor will provide a list of piles requiring intertidal wraps.

F. The intertidal wrap shall be installed first to ensure a bottom seal against the wood pile rather than on the surface of the submerged wrapped section, thus reducing the possibility of a pumping action during tidal changes, and prevent any free creosote from coming in contact with the PVC material of the subsequent sub tidal units.

G. PVC sheet shall be installed by encircling the pile with the fabricated unit, socketing the pole pieces at the bottom of the wrap, matching the pole pieces together with the top plastic sleeve and ratchet, rotating the pole pieces a minimum of 1-1/2 revolutions to wind up the surplus sheet, and bringing the assembly into sufficient circumferential tension to provide and intimate contact of the sheet with the pile for the full length of the wrap.

H. Care must be taken to insure the ends of the foam seals do not become rolled up in the skirt during tensioning. The foam ends must remain free of the skirt so they can be overlapped to insure a continuous seal.

I. After the wrap is tensioned in final position, the foam seal ends shall be tucked in an overlapping fashion inside the skirt as to provide a minimum 3”overlap of the ends of the foam. The top of the foam seal shall extend ½ inch over the top and bottom edges of the unit to prevent the formation of a water pool where borers could live during tidal changes.

J. The foam shall be tightly compressed to approximately1/8” thickness by the application of 0.030” to 0.032” by 1” 5052 aluminum alloy straps. The straps shall be placed around the wrap directly over the top and bottom seal areas.

K. An aluminum alloy clip shall be installed at the overlap, and the strap shall be drawn tight with a strapping tensioning tool. A Type II nail shall be driven through the clip after the tightening operation. At least three Type I nails shall be driven through the strap along its circumference to further seal the wrap to the pile.

L. Additional nails are to be driven wherever uneven pile surfaces require closer nail spacing to ensure a tight seal.

M. The top and bottom foam seals are to be in continuous, compressed, pressure contact with the pile surface for the full circumference. This closure must be sufficiently tight so that it will not be possible to insert an object the size of a hacksaw blade under or past the seal without the use of force or damaging the barrier.

N. Wherever it is necessary to extend upward the lengths of intertidal wraps now in position, where full coverage of attacked area has not been previously provided, the design of the extensions shall be the same as the original wrap (i.e., with pole pieces, skirts, and foam seals on each end).

O. The designs are as follows: 2’ minimum length, with 12” pole pieces and 6” skirts at each end, 3’ with 24” pole pieces and 6” skirts at each end, 4’ or longer pole pieces, 2’ shorter than wrap, with 12” skirts at each end.

P. Overlapping units below the intertidal unit shall be installed as in paragraph 4, where it is necessary to employ more than one modular unit to encapsulate a given length of pile, each section shall overlap the one below by not less than 6” and not more than 12”.

Q. Skirts of 12” minimum length shall be provided at the top and bottom of the pole pieces. All top and bottom skirts shall be permanently fastened with a minimum of four nails to insure a tight closure.

R. Nailing of pole pieces, skirts, lap joints and straps is required to insure a permanently tight enclosure. Pole pieces shall be fastened with Type II nails on 2’ center, with the top and bottom nails 8” in from the ends of the pole pieces. Top and bottom skirts and lap joints shall be secured with five Type I nails to insure a tight closure.

S. Mud line seal shall be required on all piles where the engineer has specified that the wrap extends below the existing mud line. The soil around the base of the pile shall be excavated so that the barrier can extend to a depth of 24”, plus or minus 6”, below the mud line, measured at the low side of the pile. After installation of the barrier, all excavated areas shall be backfilled to the original mud line with soil or hydraulic grouting mortar.

T. Hydraulic grouting mortar shall be used in locations where it is dangerous, or impractical, to move rocks surrounding the piling in order to install the PILE-GARD® PVC-T unit below the mud line. After installation of the barrier above the mud line, hydraulic grouting mortar shall be applied by hand packing, tremie, pumping, or by pouring grout into a suitable form or sleeve encircling the pile. The grout shall penetrate interstices of the rock surrounding the pile at the mud line and extend at least 6 inches above the bottom of the barrier to provide a positive seal.

3.3 QUALITY ASSURANCE PROVISIONS

A. The contractor shall furnish documentary evidence that all materials used in the installing the flexible plastic barriers meet the appropriate requirements of this specification.

B. The contractor shall be responsible for the inspection of all phases of the barrier installation as specified herein. The owner reserves the right to perform or check any of the inspections where such inspections are deemed necessary to assure compliance to prescribed installation requirements.

A. PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT AND PAYMENT

A. Measurement and payment will be as specified in the Contract Documents and under the pay item “Wooden Footbridge”.

END OF SECTION 061505

SECTION 101426 – POST AND PANEL/PYLON SIGNAGE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 DESCRIPTION OF WORK

A. Extent and location of each type of furnishing shown on drawings and as follows:
   1. handicap signage

1.03 QUALITY ASSURANCE

A. Manufacturing Standards -
   1. Provide each furnishing as a complete unit produced by a single manufacturer, including fittings, accessories, bases and anchorage devices as applicable.

1.04 SUBMITTALS

A. Product Data:
   1. Submit manufacturer's technical data and installation instructions for each type furnishing as follows:
      a. handicapped signage

B. Shop Drawings:
   1. Submit shop drawings of furnishings showing general layout, jointing and complete anchoring and supporting systems for:
      a. handicapped signage

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver furnishings and accessories completely identified for installation procedure.
   1. Handle and store to prevent damage or soiling.

PART 2 - PRODUCTS

2.01 FURNISHINGS

A. Exterior "Handicapped Parking" Signs:
   1. Acceptable Manufacturers:
      a. Andco Industries Corp.;
      b. Burkhart Signs, Inc.;
      c. A.S.I. Sign Systems.

d. Owner approved equal.

2. Type:
   a. 0.125 aluminum sheet.

   b. Sign face is to be 12 inches wide by 12 inches high with one inch radius corners and is to be welded to 2 aluminum backing plates 2 by 10 by 1/4 inch thick mounted one at top and one at bottom for rigidity.
   c. Bolt through sign face and backing plate at top and bottom of sign into 2 by 2 inches by 10'-6" long, square steel post (3.65 lbs./ft.) with vandal resistant fasteners.
3. Finish:
   a. Type A-10 baked enamel by "Andco"; multi-step polyurethane finish by "Burkhart" or exterior polyurethane finish by "A.S.I.", or approved equal type of finish.
   b. Paint system is to have a 5 year warranty against peeling, cracking, crazing, or blistering.
   c. Color of sign face is to be blue.
   d. Color of post, backing plate, and back of sign is to be selected by the Architect.
4. Graphic Application:
   a. Scotchlite Type B-3, reflective unigraphics, pressure sensitive letters, and handicapped symbol.
5. Typestyle:
   a. Helvetica medium.
   b. Handicapped symbol is to be standard symbol as developed by the U.S.Dept. of Transportation;
   c. Size: plus or minus 9 inches square.

6. Installation Method:
   a. Permanent concrete foundation with post embedded in concrete - 12 inch diameter by 3'-0" deep concrete footing.
7. Shop Drawing:
   a. Shop drawing is to be done to scale of sign face as noted on the Drawings for approval prior to fabrication.
8. See Drawings for number and location of signs.
9. Comply with Americans With Disabilities Act requirements for all signage requirements, including text content.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation of all items shall be complete so as to provide fully operational systems unless noted otherwise.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT AND PAYMENT

A. Measurement and payment will be as specified in the Contract Documents and under the pay item “Post and Panel Signage”.

END OF SECTION 101426

SECTION 104250 - EXTERIOR SIGNAGE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract.

1.02 SUMMARY

A. This Section includes the following types of exterior signs:
   1. Trail Traffic signs.
   2. Identity signs.
   3. Information signs.
   4. Interpretive signs.
   5. Rules sign.

B. Other work included as work of this Section:
   1. Concrete footings and bases, reinforcement, and anchors.
   2. Painting and coating required to protect complete installation from oxidation and galvanic reactions.
   3. Sealants.

1.03 SUBMITTALS

A. General:
   1. Submit the following in accordance with Conditions of the Contract and FDOT Standard Specification Sections.

B. Product Data:
   1. Include manufacturer's construction details relative to materials, dimensions of individual components, profiles, and finishes for each type of sign required.

C. Shop Drawings:
   1. Provide shop drawings for fabrication and erection of signs.
      a. Include plans, elevations, and sections of typical members and other components.
      b. Show anchors, accessories, layout, and installation details.
   2. Provide message list for each sign required, including large-scale details showing layout of wording, lettering, symbols, logos, and other graphics.
   3. For signs supported by or anchored to permanent construction, provide setting drawings, templates, and directions for installation of anchor bolts and other anchors to be installed as a unit of Work in other Sections.
   4. Material samples for verification of color, pattern, and texture selected.
      a. Metal: Samples of each finish type and color, on 6 inch long sections of extrusions and not less than 4 inch squares of sheet. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
   5. Material samples for Informative Signs:
      a. Submit one (1) half–scale sample printout of each different interpretive panel and directory panel.
      b. Design Landscape Architect shall provide Adobe Illustrator™ file for each graphic panel to sign fabricator for printing of samples.
      c. Design Landscape Architect shall review samples for color, appearance, and quality of printing.

1.04 QUALITY ASSURANCE

A. Installer Qualifications:
   1. All signs shall be manufactured by a single firm specializing in the fabrication of the types of signs indicated.

Submit a list of similar projects for review by the Landscape Architect.

2. Engage an experienced Installer who is an authorized representative of the sign manufacturer and who has completed installations similar in material, design and extent to that indicated for the Project and that has resulted in construction with a record of successful in-service performance.

B. Single-Source Responsibility:
   1. Provide and install each sign as a complete unit produced and installed by a single manufacturer, including fittings, accessories, bases, and anchoring devices, as applicable.

C. Design Criteria:
   1. The drawings indicate size, profiles, and dimensional requirements of signs.
   2. Signs by other manufacturers may be considered provided that deviations in dimensions and profiles are minor and do not change the design concept as judged by the Landscape Architect. The burden of proof of equality is on the proposer.

1.05 PROJECT CONDITIONS

A. Field Measurements:
   1. Take field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting.
   2. Show recorded measurements on final shop drawings.
   3. Coordinate fabrication schedule with construction progress to avoid delay.

1.06 DELIVERY AND HANDLING

A. Delivery:
   1. Provide protective covering or crating as recommended by the manufacturer to protect sign components and surfaces against damage during transportation and delivery.

B. Handling:
   1. Handle signs carefully to prevent breakage, surface abrasion, denting, soiling, and other defects.
   2. Inspect sign components for damage upon delivery.
      a. Do not install damaged sign components.
      b. Repair minor damage to signs, provided the finished repair is equal in all respects to the original work and is acceptable to the Architect; otherwise remove and replace damaged sign components.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers:
   1. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to, the following:
      a. ASI Sign Systems, Inc. (fabrication of all aluminum signs)
         2017 West 18th Street
         Indianapolis, IN 46202
         317.269.3400

      b. HarborGraphics Corporation (Informative Sign printing)
         P.O. Box 930
         123 Hinckley Street
         Benton Harbor, MI 49023
         1.800.722.2642

      c. Approved Equal

2.02 MATERIALS

A. Aluminum Sheet:
1. Provide aluminum sheet of alloy and temper recommended by the aluminum producer or finisher for the type of use and finish indicated, and with not less than the strength and durability properties specified in ASTM B 209 for 5005-H15.
a. Thickness: 3.2 mm [0.125 inch], unless otherwise indicated.

B. Aluminum Extrusions:
1. Provide aluminum extrusions of alloy and temper recommended by the aluminum producer or finisher for the type of use and finish indicated, and with not less than the strength and durability properties specified in ASTM B 221 for 6061-T6.

C. Reflective Material:
1. Reflective sheeting material and silkscreen paint for trail traffic signs shall be of materials and applied to the signs in accordance with the applicable provision of the FDOT Standard Specifications.

D. Graphic Film for Informative Signs:
1. 3M Scotchprint Electronic Graphics System.
a. 4 color graphics shall be on 3M Controltac Plus Electrostatic Conformable Marking Film 8620(ES)
b. Protective Overlay Film shall be 3M Scotchcal Electrostatic Protective Clear High Gloss Graffiti Resistant 8912(ES).
2. Follow manufacturer’s recommendations for application, removal, packaging, and installation of graphic film.

E. Fasteners:
1. Use concealed fasteners and sleeves fabricated from metals that are not corrosive to the sign material and mounting surface.
2. Exposed portions of fasteners and sleeves shall match color of background to which they are applied, unless noted otherwise.

F. Concrete:
1. Concrete for direct burial sign mounting shall comply with FDOT Standard Specifications.

G. Cast-in-Place Concrete Form Materials (Information Sign):
1 For exposed finish concrete, use forms made of plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials to provide continuous, straight, smooth, exposed surfaces.
a. Furnish in largest practicable sizes to minimize joints and to conform to joint system shown on drawings.
b. Use overlaid plywood complying with U.S. Product Standard PS-1 "A-C or B-B High Density Overlaid Concrete Form," Class I.
2. For unexposed finish concrete, use forms made of plywood, lumber, metal, or another acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.
3. Form release agent shall be commercial formulation form release agent with a maximum of 350 g/L volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatment of concrete surfaces.
4. Form ties shall be factory fabricated, adjustable length, removable or snap-off metal form ties designed to prevent form deflection and to prevent spalling of concrete upon removal.
a. Provide units that will leave no metal closer than 1-1/2 inches to the plane of the exposed concrete surface.
b. Provide ties that, when removed, will leave holes not larger than 1 inch in diameter in the concrete surface.

H. Reinforcing Bars shall be ASTM A 615, Grade 60, deformed.

2.03 COMPONENTS

A. Posts:
1. Provide the manufacturer's standard structural aluminum and steel tubing, in sizes as indicated on drawings.
2. Include post caps and related accessory items as detailed for a complete installation.

B. Signs:
1. Comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.
2. Fabricate signs with edges mechanically and smoothly finished to conform with the following requirements:
   a. Edge Condition: Square cut.
   b. Corner Condition: Corners rounded to radius indicated.

C. Brackets:
1. Fabricate brackets and fittings for bracket-mounted signs from extruded metals that are not corrosive to the sign material and mounting surface to suit sign panel construction and mounting conditions indicated.
2. Factory paint brackets in a color to match the color of the background to which they are attached.

D. Graphic Content and Style:
1. Provide sign copy that complies with the requirements indicated for size, style, spacing, content, position, material, finishes, and colors of letters, numbers, and other graphic devices.
   a. Silk-screen letters and graphics as indicated.
   b. graphic film as indicated
   c. Reflectorized graphics as indicated.
   d. Letter style as indicated by Design Landscape Architect.
2. Traffic control signs shall comply with MUTCD standards for shape, color, symbol, wording, lettering, and illumination or reflectorization.

2.04 FABRICATION

A. General:
1. Comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.
2. Comply with AWS for recommended practices in shop welding. Provide welds behind finish surfaces without distortion or discoloration of the exposed side. Clean exposed welded surfaces of welding flux and dress on all exposed and contact surfaces.
3. Pre-assemble signs in shop to the greatest extent possible to minimize field assembly.
4. Conceal all fasteners.

2.05 FINISHES

A. Colors and Surface Textures:
1. For exposed sign material that requires selection of materials with integral or applied colors, surface textures or other characteristics related to appearance, provide color matches indicated.

B. Aluminum Panel Finish:
1. Panel shall be smooth and free of pits, scratches, blemishes, burs, bumps, or other imperfections.
2. Clean surfaces before applying primer, paint, and surface treatments. Treat panels with a light phosphoric acid wash to remove oil and grease prior to cleaning.
3. Panels are to be primed with a self etching zinc chromate primer.
4. Finish coat is to be painted using acrylic polyurethane. Satin matte polyurethane coating, with maximum gloss of 15 degrees.

5. Color as indicated on the drawings or as selected by Design Architect.

C. Aluminum Posts and Frames:
1. Panel shall be smooth and free of pits, scratches, blemishes, burs, bumps, or other imperfections.
2. Clean surfaces before applying primer, paint, and surface treatments. Treat panels with a light phosphoric acid wash to remove oil and grease prior to cleaning.
3. Panels are to be primed with a self etching zinc chromate primer.
4. Finish coat is to be painted using acrylic polyurethane. Satin matte polyurethane coating, with maximum gloss of 15 degrees.
5. Color as indicated on the drawings or as selected by Design Architect.

D. Miscellaneous Finishes:
1. All exposed fasteners, bolts, screws, nuts, washers to match finish color of material to which they are mounted, unless noted otherwise.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General:
1. Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions.
2. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.

B. Cast-in-Place Concrete Forms (Informative Sign):
1. Design, erect, support, brace, and maintain formwork to support vertical, lateral, static, and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances and surface irregularities complying with the following limits:
   a. Provide Class A tolerances for concrete surfaces exposed to view.
   b. Provide Class C tolerances for other concrete surfaces.
2. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finish structures. Provide for openings, offsets, sinkages, chamfers, blocking, screeds, bulkheads, anchorages, and inserts, and other features required in this work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent cement paste from leaking.
3. Prepare contact form surfaces by coating with an approved, nonresidual, low-VOC, form-coating compound before placing reinforcement.
   a. Do not allow excess form-coating material to accumulate in forms or come in contact with in-place concrete surfaces against which fresh concrete will be placed. Apply according to manufacturer's instructions.
   b. Coat steel forms with nonstaining, rust-preventative material. Rust-stained steel formwork is not acceptable

C. Placement of Concrete:
1. Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded (steel tube). Notify other trades to permit installation of their work.
2. Comply with ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete," and as specified.
3. Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
4. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete complying with ACI 309.

D. Finishing of Concrete:
   1. Provide a smooth-formed finish on formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing or dampproofing. This is an as-cast concrete surface obtained with selective form-facing material, arranged in an orderly and selective manner with a minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed.

   2. Provide Smooth-rubbed finish on concrete surfaces that have received smooth-formed finish treatment not later than 1 day after form removal. Moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

3.02 REPAIR, CLEANING AND PROTECTION

A. At completion of the installation, clean soiled sign surfaces in accordance with the manufacturer's instructions.

B. Protect units from damage until acceptance by the Owner.

C. Concrete Surface Repairs (Information Signs):
   1. Repair and patch defective areas with cement mortar immediately after removing forms, when acceptable to Design Landscape Architect.
   2. Mix dry-pack mortar, consisting of one part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing.
   3. Cut out honeycombs, 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 less than 1 inch. Make edges of cut perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush coat the area to be patched with bonding agent. Place patching mortar before bonding agent has dried.
   4. For surfaces exposed to view, blend white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Provide test areas at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
   5. Remove and replace concrete having defective surfaces if defects can not be repaired to satisfaction of Design Landscape Architect. Surface defects include color and texture irregularities, cracks, spalls, bubbles, honeycomb, rock pockets, fins and other projections on the surface, and stains and other discolorations that can not be removed by cleaning. Flush out form tie holes and fill with dry pack mortar or precast concrete cement cone plugs secured in place with bonding agent.

PART 4 - METHOD OF PAYMENT AND MEASUREMENT

A. Exterior Signage, including all necessary and specified signage, posts, footer, installation and anchorage materials, and accessory requirements, will be measured per unit each for each style of signage required.

B. The accepted quantities of each signage unit will be paid for at the contract unit price per unit each including signage, posts, footer, anchorage devices, accessories, and installation requirements. This price and payment will be full compensation for furnishing and placing all materials complete.

C. Payment will be made under:

Pay Item	**Pay Unit**
Trail Traffic.....	Each
Identity Sign.....	Each
Informative Sign.....	Each
Interpretive Sign.....	Each
Rules Sign…….....	Each

END OF SECTION 10425

SECTION 129300 – SITE FURNISHINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

B. This Section includes the following:
   1. Detectable Warning Surface.
   2. Parking Bumpers.
   3. Benches.
   4. Bike Racks.
   5. Trash/Recycling Receptacles.
   6. Wood Bollard.

1.03 QUALITY ASSURANCE

A. Manufacturing Standards -
   1. Provide each furnishing as a complete unit produced by a single manufacturer, including fittings, accessories, bases and anchorage devices as applicable.

1.04 SUBMITTALS

A. Product Data:
   1. Submit manufacturer's technical data and installation instructions for each type furnishing as follows:

      a. Detectable Warning Surface.
      b. Parking Bumpers.
      c. Benches.
      d. Bike Racks.
      e. Trash/Recycling Receptacles.
      f. Wood Bollard.

B. Shop Drawings:
   1. Submit shop drawings of furnishings showing general layout, jointing and complete anchoring and supporting systems for:

      a. Detectable Warning Surface.

b. Parking Bumpers.
c. Benches.
d. Bike Racks.
e. Trash/Recycling Receptacles.
f. Wood Bollard.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver furnishings and accessories completely identified for installation procedure.
1. Handle and store to prevent damage or soiling.

PART 2 - PRODUCTS

2.01 FURNISHINGS

A. Detectable warning surface (at handicapped parking ramps):
1. Manufacturer: ADA Solutions, Inc.
One Survey Circle – 2nd Floor
North Billerica, Massachusetts 01862
Phone: 1.800.372.0519
Fax: 978.262.9125
www.adatile.com
2. Unit Type:
a. Composite Panel Paver System, Cast-in-place 24”x36” paver unit
b. Submit manufacturer’s standard selection.
c. Provide this warning surface or approved equal.

3. Installation:
a. Install in accordance with manufacturer's instructions.
b. Depth of product: 1-1/2”.
c. Provide standard colors and finishes for Landscape Architect to select.

B. Parking Bumpers:
1. Type; 2,500-psi compressive strength precast, air-entrained concrete, approximately 6 inches high, 9 inches wide, and 7 feet long.
a. Provide chamfered corners and drainage slots on underside.

2. Installation:
a. Secure wheel stops to hot-mixed asphalt surface with not less than two 3/4-inch-diameter galvanized steel dowels embedded in precast concrete at 1/3 points.
b. Size length of dowel to penetrate at least 1/2 hot-mixed asphalt depth.

C. Benches:
1. Manufacturer: PRIDE Enterprises
9400 4th Street North, Suite 200
St. Petersburg, FL 33702

Phone: 877-283-6819
Fax: 727-570-3366
www.pridestore.com

2. Unit Type:
   a. Trailside Bench (8’ wood), with custom surface mount (typically comes ground mounted)

3. Installation:
   a. Install in accordance with manufacturer's instructions.

D. Bike Rack:
1. Manufacturer: DuMor, Inc.
   Rep Services (Florida Vendor)
   585 Technology Park
   Lake Mary, FL 32746
   Phone: 407-831-9658
   Fax: 407-834-5366
   www.repservices.com

2. Unit Type:
   a. Loop Bike Rack Model #125-40 (125 Series), double powder coated

3. Installation:
   a. Install in accordance with manufacturer's instructions for surface mount.
   b. Bike Rack to be installed on a concrete pad.
   c. Provide standard colors and finishes for Landscape Architect to select.

E. Trash/Recycling Receptacles:
1. Manufacturer: PRIDE Enterprises
   9400 4th Street North, Suite 200
   St. Petersburg, FL 33702
   Phone: 877-283-6819
   Fax: 727-570-3366
   www.pridestore.com

2. Unit Type:
   a. Trash Receptacle Holder, Square with Lid (32 gallon)

3. Installation:
   a. Install in accordance with manufacturer's instructions.

F. Wood Bollards:
1. Manufacturer: Bollards to be purchased by Contractor from Manatee County per their standard.

2. Installation:
   a. Per County instructions for direct burial or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation of all items shall be complete so as to provide fully operational systems unless noted otherwise.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT AND PAYMENT

C. Measurement and payment will be as noted in the Contract Documents and under the pay items “Detectable Warning Surface”, “Parking Bumpers”, “Benches”, “Bike Rack”, “Trash/Recycling Receptacles” and “Wood Bollard”.

END OF SECTION 129300

SECTION 311000 - SITE CLEARING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK

A. Extent of site demolition is shown on Drawings.

B. Obtain permits as required by Local, State and Federal authorities with jurisdiction over this project.

C. Demolition work includes, but is not limited to:
1. Salvage of items noted to be returned to Owner or relocated.
2. Removal of existing trees and other vegetation, as required or noted.
3. Clearing and grubbing.
4. Removal of below-grade foundations and site improvements to depth to avoid conflict with new construction or site work.
5. Protection of site work and adjacent structures.
6. Disconnection, capping and removal of utilities as noted.
7. Removal and legal disposal of materials.

1.03 JOB CONDITIONS

A. Existing Utilities:
1. Locate existing underground utilities in areas of work prior to beginning of work. If utilities are to remain in place, provide adequate means of support and protection during demolition operations.

B. Coordination:
1. Prior to commencement of demolition, notify all affected utility company representatives, as well as the Owner. Coordinate shut-off, capping and continuation of utility services as required.

C. Traffic:
1. Conduct demolition operations and removal of debris to insure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.
2. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction.
3. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

D. Protections:
1. Ensure safe passage of persons around areas of demolition. Conduct operations to prevent in-

jury to adjacent buildings, structures, other facilities and persons.
2. Remove all materials in a manner that will prevent the spread of dust. If necessary, dampen debris with water.
3. Erect temporary barriers around areas where demolition occurs to prevent the spread of dust and debris.
4. Provide temporary fences, barricades, coverings, or other protections to preserve existing items indicated to remain and to prevent injury or damage to person or property. Apply protections to adjacent properties as required.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 SITE CLEARING

A. General:
1. Remove turf and other vegetation, improvements, or obstructions interfering with installation of new construction.

B. Existing Soil:
1. Existing soil is defined as a surface soil found in a depth of up to 6" deep.
a. Satisfactory soil is reasonably free of subsoil, clay lumps, stones, and other objects over 2" in diameter, and without weeds, roots, and other objectionable material.
2. Only where necessary to install proposed site features, strip soil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material.
a. Remove heavy growths of grass from areas before stripping.
b. Where trees are indicated to be left standing, stop soil stripping a sufficient distance to prevent damage to main root system.
3. Stockpile soil in storage piles where directed. Construct storage piles to freely drain surface water. Cover storage piles if required to prevent wind-blown dust.

C. Clearing and Grubbing:
1. Clear site only as needed to install new site features.
2. Completely remove stumps, roots, and other debris protruding through the ground surface.
3. Use only hand methods for grubbing inside drip line of trees indicated to be left standing.

D. Relocation of existing trees:
1. Employ standard nursery transplanting procedures utilizing an 84" tree spade, minimum, as necessary.
2. Protect all vegetation from damage.
3. All relocated plant material shall be warranted for healthy growth and survival for a period of one year beyond relocation.
4. Reset as shown on plans or as dictated by Landscape Architect.

3.02 DEMOLITION

A. Work required: Perform all operations of demolition, do all cutting and patching necessary to join new work to existing work, and do all necessary patching and repairing of existing conditions to all existing surfaces where new work is scheduled and/or noted.
   1. Various items of existing construction may interfere with the proposed work. When such items require minor changes in existing work to accomplish the new work, the Contractor affected shall change such items as required at no extra cost to the Owner.
   2. When the items to be removed or changed tie into the new work, the Contractor shall do whatever patching is necessary to the existing items to make the appearance of the reworked areas the same as the original.

3.03 PROTECTION OF EXISTING IMPROVEMENTS

A. Provide protections necessary to prevent damage to existing improvements indicated to remain in place.
   1. Protect improvements on adjoining properties and on Owner's property.
   2. Restore damaged improvements to their original condition, as acceptable to parties having jurisdiction.

3.04 DAMAGES

A. Promptly repair damages caused to adjacent facilities by demolition operations at no cost to Owner.

3.05 UTILITY SERVICES

A. Maintain existing utilities indicated to remain, keep in service, and protect against damage during demolition operations.

3.06 RELOCATED ITEMS

A. Carefully remove items indicated to be salvaged and relocated. Store items on-site until new construction permits its relocation.

3.07 SALVABLE IMPROVEMENTS

A. Carefully remove items indicated to be salvaged, and store on Owner's premises where indicated or directed.

3.08 REUSE OF EXISTING GRAVEL

A. Existing gravel pavements and bases indicated to be removed may be re-used for proposed pavement bases and other backfill needs if authorized by Landscape Architect and the existing material meets all backfill/base requirements as set out in these specifications.

3.09 REMOVAL OF VEGETATION

A. Remove only the trees, shrubs, and other vegetation as specifically indicated. Completely remove stumps, roots, and other debris protruding through ground surface. Large stumps shall be ground to a minimum of 24" below finish grade. Use only hand methods for grubbing inside dripline of

trees indicated to be left standing.

1. Fill depressions caused by vegetation removal operations with satisfactory soil material, unless further excavation or earthwork is indicated.
2. Place fill material in horizontal layers not exceeding 6" loose depth, and thoroughly compact to a density equal to adjacent original ground.

3.11 REMOVAL OF IMPROVEMENTS

A. Remove existing above-grade and below-grade improvements necessary to permit construction, and other work as indicated.
   1. Remove upper three feet of drainage structures noted to be abandoned. Plug all remaining non-functional drainage lines with concrete or masonry unless noted otherwise. Fill remaining hole with compacted stone to finish subgrade.
   2. Abandonment or removal of certain underground pipe or conduits may be shown on drawings, and is included under work of those sections. Removal of abandoned underground piping or conduit interfering with construction is included under this section.
   3. Remove below-grade foundations and footings as noted on the drawings. Backfill these areas as instructed under backfill provisions of Earthwork section.

3.12 DISPOSAL OF WASTE MATERIALS

A. Remove all existing fill, trash, and debris to undisturbed soil.
   1. Remove any trash and debris encountered to undisturbed soil.
   2. Burning is not permitted on Owner's property.
   3. Remove waste materials and unsuitable and excess soil from Owner's property and dispose of off site in legal manner.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT AND PAYMENT

A. Measurement and payment will be as noted in the Contract Documents and under the pay item “Site Clearing”.

B. The term “lump sum” when used as a unit of measurement shall include all work necessary to complete that entire component, including all necessary products and installation.

END OF SECTION 311000

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Preparing subgrades for slabs-on-grade, walks, pavements, turf and grasses and plants.
2. Excavating and backfilling for structures.
3. Drainage course for concrete slabs-on-grade.
4. Subbase course for concrete walks and pavements.
5. Subsurface drainage backfill for trenches.
6. Excavating and backfilling trenches for utilities and pits for buried utility structures.

B. Related Sections:
1. Division 03 Section "Cast-in-Place Concrete" for granular course if placed over vapor retarder and beneath the slab-on-grade.
2. Division 31 Section "Site Clearing" for site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.

1.3 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
2. Bulk Excavation: Excavation more than 10 feet (3 m) in width and more than 30 feet (9 m) in length.
3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

H. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material 3/4 cu. yd. (0.57 cu. m) or more in volume that exceed a standard penetration resistance of 100 blows/2 inches (97 blows/50 mm) when tested by a geotechnical testing agency, according to ASTM D 1586.

I. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

J. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

K. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

L. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 SUBMITTALS

A. Product Data: For each type of the following manufactured products required:

1. Geotextiles.
2. Controlled low-strength material, including design mixture.
3. Warning tapes.

B. Samples for Verification: For the following products, in sizes indicated below:

1. Geotextile: 12 by 12 inches (300 by 300 mm).
2. Warning Tape: 12 inches (300 mm) long; of each color.

C. Qualification Data: For qualified testing agency.

D. Material Test Reports: For each on-site and any borrow soil material proposed for fill and backfill as follows:

1. Classification according to ASTM D 2487.
2. Laboratory compaction curve according to ASTM D 698

1.5 QUALITY ASSURANCE

A. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E 329 and ASTM D 3740 for testing indicated.

B. Pre-excavation Conference: Conduct conference at Project site.

1.6 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth moving operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.

B. Utility Locator Service: Notify Sunshine and City of Bradenton for area where Project is located before beginning earth moving operations.

C. Do not commence earth moving operations until temporary erosion- and sedimentation-control measures, specified in Division 31 Section "Site Clearing," are in place.

D. Do not commence earth moving operations until plant-protection measures specified in Division 01 Section "Temporary Tree and Plant Protection" are in place.

E. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

F. Do not direct vehicle or equipment exhaust towards protection zones.

G. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

H. All excess soil from this site is to be stockpiled by Contractor at Perico Preserve per permitting with SWFWMD and per County direction (graphic submitted with SWFWMD permit). Contractor to coordinate with County on placement of fill at Perico Preserve.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: Soil Classification Groups A-1, A-2-4, A-2-5, and A-3 according to AASHTO M 145, or a combination of these groups; free of rock or gravel larger than 3 inches (75 mm) in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: Soil Classification Groups A-2-6, A-2-7, A-4, A-5, A-6, and A-7 according to AASHTO M 145, or a combination of these groups.

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.

E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.

G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch (25-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

H. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.

I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch (25-mm) sieve and 0 to 5 percent passing a No. 4 (4.75-mm) sieve.

J. Sand: ASTM C 33; fine aggregate.

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

2.2 GEOTEXTILES

A. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: Class 2; AASHTO M 288.
2. Grab Tensile Strength: 157 lbf (700 N); ASTM D 4632.
3. Sewn Seam Strength: 142 lbf (630 N); ASTM D 4632.
4. Tear Strength: 56 lbf (250 N); ASTM D 4533.
5. Puncture Strength: 56 lbf (250 N); ASTM D 4833.
6. Apparent Opening Size: No. 40 (0.425-mm) sieve, maximum; ASTM D 4751.
7. Permittivity: 0.5 per second, minimum; ASTM D 4491.
8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

B. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: Class 2; AASHTO M 288.
2. Grab Tensile Strength: 247 lbf (1100 N); ASTM D 4632.
3. Sewn Seam Strength: 222 lbf (990 N); ASTM D 4632.
4. Tear Strength: 90 lbf (400 N); ASTM D 4533.
5. Puncture Strength: 90 lbf (400 N); ASTM D 4833.
6. Apparent Opening Size: No. 60 (0.250-mm) sieve, maximum; ASTM D 4751.
7. Permittivity: 0.02 per second, minimum; ASTM D 4491.
8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

2.3 CONTROLLED LOW-STRENGTH MATERIAL

A. Controlled Low-Strength Material: Self-compacting, low-density, flowable concrete material produced from the following:

1. Portland Cement: ASTM C 150, Type I.
2. Fly Ash: ASTM C 618, Class C or F.
3. Normal-Weight Aggregate: ASTM C 33, 3/8-inch (10-mm) nominal maximum aggregate size.
4. Foaming Agent: ASTM C 869.
5. Water: ASTM C 94/C 94M.
6. Air-Entraining Admixture: ASTM C 260.

B. Produce low-density, controlled low-strength material with the following physical properties:

1. As-Cast Unit Weight: 36 to 42 lb/cu. ft. (576 to 675 kg/cu. m) at point of placement, when tested according to ASTM C 138/C 138M.
2. Compressive Strength: 140 psi (965 kPa) when tested according to ASTM C 495.

C. Produce conventional-weight, controlled low-strength material with 140-psi (965-kPa) compressive strength when tested according to ASTM C 495.

2.4 ACCESSORIES

A. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.

B. Protect and maintain erosion and sedimentation controls during earth moving operations.

C. Protect subgrades and foundation soils from frost. Remove temporary protection before placing subsequent materials.

3.2 DEWATERING

A. Dewatering is prohibited on this project per SWFWMD permit.

3.3 EXPLOSIVES

A. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:

    a. 24 inches (600 mm) outside of concrete forms other than at footings.
    b. 12 inches (300 mm) outside of concrete forms at footings.
    c. 6 inches (150 mm) outside of minimum required dimensions of concrete cast against grade.
    d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
    e. 6 inches (150 mm) beneath bottom of concrete slabs-on-grade.
    f. 6 inches (150 mm) beneath pipe in trenches, and the greater of 24 inches (600 mm) wider than pipe or 42 inches (1065 mm) wide.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch (25 mm). If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
2. Pile Foundations: Stop excavations 6 to 12 inches (150 to 300 mm) above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.
3. Excavation for Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch (25 mm). Do not disturb bottom of excavations intended as bearing surfaces.

B. Excavations at Edges of Tree- and Plant-Protection Zones:

1. Excavate by hand to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
2. Cut and protect roots according to requirements in Division 01 Section "Temporary Tree and Plant Protection."

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.7 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches (300 mm) higher than top of pipe or conduit unless otherwise indicated.

1. Clearance: 12 inches (300 mm) each side of pipe or conduit.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

1. For pipes and conduit less than 6 inches (150 mm) in nominal diameter, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
2. For pipes and conduit 6 inches (150 mm) or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe or conduit circumference. Fill depressions with tamped sand backfill.
3. For flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support conduit on an undisturbed subgrade.
4. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

D. Trenches in Tree- and Plant-Protection Zones:

1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.
3. Cut and protect roots according to requirements in Division 01 Section "Temporary Tree and Plant Protection."

3.8 SUBGRADE INSPECTION

A. Notify Architect when excavations have reached required subgrade.

B. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Proof-roll subgrade below slabs and pavements with a pneumatic-tired and loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons (13.6 tonnes) to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph (5 km/h).
2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.

D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.9 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi (17.2 MPa), may be used when approved by Architect.

1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

3.10 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.11 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for Record Documents.
3. Testing and inspecting underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring and bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place backfill on subgrades free of mud or frost.

3.12 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud or frost.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches (450 mm) of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Division 03 Section "Cast-in-Place Concrete."

D. Trenches under Roadways: Provide 4-inch- (100-mm-) thick, concrete-base slab support for piping or conduit less than 30 inches (750 mm) below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches (100 mm) of concrete before backfilling or placing roadway subbase course. Concrete is specified in Division 03 Section "Cast-in-Place Concrete."

E. Backfill voids with satisfactory soil while removing shoring and bracing.

F. Place and compact initial backfill of subbase material, free of particles larger than 1 inch (25 mm) in any dimension, to a height of 12 inches (300 mm) over the pipe or conduit.

1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

G. Controlled Low-Strength Material: Place initial backfill of controlled low-strength material to a height of 12 inches (300 mm) over the pipe or conduit. Coordinate backfilling with utilities testing.

H. Place and compact final backfill of satisfactory soil to final subgrade elevation.

I. Controlled Low-Strength Material: Place final backfill of controlled low-strength material to final subgrade elevation.

J. Install warning tape directly above utilities, 12 inches (300 mm) below finished grade, except 6 inches (150 mm) below subgrade under pavements and slabs.

3.13 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use satisfactory soil material.
2. Under walks and pavements, use satisfactory soil material.
3. Under steps and ramps, use engineered fill.
4. Under building slabs, use engineered fill.
5. Under footings and foundations, use engineered fill.

C. Place soil fill on subgrades free of mud or frost.

3.14 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.15 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches (200 mm) in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches (100 mm) in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:

1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches (300 mm) of existing subgrade and each layer of backfill or fill soil material at 95 percent.
2. Under walkways, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 92 percent.
3. Under turf or unpaved areas, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 85 percent.
4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

3.16 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Turf or Unpaved Areas: Plus or minus 1 inch (25 mm).
2. Pavements, Transitions and Shell Trail: Plus or minus 1/2 inch (13 mm).

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch (13 mm) when tested with a 10-foot (3-m) straightedge.

3.17 SUBSURFACE DRAINAGE

A. Subsurface Drain: Place subsurface drainage geotextile around perimeter of subdrainage trench. Place a 6-inch (150-mm) course of filter material on subsurface drainage geotextile to support subdrainage pipe. Encase subdrainage pipe in a minimum of 12 inches (300 mm) of filter material, placed in compacted layers 6 inches (150 mm) thick, and wrap in subsurface drainage geotextile, overlapping sides and ends at least 6 inches (150 mm).

1. Compact each filter material layer to 85 percent of maximum dry unit weight according to ASTM D 698 with a minimum of two passes of a plate-type vibratory compactor.

B. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches (300 mm) of final subgrade, in compacted layers 6 inches (150 mm) thick. Overlay drainage backfill with one layer of subsurface drainage geotextile, overlapping sides and ends at least 6 inches (150 mm).

1. Compact each filter material layer to 85 percent of maximum dry unit weight according to ASTM D 698] with a minimum of two passes of a plate-type vibratory compactor.
2. Place and compact impervious fill over drainage backfill in 6-inch- (150-mm-) thick compacted layers to final subgrade.

3.18 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

A. Place subbase course and base course on subgrades free of mud or frost.

B. On prepared subgrade, place subbase course and base course under pavements and walks as follows:

1. Install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
2. Place base course material over subbase course under hot-mix asphalt pavement.
3. Shape subbase course and base course to required crown elevations and cross-slope grades.
4. Place subbase course and base course 6 inches (150 mm) or less in compacted thickness in a single layer.
5. Place subbase course and base course that exceeds 6 inches (150 mm) in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick.
6. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

C. Pavement Shoulders: Place shoulders along edges of subbase course and base course to prevent lateral movement. Construct shoulders, at least 12 inches (300 mm) wide, of satisfactory soil

materials and compact simultaneously with each subbase and base layer to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.19 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

A. Place drainage course on subgrades free of mud or frost.

B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:

1. Install subdrainage geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
2. Place drainage course 6 inches (150 mm) or less in compacted thickness in a single layer.
3. Place drainage course that exceeds 6 inches (150 mm) in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick.
4. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.20 FIELD QUALITY CONTROL

A. Special Inspections: Contractor will engage a qualified special inspector to perform the following special inspections:

1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
2. Determine that fill material and maximum lift thickness comply with requirements.
3. Determine, at the required frequency, that in-place density of compacted fill complies with requirements.

B. Allow inspector to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.

D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:

1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. (186 sq. m) or less of paved area or building slab, but in no case fewer than three tests.
2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 100 feet (30 m) or less of wall length, but no fewer than two tests.

3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet (46 m) or less of trench length, but no fewer than two tests.

E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.21 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, frost, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.22 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT AND PAYMENT

B. Measurement and payment will be as noted in the Contract Documents and under the pay item “Earth Moving”.

C. The term “lump sum” when used as a unit of measurement shall include all work necessary to complete that entire component, including all necessary products and installation.

END OF SECTION 312000

SECTION 316219 - TIMBER PILES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This section includes round timber piles for the Wooden Footbridge.

B. Related Sections:

1. Division 06 Section "Heavy Timber Construction".
2. Division 06 Section "Wood Decking" for wood decking.

1.3 ACTION SUBMITTALS

A. Product Data: For preservative-treated timber piles.

1. Driving equipment.
2. Cap or cushion block.
3. Pile shoes.

B. Shop drawings:

1. Show fabrication and installation details for piles, including details of driving shoes, tips or boots, and pile head protection.

1.4 INFORMATIONAL SUBMITTALS

A. Material Certificates:

1. Timber piles.
   a. Submit the inspection report of an independent inspection agency, approved by the Contracting Officer, stating that offered products comply with applicable AWPA Standards. Identify treatment on each piece by the quality mark of an agency accredited by the Board of Review of the America Lumber Standard Committee.

B. Test reports
   1. Test piles:
      a. Submit test pile results as specified in Part 3.

C. Closeout submittals:
   1. Pile driving records
      a. Submit the inspection report of an independent inspection agency, approved by the Contracting Officer, stating that offered products comply with applicable AWPA Standards. Identify treatment on each piece by the quality mark of an agency accredited by the Board of Review of the American Lumber Standard Committee.

1.5 QUALITY ASSURANCE

A. The producer must brand each treated pile, in accordance with American Wood Protection Association Standards AWPA M1, AWPA M2, AWPA M6, AWPA T1, and AWPA U1. Submit the inspection report of an independent agency, approved by the Contracting Officer, stating that offered products comply with applicable AWPA Standards, and that the plant conforms to AWPA M3.

B. Surveys: Provide pile-driving records, including surveys, layouts, and measurements, prepared by a surveyor or professional engineer who is legally qualified to practice in jurisdiction wher Project is located to perform these kinds of services.

C. Handle and store piles at Project site to prevent breaks, cuts, abrasions, or other physical damage.

D. Do not drill holes or drive spikes or nails into pile below cutoff elevation.

1.6 SUBSURFACE DATA AND INSTALLATION DRAWINGS

A. Subsurface soil data logs are shown in the Geotechnical Report. The subsurface investigation reports are available for examination. Drawings must indicate pile locations with GPS coordinates, location of proposed test piles, and be fully coordinated with the pile driving record as work progresses. Final Record Drawings must be submitted to the Contracting Officer fifteen (15) calendar days prior to project closeout.

1.7 BASIS OF BID

A. Base bid on the number, circumference, and length of piles form tip to cutoff as indicated. Test piles must be 5 feet longer than bid length piles. From the data obtained as a result of driving the test piles, the owner will determine and list the calculated pile tip elevations for all piles. The owner reserves the right to take up to 3 working days to review test pile driving records and take up to 3 additional working days to review and approve the contractor prepared schedule of pile lengths and locations. Use this list as the basis for ordering piles. Do not order production piles

prior to receipt of the above information from the owner. Should the total number of piles or number of each length vary from that specified as the basis for bidding, the contract will be adjusted in accordance with changes made. Adjustment in contract price will not be made for cutting off piles: for any portion of a pile remaining above the cutoff elevation; or for broken, damaged or rejected piles.

PART 2 - PRODUCTS

2.1 TIMBER PILES

A. Pressure treated southern pine clean-peeled piles conforming to ASTM D25.
   1. Minimum butt circumference measured at 3 feet from the butt and tip circumference must be as indicated on the drawings.
   2. Piles must be in one piece. Splicing is not permitted.
   3. Piles shall be pressure treated with ammoniacal copper quat (ACQ) type D in accordance with the American Wood Preservers Association (AWPA) standard P5-02 and A9-01.
   4. All piling shall be pressure preservative treated with Chromated Copper Arsenate (CCA) Type C in accordance with AWPA Standards: C1-02, C3-99 or C18-99 where applicable.
   5. Piles are to be PVC wrapped prior to driving.
   6. All pilings shall meet the requirements as set forth by the American Society for Testing and Materials (ASTM) under the provisions of D25 (latest edition), standard specifications for round timber piles.

B. Service Condition: Marine.

C. Capblocks: Provide capblocks used between the cap and the hammer ram made of solid hardwood with grain parallel to the pile axis and enclosed in a close fitting housing of steel, or aluminum and approved industrial type plastic laminate disks stacked alternatively in a steel housing. Use steel plates at the top and bottom of the capblock. If the capblock is other than that specified above, submit to the Contracting Officer at least two weeks prior to the commencement of test pile driving, detailed drawings and records of previously successful use.
   1. Replacement of a wood capblock during the final driving of any pile is not allowed. The use of small wood blocks, wood chips, rope, or any other material permitting excessive loss of hemmer energy is not permitted.

D. Pile Shoes:Boot type or point type specially fabricated for the purpose and the product of a manufacturer regularly engaged in the manufacture of pile fittings. Provide size to fit tip indicated. Fabricate boot-type of 3/16 inch carbon steel conforming to ASTM A 1011/A 1011M, fully welded, with minimum three straps, each with 3/16 inch nail hole. Fabricate point type of four 3/16 inch steel plates, fully welded and sized to adequately cover full pointed area of pile; provide each plate with 3/16 or ¼ inch nail hole.

2.2 FABRICATION

A. Pile Tips: Cut and shape pile tips to accept driving shoes. Fit and fasten driving shoes to pile tips according to manufacturer's written instructions.

B. Pile Butt: Trim pile butt and cut perpendicular to longitudinal axis of pile. Chamfer and shape butt to fit tightly to driving cap of hammer.

C. Pile-Length Markings: Mark each pile length with horizontal line at 12 inch intervals and the distance from pile tip at 60 inch intervals.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine piles when delivered and when in the leads immediately before driving.

3.2 PREPARATION

A. Where the protective shell of treated wood is impaired at a point which after installation will be not less than 10 feet below the ground, make repairs in accordance with AWPA M4 unless the pile is damaged to such extent that it is rejected.

3.3 INSTALLATION

A. Cut piles at cut-off grade with pneumatic tools, sawing, or other approved method. Size bolt holes to ensure a driving fit.

B. Test Piles: Provide test piles of the same diameter and type and driven in the same manner as specified for production piles. Keep a record for each test pile and every unusual occurrence during pile driving. Record every increase or decrease of driving resistance and bring it to the attention of the Contracting Officer.

C. Driving Piles: Drive without interruption to the indicated tip elevation. If a pile fails to reach the indicated pile tip elevation, notify the County Representative who will determine the procedure to be followed. Drive production piles with the same hammer, cap block, and cushion material and use the same operating conditions as test piles. Safe design capacity for each pile is 1.5 tons.

D. Driving Equipment: Select and use a pile hammer of sufficient weight and energy to suitable install the specified pile without damage into the soils expected to be encountered. Place driving helmet or a cap and cushion block combination capable of protecting the head of the pile between the top of the pile and the ram to prevent impact damage to the pile. If block is damaged, split, highly compressible, charred, or burned or has become spongy or deteriorated in any manner, replace with a new block. The helmet or block must uniformly transmit energy to the pile and minimum loss of energy.

3.4 PRE-AUGERING OR SPUDDING OF PILES

A. Pre-augering or spudding of piles may be used to avoid vibration damage to existing structures. Drill hole diameter not greater than 90 percent of average cross-sectional dimension of pile at depth being drilled.

3.5 TREATMENT

A. Treat cut, bored, dappled, and damaged surfaces as specified an AWPA M4.

3.6 TOLERANCES IN DRIVING

A. The center of butts must be within 4 inches of the location indicated. Manipulation of piles is not permitted. Re-drive heaved piles to the required tip elevation. Remove and replace with new piles those damaged, mislocated, or driven out of alignment or provide additional piles, driven as directed.

3.7 PILE DRIVING RECORDS

A. Keep a complete and accurate record of each pile driven. Indicate the pile location, butt diameter, original length, ground elevation, tip elevation, cutoff elevation, penetration in blows per foot for the entire length of penetration of test piles, penetration in blows per foot for the last 10 feet for job piles, hammer data including make and size, and any unusual pile behavior or circumstances experienced during driving such as redriving, heaving, weaving, obstructions, jetting, spudding, and unanticipated interruptions which may occur. The following log is a preprinted form for recording pile driving data.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT AND PAYMENT

A. Measurement and payment will be as specified in the Contract Documents and under the pay items “Wooden Footbridge”.

END OF SECTION 316219

SECTION 321216 – ASPHALT PAVING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 DESCRIPTION OF WORK

A. Extent of asphalt concrete paving work is shown on drawings. Prepared aggregate subbase is specified in earthwork sections.

B. Obtain permits as required by Local, State and Federal authorities with jurisdiction over this project.

1.03 SUBMITTALS

A. Material Certificates
   1. Provide copies of materials certificates signed by material producer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.

1.04 JOB CONDITIONS

A. Weather Limitations
   1. Apply tack coat only when ambient temperature is above 50^{o} F. (10^{o}C), and when temperature has not been below 35^{o} F for 12 hours immediately prior to application.
   2. Do not apply when base is wet or contains an excess of moisture.
   3. Construct asphalt concrete surface course only when atmospheric temperature is above 40^{o} F. (4^{o}C), and when base is dry.
   4. Base course may be placed when air temperature is above 30^{o} F. (-1^{o}C) and rising and the temperature 3 inches below subgrade surface is 32^{o}F (0^{o}C) or higher.

B. Grade Control:
   1. Establish and maintain required lines and elevations.

PART 2 - PRODUCTS

2.01 GENERAL

A. Use locally available materials and gradations which exhibit a satisfactory record of previous installations.

2.02 HOT ASPHALT CONCRETE BASE

A. Meet requirements of "FDOT Standard Specifications".
   1. Coarse aggregate: #5 or #5D.
   2. Use hot asphalt concrete base mixture for base courses 2-1/2" and greater in thickness.

2.03 PREPARED AGGREGATE SUBBASE

A. Crushed concrete, compacted to 92% of maximum.

2.04 SURFACE COURSE

A. Meet requirements of "FDOT Specifications" for No. 11/12 Type Surface Mixture.

2.05 ASPHALT CEMENT

A. Comply with FDOT Specifications.

2.06 TACK COAT

A. Comply with FDOT Standard Specifications.
   1. Emulsified Asphalt, AASHTO M 140 (ASTM D 997) or M 208 (D 2397), SS-1, SS-1h, CSS-1, CSS-1h, diluted with one part water to one part emulsified asphalt.

PART 3 - EXECUTION

3.01 HAC PAVEMENT

A. The following shall comply with FDOT Standard Specifications:
   1. Surface - Type B.
   2. Base -- using coarse aggregate.
   3. Bituminous base -- 5'.

B. Execution:
   1. Remove loose material from compacted subbase surface immediately before applying prime coat.

C. Notify Contractor of unsatisfactory conditions.
   1. Do not begin paving work until deficient subbase areas have been corrected and are ready to receive paving.

3.02 TACK COAT

A. Apply to contact surfaces of previously constructed asphalt or portland cement concrete and surfaces abutting or projecting into asphalt concrete pavement.
   1. Distribute at rate of 0.05 to 0.15 gallon per square yard of surface.
   2. Allow to dry until at proper condition to receive paving.
   3. Comply with FDOT Standard Specifications.

3.03 PLACING MIX

A. General:
   1. Place asphalt concrete mixture on prepared surface, spread and strike off.
   2. Spread mixture at minimum temperature of 230° F. (110° C).
   3. Place inaccessible and small areas by hand. Place each course to required grade, cross-section, and compacted thickness.
   4. Comply with FDOT Standard Specifications.

B. Pavement Placing:
   1. Place in strips not less than 10' wide, unless otherwise acceptable to Landscape Architect/Engineer.

   2. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips.
   3. Complete base course for a section before placing surface course.

C. Joints:
   1. Make joints between old and new pavement, or between successive days work, to ensure continuous bond between adjoining work.
   2. Construct joints to have same texture, density and smoothness as other sections of asphalt concrete course.
   3. Clean contact surface and apply tack coat.

D. Rolling: - General
   1. Begin rolling when mixture will bear roller weight without excessive displacement.
   2. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.

E. Breakdown Rolling:
   1. Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge.
   2. Check surface after breakdown rolling, and repair displaced areas by loosening and filling, if required, with hot material.

F. Second Rolling:
   1. Follow breakdown rolling as soon as possible, while mixture is hot.
   2. Continue second rolling until mixture has been thoroughly compacted.

G. Apply surface course material, which shall be #11 type surface mixture one-inch thick, or as noted otherwise.

H. Finish Rolling:
   1. Perform finish rolling of surface course while mixture is still warm enough for removal of roller marks.
   2. Continue rolling until roller marks are eliminated and course has attained maximum density.

I. Minimum Quality Requirements:
   1. Sampling and testing of the individual materials and the final mixture shall be performed to insure conformance with all specification requirements, continuous uniformity and proper workability of the mixture.
      a. Test samples shall be 2000 to 3000 grams in size, taken from the delivery truck or from the pavement area before compaction.
      b. Test for conformance with composition limits and the job mix formula with respect to gradation according to American Association of State Highway and Transportation Officials (AASHTO) document T27 as modified in "FDOT Standard Specifications", and in AASHTO document T30, except decantation through the No. 200 sieve will not be required in either test.
      c. Test for bitumen requirements in accordance with Florida Highway Department Division of Materials and Test.
      d. Perform one of each type test specified for materials from each delivery truck.
      e. Record temperature of material sample and air temperature each time a sample is taken.
      f. Test results shall be reported in writing to Landscape Architect and Contractor within 24 hours after tests are made. Reports of tests shall include the project identification name and number, date of asphalt concrete placement, name of testing service, and location of asphalt concrete batch in pavement.

J. Patching:
   1. Remove and replace paving areas mixed with foreign materials and defective areas.
   2. Cut-out such areas and fill with fresh, hot asphalt concrete.
   3. Compact by rolling to maximum surface density and smoothness.

K. Protection:
   1. After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

L. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.05 FIELD QUALITY CONTROL

A. General -
   1. Test in-place asphalt concrete courses for compliance with requirements for thickness and surface smoothness.
   2. Repair or remove and replace unacceptable paving as directed by Landscape Architect.

B. Thickness:
   1. In-place compacted thickness will not be acceptable if exceeding following allowable variation from required thickness.

a. Base Course: 1/2", plus or minus.
b. Surface Course: 1/4", plus or minus.

C. Surface Smoothness:
1. Test finished surface of each asphalt concrete course for smoothness, using 10' straightedge applied parallel with, and at right angles to centerline of paved area. Surfaces will not be acceptable if exceeding the following tolerances for smoothness.
a. Base Course Surface: 1/4".
b. Wearing Course Surface: 3/16".
c. Check surface areas at intervals as directed by Landscape Architect/Engineer.

PART 4 - MEASUREMENT AND PAYMENT

1.1 MEASUREMENT AND PAYMENT

A. Measurement and payment will be as specified in the Contract Documents and under the pay items “Asphalt Paving-Conservatory Drive Entry Road and Parking Lot”, and “Asphalt Paving-8’ and 12’ Trails”.

END OF SECTION 321216

SECTION 321343 – PERVIOUS CONCRETE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Extent of pervious concrete paving is shown on drawings, including pavement.

B. Prepared subbase is specified in "Earthwork" section.

C. Joint fillers and sealers are specified in Division 32.

1.03 SUBMITTALS

A. Provide samples, manufacturer's product data, test reports, and materials' certifications as required in referenced sections for pervious concrete and joint fillers and sealers.

1.04 SCOPE OF WORK

A. The work to be performed under this contract will be defined by appropriate referenced plans or drawings.

B. The testing and preparation of the sub-base may be delegated to the general contractor, owner or owner’s agents by mutual agreement.

C. Specifications for base and subsoil preparation shall be the responsibility of the owner and his architect/engineers and shall be observed with certified strict compliance.

D. Included in the performance of the work is the furnishing of all labor, equipment and materials. The contractor shall also provide instruments required for leveling and placing forms, special and standard equipment required for placing and finishing materials, and also be responsible for the tight scheduling of the arrival of material at the appropriate time for placement.

E. Extreme weather conditions will be a factor in scheduling and placement.

F. Material suppliers shall certify that each ready-mixed batch shall be in compliance with mix specifications. Damages or failures caused by deviations from mix specifications shall be the responsibility of the concrete mixture supplier.

1.05 CONTRACTOR QUALIFICATIONS

A. The Pervious Concrete Contractors should be a “Certified Pervious Concrete Craftsmen,” and must be able to demonstrate at least three years of competent work with Pervious Concrete.

The contractor must be able to submit a list of at least three jobs completed within the previous three year period to those job's owners', engineers' or architects' satisfaction during that time. The oldest jobs installed during that period must still be demonstrating durability. Any applicable test results from such previous jobs shall be furnished to the Owner/Engineer/Architect. Note: Certification by any reputable organization shall not substitute for years of demonstrated quality installations and workmanship.

B. If either the Pervious Placing Contractor or the Pervious Concrete Ready-mix producer have no prior experience with Portland Cement, Pervious Concrete Pavement; the Contractor shall retain an experienced Consultant to supervise production, base preparation, placement and finishing. Expense of the consultant shall be the responsibility of the Contractor.

C. A contractor who has been certified by passing a test or by receiving certification from a concrete or ready-mix association or supplier, without three years experience working under the guidance of a qualified Senior Pervious Concrete Craftsman, shall not be qualified under this specification.

1.06 CONCRETE MIX DESIGN

A. If requested, the Pervious Contractor with the consensus of the Ready-mix supplier, shall furnish a proposed mix design with proportions of materials to Owner, Owner's Agent or Contracted Engineer prior to commencement of work. It will be the responsibility of the Ready-mix supplier to certify that each batch delivered meets the Pervious Concrete mix design specifications. The Ready Mix supplier shall be responsible for training all involved in creating, processing and delivering the Pervious Concrete mix. This includes the batch plant personnel as well as the Ready-mix truck drivers.

B. This responsibility begins with providing a cleaned silo for the no-fines aggregate which shall have been triple washed by the aggregate supplier or the batch plant. Trucks to be used in delivering and mixing the material shall have their drums thoroughly flushed and cleaned prior to loading. The batch plant shall load ingredients per mix design and order of addition. Drivers shall be thoroughly made aware of drum speed and number of rotations required to produce the homogenous mix required by time of discharge. Water amount per design mix is critical, and shall not be changed by either the batch plant or the drivers with mutual consent of all concerned.

C. It shall also be the responsibility of the Pervious Concrete Contractor to accept or reject each shipment. The contractor, based upon years of experience, will be able, in addition to the certification from the supplier, be able to judge the appearance, feel, workability and consistency of the batch. Any questions shall be discussed with the driver and if there is justification to reject a batch, the Ready-mix plant will be immediately notified, followed up with appropriate documentation.

D. It shall be the responsibility of the Ready-mix supplier to train batch plant operators, supervisors and ready-mix truck drivers how to properly measure, mix, deliver and discharge Pervious Concrete. Since Pervious Concrete is much different in performance characteristics, the rodded unit weight sampling is inappropriate and meaningless. However, if testing is required, core samples can be tested after 28 days for compressive strength according to ASTM C-39 with a minimum of three samples being tested, from a 1,000 square foot slab and one additional sample taken for each additional 2,000 square feet. Samples should be randomly taken from the slab and

core cavities must be refilled with pervious concrete. Samples can also be measured for thickness, density and compaction.

1.07 TESTING AGENCY PROCEDURES

A. Testing procedures shall be established as an integral part of this specification. The level of testing and methods to be used shall be agreed to by all involved parties. Charger Enterprises and/or its material suppliers reserve the right to exclude any test procedures which do not properly address the unique characteristics of pervious concrete. If a testing laboratory is to be employed, it shall be the responsibility of the owner to select and pay for such testing. Only qualified testing laboratories employing experienced technicians or engineers who are thoroughly familiar with Pervious Concrete installations shall be used. Testing agencies shall have at least three years experience with Pervious Concrete work.

B. Test Panels

1. If so required by the contract, the Pervious Contractor may be required to prepare test panels as specified by the architect, engineer or owner. Cost of creating and removing such panels shall be covered by a line item in the contract and contract proposal. If 12' x 12' or some other size, sample panels are required for evaluation, they will be provided, if so directed by specification. Test panels shall be of the same thickness as the poured slab, with the same sub-base, and shall be identified by date and batch or truck load. When practical, sample panels shall be of a size that will allow them to be integrated into the final pavement project, if accepted.

2. Requirements for acceptance of panels: The thickness of the slab shall measure no less than ½" of the designed thickness.

3. Panels shall be devoid of any skin of Portland Cement at the bottom or top of the slab. Such skin can prevent the passage of water through the slab at its designed percolation rate.

4. Void containment of the slab should be between 15% minimum and 22% maximum. However, if a wet mix has been applied, a cement skin may form at the base of the slab. Though the void content may be within acceptable limits, the percolation specification may not be met.

5. Unit weight shall be within ± 5% of the mix design.

6. A minimum compressive strength according to ASTM C-39, of 300 psi shall be required.

7. Using a Constant-Head Permeameter, or a mutually agreed to procedure, samples shall demonstrate a percolation rate of 90% or more of the percolation of the Base under the Pervious Concrete slab.

PART 2 -MATERIALS

2.01 INGREDIENTS

A. Components of mixture shall consist of Portland cement, limestone, or other locally available, proven satisfactory aggregate, admixtures and stabilizers as appropriate, and water which

complies with local concrete paving mix specifications. The addition of water to the mix shall not be the decision of the truck driver.

1. Cement: Cement shall be Portland Cement Type I or II conforming to ASTM C-150 or Portland Cement IP or IS conforming to ASTM C-595.

2. Fly ash and Ground Iron Blast Furnace Slag: Flyash conforming to ASTM-C618 may be used in amounts not to exceed 20 percent of total cementitious material. Ground Iron Blast Furnace Slag conforming to ASTM C989 may be used in amounts not to exceed 50 percent by weight of total cementitious material.

3. Aggregate: Though No. 8 coarse aggregate as specified by FDOT (3/8 to No. 16) per ASTM C 33 or No. 89 Coarse Aggregate (3/8 to No. 50) per ASTM D 448 has been widely used. For mix design incorporating fine aggregate it shall conform to FDOT Specification #902. Other limestone or granite aggregates up to 1" may be used upon approval of Charger Enterprises, the Ready Mix Concrete vendor, and any involved Engineer, Architect or Owner's Representative. For best results aggregate shall be triple washed to remove fines thus enhancing percolation. It shall be the responsibility of the aggregate supplier to certify the triple wash compliance.

2.02 AIR ENTRAINING AGENTS

A. Air entraining agents shall comply with ASTM C- 260.

2.03 ADMIXTURES

A. Type A Water Reducing Admixtures shall comply with ASTM C-494.

B. Type B Retardation Admixtures shall comply with ASTM C-494.

C. Type D Water Reducing/Retarding Admixtures shall comply with ASTM C-494. Hydration stabilizers which are often recommended and sometimes required shall also meet the requirements of Type B Retardation Admixtures or Type D Water Reducing/Retarding Admixtures. Additional bonding agents may be included in mix based upon proven advantages and by mutual acceptance of all parties, who have a vested interest involved. They may include, but are not limited to polymer based, or silica-based ingredients and must not interfere with necessary hydration processes.

2.04 WATER

A. Water shall be potable or shall comply with FDOT Standard Specifications, Section 923.

2.05 PROPORTIONS:

A. Cement Content: For pavement being used by vehicular traffic, the total cementitious material shall not be less than 600 lbs. per cubic yard of mix.

B. Lower Cementitious Material Content: If required, and if material performance can be achieved and verified using a lower cementitious content, minimum cement content may be lowered upon approval of owner's engineer or its agent.

C. Aggregate Content: The volume of aggregate specified above shall be equal to 27 cu. ft. per cu. yd. when calculated as a function of the unit weight determined in accordance with ASTM C-29 jiggling procedure. The 27 cu. ft. includes the 15% to 25% Fine aggregate, if used, should not exceed 3 cu. ft. and shall be included in the total aggregate volume. Such fine aggregate will reduce water percolation and retention of the pavement.

D. Admixtures: Admixtures may be appropriate for numerous reasons. They shall be used according to manufacturer's directions including storing, mixing, placing and curing. Admixtures which simply improve placement or reduce cost, but which may adversely affect the quality of the installed Pervious Concrete may not be used.

E. Water: Water quantity which is an extremely critical component shall be such that the cement paste displays a wet metallic sheen without causing the cement paste to flow from the aggregate.

F. Insufficient water content will also cause inconsistency in the mix and reduce bond strength. This will cause aggregate to separate from the pavement over time. Too much water content will result in the paste forming membranes which seal the void system primarily at the bottom of the slab. It also may cause a poor surface bond, resulting in unnecessary raveling.

2.06 SUBGRADE PREPARATION AND FORM WORK

A. Preliminary Engineering: Prior to the specification of Pervious Concrete for any paving application, the Owner through a qualified Engineer and/or the General Contractor shall be responsible for evaluation of existing soils relative to stability, drainage and the identifying of any buried organic material or hazardous waste. Any problems will then be professionally identified and properly addressed and remedied as appropriate, either under the responsibility of the Pervious Contractor, the General Contractor or any other specialty contractor designated by the owner or engineer involved. In no case can any organic material such as roots, wood, stumps, sod, etc. be allowed to remain in soil below sub-base. Neither can clay nor organic sludge be tolerated.

B. Grading Undisturbed Material: In order to achieve the designed elevations, undisturbed earth must be graded. At the same time problem materials and clay concentrations should be removed. In much of Florida's sandy soils grading and compaction of the sandy soils can convert the graded undisturbed soil into a base as long as it is compacted to a modified proctor value of 92% to 95% of a maximum dry density as established by ASTM D 1157 or AASHTO T 180.

C. Sub-grade Material: After any problems with the previously undisturbed soil have been corrected, and if the native soil is not suitable to serve as a base, stone aggregate or crushed, recycled concrete may be installed as a base, a minimum of 6"thick. It shall be compacted by a vibratory compactor to a proctor value of 92% of 95% of a maximum dry density as established by ASTM D 1157 or AASHTO T 180. To create an under pavement reservoir a bed of 6" to 10" of crushed stone or recycled, crushed concrete may also be used to enhance water storage. A choice of the best available soil shall be made by an engineer if appropriate. The use of such a bed may be used to offset the need for open detention ponds, if supported by design engineering,

D. Sub-grade Permeability: Prior to the placement of Portland Cement Pervious Pavement, the sub-grade shall be tested for the rate of permeability by the double ring infiltrometer, or such other

suitable test that will be agreeable to all parties concerned. Test borings are recommended to determine soil conditions and water table level. A layer of clay discovered less than 5' below the base may restrict the permeability of the Pervious system. Borings may not be required if undisturbed soil under base demonstrates good permeability and stability and has not been disturbed for three years or more. Permeability testing and certification if required will be the responsibility of the Owner or General Contractor.

E. Sub-grade Support: The sub-grade material shall be placed and compacted in layers of a thickness that can be compacted by a mechanical vibratory roller or compactor to a minimum density of 94 % ± 2% as determined by ASTM D-1557 or AASHTO-T-180. A minimum Limerick Bearing Ratio (LBR) of 20 ± 2 shall be obtained in the top 6 inches of sub-grade. Sub-grade stabilization shall be performed if, and as, directed by a qualified engineer. Such engineering services shall be performed if needed at the expense and oversight of the Owner or the General Contractor. If fill material (embankment) is required to bring sub-grade to final elevation, it shall be clean and free of deleterious materials. It shall be placed and compacted in maximum layers of 8". Layers shall be compacted by a mechanical vibratory roller or compactor to a minimum density of 92% of maximum dry density as established by ASTM-D 1557-D or AASHTO-T-180.

F. Sub-grade Moisture: The sub-grade shall be in a moist condition with no free standing water (within ± 3% of the optimum moisture content as determined by the modified compaction test ASTM-D-1557 or AASHO-T-180).

G. Forms:

1. Forms shall be primarily of roll formed steel or reinforced plastic.

2. Forms shall be the depth of the pavement, or be elevated with steel pins and supported to provide the desired depth of pavement. (Steel forms have proven to provide the best support for power screed machines and to contain the pressures exerted by compacting rollers.)

3. Appropriate release agents shall be applied to the forms before placing concrete and to be regularly applied to rollers used in compaction.

4. When debris or aggregate begins to stick to compaction rollers, they shall be cleaned and recoated with a release agent. Rollers with detached aggregate on their surface when used on fresh Pervious Concrete are a major cause of raveling.

5. If screed machines pick up traces of debris they should be pressure cleaned between truckloads or as otherwise needed. Forms shall be set to specified elevations and those elevations shall be rechecked immediately prior to the placement of the pervious concrete, aggregate mix.

6. Elevations shall be established and checked by a laser or other suitable device.

7. Any disturbance of forms or base by vehicles or workers shall be repaired and elevations reconfirmed prior to Pervious Concrete Placement.

8. Concrete with footprints should be immediately removed and replaced with fresh concrete.

9. A suitable material cut into 3/8" thick, spacing strips shall be placed on top of forms or of previously placed material to support the vibrating screed during its operation. This allows for final compaction by steel compaction rollers applied to surface both lengthwise and crosswise.

2.07 MIXING, HAULING AND PLACING

A. Mix Time: Truck mixers shall be operated at the speed designated as mixing speed by the manufacturer for 75 to 100 revolutions of the drum. Commencing mixing too soon and exceeding 100 revolutions may result in a hot, unworkable mix which may result in premature failure of the pervious slab.

B. Transportation: The Portland cement aggregate mixture may be transported or mixed on site and must be used within one (1) hour of the introduction of mix water, unless otherwise approved by an involved engineer. This time may be increased to 120 minutes when utilizing an approved retarding admixture or the hydration stabilizer specified in Section 205.

C. Discharge: Each mixer truck driver shall provide a certificate guaranteeing mix conformity with specification. Each batch will be inspected as described above, by the Pervious Concrete Contractor or his qualified agent, for appearance, workability and uniformity of concrete according to Section 304. A minimal amount of water may then be added to obtain the required mix consistency. A minimum of 20 revolutions at the manufacturer’s designated mixing speed shall be required following any addition of water to the mix.

D. Discharge shall be a continuous operation and shall be completed as quickly as possible. Concrete shall be deposited as close to its final position as practicable and at a point so that fresh concrete enters and adheres to the mass of previously placed green concrete. The practice of discharging onto sub-grade and pulling or shoveling to final placement is not allowed.

E. Placing and Finishing Equipment: Unless otherwise approved by the Owner or Engineer in writing, the contractor shall provide mechanical equipment of either slipform or form riding with a following compactive unit that will provide a minimum of 10 psi vertical force. The pervious concrete pavement will be placed to the required cross section and shall not deviate more than ± 3/8" in 10' from the profile grade (3/8 inch in 10 feet). If placing equipment does not provide the minimum specified vertical force, a full width roller or other full width compaction device that provides sufficient compactive effort, shall be used immediately following the strike off operation.

F. After mechanical or other approved strike off and compaction operation, no other finishing operation will be allowed. If vibration, internal or surface applied, is used; it shall be shut off immediately when forward progress is halted for any reason. The Contractor will be restricted to pavement placement widths of a maximum of fifteen (15) feet unless the contractor can demonstrate competence to provide placement greater than the maximum width specified, to the satisfaction of the Engineer. During placement, care should be taken to prevent workers from stepping into the slurry mix. Footprints can compress and force cement paste into the voids at the bottom of the slab, forming resistance to percolation through the slab.

G. Pervious Concrete does not lend itself to being pumped. However, it can be placed using a belt conveyor. During placement all tools including screed machines, compaction rollers, rakes, trowels and forms shall be kept clean, and coated with a release agent to reduce the possibility of raveling. Compaction rollers displaying aggregate adhesion will accelerate raveling and disintegration.

2.08 CURING

A. Curing procedures shall begin within twenty (20) minutes after the final placement operations. The pavement surface shall be covered with a minimum six (6) mil thick, unpigmented, polyethylene sheet or other approved covering material.

B. Prior to covering a fog or light mist shall be sprayed above the surface when required, due to ambient conditions (temperature, wind and humidity). The cover shall overlap all exposed concrete and film edges by a minimum of 1 foot and shall be secured to pervious surface to avoid bubbles which will cause uneven curing and discoloration. Polyethylene shall be covered evenly with a layer of soil. This is to prevent polyethylene dislocation due to winds or adjacent traffic conditions. Though rebar and wood has been often been used for this purpose, air invades the space between them under the polyethylene between the rebars which results in uneven curing, strength and coloration. This dirt must be thoroughly removed by sweeping prior to removing the polyethylene to prevent any clogging of the Pervious Concrete. Care must be taken to prevent seepage through any overlap joints.

C. Cure Time:
1. Portland Cement Type I, II, or IS - 7 days minimum.

2. Portland Cement Type I or II with Class F Flyash (as part of the 600 lbs./cy minimum cementitious) or

3. Type IP - 10 days minimum.

4. No truck traffic shall be allowed for 10 days following placement. (For passenger cars/light trucks no traffic shall be allowed for 7 days.)

2.09 JOINTING

A. Though some engineers have recommended the installation of control (contraction) joints installed with joint rollers at 40 foot intervals, we have learned that the use of these rolled joints are counterproductive causing excessive raveling, particularly adjacent to the joints.

B. When required we have also found that saw cut joints at 40 to 60 foot intervals have also proven to accommodate contraction without causing significant stress cracking. Saw cutting should be performed seven (7) days after placement, preferably within four days of completion of the placement procedure.

C. When saw cut joints are performed after four days, the plastic covering will be swept clean, then slit and folded back to accommodate the saw cut. Upon completion the plastic will be folded back over the edges and covered with a new piece of plastic allowing a minimum of 1 foot overlap on each side. The plastic will then be covered with soil for the remainder of the seven-day period.

D. Saw-cut joints will be installed at a depth of 1/4 of the thickness of the pavement. When a pour is interrupted it should be terminated against a form and properly compacted. A 45° groove 1" deep shall be created adjacent to the form. When the pour is continued thereafter, a similar groove would be formed into the joint formed by the new pour, matching the previous groove. The “V” shape resulting can then be filled with an approved elastomeric or asphaltic joint sealing product. Isolation (expansion) joints will not be used except when the pavement is abutting slabs or other adjoining structures particularly where a difference in thermal expansion exists.

2.10 TESTING, INSPECTION AND ACCEPTANCE:

A. Laboratory and/or Field Testing: All laboratory test procedures shall be established by the mutual consent of the pervious concrete contractor, the Owner, General Contractor and any engineer or architect representing the concerns of the Owner, or any other entity having a financial interest in the project.

B. Laboratory Testing: Most currently used procedures for testing pervious concrete, beyond establishing void content have little benefit in establishing the physical properties other than the performance of properly formulated and placed Pervious Concrete which has functioned properly for decades. Some more relevant test methods are being evaluated and may be proposed.

C. At present the Owner or General Contractor may retain a pervious qualified, independent testing laboratory. The laboratory must provide evidence of conforming to the requirements of ASTM E-329 “Standard Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials used in Construction,” and must have at least three (3) years of experience in working with pervious concrete. All test samples shall be made and taken at the time of placement. All samples shall be identified by date and batch mix or truck load. Laboratory testing shall be done expeditiously, and results communicated to all concerned in a timely manner.

D. Field Testing: Field testing shall be performed as per contract documents or specification by either the General Contractor, his agent, or if specified by a pervious concrete qualified, test laboratory. To qualify, field agents shall have a minimum of (1) one year and 3 three projects experience in field testing pervious concrete. Laboratory shall be thoroughly familiar with the unique methods for testing Pervious Concrete.

E. Testing procedures are in a state of evolution at present. Permeability may be field tested using a constant-head Permeameter or an Embedded Ring Infiltrometer. (ERIK) For Lab testing of percability samples, 2' x 2' can be cut from a typical slab, or made in on-site in forms. The sample, 2' x 2’ by 6", or the thickness of the pervious concrete being placed shall have a 2' x 2' x 12" form built around Caulk is then applied between the form and the pervious concrete. The added height provides a dam for the addition of water. The caulk prevents the water from seeping between the form and the edge of the pervious concrete. The form can be placed on a typical compacted base. Three inches of water can be placed inside the form after the concrete has cured partially, and the drainage time can be measured. The three inches of water should be accommodated below the upper surface of the pervious concrete at the same rate as the sub-base is capable of receiving the water. The three inches of water should pass through the

pervious concrete and the base in 3 minutes or less, if sub-base can accommodate that amount of water (See SWFMD RESOURCE REGULATION TRAINING MEMORANDUM TM/ERP_ 980521.a, Dated May 01, 1998, Page 2. “Site Drainage Conditions.)

2.11 PAVEMENT TEST PROCEDURE:

A. Responsibility: The Pervious Contractor shall be responsible for requiring a pervious concrete material supplier to provide a mix compliance statement on each shipping document. No deviation of the approved mix design will be accepted without the concurrence of the owner’s engineer or agent. Final addition of water is primarily the responsibility of the Pervious Contractor.

B. Paving Material: At the owner’s request, if batch certification is not adequate, a minimum frequency of one (1) test for each day of placement shall be conducted to verify the weight of material as delivered. As noted above rodded samples have no relevance to pervious concrete paving. The test shall be conducted in accordance with ASTM C-172 and C-29. Mix shall be within ± (5%) five percent of the design unit weight. If outside of range, mix proportions shall be modified to comply.

C. Pavement Thickness Acceptance: Prior to placement, Contractor shall confirm grade peg and/or form elevations to provide required thickness of the pervious slab. If an outside testing laboratory is employed, the following procedure shall be followed:

1. During placement a field engineer will verify form elevations and measure depth of placement at appropriate time intervals. Within 24 hours of placement core samples may also be taken in accordance with ASTMC-42. This must be done in the presence of the pervious concrete contractor or his agent, and core cavities shall immediately be filled with pervious concrete. These cores shall be used for verification of pavement thickness. At seven days from the placement of the slab, these core ends shall be trimmed to facilitate volume determination. Core unit weights shall be calculated based upon weight results when tested in accordance with ASTM-C-140 paragraph 14.1 (disregard suspended weight.). Pavement acceptance shall be based on the average weight of the cores being within ± (5%) five percent of the design unit weight. The thickness of the pavement shall be a minimum of five (5) inches for light traffic loadings. Additional thickness will be required for pavements subjected to frequent, heavy axle loadings. As noted above, compressive strength tests can only be performed 28 days after concrete has been cured. Tests shall be performed in accordance with ASTM-C-39.

2.12 PERMEABILITY

A. One of the most important properties of pervious concrete is its percolation rate, which is directly related to its void content. A testing apparatus called a falling head Permeameter can be used to test a core sample to establish its coefficient of permeability. Please see the two references below:

1. http://www.geology.sdsu/edu/classes/geol.552/permeameter/permeameters.htm

2. http://www.dot.state.fl.us/researchcenter/Completed_proj/summary_RD/FDOT_BD521_02.pdf

2.13 MAINTENANCE

A. Maintenance is the responsibility of the owner after the Pervious project has been completed and accepted.

B. Protect Pervious Pavement from potential clogging: Do not permit landscape or other contractors to store sand or soil on pervious surfaces. Schedule pervious installation near the conclusion of a construction project. Owner or General Contractor shall arrange to have pervious concrete vacuumed before area is opened to traffic.

C. Quarterly Pervious Maintenance: Pavements shall be examined for damage or deterioration which will be rare. They shall be cleaned with parking lot vacuums. If oil has spilled or dripped in any area treat with oil-digesting microbial compound.

D. Adjacent Soil Impact: Stabilize any adjacent landscape areas that may be allowing soil to wash onto pervious surfaces.

E. Organic debris: Any leaves or grass cuttings shall be removed by blower or parking lot vacuums as part of a landscape maintenance contract. This response should follow every mowing and leaf removal from landscape areas.

F. Repairs: When utility work or other activity damages Pervious Pavement, it shall be replaced with Pervious concrete. Use of original Pervious Contractor will preserve any warranty. Under no circumstances should effective storm water management be diminished by repaving with any impervious paving material.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT AND PAYMENT

A. Measurement and payment will be as specified in the Contract Documents and under the pay item “Pervious Concrete-Conservatory Drive Entry” and “Pervious Concrete-DeSoto Woods Drive Entry and Parking Area”.

END OF SECTION.

SECTION 321373 – CONCRETE PAVING JOINT SEALANT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including General and Supplementary Conditions, and Division 1 specification sections, apply to the work of this section.

1.02 DESCRIPTION OF THE WORK

A. The extent of each form and type of joint sealer is indicated by provisions of this section.

B. The applications for joint sealers as work of this section include the following:
   1. Expansion, Construction and Contraction joints between concrete units.
   2. Expansion joints between masonry units.
   3. Expansion joints in horizontal concrete flatwork.

C. General Performance:
   1. Except as otherwise indicated, joint sealers are required to establish and maintain airtight and waterproof continuous seals on a permanent basis, within recognized limitations of wear and aging as indicated for each application.
   2. Failures of installed sealers to comply with this requirement will be recognized as failures of materials and workmanship.

1.03 SUBMITTALS

A. Product Data:
   1. Submit manufacturer's product specifications, handling/installation/curing instructions, and performance tested data sheets for each elastomeric product required.

1.04 JOB CONDITIONS

A. Weather Conditions:
   1. Do not proceed with installation of liquid sealants under unfavorable weather conditions.
   2. Install elastomeric sealants when temperature is in lower third of temperature range recommended by manufacturer for installation.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. General:
   1. Manufacturers listed in this article include those known to produce the indicated category of prime joint sealer material, either as a nominally pure generic product or an as equivalent-performance modification thereof or proprietary product.

B. Manufacturer:
   1. Subject to compliance with requirements, provide products of one of the following:
   2.. Manufacturers of Elastomeric Sealants (Liquid):
      a. Dow Corning Corp.; Midland, MI
      b. W.R.Meadows, Inc.; Elgin, IL
      c. Pecora Corp.; Harlesville, PA
      d. Sonneborn/Contech, Inc.; Minneapolis, MN
      e. Tremco, Inc.; Cleveland, OH
      f. Toch/Carboline Co.; St.Louis, MO

2.02 MATERIALS

A. General Sealer Performance Requirements:
   1. Provide colors indicated or, if not otherwise indicated, as selected by Landscape Architect from manufacturer's standard colors.
   2. Select materials for compatibility with joint surfaces and other indicated exposures, and except as otherwise indicated select modulus of elasticity and hardness or grade recommended by manufacturer for each application indicated.
   3. Where exposed to traffic, select nontracking materials of sufficient strength and hardness to withstand stilletto heel traffic without damage or deterioration of sealer system.

B. Miscellaneous Materials:
   1. Joint Primer/Sealer:
      a. Provide type of joint primer/sealer recommended by sealant manufacturer for joint surfaces to be primed or sealed.
   2. Sealant Backer Rod:
      a. Provide compressible rod stock of polyethylene foam, polyurethane foam, polyethylene jacketed polyurethane foam, butyl rubber foam, neoprene foam or other flexible, permanent, durable nonabsorbtive material as recommended by sealant manufacturer for compatibility with sealant.
   3. Expansion Board Cap:
      a. Provide removable cap (i.e. Zip-Strip) on all concrete flatwork expansion joints to facilitate sealant installation.
      b. Install 1/2" x 1/2" cap as integral part of all expansion joints.
      c. Remove cap immediately prior to sealant installation.

2.03 INSPECTION

A. Installer must examine substrates, (joint surfaces) and conditions under which joint sealer work is to be performed, and must notify Contractor in writing of unsatisfactory conditions.

B. Do not proceed with joint sealer work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

PART 3 - EXECUTION

3.01 JOINT PREPARATION

A. Clean joint surfaces immediately before installation of gaskets, sealants.
   1. Remove dirt, insecure coatings, moisture and other substances which could interfere with seal of sealant.
   2. Etch concrete and masonry joint surfaces as recommended by sealant manufacturer.

B. Prime or seal joint surfaces where indicated, and where recommended by sealant manufacturer.
   1. Confine primer/sealer to areas of sealant bond.
   2. Do not allow spillage or migration onto adjoining surfaces.

3.02 INSTALLATION

A. Comply with manufacturer's printed instructions except where more stringent requirements are shown or specified, and except where manufacturer's technical representative directs otherwise.

B. Set joint filler units at depth or position in joint as indicated to coordinate with other work, including installation of bond breakers, backer rods and sealants.
   1. Do not leave voids or gaps between ends of joint filler units.

C. Install sealant backer rod for liquid-applied sealants, except where shown to be omitted or recommended to be omitted by sealant manufacturer for application indicated.

D. Employ only proven installation techniques, which will ensure that sealants are deposited in uniform, continuous ribbons without gaps or air pockets, with complete "wetting" of joint bond surfaces equally on opposite sides.
   1. Except as otherwise indicated, fill sealant rabbet to a slightly concave surface, slightly below adjoining surfaces.
   2. Where horizontal joints are between a horizontal surface and vertical surface, fill joint to form a slight cove, so that joint will not trap moisture and dirt.

E. Install liquid-applied sealant to depths as shown or, if not shown, as recommended by sealant manufacturer but within the following general limitations, measured at center (thin) section of beads; (not applicable to sealants in lapped joints):
   1. For sidewalks, pavements and similar joints sealed with elastomeric sealants and subject to traffic and other abrasion and indentation exposures, fill joints to a depth equal to 75% of joint width, but neither more than 5/8" deep nor less than 3/8" deep.
   2. For normal moving joints sealed with elastomeric sealants but not subject to traffic, fill joints to a depth equal to 50% of joint width, but neither more than 1/2" deep nor less than 1/4" deep.

3.03 LOCATION OF CAULKING AND SEALANTS

A. Carefully study the drawings and furnish and install the proper materials at each point where called for on the drawings and herein, plus at all other points where sealant is essential in main

   taining the continued integrity of the watertight barrier. The following listings are included as a guide only.

B. Locations of joints filled with sealants:

1. All joints so noted in all concrete site improvements and the joint between the concrete slabs and dissimilar materials.
2. Any other exterior joints between dissimilar materials where the joining of the two surfaces leaves a gap between the meeting materials or components as may be dictated by the various methods of construction - to make watertight.
3. Any other exterior locations which are noted "caulked" or "sealant" and not specifically listed herein, or included in the work of any other sections of the specifications.

3.04 JOINT DESIGN

A. All sealant joints shall conform to the following criteria:
   1. No joint less than 1/4" in width or depth.
   2. Joints up to 1/2" in width shall have equal depth.
   3. Joints over 1/2" in width shall have depth equal to 1/2 the width.

B. Provide backer rod as specified to limit depth of joints.
   1. In shallow joints where use of backer rod is restricted, provide bond-breaker tape.

C. Spillage:
   1. Do not allow sealants or compounds to overflow or spill onto adjoining work, or to migrate into voids of exposed finishes.
   2. Clean adjoining surfaces by whatever means may be necessary to eliminate evidence of spillage.

D. Recess exposed edges of joint fillers slightly behind adjoining surfaces, unless otherwise shown, so that compressed units will not protrude from joints.

E. Pavement and Sidewalk Joints:
   1. Provide approved foam, bituminous and/or fiber expansion joint fillers at all areas indicated to receive an expansion joint (EJ), or as otherwise detailed.
      a. Install non-bituminous joint filler material between limestone units and any other material.
   2. Employ the use of expansion board cap to ensure proper depth of sealants.
   3. Provide multi-component polyurethane sealant on top of joint filler where indicated, and at the right-of-way lines, where new pavement meets vertical surfaces.

F. Miscellaneous Above Grade Joints (other than pavement):
   1. Provide polyurethane joint filler or backer rod, as indicated with single-component polyurethane sealant.

3.05 CURE AND PROTECTION

A. Cure sealants in compliance with manufacturer's instructions and recommendations, to obtain high early bond strength, internal cohesive strength and surface durability.
   1. Advise Contractor of procedures required for cure and protection of joint sealers during construction period, so that they will be without deterioration or damage (other than normal wear and weathering) at time of substantial completion.

2. Cure and protect sealants in a manner which will minimize increases in modulus of elasticity and other accelerated aging effects.
3. Replace or restore sealants which are damaged or deteriorated during construction period.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT AND PAYMENT

A. Measurement and payment will be as specified in the Contract Documents and under the pay item “Concrete Walk and Pads”, “Decorative Columns-Conservatory Drive Entry” and “Decorative Columns-DeSoto Woods Drive Entry”.

END OF SECTION 321373

SECTION 321443 - POROUS UNIT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Solid concrete pavers with openings between pavers filled with aggregate.
2. Aggregate setting bed for pavers.

B. Related Requirements:

1. Division 31 Section "Earth Moving" for excavation and compacted subgrade.
2. Division 32 Section "Concrete Paving" for cast-in-place concrete curbs that serve as edge restraints for porous paving.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at project site.

1.4 ACTION SUBMITTALS

A. Product Data: For materials other than aggregates.

B. Product Data: For the following:

1. Pavers.
2. Geotextiles

C. Sieve Analyses: For aggregate materials, according to ASTM C 136.

D. Samples:

1. Full-size units of each type of unit paver indicated.
2. Aggregate fill.
3. Aggregate setting bed materials.

1.5 INFORMATIONAL SUBMITTALS

A. Material Certificates: For unit pavers. Include statements of material properties indicating compliance with requirements, including compliance with standards. Provide for each type and size of unit.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for unit pavers, indicating compliance with requirements.

1. For grid paving units, include durability test data based on testing according to proven field performance requirements of ASTM C 1319 performed on units subjected to three years' exposure to same general type of environment, temperature range, and traffic volume as Project.
2. For solid interlocking paving units, include test data for freezing and thawing according to ASTM C 67.

1.6 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store pavers on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied.

B. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

PART 2 - PRODUCTS

2.1 CONCRETE UNIT PAVERS

A. Source Limitations: Obtain each type of paver from single source that has resources to provide materials and products of consistent quality in appearance and physical properties.

B. Solid Concrete Pavers for Porous Paving: Solid interlocking paving units of shapes that provide openings between units, complying with ASTM C 936, resistant to freezing and thawing when tested according to ASTM C 67, and made from normal-weight aggregates.

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

a. The Tremron Group, AquaPaver.

2. Thickness: 3-1/8 inches (80 mm).
3. Face Size and Shape: Per manufacturer.
4. Color: As selected by Architect from manufacturer's full range.

2.2 AGGREGATE SETTING-BED MATERIALS

A. Graded Aggregate for Subbase: Sound crushed stone or gravel complying with ASTM D 2940, subbase material.

B. Graded Aggregate for Base Course: Sound crushed stone or gravel complying with ASTM D 2940, base-course material.

C. Sand for Leveling Course: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements in ASTM C 33 for fine aggregate.

D. Graded Aggregate for Leveling Course: Sound crushed stone or gravel complying with ASTM D 448 for Size No. 8.

E. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications; made from polyolefins or polyesters, with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured according to test methods referenced:

1. Survivability: Class 2; AASHTO M 288.
2. Apparent Opening Size: No. 60 (0.250-mm) sieve, maximum; ASTM D 4751.
3. Permittivity: 0.02 per second, minimum; ASTM D 4491.
4. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

F. Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured according to test methods referenced:

1. Survivability: Class 2; AASHTO M 288.
2. Apparent Opening Size: No. 40 (0.425-mm) sieve, maximum; ASTM D 4751.
3. Permittivity: 0.5 per second, minimum; ASTM D 4491.
4. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

2.3 FILL MATERIALS

A. Graded Aggregate for Porous Paving Fill: Sound crushed stone or gravel complying with ASTM D 448 for Size No. 8.

PART 3 - EXECUTION

3.1 PREPARATION

A. Proof-roll prepared subgrade according to requirements in Division 31 Section "Earth Moving" to identify soft pockets and areas of excess yielding. Proceed with porous paver installation only after deficient subgrades have been corrected and are ready to receive subbase and base course for porous paving.

3.2 INSTALLATION, GENERAL

A. Do not use unit pavers with chips, cracks, voids, discolorations, and other defects that might be structurally unsound or visible in finished work.

B. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.

C. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.

D. Tolerances:

1. Variation in Plane between Adjacent Units (Lipping): Do not exceed 1/16-inch (1.5-mm) unit-to-unit offset from flush.
2. Variation from Level or Indicated Slope: Do not exceed 1/8 inch in 24 inches (3 mm in 600 mm).

3.3 SETTING-BED INSTALLATION

A. Compact soil subgrade uniformly to at least 95 percent of ASTM D 698 laboratory density.

B. Proof-roll prepared subgrade to identify soft pockets and areas of excess yielding. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.

C. Place aggregate subbase and base, compact by tamping with plate vibrator, and screed to depth indicated.

D. Place aggregate subbase and base, compact to 100 percent of ASTM D 1557 maximum laboratory density, and screed to depth indicated.

E. Place drainage geotextile over compacted base course, overlapping ends and edges at least 12 inches (300 mm).

F. Place leveling course and screed to a thickness of 1-1/2 to 2 inches (40 to 50 mm), taking care that moisture content remains constant and density is loose and constant until pavers are set and compacted.

3.4 PAVER INSTALLATION

A. Set unit pavers on leveling course, being careful not to disturb leveling base. If pavers have lugs or spacer bars to control spacing, place pavers hand tight against lugs or spacer bars. If pavers do not have lugs or spacer bars, place pavers with a 1/16-inch- (1.6-mm-) minimum and maximum joint width. Use string lines to keep straight lines. Fill gaps between units that exceed 3/8 inch (10 mm) with pieces cut to fit from full-size pavers.

1. When installation is performed with mechanical equipment, use only unit pavers with lugs or spacer bars on sides of each unit.

B. Compact pavers into leveling course with a low-amplitude plate vibrator capable of a 3500- to 5000-lbf (16- to 22-kN) compaction force at 80 to 90 Hz. Use vibrator with neoprene mat on face of plate or other means as needed to prevent cracking and chipping of pavers. Perform at least three passes across paving with vibrator.

1. Compact pavers when there is sufficient surface to accommodate operation of vibrator, leaving at least 36 inches (900 mm) of uncompacted pavers adjacent to temporary edges.
2. Before ending each day's work, compact installed concrete pavers except for 36-inch (900 mm) width of uncompacted pavers adjacent to temporary edges (laying faces).
3. As work progresses to perimeter of installation, compact installed pavers that are adjacent to permanent edges unless they are within 36 inches (90 mm) of laying face.
4. Before ending each day's work and when rain interrupts work, cover pavers that have not been compacted and leveling course on which pavers have not been placed with nonstaining plastic sheets to protect them from rain.

C. Place soil fill as follows, immediately after vibrating pavers into leveling course. Spread and screed soil fill level with tops of pavers. Vibrate pavers and add soil fill until porous paving is filled to about 3/4 inch (19 mm) from top surface; remove excess soil fill if any.

1. Before ending each day's work, place soil fill in installed porous paving except for 42-inch (1067-mm) width of unfilled paving adjacent to temporary edges (laying faces).
2. As work progresses to perimeter of installation, place soil fill in installed paving that is adjacent to permanent edges unless it is within 42 inches (1067 mm) of laying face.

3. Before ending each day's work and when rain interrupts work, cover paving that has not been filled with nonstaining plastic sheets to protect it from rain.

D. Place graded aggregate fill immediately after vibrating pavers into leveling course. Spread and screed aggregate fill level with tops of pavers.

1. Before ending each day's work, place aggregate fill in installed porous paving except for 42-inch (1067-mm) width of unfilled paving adjacent to temporary edges (laying faces).
2. As work progresses to perimeter of installation, place aggregate fill in installed paving that is adjacent to permanent edges unless it is within 42 inches (1067 mm) of laying face.
3. Before ending each day's work and when rain interrupts work, cover paving that has not been filled with nonstaining plastic sheets to protect it from rain.

E. As work progresses, remove and replace pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT AND PAYMENT

A. Measurement and payment will be as specified in the Contract Documents and under the pay items “Porous Unit Pavers-Conservatory Drive Entry” and “Porous Unit Pavers-DeSoto Woods Drive Entry”.

END OF SECTION 321443

SECTION 323223 - SEGMENTAL RETAINING WALL

PART 1: GENERAL

1.01 Description

A. Work shall consist of furnishing materials, labor, equipment and supervision to install a segmental retaining wall system in accordance with plans and specifications and in reasonably close conformity with the lines, grades, design and dimensions shown on plans or established by Owner or Owner's engineer.

1.02 Reference Standards

A. Segmental Retaining Wall Units

1. ASTM C 140 - Sampling and Testing Concrete Masonry Units
2. ASTM C 1372 – Standard Specification for Dry-Cast Segmental Retaining Wall Units

B. Geosynthetic Reinforcement

1. ASTM D 4595 – Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method
2. ASTM D 5262 – Standard Test Method for Evaluating the Unconfined Tension Creep and Creep Rupture Behavior of Geosynthetics
3. ASTM D 5321 – Standard Test Method For Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic by Direct Shear Method
4. ASTM D 5818 - Standard Practice for Exposure and Retrieval of Samples to Evaluate Installation Damage of Geosynthetics
5. ASTM D 6706 – Standard Test Method for Measuring Geosynthetic Pullout Resistance in Soil

C. Soils

1. ASTM D 698 – Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort
2. ASTM D 2487 – Standard Practice for Classification of Soils for Engineering Purposes
3. ASTM D 422 – Standard Test Method for Particle-Size Analysis of Soils
4. ASTM D 4318 – Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils
5. ASTM G 51 – Standard Test Method for Measuring pH of Soil for Use in Corrosion Testing

D. Engineering Design

1. "NCMA Design Manual for Segmental Retaining Walls," Third Edition

E. Where specifications and reference documents conflict, the Wall Design Engineer shall make the final determination of applicable document.

1.03 Submittals

A. Materials Submittals: The Contractor shall submit manufacturers' certifications two weeks prior to start of work stating that the SRW units and geosynthetic reinforcement meet the requirements of Section 2 of this specification.

B. Design Submittal: The Contractor shall submit two sets of detailed design calculations and final retaining wall plans for approval at least two weeks prior to the beginning of wall construction. All calculations and drawings shall be prepared and sealed by a professional Civil Engineer (P.E.) – (Wall Design Engineer) experienced in SRW design and licensed in the state where the wall is to be built.

1.04 Delivery, Storage and Handling

A. Contractor shall check materials upon delivery to ensure that the specified type and grade of materials have been received and proper color and texture of SRW units have been received.

B. Contractor shall store and handle materials in accordance with manufacturer’s recommendations and in a manner to prevent deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breaking, chipping or other causes.

C. Contractor shall prevent excessive mud, wet concrete, epoxies and similar materials that may affix themselves from coming in contact with materials.

D. Contractor shall protect materials from damage; no damaged material shall be incorporated into the segmental wall.

E. Geosynthetic shall be protected from UV exposure and the protective covering on geosynthetic shall remain until immediately before installation and shall be stored at temperatures above -10 degrees F

PART 2: MATERIALS

2.01 Segmental Retaining Wall Units

A. SRW units shall be machine formed, Portland cement concrete blocks specifically designed for retaining wall applications. SRW units currently approved for this project are:

VERSA-LOK Standard Retaining Wall Units as manufactured by VERSA-LOK.

B. Color of SRW units shall be selected by the architect from manufacturer’s color palette.

C. Finish of SRW units shall be split-face.

D. SRW unit faces shall be of straight geometry.

E. SRW unit height shall be 8 inches.

F. SRW units shall provide a minimum weight of 120 psf wall face area.

G. SRW units shall be solid through the full depth of the unit.

H. SRW units shall have a depth (front face to rear) to height ratio of 2:1, minimum.

I. SRW units shall be capable of being erected with the horizontal gap between adjacent units not exceeding 1/8 inch.

J. SRW units shall be interlocked with connecting pins that provide ¾-inch setback from unit below (yielding a 7-degree cant from vertical).

K. SRW units shall be sound and free of cracks or other defects that would interfere with the proper placing of the unit or significantly impair the strength or permanence of the structure. Any cracks or chips observed during construction shall fall within the guidelines outlined in ASTM C 1372.

L. Concrete SRW units shall conform to the requirements of ASTM 1372 and have a minimum net average 28 days compressive strength of 3000 psi. Compressive strength test specimens shall conform to the saw-cut coupon provisions of ASTM C140.

M. SRW units' molded dimensions shall not differ more than $\pm$ 1/8 inch from that specified, as measured in accordance with ASTM C 140. This tolerance does not apply to architectural surfaces, such as split faces.

2.02 Segmental Retaining Wall Unit Connection Pins

A. SRW units shall be interlocked with VERSA-Tuff connection pins. The pins shall consist of glass-reinforced nylon made for the expressed use with the SRW units supplied.

2.03 Geosynthetic Reinforcement

A. Geosynthetic reinforcement shall consist of high-tenacity PET geogrids, HDPE geogrids, or geotextiles manufactured for soil reinforcement applications. The type, strength and placement of the geosynthetic reinforcement shall be determined by procedures outlined in this specification and the NCMA Design Manual for Segmental Retaining Walls (3rd Edition 2009) and materials shall be specified by Wall Design Engineer in their final wall plans and specifications. The manufacturers/suppliers of the geosynthetic reinforcement shall have demonstrated construction of similar size and types of segmental retaining walls on previous projects.

The geosynthetic type must be approved one week prior to bid opening. Geosynthetic types currently approved for this project are:

VERSA-Grid Geogrids

B. The type, strength and placement of the reinforcing geosynthetic shall be as determined by the Wall Design Engineer, as shown on the final, P.E.-stamped retaining wall plans.

2.04 Leveling Pad

A. Material for leveling pad shall consist of compacted sand, gravel, or combination thereof (USCS soil types GP,GW, SP, & SW) and shall be a minimum of 6 inches in depth. Lean concrete with a

strength of 200-300 psi and 3 inches thick maximum may also be used as a leveling pad material. The leveling pad should extend laterally at least a distance of 6 inches from the toe and heel of the lowermost SRW unit.

2.05 Reinforced Backfill Soil

A. The reinforced soil material shall be free of debris. Unless otherwise noted on the final, P.E.-sealed, retaining wall plans prepared by the Wall Design Engineer, the reinforced material shall consist of the inorganic USCS soil types GP, GW, SW, SP, SM, meeting the following gradation, as determined in accordance with ASTM D422:

Sieve Size	Percent Passing
1 inch	100
No. 4	20-100
No. 40	0-60
No. 200	0-35

B. The maximum particle size of poorly-graded gravels (GP) (no fines) should not exceed 3/4 inch unless expressly approved by the Wall Design Engineer and the long-term design strength (LTDS) of the geosynthetic is reduced to account for additional installation damage from particles larger than this maximum.

C. The plasticity of the fine fraction shall be less than 20.

D. The pH of the backfill material shall be between 3 and 9 when tested in accordance with ASTM G 51.

PART 3: DESIGN PARAMETERS

3.01 Soil

A. The soil parameters, as determined by the Owner's Geotechnical Engineer shall be used for the preparation of the final design and are included with the bid package.

B. Should the actual soil conditions observed during construction differ from those assumed for the design, design shall be reviewed by the Wall Design Engineer at the Owner's Geotechnical Engineer's direction.

3.02 Design

A. The design analysis for the final, P.E.-stamped retaining wall plans prepared by the Wall Design Engineer shall consider the external stability against sliding and overturning, internal stability and facial stability of the reinforced soil mass, and shall be in accordance with acceptable engineering practice and these specifications. The internal and external stability analysis shall be performed in accordance with the "NCMA Design Manual for Segmental Retaining Walls, 3rd Edition" using the recommended minimum factors of safety in this manual.

B. External stability analysis for bearing capacity, global stability, and total and differential settlement shall be the responsibility of the Owner and the Owner's Geotechnical Engineer. The Geotechnical Engineer shall perform bearing capacity, settlement estimates, and global stability analysis based on the final wall design provided by the Wall Design Engineer and coordinate any required changes with the Wall Design Engineer.

C. While vertical spacing between geogrid layers may vary, it shall not exceed 2.0 feet maximum in the wall design.

D. The geosynthetic placement in the wall design shall have 100% continuous coverage parallel to the wall face. Gapping between horizontally adjacent layers of geosynthetic (partial coverage) will not be allowed.

PART 4:CONSTRUCTION

4.01 Inspection

A. The Owner or Owner's Engineer is responsible for verifying that the materials supplied by the Contractor meet all the requirements of the specification. This includes all submittals for materials and design, qualifications and proper installation of wall system.

B. Contractor's field construction supervisor shall have demonstrated experience and be qualified to direct all work at the site.

4.02 Excavation

A. Contractor shall excavate to the lines and grades shown on the project grading plans. Contractor shall take precautions to minimize over-excavation. Over-excavation shall be filled with compacted infill material, or as directed by the Wall Design Engineer, at the Contractor's expense.

B. Contractor shall verify location of existing structures and utilities prior to excavation. Contractor shall ensure all surrounding structures are protected from the effects of wall excavation. Excavation support, if required, is the responsibility of the Contractor.

4.03 Foundation Preparation

A. Following the excavation, the foundation soil shall be examined by the Owner's Engineer to assure actual foundation soil strength meets or exceeds the assumed design bearing strength. Soils not meeting the required strength shall be removed and replaced with infill soils, as directed by the Owner's Geotechnical Engineer.

B. Foundation soil shall be proof-rolled and compacted to 95% standard Proctor density and inspected by the Owner's Geotechnical Engineer prior to placement of leveling pad materials.

4.04 Leveling Pad Construction

A. Leveling pad shall be placed as shown on the final, P.E.-sealed retaining wall plans with a minimum thickness of 6 inches. The leveling pad should extend laterally at least a distance of 6

inches from the toe and heel of the lowermost SRW unit.

B. Granular leveling pad material shall be compacted to provide a firm, level bearing surface on which to place the first course of units. Well-graded sand can be used to smooth the top 1/4 inch to 1/2 inch of the leveling pad. Compaction will be with mechanical plate compactors to achieve 95% of maximum standard Proctor density (ASTM D 698).

4.05 SRW Unit Installation

A. All SRW units shall be installed at the proper elevation and orientation as shown on the final, P.E.-sealed wall plans and details or as directed by the Wall Design Engineer. The SRW units shall be installed in general accordance with the manufacturer's recommendations. The specifications and drawings shall govern in any conflict between the two requirements.

B. First course of SRW units shall be placed on the leveling pad. The units shall be leveled side-to-side, front-to-rear and with adjacent units, and aligned to ensure intimate contact with the leveling pad. The first course is the most important to ensure accurate and acceptable results. No gaps shall be left between the front of adjacent units. Alignment may be done by means of a string line or offset from base line to the back of the units.

C. All excess debris shall be cleaned from top of units and the next course of units installed on top of the units below.

D. Two VERSA-Tuff connection pins shall be inserted through the pin holes of each upper-course unit into receiving slots in lower-course units. Pins shall be fully seated in the pin slot below. Units shall be pushed forward to remove any looseness in the unit-to-unit connection.

E. Prior to placement of next course, the level and alignment of the units shall be checked and corrected where needed.

F. Layout of curves and corners shall be installed in accordance with the wall plan details or in general accordance with SRW manufacturer’s installation guidelines. Walls meeting at corners shall be interlocked by overlapping successive courses.

G. Procedures C. through F. shall be repeated until reaching top of wall units, just below the height of the cap units. Geosynthetic reinforcement, drainage materials, and reinforced backfill shall be placed in sequence with unit installation as described in Section 4.06, 4.07 and 4.08.

4.06 Geosynthetic Reinforcement Placement

A. All geosynthetic reinforcement shall be installed at the proper elevation and orientation as shown on the final P.E.-sealed retaining wall plan profiles and details, or as directed by the Wall Design Engineer.

B. At the elevations shown on the final plans, (after the units, drainage material and backfill have been placed to this elevation) the geosynthetic reinforcement shall be laid horizontally on compacted infill and on top of the concrete SRW units, to within 1 inch of the front face of the unit below. Embedment of the geosynthetic in the SRW units shall be consistent with SRW

manufacturer's recommendations. Correct orientation of the geosynthetic reinforcement shall be verified by the Contractor to be in accordance with the geosynthetic manufacturer's recommendations. The highest-strength direction of the geosynthetic must be perpendicular to the wall face.

C. Geosynthetic reinforcement layers shall be one continuous piece for their entire embedment length. Splicing of the geosynthetic in the design-strength direction (perpendicular to the wall face) shall not be permitted. Along the length of the wall, horizontally adjacent sections of geosynthetic reinforcement shall be butted in a manner to assure 100% coverage parallel to the wall face.

D. Tracked construction equipment shall not be operated directly on the geosynthetic reinforcement. A minimum of 6 inches of backfill is required prior to operation of tracked vehicles over the geosynthetic. Turning should be kept to a minimum. Rubber-tired equipment may pass over the geosynthetic reinforcement at slow speeds (less than 5 mph).

E. The geosynthetic reinforcement shall be free of wrinkles prior to placement of soil fill. The nominal tension shall be applied to the reinforcement and secured in place with staples, stakes or by hand tensioning until reinforcement is covered by 6 inches of fill.

4.07 Backfill Placement

A. The reinforced backfill shall be placed as shown in the final wall plans in the maximum compacted lift thickness of 8 inches and shall be compacted to a minimum of 95% of standard Proctor density (ASTM D 698) at a moisture content within -1% point to +3% points of optimum. The backfill shall be placed and spread in such a manner as to eliminate wrinkles or movement of the geosynthetic reinforcement and the SRW units.

B. Only hand-operated compaction equipment shall be allowed within 3 feet of the back of the wall units. Compaction within the 3 feet behind the wall units shall be achieved by at least three passes of a lightweight mechanical tamper, plate, or roller.

C. At the end of each day's operation, the Contractor shall slope the last level of backfill away from the wall facing and reinforced backfill to direct water runoff away from the wall face.

D. At completion of wall construction, backfill shall be placed level with final top of wall elevation. If final grading, paving, landscaping and/or storm drainage installation adjacent to the wall is not placed immediately after wall completion, temporary grading and drainage shall be provided to ensure water runoff is not directed at the wall nor allowed to collect or pond behind the wall until final construction adjacent to the wall is completed.

4.08 SRW Caps

A. SRW caps shall be properly aligned and glued to underlying units with VERSA-LOK adhesive, a flexible, high-strength concrete adhesive. Rigid adhesive or mortar are not acceptable.

B. Caps shall overhang the top course of units by 3/4 inch to 1 inch. Slight variation in overhang is allowed to correct alignment at the top of the wall.

4.9 Construction Adjacent to Completed Wall

A. The Owner or Owner's Representative is responsible for ensuring that construction by others adjacent to the wall does not disturb the wall or place temporary construction loads on the wall that exceed design loads, including loads such as water pressure, temporary grades, or equipment loading. Heavy paving or grading equipment shall be kept a minimum of 3 feet behind the back of the wall face. Equipment with wheel loads in excess of 150 psf live load shall not be operated within 10 feet of the face of the retaining wall during construction adjacent to the wall. Care should be taken by the General Contractor to ensure water runoff is directed away from the wall structure until final grading and surface drainage collection systems are completed.

END OF SECTION 323223