Land Development Procedures Manual

VOLUME 4:

Specifications

LAND DEVELOPMENT PROCEDURES MANUAL

VOLUME 4: SPECIFICATIONS

CITY OF JACKSONVILLE, FLORIDA

2026

Approved and Adopted in Accordance with

Provisions of Chapter 654, Jacksonville Ordinance Code

(Code of Subdivision Regulations)

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LAND DEVELOPEMENT PROCEDURE MANUAL REVISIONS

Revision Number	Sections Revised	Effective Date
1	Replace all previous specifications with the enclosed specifications	January 31, 2025
2	Remove reference to the Context Sensitive Street Standards Committee	January 1, 2026
3	Updated FDOT specification references based on FY2025-26 FDOT ebook	January 1, 2026

GENERAL STATEMENT OF LAND DEVELOPMENT PROCEDURES AND CRITERIA

The Land Development Procedures Manual (LDPM) has been produced by the Subdivision Standards and Policy Advisory Committee in conjunction with the Department of Planning and Development, the Department of Public Works, JEA, the Office of General Counsel, and the Private Sector in order to assist in the development of land within the City of Jacksonville. In addition, hereto, certain criteria have been incorporated pursuant to various elements of the 2030 Comprehensive Plan, adopted per Chapter 650 of the Jacksonville Ordinance Code and Chapter 163, Part II, Florida Statutes.

The LDPM includes four volumes as outlined below which are adopted and approved as provided in Chapter 654 of the Jacksonville Ordinance Code to be used by the Divisions within the Department of Planning and Development, the Engineering Division of the Department of Public Works, and JEA in review and approval of permit applications and site development plans.

VOLUME 1: Land Development Review and Approval Procedures

VOLUME 2: Design Guidelines

VOLUME 3: Standard Design Details

VOLUME 4: Standard Specifications

The information contained in the LDPM Volumes 1 through 4 will apply to all development and construction projects, both public and private, within the jurisdiction of the Department of Planning and Development of the City of Jacksonville.

LAND DEVELOPMENT PROCEDURE MANUAL

VOLUME 4: SPECIFICATIONS

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Roadway (500)

Landscaping and Exterior Improvements (600)

SECTION 101
MOBILIZATION

PART 1 GENERAL

1.1 SCOPE OF WORK:

A. Perform preparatory work and operations in mobilizing for commencing work on the project, including, but not limited to, those operations necessary for the movement of personnel, equipment, supplies, and incidentals to the project site and for establishment of temporary offices, buildings, safety equipment and first aid supplies, and sanitary and other facilities. In addition, mobilization shall include the costs of bonds and any required insurance and any other preconstruction expenses necessary for the start of the work excluding the cost of construction materials.

PART 2 MATERIALS (NOT USED)

PART 3 INSTALLATION (NOT USED)

PART 4 MEASUREMENT AND PAYMENT:

4.1 Payment shall be made as follows: As soon as the contractor has satisfactorily mobilized onsite and commenced construction operations, the contractor may request payment for 15% of the Lump Sum bid amount for Mobilization plus actual costs for contract required bonds and insurance. Payment for the remainder of mobilization will be made based on the percentage completion of the total project. The Contractor shall submit partial pay requests for Mobilization based on the percent of the total Project completed to date of that request (i.e., if payment for 30% of the work is approved, the Contractor shall be paid for 30% of the total Lump Sum amount for Mobilization). Note: If the initial payment is 30% of the Lump Sum amount, no further payment will be made for this work until project completion exceeds 30%.

4.2 When the proposal does not include a separate item for Mobilization, all work and incidental costs specified as being covered under this Section will be included for payment under Site Preparation, and no separate payment will be made.

END OF SECTION 101

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SECTION 102
CLEARING AND GRUBBING

PART 1 GENERAL

1.1 Summary

A. Clear and grub within the areas shown in the Plans. Remove and dispose of all trees, stumps, roots and other such protruding objects, buildings, structures, appurtenances, existing flexible asphalt pavement, and other facilities necessary to prepare the area for the proposed construction. Remove and dispose of all product and debris not required to be salvaged or not required to complete the construction.

PART 2 MATERIALS (NOT USED)

PART 3 INSTALLATION

3.1 All clearing and grubbing activities shall comply with FDOT Standard Specifications for Road and Bridge Construction, Section 110, latest edition except as outlined below.

A. Trees to Remain

1. Where so directed by the Engineer or shown on the contract documents, desirable trees within the roadway area shall be protected, trimmed and left standing. Tree protection shall comply with City Standard Detail L-XXX
2. Branches of the trees extending over the area occupied by the roadway shall be trimmed as directed, to give a clear height of 16.5 feet above the final roadway elevation.
3. Tree trimming shall also be performed around electrical conductors, as required by JEA. The tree trimming Contractor shall be certified to work in close proximity to high voltage lines.

B. Mowing of Grass

1. The Contractor shall mow the grass at least once per month or more often and when directed by the Engineer. Mowing shall continue until final inspection and acceptance of the project by the City for maintenance.

C. Dust Control

1. The Contractor shall use water sprinkling, water trucks or other suitable methods to limit dust during construction. Dust control shall be as often as conditions dictate and when directed by the Engineer. Payment for dust control shall be included in the lump sum price in the proposal for Site Preparation.

PART 4 MEASUREMENT AND PAYMENT

4.1 Payment for Site Preparation

A. Payment for Site Preparation will be Lump Sum as shown on the proposal.

1. Payment will be made based on the percentage completion of the total project. The Contractor shall submit partial pay requests for Site Preparation based on the percent of the total Project completed to date of that request (i.e., if payment for 30% of the work is approved, the Contractor shall be paid for 30% of the total Lump Sum amount for Site Preparation).

B. Tree Trimming

1. Payment for tree trimming shall be included in the lump sum price for Site Preparation.

C. Mowing of Grass

1. Payment for mowing shall be included in the lump sum price in the Proposal for Site Preparation. Failure to mow as required will result in nonpayment for Site Preparation for the monthly payment period.

D. When the Proposal does not include a separate item for Site Preparation, all work and incidental costs specified as being covered under this Section will be included for payment in the applicable contract unit price(s) authorized and paid to construct the project, and no separate payment will be made.

END OF SECTION 102

SECTION 201
EXCAVATION AND EMBANKMENT

PART 1 GENERAL

1.1 Summary

A. Excavate and construct embankments as required for the roadway, ditches, channel changes and borrow material. Use suitable excavated material or authorized borrow material to prepare subgrades and foundations.
B. Refer to FDOT Standard Plans Section 120 for all requirements for excavation and embankment.

1.2 Definitions

A. Refer to FDOT Standard Plans Section 120-2 for classifications of excavation and related definitions for:

Roadway Excavation	Lateral Ditch Excavation
Borrow Excavation	Channel Excavation
Subsoil Excavation	

1.3 References and Related Documents

A. FDOT Standard Plans, Index 120-001.

B. FDOT Standard Specifications for Road and Bridge Construction, Section 110, latest edition for excavation of material for clearing and grubbing.

C. FDOT Standard Specifications for Road and Bridge Construction, Section 125, latest for excavation and backfilling of structures and pipe.

PART 2 MATERIALS

2.1 Borrow

A. Refer to FDOT Standard Specifications for Road and Bridge Construction, Section 120-6, latest edition for materials requirements for borrow excavation.

2.2 Embankment

A. Materials for Embankment shall comply with FDOT Standard Specifications for Road and Bridge Construction, Section 120-7, latest edition.

2.3 Submittals

A. Soil classification tests shall be provided in accordance with FDOT Specifications for Road and Bridge Construction, Section 120-10, latest edition

B. Prior to placing any borrow material that is the product of soil incineration, provide the Engineer with a copy of the Certificate of Materials Recycling and Post Burn Analysis showing that the material is below all allowable pollutant concentrations.

2.4 Source Quality Control

A. Refer to FDOT Standard Specifications for Road and Bridge Construction, Section 120-10 for quality assurance and quality control requirements.

PART 3 INSTALLATION

3.1 Instructions

A. Construct embankments in accordance with FDOT Standard Plans, Index 120-001. Compact and dress excavated areas and embankments.

B. If areas of contamination or abnormal conditions are encountered, refer to FDOT Standard Specifications for Road and Bridge Construction, Section 120-1.2, latest edition.

C. Removal of Unsuitable Materials and Existing Roads shall comply with FDOT Standard Specifications for Road and Bridge Construction, Section 120-4, latest edition.

D. Disposal of Surplus and Unsuitable Material shall comply with FDOT Standard Specifications for Road and Bridge Construction, Section 120-5, latest edition.

E. Use of Borrow Material shall comply with FDOT Standard Specifications for Road and Bridge Construction, Section 120-6, latest edition except as noted below.

1. Section 120-6.2 shall not apply.

2. If an offsite borrow pit is to be used as a source of borrow material, it must be approved by the Engineer in writing. All applicable soil testing and analysis to confirm the off-site borrow source complies with the materials specifications of the project shall be paid for by the Contractor.

F. Embankment Construction shall comply with FDOT Standard Specifications for Road and Bridge Construction, Section 120-8, latest edition.

G. Compaction activities shall comply with FDOT Standard Specifications for Road and Bridge Construction, Section 120-9, latest edition.

3.2 Tolerances

A. Refer to FDOT Specifications for Road and Bridge Construction, Section 120-10, latest edition

3.3 Field Quality Control

A. Refer to FDOT Specifications for Road and Bridge Construction, Section 120-10, latest edition for quality assurance and quality control requirements that must be satisfied for acceptance.

3.4 Protection

A. Refer to FDOT Specifications for Road and Bridge Construction, Section 120-11, latest edition for protection requirements.

3.5 Maintenance

A. Refer to FDOT Specifications for Road and Bridge Construction, Section 120-11 for maintenance requirements.

B. Maintain all adequate drainage, earthwork construction, and all work from natural encroachments until final acceptance of the Project. Refer to FDOT Specifications for Road and Bridge Construction, Section 104, latest edition for requirements of maintenance and protection of earthwork construction.

PART 4 MEASUREMENT AND PAYMENT

4.1 Measurement

A. Use FDOT Specifications for Road and Bridge Construction Section, 120-12 for basis of measurement for excavation and embankment.

4.2 Payment

A. Use FDOT Specifications for Road and Bridge Construction Section, 120-13 for basis of payment for excavation and embankment.

END OF SECTION 201

SECTION 202
EXCAVATION AND EMBANKMENT FOR STRUCTURES AND PIPES

PART 1 GENERAL

1.1 Summary

A. Excavate for box culverts, pipes, retaining walls, headwalls for pipes and drains, catch basins, drop inlets, manholes, and similar structures. Construct and remove cofferdams, sheeting, bracing, etc.; pump or otherwise dewater foundations; remove and dispose of any existing structures or portions of structures not covered by other items in the Contract, including foundations, abutments, piers, wings, and all other materials, obstructions, etc., found necessary to clear the site for the proposed work; backfill, dispose of surplus material, and perform final cleaning, as may be necessary for the proper execution of the work. This Section does not include excavation for bases or pavements, curbs, curb and gutter, valley gutter, ditch pavement, or rubble gutter.

B. Refer to FDOT Standard Specifications for Road and Bridge Construction, Section 125, latest edition for requirements related to excavation and embankment for structures and pipes.

1.2 References and Related Documents

A. FDOT Standard Plans, Index 120-001.

B. FDOT Standard Specifications for Road and Bridge Construction, Section 110, latest edition for excavation of material for clearing and grubbing

C. FDOT Standard Specifications for Road and Bridge Construction, Section 125, latest for excavation and backfilling of structures and pipe.

PART 2 MATERIALS

2.1 Backfill materials shall meet the classifications in FDOT Standard Plans, Index 120-00, latest edition.

PART 3 INSTALLATION

3.1 Safety

A. Comply with OSHA trench safety standards (29CFR 1926, Subpart P, and all subsequent revisions adopted by the Department of Labor and Employment Security) when required.

B. Consider these and more stringent trench safety standards as minimum Contract requirements.

3.2 Instructions

A. Consider all materials excavated as unclassified and as excavation regardless of the material encountered.

B. Cofferdams shall be constructed in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 125-3, latest edition.

C. Excavation s shall be performed in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 125-4, latest edition.

D. Refer to FDOT Standard Specifications for Road and Bridge Construction, Section 125-5, latest edition for activities to preserve channels and streams during excavation.

E. Dispose of surplus materials in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 125-6, latest edition.

F. Pumping activities shall be performed in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 125-7, latest edition.

G. Backfill activities shall be performed in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 125-8, latest edition.

3.3 Field Quality Control

A. Refer to FDOT Standard Specifications for Road and Bridge Construction, Section 125-9 for quality assurance and quality control requirements for the acceptance program.

B. Refer to FDOT Standard Specifications for Road and Bridge Construction, Section 125-9 for verification and resolution procedures.

3.4 Maintenance

A. Site restoration shall be performed in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 125-10, latest edition.

B. Refer to with FDOT Standard Specifications for Road and Bridge Construction, 125-11, latest edition for cleanup requirements.

PART 4 MEASUREMENT AND PAYMENT

A. No separate measurement or payment will be made for work under this section.

B. Payment for excavation of bridge structures will be made under Specification Section 201

C. Payment for excavation of drainage structures will be incidental to these items.

END OF SECTION 202

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SECTION 203
JACK AND BORE

PART 1 GENERAL

1.1 Summary

A. The work specified in this Section documents the approved construction methods, procedures and materials for Jack and Bore, also known as auger boring. Micro tunneling is also included in the category of Jack and Bore for purposes of the Specifications.

B. All Jack and Bore activities shall comply with the FDOT Standard Specifications for Road and Bridge Construction, Section 556, latest edition.

PART 2 MATERIALS

A. Materials used for the installation of Jack and Bore, including, but not limited to, the pipe casing, coupling, and joints shall comply with FDOT Standard Specifications for Road and Bridge Construction, Section 556-2, latest edition.

PART 3 INSTALLATION

A. All jacking and boring within City rights-of-way or easements will be accomplished in accordance with the FDOT Standard Specifications for Road and Bridge Construction, Section 556, latest edition.

PART 4 MEASUREMENT AND PAYMENT

A. No direct payment will be made under this Section. Include the cost to perform this operation in the Contract unit price for the item being installed.

B. No compensation will be made for failed bore paths, injection of excavatable flowable fill, products taken out of service or incomplete installations.

C. No compensation will be made for the pay item associated with the jack and bore until a bore path report has been submitted to the Engineer.

END OF SECTION 203

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SECTION 301
PRECAST DRAINAGE STRUCTURES

PART 1 GENERAL

1.1 Summary

A. The work under this section includes the furnishing of all labor, materials, and equipment necessary for the construction and installation of all manholes, catch basins, end walls, and other such structures, as called for on the drawings. These are to be shown in the details.

1.2 References and Related Documents

A. FDOT Standard Specifications for Road and Bridge Construction, Section 449, latest edition for Precast Concrete Drainage Products.

1.3 Qualifications

A. The manufacture of the precast drainage structures shall be certified by the FDOT Materials Acceptance and Certification (MAC) Program for Precast Pipe and Precast Drainage Structures.

1.4 Submittals

A. Product Data for each type of product.

B. The Contractor shall submit shop drawings for each individual structure on the drawings for approval by the Engineer before placing order for structures. Shop drawing shall depict openings, elevations, and other pertinent details to determine conformance with the Plans.

C. Manufacturer certification as outlined in Paragraph 1.3

PART 2 MATERIALS

2.1 Precast Drainage Structures

A. Precast drainage structures shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 449, latest edition with

the following additions:

1. Minimum wall thickness shall conform to City Drainage Standards.
2. Rings shall be custom made with openings to meet indicated pipe alignment conditions and invert elevations.
3. Bases for manholes shall be cast integrally with the bottom manhole section.
4. Joint contact surfaces shall be formed with machined castings; they shall be exactly parallel with a 2-degree slope and nominal 1/16 inch clearance with the tongue-equipped with a proper recess for the installation of gasket.

B. Cast Iron Fixtures:

1. Fixtures shall be of the standard Jacksonville type as detailed on drawings.
2. Castings shall be made of good quality, strong, tough, even grained cast iron and shall be smooth, free from scale, lumps, blisters, sand holes and defects of any nature which would render them unfit for the service for which they are intended.
3. Castings shall meet the requirements of ASTM A48, Specifications for Gray Iron Castings, Class No. 30, or Grade 65-45-12, Ductile Iron meeting the requirements of ASTM A536, Standard Specification for Ductile Iron Castings.
4. Manhole frame and cover shall be designed to withstand HS 20-44 loading defined in the AASHTO Specifications. Frames & covers shall be machined or ground at touching surfaces so as to seat firmly and prevent rocking. Any set not matching perfectly shall be removed and replaced at no additional cost.

C. Manhole Adjustment Ring

1. Manholes adjust-to-grade ring shall meet the requirements of ASTM C478.

PART 3 INSTALLATION

3.1 Removal or abandonment of existing structures

A. Remove Existing Structure

1. Where a new structure is designated to replace an existing structure, complete removal of the existing structure shall be achieved to permit the construction of a new structure at approximately the same location. Depth of the new structure may vary considerably from the existing structure.
2. Removing existing structures shall include the complete removal of the existing manhole. The existing structure shall be removed from the job site.

3. Cast iron castings removed from existing structures shall be thoroughly cleaned and subjected to a careful hammer inspection in the presence of the Engineer. If the castings pass inspection, and, if not used on this job, they shall be delivered to the property yard of the City of Jacksonville, Department of Public Works. The Contractor will be held strictly accountable for all castings removed.
4. Any or all existing pipes in and out of the structure to be removed, which are not themselves removed, shall be sealed, or as shown on the Plans, connected to the new structure. If a pipe is to be abandoned, the sealing shall be accomplished by mortaring (bricking) the end of the pipe for a distance of 18 inches minimum, or half the diameter of the pipe, whichever is larger, into the pipe with rubble and acceptable cement grout to form a solid waterproof plug completely bonded to the pipe, unless otherwise specified.

B. Abandoning Existing Structures:

1. Abandoning existing structures shall include the abandonment of structures as shown on the Drawings or called for elsewhere in the Contract Documents.
2. Abandonment shall be accomplished by sealing all pipes leading in and out of the structure to be abandoned. The sealing shall be completed by placing rubble and approved cement grout for 18 inch minimum, or half the diameter of the pipe, whichever is larger, in the end of each pipe completely bonding this mortar plug to the pipe and forming a tight waterproof seal.
3. The structure shall be removed to a depth of not less than 30 inches below the proposed finished grade. The remaining portion of the structure shall be filled with sand or other granular fill material. The fill material used to fill the abandoned structure shall be clean, granular, well-graded, free of organic matter or any deleterious material, and be compacted to the abandoned structure to 98% of the maximum density as determined by the Modified Proctor AASHTO T180.
4. The abandonment shall be completed by backfilling the void left by removing the top of the structure with approved fill material and replacing the pavement or other surface conditioning in kind. Pavement repair shall be as outlined in the details and Specification Section 503.

3.2 Installation of new structures

A. Excavation shall be carried out in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 425-7.1, latest edition.

B. Placing Sections:

1. Precast concrete sections shall be set so the manhole will be vertical and with sections in true alignment.
2. Joint surfaces of the base or previously installed section shall have an O-ring installed in the recess or shall be sealed with pre-molded plastic joint sealer equal to "Ramnek". If "Ramnek" is used, joints shall be primed with an asphaltic cement material.
3. All holes in precast section used for handling, and the annular space between the wall and entering pipes shall be thoroughly plugged with non-shrinking mortar, applied so that there will be zero leakage through openings and around pipes. The mortar shall be finished smooth and flush with the adjoining interior and exterior manhole wall surfaces.

C. Placing Pipe: Inlet and outlet pipes shall be of the same size and kind as the connecting pipe shown in the plans. They shall extend through the walls for a distance beyond the outside surface sufficient for the intended connections, and the concrete shall be constructed around them neatly so as to prevent leakage along their outer surface. The inlet and outlet pipes shall be flush with the inside of the wall.

D. Manhole castings shall be set in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 425-7.3, latest edition.

1. Frames on manhole cones shall be set concentric with the masonry and in a full bed of mortar so that the space between the top of the manhole and masonry and the bottom flanges of the frame shall be filled and made watertight.
2. A ring of mortar at least 1 inch thick and pitched to shed water away from the frame shall be placed around the outside of the bottom flange. Mortar shall extend to the outer edge of the masonry and shall be finished smooth and flush with the top of the flange.

E. Structures shall be backfilled in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 425-7.6, latest edition.

F. Manholes, catch basins, inlets, valve boxes, etc. shall be adjusted in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 425-7.7, latest edition.

3.3 Tolerances (NOT USED)

3.4 Field Quality Control and Inspections (NOT USED)

3.5 Protection (NOT USED)

PART 4 MEASUREMENT AND PAYMENT

4.1 Measurement

A. The quantities to be paid for will be the number of inlets, manholes, junction boxes, and yard drains, completed and accepted; and the number of structures of these types (including also valve boxes) satisfactorily adjusted.

B. Measurement for removal of existing structures shall be the actual physical count of structures removed as called for on the Contract Drawings or as approved by the Engineer.

C. Measurement for payment of abandoned structures shall be the actual physical count of structures abandoned, as called for on the Contract Drawings or approved by the Engineer.

4.2 Payment

A. New Structures: Price and payment will be full compensation for furnishing all materials and completing all work described herein or shown in the Plans, including all clearing and grubbing outside the limits of clearing and grubbing as shown in the Plans, all excavation except the volume included in the measurement designated to be paid for under the items for the grading work on the project, all backfilling around the structures, the disposal of surplus material, and the furnishing and placing of all aprons, gratings, frames, covers, and any other necessary fittings.

B. Adjusted Structures: When an item of payment for adjusting manholes, valve boxes, or inlets is provided in the proposal, price and payment will be full compensation for the number of such structures designated to be paid for under such separate items, and which are satisfactorily adjusted, at the Contract unit prices each for adjusting inlets, adjusting manholes, and adjusting valve boxes. If no separate pay item is shown, payment will be made under adjusting miscellaneous structures.

C. Removed Structures: Payment for structures removed shall be at the unit price set forth in the Proposal for each structure removed. Payment will be compensation in full for complete removal of the structure and disposal of debris; removal,

cleaning, inspecting and delivering frames and covers for storage; sealing all pipes leading in and out of the structure; placing and compacting the backfill of the void left by removing the structure and replacing the pavement or other surface condition in kind, if the removed structure is outside the construction trench for the new construction.

D. Abandoned Structures: Structures filled and abandoned as specified herein shall be paid for at unit price set forth in the Contract Agreement for each structure filled and abandoned. Payment will be compensation in full for removal of the upper portion of the structures and disposal of the debris; removal, cleaning, inspecting and delivering frames and covers for storage; sealing any and all pipes leading in and out of the structure; placing and compacting fill material used to fill the abandoned structure; and backfilling the void left by removing the top of the structure with approved compacted fill material and replacing the pavement or other surface condition in kind.

END OF SECTION 301

SECTION 302
PRECAST CONCRETE BOX CULVERTS

PART 1 GENERAL

1.1 Summary

A. The work specified in this Section consists of the construction and installation of pre-cast concrete box culverts. The work shall be done in accordance with these Specifications and in conformity with the lines, grades, dimensions, and notes shown in the Plans.

B. Cast in Place Concrete for headwalls, wingwalls, and associate drainage structures shall be constructed of reinforced concrete, proportioned, mixed, placed, finished and cured.

1.2 References and Related Documents

A. Refer to FDOT Standard Specifications for Road and Bridge Construction, Section 410, latest edition for all relevant requirements related to Precast Concrete Box Culvert installation., when applicable.

B. Refer to FDOT Standard Specifications for Road and Bridge Construction, Section 407 for all relevant requirements related to Three-Sided Precast Concrete Culverts, when applicable.

C. FDOT Standard Plans for Bridge Construction, Index 400-292 for Standard Precast Box Culverts

D. FDOT Standard Plans for Bridge Construction, Index 400-291 for Standard Precast Box Culverts Supplemental Details

E. Refer to FDOT Structures Manual, latest edition, for design of pre-cast box culverts and three-sided precast culverts.

1.3 Qualifications

A. The manufacture of the precast drainage structures shall be certified by the FDOT Materials Acceptance and Certification (MAC) Program for Precast Pipe and Precast Drainage Structures.

1.4 Submittals

A. Product Data for each type of product.

B. Prior to fabrication of the precast box culvert, submit drawings and design calculations in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 410-4 and Section 410-12 or Section 407-13, latest edition. All precast sections furnished under this Contract shall be fabricated in full accordance with the approved shop drawings.

C. Manufacturer certification as outlined in Paragraph 1.3

D. Submit from the precast culvert manufacturer a written recommendation of the configuration of the joint and gaskets required to create a soli-tight seal, meeting the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 410-11, latest edition.

1.5 Source Quality Control - NONE

1.6 Manufacturer Certifications/Testing

A. Materials acceptance and testing for four-sided precast box culverts shall be made in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 410-3, latest edition.

B. Materials acceptance and testing for three-sided precast box culverts shall be made in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 407-4, latest edition.

PART 2 MATERIALS

2.1 Four-sided Precast Box Culvert

A. Materials used for the construction of the precast box culvert shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 410-2, latest edition.

B. Design of the precast box culvert shall comply with FDOT Standard Specifications for Road and Bridge Construction, Section 410-4, latest edition.

C. Fabrication of the precast box culvert shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 410-6, latest edition.

D. Other elements of the precast culvert system, as applicable, shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 410-5, latest edition.

2.2 Three-Sided Pre-cast Box Culvert

A. Materials used for the construction of the precast box culvert shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 407-2, latest edition.

B. Design of the precast box culvert shall comply with FDOT Standard Specifications for Road and Bridge Construction, Section 407-5, latest edition.

C. Fabrication of the precast box culvert shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 407-7, latest edition.

D. Other elements of the precast culvert system, as applicable, shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 407-6, latest edition.

2.3 Headwalls, wingwalls, and other special features.

A. Cast-in-place Headwalls, wingwalls, and associated concrete works shall be constructed in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 346, latest edition.

B. Precast headwalls, wingwalls, and associated concrete works shall be constructed in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 449, latest edition and City Standard Details.

2.4 Gaskets

A. Field joints for precast concrete box culvert shall be rubber gaskets or pre-formed flexible joint sealants, made based on the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 410-11 or Section 407-8, latest edition.

2.5 Granular materials

A. Coarse aggregate shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 901, latest edition.

B. Fine aggregate shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 902, latest edition.

2.6 Geotextile Fabric

A. Geotextile shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 985, latest edition.

PART 3 INSTALLATION

3.1 Installation

A. Handling, Storage, and Shipping

1. Handle, store, and ship precast box culverts in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 410-7 or Section 407-9, latest edition.

B. Trench, Foundation, Laying, and Backfill shall be provided in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 410-10 or Section 407-12, latest edition.

C. Joints shall be provided and installed in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 410-11, latest edition.

D. Cast in Place Concrete

1. Each wingwall shall be constructed, if possible, as a monolith. Construction joints, where unavoidable, shall be horizontal and so located that no joints will be visible in the exposed face of the wing above the ground line.
2. All construction joints shall have formed keys. Keys shall be beveled as shown in the plans or as directed, but in no case shall the edge of the beveled material forming the key be less than 1 1/2 inches from the edge of the concrete.

3.2 Tolerances - NONE

3.3 Field Quality Control

A. Physical Sampling Requirements
   1. Cast in place concrete sampling requirements (3 cylinders at 7, 14, 28-day compressive testing)
   2. Non-shrink cement mortar (3 cylinders at 7, 14, 28-day compressive testing)

B. Physical Testing Requirements and Inspections

   1. An inspector shall evaluate cracks, spalls and other deficiencies in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 410-8 or Section 407-10, latest edition.

   2. Markings. Ensure each section of Precast Box Culvert has permanently and clear marking on an inside face by indentation, waterproof paint, or as specified in the Producer QC Plan, showing the manufacture date, serial number, project number, and manufacturer's name or symbol in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 410-9 or Section 407-11, latest edition.

C. Performance Testing - NONE

3.4 Protection - NONE

3.5 Maintenance - NONE

PART 4 MEASUREMENT AND PAYMENT

4.1 Measurement

A. The quantity to be paid for will be the plan quantity at the price bid for the sum of the items shown in the Contract Documents. The length of precast culvert is measured along the centerline of the structure, from the outside face of the headwalls at each end. No increase in length will be permitted for multiple barrel precast culvert installations or extension of precast culverts ends to avoid skewed end conditions.

4.2 Payment

A. Price and payment will be full compensation for all work and materials specified in this Section necessary to complete the structure, including dewatering, excavation, channel excavation, channel lining, backfilling, footings, headwalls, wingwalls, toe walls and other miscellaneous items.

END OF SECTION 302

SECTION 303
REINFORCED CONCRETE PIPE

PART 1 GENERAL

1.1 Summary

A. The work specified in this section includes furnishing all labor, equipment, and materials required to construct Reinforced Concrete Piping shown on the drawings and specified hereinafter.

1.2 Definitions - NONE

1.3 Qualifications

A. The manufacture of the pipe shall be certified by the FDOT Materials Acceptance and Certification (MAC) Program for Precast Pipe and Precast Drainage Structures.

B. Pipe inspections shall be performed using a combination color CCTV pipeline survey system with a cable distance counter, laser profiling system, non-contact video micrometer and measurement software. The equipment and software used must be tested and approved by a recognized independent testing group and includes a certified accuracy of 0.5% or better and a repeatability of 0.12% or better. References for the equipment calibration are ASTM E 691 and ASTM E 177. Equipment meeting or exceeding the calibration criteria and with the ability to perform specification requirements as defined in FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 430-4.8 and 430-4.8.1 of the Specifications will be acceptable.

1.4 Submittals

A. Product Data for each type of product.

B. Submit information to the Engineer regarding configuration of the joint and the amount of gasket material required to affect a satisfactory seal for field joints in accordance with FDOT Standard Specifications for Road and Bridge Construction (most recent version) Sections 430-7.3.1.3 and 430-7.3.2.3

C. Manufacturer certification as outlined in Paragraph 1.3

D. Pipe inspection equipment certification outlined in Paragraph 1.3

E. Manufacturer certifications as outlined in Paragraph 1.5

1.5 Source Quality Control

A. Manufacturer Certifications/Testing

1. Ensure that the materials used for the construction of the reinforced concrete pipe have a certification statement from the source, showing that they meet the applicable requirements of the Specifications.
2. The manufacturer of the gasket material shall furnish the Engineer certified test results for gasket composition covering each shipment of material to the project.
3. Ensure that each shipment of Pipe to the project site is accompanied with a signed or stamped delivery ticket providing the description and the list of the delivered Pipe. Each delivery ticket shall include the list of Pipe being shipped, be on the Plant's letterhead and include as a minimum the following information:

    a. Project Number
    b. Date Shipped
    c. Cast Date
    d. Type of Pipe
    e. Quantity of Products
    f. Serial Number
    g. Buy America compliance statement and dollar amount of non-domestic steel and iron used in the finished products for each delivery (for projects with Buy America requirements).

4. The QC manager or designee shall stamp the Pipe prior to their shipment to the project site. Each shipment of the Pipe to the project site shall include the list of delivered Pipe.

PART 2 MATERIALS

2.1 Pipe

A. Round reinforced concrete pipe shall meet the material specifications in FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 449-4.1 Special Requirements for Steel Reinforced Concrete Pipe.

B. Elliptical reinforced concrete pipe shall meet the material specifications in FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 449-4.4 Special Requirements for Reinforced Elliptical Concrete Pipe.

C. Pipe shall be of the bell-and-spigot type meeting the requirements called for in the Plans. Pipe joints shall meet the specifications in FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 449-5.1 Design of Joint.

2.2 Gaskets

A. Rubber gaskets for either round or elliptical concrete pipe shall meet the material specifications in FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 942-1 Round Rubber Gaskets for Pipe Joints.

B. Cold Adhesive Preformed Plastic Gaskets for Elliptical Concrete Pipe shall meet the material specifications in FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 942-2 Cold Adhesive Preformed Plastic Gaskets.

C. Field Joints for Elliptical Concrete Pipe shall utilize either a preformed plastic gasket material or approved rubber gasket material meeting the requirements of FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 942-2 and Section 942-1 respectively.

D. The pipe manufacturer shall furnish the Engineer with information in regard to configuration of the joint and the amount of gasket material required to affect a satisfactory seal for field joints.

E. All patching compounds shall comply with FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 449. Pre-mixed packaged compounds may be used, when it is listed on the FDOT APL.

2.3 Filter Fabric

A. Filter fabric shall meet the physical requirements of Type D-3 specified in FDOT Standard Specifications for Road and Bridge Construction (most recent version), Section 985 Geosynthetic Materials.

PART 3 INSTALLATION

3.1 Instructions

A. Pipe shall be installed in accordance with FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 430-4 Laying Pipe Except as follows:

1. Metal Pipe protection shall not apply.

B. Contractor shall follow FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 430-7 Special Requirements for Concrete Pipe.

C. These specifications shall be used in conjunction with the FDOT Standard Index Drawing outlining other requirements for this type of construction.

3.2 Tolerances

A. Tolerances in imperfections and permissible repairs for joint of concrete gasketed pipe shall comply with FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 449-5.4.

B. Cosmetic defects, defined as those as defined in ASTM C76 and AASHTO R73 may be repaired in accordance with FDOT Specifications 450-13 Repair Methods and Materials.

C. Installations where concrete pipe are outside of these tolerances shall be re-laid without additional compensation. No mortar, joint compound, or other filler which would tend to restrict the flexibility of the joint shall be applied to the gap.

3.3 Field Quality Control - Inspection

A. Pipe materials shall undergo visual inspection prior to installation. Pipe shall be subject to rejection on account of failure to conform to any of the specification requirements (ASTM C76 and AASHTO R73). Individual sections of pipe may be rejected because of any of the following:

1. Fractures or cracks passing through the wall, except for a single end crack that does not exceed the depth of the joint.
2. Defects that indicate proportioning, mixing, and molding
3. Surface defects indicating honeycombed or open texture that would adversely affect the function of the pipe.
4. The ends of the pipe are not normal to the walls and center line of the pipe, within the limits of variations:

    a. Length of Two Opposite Sides—Variations in the laying length of two opposite sides of the pipe shall not be more than 1⁄4 in. for all sizes through 24-in. internal diameter, and not more than 1⁄8 in./ft for all sizes larger with a maximum of 5⁄8 in. in any length of pipe through 84-in. internal diameter, and a maximum of 3⁄4 in. for 90-

in. internal diameter or larger, except where beveled end pipe for laying on curves is specified by the owner.

b. Length of Pipe—The underrun in length of a section of pipe shall not be more than 1⁄8 in./ft. with a maximum of 1⁄2 in. in any length of pipe.

5. Damaged or cracked ends where such damage would prevent making a satisfactory joint.
6. Any continuous crack having a surface width of 0.01 in. or more and extending for a length of 12 in. or more, regardless of position in the wall of the pipe.

B. Inspection of newly installed reinforced concrete pipe shall occur after final fills are placed over the pipe, but before pavements or other structures are installed. Pipe inspection shall be conducted in accordance with FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 430-4.8 Pipe Inspection.

3.4 Protection

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.5 Maintenance – NONE

PART 4 MEASUREMENT AND PAYMENT (UNIT PRICE)

4.1 DESCRIPTION: For furnishing and installing pipe and fittings, the price per foot for installing pipe and pipe fittings shall be full compensation for the completed pipeline, ready for service, and shall include, but not be limited to; exploratory excavation; excavation; sheeting and shoring if necessary; complying with Florida "Trench Safety Act"; dewatering the excavation; transporting and unloading the pipe, fittings and all other materials not specified in other bid items from delivery trucks at the job site (trench side) and placing them into position in the trench; installing pipe, and pipe fittings, and appurtenances; making all connections within the lines themselves; cleaning and testing the pipe and fittings (including inspection); placing and compacting backfill; removal and disposal of excess or unsuitable fill material, where required; maintaining access to adjacent construction areas along the route of the pipe;

protecting existing utilities along the route of the pipe; complying with work hour restrictions; preparation and submittal of Contractor's daily progress reports and/or field notes and monthly as-builts of the work that has been performed to date; moving and replacing utilities, trees, landscaping, shrubs, and all other similar items, to original locations and to equal or better than original conditions; and all other appurtenant and miscellaneous items and work (not included in another bid item) including final cleanup for a complete, satisfactory and functional installation.

4.2 BASIS OF PAYMENT: Payment will be made at the unit price bid times the number of linear feet installed and accepted by the Engineer.

END OF SECTION 303

SECTION 304
CORRUGATED STEEL PIPE AND PIPE ARCH

PART 1 GENERAL

1.1 Summary

A. The work specified in this section includes furnishing all labor, equipment and materials required to construct corrugated steel storm drainage piping shown on the drawings and specified hereinafter.

1.2 Definitions – NONE

1.3 Qualifications

A. The manufacture of the pipe shall be certified by the FDOT Materials Acceptance and Certification (MAC) Program for Flexible Pipe Production – Corrugated Steel Pipe.

B. Pipe inspections shall be performed using a combination color CCTV pipeline survey system with a cable distance counter, laser profiling system, non-contact video micrometer and measurement software. The equipment and software used must be tested and approved by a recognized independent testing group and includes a certified accuracy of 0.5% or better and a repeatability of 0.12% or better. References for the equipment calibration are ASTM E 691 and ASTM E 177. Equipment meeting or exceeding the calibration criteria and with the ability to perform specification requirements as defined in FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 430-4.8 and 430-4.8.1 of the Specifications will be acceptable.

1.4 Submittals

A. Product Data for each type of product.

B. Submit information to the Engineer regarding configuration of the joint and the amount of gasket material required to affect a satisfactory seal for field joints in accordance with FDOT Standard Specifications for Road and Bridge Construction (most recent version) Sections 430-7.3.1.3 and 430-7.3.2.3

C. Manufacturer certification as outlined in Paragraph 1.3

D. Pipe inspection equipment certification outlined in Paragraph 1.3

E. Manufacturer certifications as outlined in Paragraph 1.5

F. Raw materials manufacturer's certification of compliance for bituminous coating, paved invert, and paved interior per AASHTO M190.

1.5 Source Quality Control

A. Manufacturer Certifications/Testing

1. Ensure that the materials used for the construction of the corrugated steel pipe have a certification statement from the source, showing that they meet the applicable requirements of the specifications.
2. The acceptance of the bituminous coating paved invert, and the paved interior will be based on the manufacturer's certified mill tests.
3. Ensure that each shipment of Pipe to the project site is accompanied with a signed or stamped delivery ticket providing the description and the list of the delivered Pipe. Each delivery ticket shall include the list of Pipe being shipped, be on the Plant's letterhead and include as a minimum the following information:

    a. Project Number
    b. Date Shipped
    c. Cast Date
    d. Type of Pipe
    e. Quantity of Products
    f. Serial Number
    g. Buy America compliance statement and dollar amount of non-domestic steel and iron used in the finished products for each delivery (for projects with Buy America requirements).

4. The QC manager or designee shall stamp the Pipe prior to their shipment to the project site. Each shipment of the Pipe to the project site shall include the list of delivered Pipe.

PART 2 MATERIALS

2.1 Pipe

A. Corrugated steel pipe, including round culvert pipe, pipe arch and underdrain and coupling bands for each type, shall conform to the requirements of AASHTO M36, and shall be fabricated with helical corrugations with a minimum of two annular corrugations formed on each end of each pipe to accommodate a coupling band. For the round culvert pipe and the pipe arch, and with the additional provisions contained herein.

B. Round culvert pipe: For round culvert pipe used as side drain, shall be as specified in FDOT Standard Specifications, Section 943-2:

C. Pipe arch: For corrugated metal pipe arch, in addition to the requirements shown in AASHTO M36, shall be as specified in FDOT Standard Specifications, Section 943-3 Pipe Arch.

2.2 Linings and Coatings

A. Bituminous Coating: When bituminous coating is called for in the Contract Documents, all corrugated steel pipe shall be coated with bituminous coating in accordance with the requirements of AASHTO M 190, and as noted in FDOT Standard Specifications, Section 943-5 Bituminous Coating and Paved Invert.

B. Paved Interior: When bituminous coated and paved interiors are called for, the coating and paving shall meet the requirements FDOT Standard Specifications, Section 943-6 Paved Interior.

2.3 Pipe Joints

A. Flat gaskets shall meet the requirements of ASTMD1056, designation 2C2 or 2B3.

B. Circular gaskets shall meet the requirements of ASTM C361.

C. Preformed plastic gaskets shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 942-2 Cold Adhesive Preformed Plastic Gaskets.

D. Field Joints for Corrugated Steel Pipe shall utilize either a rubber or neoprene gasket as required by FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 430-8.

E. The pipe manufacturer shall furnish the Engineer with information in regard to configuration of the joint and the amount of gasket material required to affect a satisfactory seal for field joints.

2.4 Filter Fabric

A. Filter fabric shall meet the requirements specified of FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 985.

PART 3 INSTALLATION

3.1 Instructions

A. Pipe shall be installed in accordance with FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 430-4 Laying Pipe

B. Contractor shall follow FDOT Standard Specifications (most current version), Section 430-8 Specific Requirements for Corrugated Metal Pipe.

C. These specifications shall be used in conjunction with the FDOT Standard Index Drawing outlining other requirements for this type of construction.

3.2 Tolerances

A. Pipe deflection tolerances shall comply with FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 430-8.2 Laying and Shape Requirements for Corrugated Metal Pipe.

B. Installations where pipe are outside of these tolerances shall be re-laid without additional compensation.

3.3 Field Quality Control – Inspection

A. Pipe materials shall undergo visual inspection prior to installation. Individual sections of pipe may be rejected if zinc or aluminum coatings are bruised or broken. Do not use pipe showing bruises or breakage of the zinc or aluminum coating.

B. Inspection of newly installed pipe shall occur after final fills are placed over the pipe, but before pavements or other structures are installed. Pipe inspection shall

be conducted in accordance with FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 430-4.8 Pipe Inspection.

C. Pipe Inspection report shall include an Ovality Report for non-rigid pipe in accordance with FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 430-4.8 Pipe Inspection. Contractor may use a mandrel to verify deflection tolerances from the laser profile report; however, a mandrel reading cannot be submitted in lieu of a laser profiler.

3.4 Protection

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.5 Maintenance - NONE

PART 4 MEASUREMENT AND PAYMENT

4.1 DESCRIPTION: For furnishing and installing pipe and fittings, the price per foot for installing pipe and pipe fittings shall be full compensation for the completed pipeline, ready for service, and shall include, but not be limited to; exploratory excavation; excavation; sheeting and shoring if necessary; complying with Florida "Trench Safety Act"; dewatering the excavation; transporting and unloading the pipe, fittings and all other materials not specified in other bid items from delivery trucks at the job site (trench side) and placing them into position in the trench; installing pipe, and pipe fittings, and appurtenances; making all connections within the lines themselves; cleaning and testing the pipe and fittings; placing and compacting backfill; removal and disposal of excess or unsuitable fill material, where required; maintaining access to adjacent construction areas along the route of the pipe; protecting existing utilities along the route of the pipe; complying with work hour restrictions; preparation and submittal of Contractor's daily progress reports and/or field notes and monthly as-builts of the work that has been performed to date; moving and replacing utilities, trees, landscaping, shrubs, and all other similar items, to original locations and to equal or better than original conditions; and all other appurtenant and miscellaneous items and

work (not included in another bid item) including final cleanup for a complete, satisfactory and functional installation.

4.2 BASIS OF PAYMENT: Payment will be made at the unit price bid times the number of linear feet installed and accepted by the Engineer.

4.3 MEASUREMENT: The Work required for this item will be measured based on the linear feet of pipe installed and accepted by the Engineer.

END OF SECTION 304

SECTION 305
CORRUGATED ALUMINUM ALLOY PIPE AND PIPE ARCH

PART 1 GENERAL

1.1 Summary

A. The work specified in this section includes furnishing all labor, equipment, and materials required to construct corrugated Aluminum Alloy Piping shown on the drawings and specified hereinafter.

1.2 Definitions – NONE

1.3 Qualifications

A. The manufacture of the pipe shall be certified by the FDOT Materials Acceptance and Certification (MAC) Program for Flexible Pipe Production – Corrugated Aluminum Pipe.

B. Pipe inspections shall be performed using a combination color CCTV pipeline survey system with a cable distance counter, laser profiling system, non-contact video micrometer and measurement software. The equipment and software used must be tested and approved by a recognized independent testing group and includes a certified accuracy of 0.5% or better and a repeatability of 0.12% or better. References for the equipment calibration are ASTM E 691 and ASTM E 177. Equipment meeting or exceeding the calibration criteria and with the ability to perform specification requirements as defined in FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 430-4.8 and 430-4.8.1 of the Specifications will be acceptable.

1.4 Submittals

A. Product Data for each type of product.

B. Submit information to the Engineer regarding configuration of the joint and the amount of gasket material required to affect a satisfactory seal for field joints in accordance with FDOT Standard Specifications for Road and Bridge Construction (most recent version) Sections 430-7.3.1.3 and 430-7.3.2.3

C. Manufacturer certification as outlined in Paragraph 1.3

D. Pipe inspection equipment certification outlined in Paragraph 1.3

E. Manufacturer certifications as outlined in Paragraph 1.5

1.5 Source Quality Control

A. Manufacturer Certifications/Testing
1. Submit to the Engineer, prior to installation, a certified mill analysis and certification verifying that the aluminum parts and components are of the alloys specified and comply with the requirements of this Section in compliance with FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 945-2.3.
2. The manufacturer of the gasket material shall furnish the Engineer certified test results for gasket composition covering each shipment of material to the project.
3. Ensure that each shipment of Pipe to the project site is accompanied with a signed or stamped delivery ticket providing the description and the list of the delivered Pipe. Each delivery ticket shall include the list of Pipe being shipped, be on the Plant's letterhead and include as a minimum the following information:

a. Project Number
b. Date Shipped
c. Cast Date
d. Type of Pipe
e. Quantity of Products
f. Serial Number
g. Buy America compliance statement and dollar amount of non-domestic steel and iron used in the finished products for each delivery (for projects with Buy America requirements).

4. The QC manager or designee shall stamp the Pipe prior to their shipment to the project site. Each shipment of the Pipe to the project site shall include the list of delivered Pipe.

PART 2 MATERIALS

2.1 Pipe

A. Aluminum-alloy culvert pipe and underdrains shall meet the requirements of Round reinforced concrete pipe shall meet the material specifications in FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 945 Aluminum Pipe.

2.2 Pipe Joints

A. Flat gaskets shall meet the requirements of ASTMD1056, designation 2C2 or 2B3

B. Circular gaskets shall meet the requirements of ASTM C361.

C. Preformed plastic gaskets shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 942-2 Cold Adhesive Preformed Plastic Gaskets.

D. Field Joints for Corrugated Aluminum Pipe shall utilize either a rubber or neoprene gasket as required by FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 430-8.

E. The pipe manufacturer shall furnish the Engineer with information in regard to configuration of the joint and the amount of gasket material required to affect a satisfactory seal for field joints.

2.3 Filter Fabric

A. Filter fabric shall meet the requirements specified of FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 985.

PART 3 INSTALLATION

3.1 Instructions

A. Pipe shall be installed in accordance with FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 430-4 Laying Pipe.

B. Contractor shall follow FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 430-8 Special Requirements for Corrugated Metal Pipe.

C. These specifications shall be used in conjunction with the FDOT Standard Index Drawing outlining other requirements for this type of construction.

3.2 Tolerances

A. Pipe deflection tolerances shall comply with FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 430-8.2 Laying and Shape Requirements for Corrugated Metal Pipe.

B. Installations where pipe are outside of these tolerances shall be re-laid without additional compensation.

3.3 Field Quality Control – Inspection

A. Inspection of newly installed pipe shall occur after final fills are placed over the pipe, but before pavements or other structures are installed. Pipe inspection shall be conducted in accordance with FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 430-4.8 Pipe Inspection.

B. Pipe Inspection report shall include an Ovality Report for non-rigid pipe in accordance with FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 430-4.8 Pipe Inspection. Contractor may use a mandrel to verify deflection tolerances from the laser profile report; however, a mandrel reading cannot be submitted in lieu of a laser profiler.

3.4 Protection

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.5 Maintenance - NONE

PART 4 MEASUREMENT AND PAYMENT

4.1 DESCRIPTION: For furnishing and installing pipe and fittings, the price per foot for installing pipe and pipe fittings shall be full compensation for the completed pipeline, ready for service, and shall include, but not be limited to; exploratory excavation; excavation; sheeting and shoring if necessary; complying with Florida "Trench Safety

Act"; dewatering the excavation; transporting and unloading the pipe, fittings and all other materials not specified in other bid items from delivery trucks at the job site (trench side) and placing them into position in the trench; installing pipe, and pipe fittings, and appurtenances; making all connections within the lines themselves; cleaning and testing the pipe and fittings (including inspection); placing and compacting backfill; removal and disposal of excess or unsuitable fill material, where required; maintaining access to adjacent construction areas along the route of the pipe; protecting existing utilities along the route of the pipe; complying with work hour restrictions; preparation and submittal of Contractor's daily progress reports and/or field notes and monthly as-builts of the work that has been performed to date; moving and replacing utilities, trees, landscaping, shrubs, and all other similar items, to original locations and to equal or better than original conditions; and all other appurtenant and miscellaneous items and work (not included in another bid item) including final cleanup for a complete, satisfactory and functional installation.

4.2 BASIS OF PAYMENT: Payment will be made at the unit price bid times the number of linear feet installed and accepted by the Engineer.

4.3 MEASUREMENT: The Work required for this item will be measured based on the linear feet of pipe installed and accepted by the Engineer.

END OF SECTION 305

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SECTION 306
SMOOTH INTERIOR CORRUGATED POLYPROPYLENE (PP) PIPE

PART 1 GENERAL

1.1 Summary

A. The work under this section includes the furnishing of all labor, materials, and equipment required to construct smooth interior corrugated polypropylene piping as shown on the drawings and specified hereinafter. For use as storm sewer outside and under paved travel surfaces (15” to 60” diameter).

1.2 Definitions and Reference Documents

A. FDOT Standard Plans, Index 425-001 and 430-001, latest edition.

1.3 Qualifications

A. The manufacture of the pipe shall be certified by the FDOT Materials Acceptance and Certification (MAC) Program for Class II Polypropylene Pipe for the type and size ranges called for in the Drawings.

B. Pipe inspections shall be performed using a combination color CCTV pipeline survey system with a cable distance counter, laser profiling system, non-contact video micrometer and measurement software. The equipment and software used must be tested and approved by a recognized independent testing group and includes a certified accuracy of 0.5% or better and a repeatability of 0.12% or better. References for the equipment calibration are ASTM E 691 and ASTM E 177. Equipment meeting or exceeding the calibration criteria and with the ability to perform specification requirements as defined in FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 430-4.8 and 430-4.8.1 of the Specifications will be acceptable.

1.4 Submittals

A. Product data for each type of product.

B. Manufacturer certification as outlined in Paragraph 1.3

C. Pipe inspection equipment certification outlined in Paragraph 1.3

D. Manufacturer certification as described in Paragraph 1.5

1.5 Source Quality Control

A. Manufacturer Certifications/Testing

1. Prior to use, submit to the Engineer a material certification from the manufacturer confirming that the requirements of this Section are met. Materials will not be considered for payment when not accompanied by a material certification.
2. Ensure that each shipment of Pipe to the project site is accompanied with a signed or stamped delivery ticket providing the description and the list of the delivered Pipe. Each delivery ticket shall include the list of Pipe being shipped, be on the Plant's letterhead and include as a minimum the following information:

    a. Project Number
    b. Date Shipped
    c. Cast Date
    d. Type of Pipe
    e. Quantity of Products
    f. Serial Number
    g. Buy America compliance statement and dollar amount of non-domestic steel and iron used in the finished products for each delivery (for projects with Buy America requirements).

3. The QC manager or designee shall stamp the Pipe prior to their shipment to the project site. Each shipment of the Pipe to the project site shall include the list of delivered Pipe.

PART 2 MATERIALS

2.1 Pipe

A. Polypropylene Pipe shall meet the materials specifications in FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 948-7 Profile Wall Polypropylene (PP) Pipe (up to 60 inches) for Class II applications (100-year design service life).

2.2 Joints and Connectors:

A. Field joints shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 430-4.1General Requirements and Section 430-9.2 Field Joints.

B. Wall zone installation structure connections shall utilize resilient connectors that meet the requirements of FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 948-7.2.1 for resilient connectors.

2.3 Filter Fabric

A. Filter fabric shall meet the requirements specified of FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 985.

2.4 End Treatments

A. End Treatments shall meet the requirements of COJ Specification 301 Drainage Structures

2.5 Physical Sampling Requirements - NONE

PART 3 INSTALLATION

3.1 Instructions

A. Pipe shall be installed in accordance with FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 430-4 Laying Pipe Except as follows:

1. Metal Pipe protection shall not apply.

B. Contractor shall follow FDOT Standard Specifications for Road and Bridge Construction (most recent version), Section 430-9, Specific Requirements for Polypropylene Pipe.

C. These specifications shall be used in conjunction with the FDOT Standard Index Drawing outlining other requirements for this type of construction.

D. End Treatment: The terminal ends of all polypropylene pipe shall be protected by a drainage structure. The structure shall be a precast or constructed in place manhole, inlet or headwall/mitered end wall, or a metal mitered end wall. Where the pipe terminates in a masonry structure, the end of the pipe shall be roughened to provide for a good seal with the non-shrink grout used to seal the structure or an approved resilient connector.

E. When excavatable flowable fill is used as backfill for pipe or where flotation or misalignment may occur, the contractor shall use straps, soil anchors or other approved means of restraint to ensure correct alignment. The contractor shall also take all necessary precautions to prevent any damages caused by the hydraulic pressure of the fill during placement prior to hardening. Provide the means to confine the material within the designated space.

3.2 Tolerances

A. Check structure shape regularly during backfilling to verify acceptability of the construction method used. Replace pipe deflected 5 percent or more of the certified actual mean diameter of the pipe at final inspection at no cost.

3.3 Field Quality Control - Inspection

A. Inspection of newly installed pipe shall occur after final fills are placed over the pipe, but before pavements or other structures are installed. Pipe inspection shall be conducted in accordance with FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 430-4.8 Pipe Inspection.

B. Pipe Inspection report shall include an Ovality Report for non-rigid pipe in accordance with FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 430-4.8 Pipe Inspection. Contractor may use a mandrel to verify deflection tolerances from the laser profile report; however, a mandrel reading cannot be submitted in lieu of a laser profiler.

3.4 Protection

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.5 Maintenance – NONE

PART 4 MEASUREMENT AND PAYMENT (UNIT PRICE)

4.1 DESCRIPTION: For furnishing and installing pipe and fittings, the price per foot for installing pipe and pipe fittings shall be full compensation for the completed pipeline, ready for service, and shall include, but not be limited to; exploratory excavation; excavation; sheeting and shoring if necessary; complying with Florida "Trench Safety Act"; dewatering the excavation; transporting and unloading the pipe, fittings and all other materials not specified in other bid items from delivery trucks at the job site (trench side) and placing them into position in the trench; installing pipe, and pipe fittings, and appurtenances; making all connections within the lines themselves; cleaning and testing the pipe and fittings (including inspection); placing and compacting backfill; removal and disposal of excess or unsuitable fill material, where required; maintaining access to adjacent construction areas along the route of the pipe; protecting existing utilities along the route of the pipe; complying with work hour restrictions; preparation and submittal of Contractor's daily progress reports and/or field notes and monthly as-builts of the work that has been performed to date; moving and replacing utilities, trees, landscaping, shrubs, and all other similar items, to original locations and to equal or better than original conditions; and all other appurtenant and miscellaneous items and work (not included in another bid item) including final cleanup for a complete, satisfactory and functional installation.

4.2 BASIS OF PAYMENT: Payment will be made at the unit price bid times the number of linear feet installed and accepted by the Engineer.

4.3 MEASUREMENT: The Work required for this item will be measured based on the linear feet of pipe installed and accepted by the Engineer.

END OF SECTION 306

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SECTION 307
POLYVINYL CHLORIDE (PVC) PIPE

PART 1 GENERAL

1.1 Summary

A. The work specified in this section includes furnishing all labor, equipment and materials required to construct polyvinyl chloride (PVC) storm drainage piping shown on the drawings and specified hereinafter.

1.2 Definitions - NONE

1.3 Qualifications

A. The manufacture of the pipe shall be certified by the FDOT Materials Acceptance and Certification (MAC) Program for Flexible Pipe Production – Corrugated PVC Pipe.

B. Pipe inspections shall be performed using a combination color CCTV pipeline survey system with a cable distance counter, laser profiling system, non-contact video micrometer and measurement software. The equipment and software used must be tested and approved by a recognized independent testing group and includes a certified accuracy of 0.5% or better and a repeatability of 0.12% or better. References for the equipment calibration are ASTM E 691 and ASTM E 177. Equipment meeting or exceeding the calibration criteria and with the ability to perform specification requirements as defined in FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 430-4.8 and 430-4.8.1 of the Specifications will be acceptable.

1.4 Submittals

A. Product data for each type of product.

B. Manufacturer certification as outlined in Paragraph 1.3

C. Pipe inspection equipment certification outlined in Paragraph 1.3

D. Manufacturer certification as described in Paragraph 1.5

1.5 Source Quality Control

A. Manufacturer Certifications/Testing

1. Prior to use, submit to the Engineer a material certification from the manufacturer confirming that the requirements of this Section are met. Materials will not be considered for payment when not accompanied by a material certification.
2. Ensure that each shipment of Pipe to the project site is accompanied with a signed or stamped delivery ticket providing the description and the list of the delivered Pipe. Each delivery ticket shall include the list of Pipe being shipped, be on the Plant's letterhead and include as a minimum the following information:

    a. Project Number
    b. Date Shipped
    c. Cast Date
    d. Type of Pipe
    e. Quantity of Products
    f. Serial Number
    g. Buy America compliance statement and dollar amount of non-domestic steel and iron used in the finished products for each delivery (for projects with Buy America requirements).

3. The QC manager or designee shall stamp the Pipe prior to their shipment to the project site. Each shipment of the Pipe to the project site shall include the list of delivered Pipe.

PART 2 MATERIALS

2.1 Pipe

A. Polyvinyl Chloride (PVC) Pipe shall meet the materials specifications in FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 948-1 PVC Plastic Pipe.

2.2 Joints and Connectors:

A. Field joints shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 430-2.2 Joint Materials and Section 430-9.2 Field Joints.

2.3 Filter Fabric

A. Filter fabric shall meet the requirements specified of FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 985.

2.4 Solvent Cement

A. Solvent cement shall meet the requirements of specifications ASTM D 2564

PART 3 INSTALLATION

3.1 Instructions

A. Pipe shall be installed in accordance with FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 430-4 Laying Pipe Except as follows:

1. Metal Pipe protection shall not apply.

B. Contractor shall follow FDOT Standard Specifications for Road and Bridge Construction (most recent version), Section 430-9, Specific Requirements for PVC Pipe.

C. Joining systems

1. Solvent Cement Type Joints: Perforated pipe may be connected with belled ends, coupled with sleeve-type couplings or stop-type couplings.

D. End Treatment

1. The terminal ends of all polyvinyl chloride pipe shall be protected by a drainage structure. The structure shall be a precast or constructed in place manhole, inlet or headwall/mitered endwall or a metal mitered endwall. Where the pipe terminates in a masonry structure, the end of the pipe shall be roughened to provide for a good seal with the non-shrink grout used to seal the structure.

3.2 Tolerances

A. Check structure shape regularly during backfilling to verify acceptability of the construction method used. Replace pipe deflected 5 percent or more of the certified actual mean diameter of the pipe at final inspection at no cost.

3.3 Field Quality Control - Inspection

A. Inspection of newly installed pipe shall occur after final fills are placed over the pipe, but before pavements or other structures are installed. Pipe inspection shall be conducted in accordance with FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 430-4.8 Pipe Inspection.

B. Pipe Inspection report shall include an Ovality Report for non-rigid pipe in accordance with FDOT Standard Specifications for Road and Bridge Construction (most recent version) Section 430-4.8 Pipe Inspection. Contractor may use a mandrel to verify deflection tolerances from the laser profile report; however, a mandrel reading cannot be submitted in lieu of a laser profiler.

3.4 Protection

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.5 Maintenance – NONE

PART 4 MEASUREMENT AND PAYMENT (UNIT PRICE)

4.1 DESCRIPTION: For furnishing and installing pipe and fittings, the price per foot for installing pipe and pipe fittings shall be full compensation for the completed pipeline, ready for service, and shall include, but not be limited to; exploratory excavation; excavation; sheeting and shoring if necessary; complying with Florida "Trench Safety Act"; dewatering the excavation; transporting and unloading the pipe, fittings and all other materials not specified in other bid items from delivery trucks at the job site (trench side) and placing them into position in the trench; installing pipe, and pipe fittings, and appurtenances; making all connections within the lines themselves; cleaning and testing the pipe and fittings (including inspection); placing and compacting backfill; removal and disposal of excess or unsuitable fill material, where required; maintaining access to adjacent construction areas along the route of the pipe; protecting existing utilities along the route of the pipe; complying with work hour restrictions; preparation and submittal of Contractor's daily progress reports and/or field notes and monthly as-builts of the work that has been performed to date; moving and replacing utilities, trees, landscaping, shrubs, and all other similar items, to original locations and to equal or better than original conditions; and all other appurtenant and miscellaneous

items and work (not included in another bid item) including final cleanup for a complete, satisfactory and functional installation.

4.2 BASIS OF PAYMENT: Payment will be made at the unit price bid times the number of linear feet installed and accepted by the Engineer.

4.3 MEASUREMENT: The Work required for this item will be measured based on the linear feet of pipe installed and accepted by the Engineer.

END OF SECTION 307

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SECTION 308
UNDERDRAIN

PART 1 GENERAL

1.1 Summary

A. Construct underdrains, underdrain cleanout structures, underdrain inspection boxes and underdrain outlet pipes in accordance with the Plans

1.2 Definitions

A. Prefabricated Drainage System: The prefabricated drainage system (PDS) will consist of a preformed plastic core totally encapsulated with a filter fabric complete with specially designed fittings as provided by the manufacturer of the drainage system and meeting the specifications listed below.

B. Profile Wall Pipe - a pipe product consisting of an essentially smooth wall waterway braced with annular or helical projections or ribs on the outside of the pipe or with annual or helical bracing between essentially smooth outer and inner walls.

1.3 References and Related Documents

A. FDOT Standard Specifications for Road and Bridge Construction, Section 440 Underdrains, latest edition.

B. FDOT Standard Plans 440-001 Underdrain and 440-002 Underdrain Inspection Box, latest editions

1.4 Qualifications (NOT USED)

1.5 Submittals (NOT USED)

PART 2 MATERIALS

2.1 Refer to FDOT Standard Specifications for Road and Bridge Construction, Section 440-2, latest edition for acceptable materials. Use any one of the types of pipes listed in 440-2,

unless a particular type is specifically required. Use only perforated pipe, and do not use open joints.

A. Perforations, when required, shall be circular holes 3/16-to-3/8-inch diameter or slots not to exceed 1/8 in. in width or 1-1/2 in. in length, to provide an inlet area of 1.0 square inch per foot minimum. (For 6-inch and 8-inch)

B. Perforations shall be arranged in rows parallel to the axis of the pipe. Perforations shall not occur within the rib structure itself but between. The rows of perforations shall be arranged in two equal groups placed symmetrically on either side of a lower unperforated segment, corresponding to the flowline of the pipe. The spacing of the rows shall be uniform.

2.2 Source Quality Control

A. Manufacturer Certifications/Testing will be determined based on the underdrain material selected.

PART 3 INSTALLATION

3.1 Pipe and fittings produced to this specification should be installed in accordance with ASTM D 2321 and the manufacturer's recommendation instructions.

A. Excavate the trench carefully, to the depth required to permit the pipe to be laid to the grade required, and to the dimensions shown in the Plans.

B. Refer to FDOT Standard Specifications for Road and Bridge Construction, Section 440-4, latest edition for instructions and requirements for laying pipe.

1. Clean-Outs: Upstream ends of underdrain pipes are to have a removable plug for future clean out as shown on the Standard Details. Clean-out access boxes are required. Clean-outs shall be installed at intermediate points on the underdrain when the length exceeds 300 feet.
2. Underdrain Outfall into Ditches: Where so directed by the Engineer, ditch paving shall be constructed from the outfall down the bank to approximately 12 inches below the ditch bottom or normal water level. Payment for the materials and effort shall be included in the unit and price submitted for ditch paving.
3. Utility Conflicts: When directed by the City Engineer, the entire run (high end to outfall) shall be excavated prior to the placing of any underdrain. This procedure will reveal any "conflicts" with existing utilities and thus preclude

any readjusting of final grade and avoid any flat or low areas in the underdrain.

4. Placing of Unprotected Pipe under Roadways: Where necessary and so directed by the Engineer, unperforated PVC pipe (ASTM F758-82) shall be placed under existing roadways. Payment for the excavation, backfilling and compaction shall be included in the unit price submitted for unperforated pipes.

C. Refer to FDOT Standard Specifications for Road and Bridge Construction, Section 440-5 for instructions and requirements for placing filler material and backfilling.

D. To prevent clogging of underdrain from construction sediments, initially excavate the associated stormwater facilities to rough grade. After the contributing drainage area is stabilized, construct the underdrains and excavate the stormwater facilities to achieve the final elevation.

E. End Treatment: The terminal ends of all PVC Profile wall pipe shall be protected by a drainage structure. The structure shall be a precast or constructed in place manhole, inlet or headwall/mitered endwall or a metal mitered endwall. Where the pipe terminates in a masonry structure the end of the pipe shall be roughened to provide for a good seal with the non-shrink grout used to seal the envelope.

F. Tolerances - NONE

G. Field quality Control - NONE

3.2 Performance Testing

A. Protection - NONE

B. Maintenance - NONE

PART 4 MEASUREMENT AND PAYMENT

4.1 Measurement

A. The quantities to be paid for will be the length, in feet, of underdrain, which includes underdrain cleanout structures, measured in place, along the centerline and gradient of the underdrain, completed and accepted. The quantities to be paid for will be the length, in feet, of outlet pipe measured in place, along the centerline and gradient of the outlet pipe, completed and accepted. The quantity of

underdrain inspection boxes to be paid for will be the number completed and accepted.

B. No separate measurement or payment will be made under this Section for underdrains associated with box culverts or the Standard Plans, Index 400-289.

4.2 Payment

A. Price and payment will be full compensation for all the work specified in this section, including all materials, disposal of materials, pipe and fittings, stubbing into drainage structures, and all excavation except the volume included in the items for the grading work.

END OF SECTION 308

SECTION 309
CONCRETE DITCH PAVING

PART 1 GENERAL

1.1 Summary

A. Construct concrete pavement in the flow channel of drainage ditches and on slopes as shown on the Plans and in accordance with these Specifications and in conformity with the line, grades, dimensions and notes shown on the plans Standard Plans.

1.2 References and Related Documents

A. FDOT Standard Specifications for Road and Bridge Construction, Section 524 Concrete Ditch and Slope Pavement, latest edition.

B. FDOT Standard Plans 524-001 Ditch Pavement and Sodding

1.2 Qualifications

A. Obtain concrete from a plant that is currently on the FDOT's Nonstructural Concrete Production Facility Listing.

1.3 Submittals

A. Product information for each material used.

PART 2 MATERIALS

2.1 All materials shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 524-2, latest edition. Use products listed on the FDOT Approved Product List

A. Filter fabric shall comply with the requirements present in FDOT Standard Specifications for Road and Bridge Construction, Section 985, latest edition.

B. Concrete shall comply with the requirements present in FDOT Standard Specifications for Road and Bridge Construction, Section 347. latest edition.

C. Reinforcing steel shall comply with the requirements present in FDOT Standard Specifications for Road and Bridge Construction, Section 415, latest edition.

D. Preformed expansion joint metal and hot poured sealer shall comply with the requirements present in FDOT Standard Specifications for Road and Bridge Construction, Section 347, latest edition.

PART 3 INSTALLATION

3.1 Installation

A. Poured in Place Concrete Ditch Paving: Concrete ditch paving shall be a minimum of 4” thick with 6X6-10/10 wire mesh. The concrete shall have a minimum design strength of 2500 psi.

B. Forms shall be provided in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 524-3, latest edition.

C. Foundation for ditch paving shall be provided in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 542-4, latest edition. Additionally, dich foundation shall comply with the following:

1. Concrete ditch paving shall be placed in areas free of flowing or standing water. The contractor shall keep the area dry during grading, forming, and placement of the ditch paving. Dewatering may be accomplished by wellpoints, sock drains, or sump pumping.
2. If the contractor elects to use crush stone as a method of drying the bottom or conveying water to the sump or sock drain, the stone shall be wrapped in a non-woven fabric.
3. Concrete ditch paving shall have a minimum 18” turndown on all edges. Edges along the flowline of the ditch pavement shall be turned down at an angle which is 45 degrees from horizontal. All other turndowns shall be constructed at an angle of 90 degrees from the adjacent surface.

D. Joints and Weepholes shall be provided in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 524-5, latest edition, except as follows:

1. Joints shall be spaced not more than 10 feet apart.
2. If a prefabricated edge drain system is used, the system shall be laid perpendicular to the ditch from top of bank to top of bank with a minimum

of one outlet tee in the bottom and each side. Unless otherwise specified, the spacing of the weephole systems shall be a maximum of 10 feet on center.

E. Concrete shall be placed in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 524-6, latest edition.

F. Finish the ditch pavement in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 524-7, latest edition,

G. Cure the concrete as specified in FDOT Standard Specifications for Road and Bridge Construction, Section 524-8, latest edition.

3.2 Field Quality Control

A. Test each batch of concrete before discharging concrete at the placement site in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 347, latest edition for non-structural Portland Cement Concrete.

PART 4 MEASUREMENT AND PAYMENT

4.1 Measurement

A. The quantities to be paid for Concrete Ditch Pavement and Concrete Slope Pavement will be the plan quantity, in square yards, completed and accepted. Where the Plans show headers or cut-off walls at the end or edge of the pavement, the volume of the additional thickness of pavement that constitutes the headers, calculated in accordance with plan dimensions, will be converted into equivalent square yards of standard thickness pavement and included in the quantity to be paid for.

B. No deduction will be made for any areas occupied by manholes, inlets, or other drainage structures or by public utility appurtenances within the pavement area. The square yard quantity includes any ditch blocks with ditch or slope pavement on top. When steel reinforcement is called for in the Plans, payment will be included in the square yard item.

C. Sod will be measured and paid for in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 570, latest edition.

D. The quantity to be paid for Concrete Core Ditch Blocks will be the plan quantity of concrete, in cubic yards, completed and accepted. When steel reinforcement is called for in the Plans, payment will be included in the cubic yard pay item. The cubic yard pay item includes any ditch block within a grass or earth ditch, without other pavement on top.

E. Prices and payments will be full compensation for all work specified in this Section, including all earthwork, skimmers, and incidental materials necessary to complete the work.

4.2 Payment

A. Prices and payments will be full compensation for all work specified in this Section, including all earthwork, skimmers, and incidental materials necessary to complete the work.

END OF SECTION 309

SECTION 310
REVETMENT SYSTEMS

PART 1 GENERAL

1.1 Summary

A. The work under this section includes the furnishing of all labor, equipment, hauling and materials necessary for the proper placement of stone riprap, bedding stone, Sand-Cement Riprap, Riprap and rock lining placed loose for soil stabilization and slope protection, as called for on the drawings.

B. Construct riprap composed of sand-cement or rubble (consisting of broken stone or broken concrete) as shown in the Standard Plans and in the Plans.

C. Furnish and install gabions, including gabion baskets and gabion mattresses, filled with rock in accordance with this Section and in conformance with the lines, grades, design, and dimensions shown in the Plans.

D. Refer to FDOT Standard Specifications for Road and Bridge Construction, Section 530-1.2, latest edition for a description of Articulating Concrete Block (ACB) Revetment Systems.

1.2 References and Related Documents

A. FDOT Standard Specifications for Road and Bridge Construction, Section 530, Revetment Systems

1.3 Qualifications

1.4 Submittals

A. Submit manufacturer information regarding size distribution and types for rock for riprap and bedding stone.

PART 2 MATERIALS

2.1 Riprap

A. Materials used for rip rap systems, including but not limited to filter fabric, prepackaged sand-cement riprap bags, rubble, and bedding stone, shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 530-2.1, latest edition.

2.2 ACB Revetment

A. ACB Revetment Systems shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 530-2.2, latest edition.

2.3 Gabions

A. Gabions shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 530-2.3, latest edition.

2.4 Source Quality Control

A. The Engineer will approve construction aggregate sources, may perform independent verification tests on all materials, and may test components in a blend of rubble. Refer to FDOT Standard Specifications for Road and Bridge Construction, Section 530-2.1.3.4, latest edition.

PART 3 INSTALLATION

3.1 Installation of revetment systems shall comply with construction and installation requirements of FDOT Standard Specifications for Road and Bridge and Construction, Section 530-3, latest edition.

A. See FDOT Standard Specifications for Road and Bridge and Construction, Section 530-3.1 for geotextile fabric.

B. See FDOT Standard Specifications for Road and Bridge and Construction, Section 530-3.2 for sand-cement bags.

C. See FDOT Standard Specifications for Road and Bridge and Construction, Section 530-3.3 for rubble.

D. See FDOT Standard Specifications for Road and Bridge and Construction, Section 530-3.4 for bedding stone.

E. See FDOT Standard Specifications for Road and Bridge and Construction, Section 530-3.5 for ACB revetment systems.

F. See FDOT Standard Specifications for Road and Bridge and Construction, Section 530-3.6 for gabions.

3.2 Tolerances (NOT USED)

3.3 Field Quality Control

A. Refer to FDOT Standard Plans Section 530-3 for field quality control requirements.

3.4 Protection (NOT USED)

3.5 Maintenance (NOT USED)

PART 4 MEASUREMENT AND PAYMENT

4.1 Measurement

A. Sand-cement bags: The quantity to be paid for will be the volume, in cubic yards, calculated from the minimum dimensions shown in the Plans, satisfactorily placed and accepted.

B. Rubble and Bedding Stone: : The quantities to be paid for will be the weight, in tons, in surface dry natural state, by railroad scales, truck scales, or barge displacement. The weights shall be determined per FDOT Standard Specifications for Road and Bridge Construction, Section 530-4.2, latest edition.

C. ACB Revetment System: The quantity to be paid for will be the plan quantity, in square yards, completed and accepted. No allowance will be made for ACB placed outside the Plan dimensions, unless the additional placement is ordered by the Engineer.

D. Gabions: For mattress type applications, the quantity to be paid for will be the plan quantity, in square yards, placed in the final locations. For stacked basket applications, the quantity to be paid for will be the plan quantity, in cubic yards, placed in the final locations.

4.2 Payment

A. Sand-cement Bags: Gabions: Price and payment will be full compensation for all work specified in this Section, including all materials, labor, hauling, excavation and backfill. Include the cost of dressing and shaping the existing fills or subgrades for placing the riprap.

B. Rubble: Price and payment will be full compensation for all work specified in this Section, including all materials and hauling. Include the cost of dressing and shaping the existing fills (or subgrade) for placing bedding stone in the Contract unit price for riprap (rubble). As an exception to the above, concrete that is shown to be removed from an existing structure and subsequently disposed of by being used in the embankment as riprap will not be paid for under this Section. Include the cost of such work under removal of existing structures.

C. Bedding Stone: Price and payment will be full compensation for all work specified in this Section, including all materials and hauling. Include the cost of dressing and shaping the existing fills (or subgrade) for placing bedding stone in the Contract unit price for riprap (rubble).

D. ACB Revetment System: Price and payment will be full compensation for all work specified in this Section, including all materials, labor, hauling, excavation and backfill.

E. Gabions: Price and payment will be full compensation for all work specified in this Section, including all materials, labor, hauling, excavation and backfill.

F. Geotextile fabric: Include the cost of materials and installation of the geotextile fabric, including any repairs or replacement, in the Contract unit price for riprap or ACB revetment system.

END OF SECTION 310

SECTION 311
CAST IN PLACE DRAINAGE STRUCTURES

PART 1 GENERAL

1.1 Summary

A. The work under this section includes the construction of inlets, manholes, and junction boxes from reinforced concrete as shown in the Plans. Furnish and install the necessary metal frames and gratings. Adjust structures shown in the Plans to be adjusted or requiring adjustment for the satisfactory completion of the work.

1.2 References and Related Documents

A. FDOT Standard Specifications for Road and Bridge Construction, Section 425, latest edition for Inlets, Manholes, and Junction boxes

1.3 Qualifications (NOT USED)

1.4 Submittals

A. Product Data for each type of product.

PART 2 MATERIALS

2.1 Composition and proportioning of concrete and mortar shall comply with the FDOT Standard Specifications for Road and Bridge Construction, Section 425-2, latest edition.

2.2 Materials of construction for cast in place structures shall comply with the FDOT Standard Specifications for Road and Bridge Construction, Section 425-3, latest edition, with the following exceptions and additions:

A. Cast Iron Fixtures:

1. Fixtures shall be of the standard Jacksonville type as detailed on drawings.
2. Castings shall be made of good quality, strong, tough, even grained cast iron and shall be smooth, free from scale, lumps, blisters, sand holes and defects

of any nature which would render them unfit for the service for which they are intended.

3. Castings shall meet the requirements of ASTM A48, Specifications for Gray Iron Castings, Class No. 30, or Grade 65-45-12, Ductile Iron meeting the requirements of ASTM A536, Standard Specification for Ductile Iron Castings.
4. Manhole frame and cover shall be designed to withstand HS 20-44 loading defined in the AASHTO Specifications. Frames & covers shall be machined or ground at touching surfaces so as to seat firmly and prevent rocking. Any set not matching perfectly shall be removed and replaced at no additional cost.

B. Manhole Adjustment Ring

1. Manholes adjust-to-grade ring shall meet the requirements of ASTM C478.

2.3 Masonry Structures

A. Brick: Brick shall be sound, hard, and uniformly burned, regular and uniform in shape and size, of compact texture and satisfactory to the Engineer. Brick shall comply with the ASTM Standard Specifications for Sewer Brick (Made from Clay or Shale), Designation C32, latest, Grade MM.

B. Mortar for Brickwork: The mortar shall be composed of Portland Cement and sand. Mortar shall be one part cement and two parts sand. Lime shall not be added. Mortar shall be used within 30 minutes after its preparation.

1. Cement: Portland, ASTM C150, Specifications for Portland Cement, Type I.
2. Sand: Washed silica sand ASTM C144, Specifications for Aggregate for Masonry Mortar.
3. Manholes and catch basins shall be of precast construction as detailed and shall be dimensioned as called for on the Drawings. Solid brick structures may be used in certain special places as called for on the Drawings.

PART 3 INSTALLATION

3.1 Removal or abandonment of existing structures

A. Remove Existing Structure

1. Where a new structure is designated to replace an existing structure, complete removal of the existing structure shall be achieved to permit the

construction of a new structure at approximately the same location. Depth of the new structure may vary considerably from the existing structure.

2. Removing existing structures shall include the complete removal of the existing manhole. The existing structure shall be removed from the job site.
3. Cast iron castings removed from existing structures shall be thoroughly cleaned and subjected to a careful hammer inspection in the presence of the Engineer. If the castings pass inspection, and, if not used on this job, they shall be delivered to the property yard of the City of Jacksonville, Department of Public Works. The Contractor will be held strictly accountable for all castings removed.
4. Any or all existing pipes in and out of the structure to be removed, which are not themselves removed, shall be sealed, or as shown on the Plans, connected to the new structure. If a pipe is to be abandoned, the sealing shall be accomplished by mortaring (bricking) the end of the pipe for a distance of 18 inches minimum, or half the diameter of the pipe, whichever is larger, into the pipe with rubble and acceptable cement grout to form a solid waterproof plug completely bonded to the pipe, unless otherwise specified.

B. Abandoning Existing Structures:

1. Abandoning existing structures shall include the abandonment of structures as shown on the Drawings or called for elsewhere in the Contract Documents.
2. Abandonment shall be accomplished by sealing all pipes leading in and out of the structure to be abandoned. The sealing shall be completed by placing rubble and approved cement grout for 18 inch minimum, or half the diameter of the pipe, whichever is larger, in the end of each pipe completely bonding this mortar plug to the pipe and forming a tight waterproof seal.
3. The structure shall be removed to a depth of not less than 30 inches below the proposed finished grade. The remaining portion of the structure shall be filled with sand or other granular fill material. The fill material used to fill the abandoned structure shall be clean, granular, well-graded, free of organic matter or any deleterious material, and be compacted to the abandoned structure to 98% of the maximum density as determined by the Modified Proctor AASHTO T180.
4. The abandonment shall be completed by backfilling the void left by removing the top of the structure with approved fill material and replacing the pavement or other surface conditioning in kind. Pavement repair shall be as outlined in the details and Specification Section 503.

3.2 Installation of new structures

A. Forms shall be constructed of wood or metal so that they may be removed without damaging the concrete. Build forms true to line and grade and brace them in a substantial and unyielding manner. Obtain the Engineer's approval before filling them with concrete.

B. Excavation shall be carried out in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 425-7.1, latest edition.

C. Reinforcing Steel shall be provided and installed following the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 425-7.4, latest edition.

D. Concrete shall be placed and cured as specified in FDOT Standard Specifications for Road and Bridge Construction, Section 425-7.2, latest edition.

1. Bases for manholes shall be cast integrally with the bottom manhole section.
2. Placing Pipe: Inlet and outlet pipes shall be of the same size and kind as the connecting pipe shown in the plans. They shall extend through the walls for a distance beyond the outside surface sufficient for the intended connections, and the concrete shall be constructed around them neatly so as to prevent leakage along their outer surface. The inlet and outlet pipes shall be flush with the inside of the wall.

E. Solid brick structures may be used in certain special places as called for on the Drawings. Brick masonry shall follow the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 425-7.5, latest edition.

1. Both faces of brick masonry shall be plastered with mortar from 1/4 inch to 3/8 inch thick. If required, the masonry shall be properly moistened prior to application of the mortar. The plaster shall be carefully spread and troweled so that all cracks are thoroughly worked out.
2. After hardening, the plaster shall be carefully checked, by being tapped, for bond and soundness. Unbonded or unsound plaster shall be removed and replaced.
3. Brick masonry and plaster shall be protected from too rapid drying by use of burlaps kept moist, or by other approved means, and shall be protected from weather and frost, as required.

F. Manhole castings shall be set in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 425-7.3, latest edition.

1. Frames on manhole cones shall be set concentric with the masonry and in a full bed of mortar so that the space between the top of the manhole and masonry and the bottom flanges of the frame shall be filled and made watertight.
2. A ring of mortar at least 1 inch thick and pitched to shed water away from the frame shall be placed around the outside of the bottom flange. Mortar shall extend to the outer edge of the masonry and shall be finished smooth and flush with the top of the flange.

G. Cast in place structures shall be backfilled in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 425-7.6, latest edition.

H. Manholes, catch basins, inlets, valve boxes, etc. shall be adjusted in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 425-7.7, latest edition.

3.3 Tolerances (NOT USED)

3.4 Field Quality Control and Inspections (NOT USED)

3.5 Protection (NOT USED)

PART 4 MEASUREMENT AND PAYMENT

4.1 Measurement

A. The quantities to be paid for will be the number of inlets, manholes, junction boxes, and yard drains, completed and accepted; and the number of structures of these types (including also valve boxes) satisfactorily adjusted.

B. Measurement for removal of existing structures shall be the actual physical count of structures removed as called for on the Contract Drawings or as approved by the Engineer.

C. Measurement for payment of abandoned structures shall be the actual physical count of structures abandoned, as called for on the Contract Drawings or approved by the Engineer.

4.2 Payment

A. New Structures: Price and payment will be full compensation for furnishing all materials and completing all work described herein or shown in the Plans, including all clearing and grubbing outside the limits of clearing and grubbing as shown in the Plans, all excavation except the volume included in the measurement designated to be paid for under the items for the grading work on the project, all backfilling around the structures, the disposal of surplus material, and the furnishing and placing of all aprons, gratings, frames, covers, and any other necessary fittings.

B. Adjusted Structures: When an item of payment for adjusting manholes, valve boxes, or inlets is provided in the proposal, price and payment will be full compensation for the number of such structures designated to be paid for under such separate items, and which are satisfactorily adjusted, at the Contract unit prices each for adjusting inlets, adjusting manholes, and adjusting valve boxes. If no separate pay item is shown, payment will be made under adjusting miscellaneous structures.

C. Removed Structures: Payment for structures removed shall be at the unit price set forth in the Proposal for each structure removed. Payment will be compensation in full for complete removal of the structure and disposal of debris; removal, cleaning, inspecting and delivering frames and covers for storage; sealing all pipes leading in and out of the structure; placing and compacting the backfill of the void left by removing the structure and replacing the pavement or other surface condition in kind, if the removed structure is outside the construction trench for the new construction.

D. Abandoned Structures: Structures filled and abandoned as specified herein shall be paid for at unit price set forth in the Contract Agreement for each structure filled and abandoned. Payment will be compensation in full for removal of the upper portion of the structures and disposal of the debris; removal, cleaning, inspecting and delivering frames and covers for storage; sealing any and all pipes leading in and out of the structure; placing and compacting fill material used to fill the abandoned structure; and backfilling the void left by removing the top of the structure with approved compacted fill material and replacing the pavement or other surface condition in kind.

END OF SECTION 311

SECTION 401
STABILIZED SUBGRADE

PART 1 GENERAL

1.1 Summary

A. The work specified in this section consists of the preparation of the firm and unyielding subgrade having the required bearing value specified in the Plans & Specifications. It is intended that the desired bearing value be obtained regardless of the quality of the existing soil or materials available on the site.

PART 2 MATERIAL

2.1 The material for the Stabilized Subgrade shall meet the requirements of FDOT Specification Section 914, latest edition.

2.2 Modification to FDOT Specification Section 914

A. Table 914-1 shall be modified: 100% of stabilization materials shall pass a 3.5-inch screen (FM 1 T27).

B. Local Materials as defined in FDOT Specification Section 914-2.2 shall not be used unless approved in writing by the Engineer.

PART 3 INSTALLATION

3.1 Method of Construction

A. Construction Methods shall meet the requirements of FDOT Specification Section 160-1, 160-2, and 160-3, latest edition.

3.2 Testing Requirements

A. Density Requirements: Densities shall meet the requirements established in FDOT Specification Section 160-4.

B. Bearing Value Requirements and Tolerances: The completed subgrade shall be constructed to obtain a minimum L.B.R. of 40. The contractor shall obtain and submit test results from an FDOT approved independent testing laboratory showing the results. The Contractor shall provide the test results according to

their Quality Control Testing Program. However, a minimum of one test shall be taken per 1,000 lineal feet of roadway centerline for each type of soil of completed subgrade. For Stabilized subgrades with a L.B.R. of 40, any material which tests below a L.B.R. of 36 will be unacceptable.

C. Quality Control Testing Program: The Contractor shall submit their own Quality Control Testing program in writing for approval by the City prior to commencing Stabilized subgrade operations.

PART 4 MEASUREMENT AND PAYMENT (Projects Bid by City)

4.1 Method of Measure and Payment:

A. Unless specified otherwise in the Special Conditions, subgrade prepared to the limits shown on the Plans shall be paid for at the Contract unit price established in the Proposal for Stabilized Subgrade complete and accepted regardless of the method of construction or amount of stabilizing material used to obtain the required bearing value. Quantities will be determined by field measurements of acceptable Stabilized subgrade in square yards of surface area.

END SECTION 401

SECTION 402
LIMEROCK BASE COURSE

PART 1 GENERAL

1.1 Summary:

A. The work specified in this section consists of the construction of the base course composed of limerock. It shall be constructed on the prepared subgrade, in accordance with these specifications and in conformity with the lines, grades, notes and typical cross sections shown in the plans, and the FDOT Standard Specifications for Road and Bridge Construction, Sections 200 and 911, latest edition.

PART 2 MATERIAL

2.1 The material for the limerock base course shall meet the requirements FDOT Standard Specifications for Road and Bridge Construction, Section 911, latest edition.

2.2 Modification to FDOT Standard Specifications for Road and Bridge Construction, Section 911, latest edition.

A. Material other than limerock as defined in FDOT Standard Specifications for Road and Bridge Construction, Section 911-1 shall not be used unless approved in writing by the Engineer.

B. Table 911-4 shall be modified: 100% of limerock base material shall pass a 3.5" screen (FM 1 T27).

PART 3 INSTALLATION

3.1 Method of Construction

A. Construction Methods shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 200, latest edition. The reuse of existing base material will not be allowed.

B. Equipment

1. Construction equipment shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction Section 200-3, latest edition.

C. Transporting Limerock

1. Transporting limerock shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction Section 200-4, latest edition.

D. Spreading Limerock:

1. Spreading rock shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 200-5, latest edition.
2. When specified compacted thickness of the base is greater than six (6) inches, the base shall be constructed in two courses. The thickness of the first course shall be approximately one-half the total thickness of the finished base, or enough additional to bear the weight of the construction equipment without disturbing the subgrade.

E. Compacting and Finishing Base

1. Compacting and Finishing Base shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 200-6, latest edition.

F. Priming and Maintaining

1. Priming and maintaining the limerock base shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 200-8, latest edition.

3.2 Testing Requirements

A. Thickness requirements:

1. Thickness of the base shall be measured at intervals of not more than 200 feet. Measurements shall be taken at various points on the cross section, through holes not less than three (3) inches in diameter.
2. Where the compacted base is deficient by more than 1/2 inch from the thickness called for in the plans, the contractor shall correct such areas by scarifying and adding rock. The base shall be scarified, and limerock added to a distance of 100 feet in each direction from the edge of the deficient area. The affected areas shall then be brought to the required state of compaction and to the required thickness and cross section.

B. Density Requirements:

1. As soon as proper conditions of moisture are attained the material shall be compacted to a density not less than for 98% of the maximum density as determined by FM 1 T180. The minimum density which will be acceptable at any location outside the traveled roadway (Such as side streets, crossovers, turnouts, etc.) shall be 95% of such maximum. Limerock base for shoulder pavement shall be compacted to a density not less than 95% @ ±2% of optimum moisture, of the maximum density determined by FM 1 T180.
2. All limerock shall achieve a minimum of 100 L.B.R.

C. Density Test:

1. At least three density determinations not more than 300 feet apart shall be made on each day's final compaction operations on each course, and the density determinations shall be made at more frequent intervals if deemed necessary by the Engineer. During the final compacting operations, if blading of any areas is necessary to obtain the true grade and cross section, the compacting operations for such areas shall be completed prior to making the density tests on the finished base.

D. Cross Slope and Elevation Data Collection:

1. Cross slope and elevation data collection shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 200-7.3.1.3 and 200-7.3.1.4, latest edition.

E. Quality Control Testing Program:

1. The Contractor shall submit their own Quality Control Testing program in writing for approval by the City prior to commencing limerock base course construction.

PART 4 MEASUREMENT AND PAYMENT (Projects Bid by City)

4.1 Method of Measure and Payment:

A. The quantity of limerock base, determined as provided above, shall be paid for at the contract unit price per square yard for Limerock Base, completed and accepted. Such price and payment shall be full compensation for all work specified in this Section, including correcting all defective surface and deficient thickness. The cost of removing all cracks and checks, including additional

limerock required for such crack elimination, shall not be paid for separately but shall be included in the contract unit price per square yard for the limerock base.

END OF SECTION 402

SECTION 403
SUPERPAVE BASE COURSE

PART 1 GENERAL

1.1 Summary

A. The work specified in this section consists of the construction of the base course composed of Superpave asphalt. It shall be constructed on the prepared subgrade, in accordance with these specifications and in conformity with the lines, grades, notes and typical cross sections shown in the plans, and the FDOT Standard Specifications for Road and Bridge Construction, Section 234, latest edition.

PART 2 MATERIAL

2.1 The material for the Superpave asphalt base course shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Sections 234, 334, 901, 902 and 916, latest edition.

PART 3 INSTALLATION

3.1 Method of Construction

A. Superpave asphalt base production and Construction Methods shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 320 and 330, latest edition.

3.2 Quality Control Testing Program:

A. The Contractor shall submit their own Quality Control Testing program in writing for approval by the City prior to commencing Superpave base course construction.

PART 4 MEASUREMENT AND PAYMENT (Projects Bid by City)

4.1 Method of Measure and Payment:

A. The quantity of Superpave base course, determined as provided above, shall be paid for at the contract unit price per square yard for Superpave Asphalt Base,

completed and accepted. Such price and payment shall be full compensation for all work specified in this Section, including tack coat application, and correcting all defective surface and deficient thickness.

END OF SECTION 403

SECTION 404
BITUMINOUS MATERIALS

PART 1 GENERAL

1.1 Summary

A. This section defines the bituminous materials required for Superpave Asphalt Concrete.

PART 2 MATERIAL

2.1 Bituminous Materials shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 916, latest edition.

PART 3 INSTALLATION (NOT USED)

PART 4 MEASUREMENT AND PAYMENT

4.1 Method of Measure and Payment:

A. The cost of all Bituminous Materials specified in this section shall be included in the cost of Superpave Asphalt Concrete.

END OF SECTION 404

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SECTION 405
HOT MIX ASPHALT – PLANT METHODS AND EQUIPMENT

PART 1 GENERAL

1.1 Summary

A. This section specifies the basic equipment and operational requirements for preparing all plant-mixed hot bituminous mixtures for structural courses and bases, and the requirements for the equipment to be used in the construction of the asphalt pavements and bases.

B. Hot Mix Asphalt - Plant Methods and Equipment shall meet the requirements FDOT Standard Specifications for Road and Bridge Construction, Section 320, latest edition.

PART 2 MATERIALS (NOT USED)

PART 3 INSTALLATION (NOT USED)

PART 4 MEASUREMENT AND PAYMENT (NOT USED)

END OF SECTION 405

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SECTION 406
PRIME AND TACK COATS

PART 1 GENERAL

1.1 Summary

A. This section describes the prime coats on previously prepared bases and the application of tack coats on previously prepared bases and on existing asphalt pavement surfaces.

PART 2 MATERIAL

2.1 Materials shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Sections 902 Fine Aggregate and 916 Bituminous Materials, latest edition.

PART 3 INSTALLATION

3.1 Method of Construction

A. Construction methods and applications shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 300 Prime and Tack Coats, latest edition.

PART4 MEASUREMENT AND PAYMENT

4.1 Method of Measure and Payment:

A. The cost of all Prime and Tack Coats specified in this section are incidental to the cost of other items of related work. There is no direct payment for the work specified in the Section.

END OF SECTION 405

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SECTION 407
HOT MIX ASPHALT – GENERAL CONSTRUCTION REQUIREMENTS

PART 1 GENERAL

1.1 Summary

A. This section specifies the basic equipment and construction requirements for hot mix asphalt pavements and bases.

B. Hot Mix Asphalt – General Construction Requirements shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 330, latest edition.

PART 2 MATERIAL (NOT USED)

PART 3 INSTALLATION (NOT USED)

PART 4 MEASUREMENT AND PAYMENT (Projects Bid by City) (NOT USED)

END OF SECTION 407

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SECTION 408
SUPERPAVE ASPHALT CONCRETE

PART 1 GENERAL

1.1 Summary

A. The work specified in this section consists of the construction of Superpave Asphalt pavement. Superpave Asphalt shall be constructed in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 334 Superpave Asphalt Concrete, latest edition, and in conformity with the lines, grades, notes, and typical sections shown in the plans.

PART 2 MATERIAL

2.1 The material for the Superpave (SP) Asphalt shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Sections 334 Superpave Asphalt Concrete, 901 Coarse Aggregate, 902 Fine Aggregate, and 916 Bituminous Materials, latest edition.

2.2 FDOT Friction Course: The City of Jacksonville does not use FDOT Friction Course asphalt pavement.

PART 3 INSTALLATION

3.1 Method of Construction

A. Superpave Asphalt production and Construction Methods shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Sections 320 Hot Mix Asphalt Plant Methods and Equipment, and 330 Hot Mix Asphalt General Construction Requirements, latest edition.

3.2 Quality Control Testing Program:

A. The Contractor shall submit their own Quality Control Testing program in writing for approval by the City prior to commencing asphalt pavement construction.

PART 4 MEASUREMENT AND PAYMENT (Projects Bid by City)

4.1 Method of Measure and Payment:

A. This work shall be paid for at the unit price bid per ton or per square yard for "Superpave Asphaltic Concrete" complete in place, as called for in the proposal, which price shall include the furnishing of all work, labor, equipment and material necessary to complete the pavement as indicated on the plans or called for in the Proposal.

B. Pay Factors as described in FDOT Specification Section 334-8 to adjust the payment for Superpave Asphaltic Concrete shall not be used.

END OF SECTION 408

SECTION 409
MILLING OF EXISTING ASPHALT PAVEMENT

PART 1 GENERAL

1.1 Summary

A. This section specifies the basic equipment and construction requirements for Milling of Existing Asphalt Pavement.

B. Milling of Existing Asphalt Pavement shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 327, latest edition.

PART 2 MATERIAL (NOT USED)

PART 3 INSTALLATION (NOT USED)

PART 4 MEASUREMENT AND PAYMENT (Projects Bid by City)

4.1 The quantity to be paid will be the plan quantity area, in square yards, over which milling is completed and accepted. Price and payment will be full compensation for all work specified in this Section, including hauling off and stockpiling or otherwise disposing of the milled material.

END OF SECTION 409

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SECTION 410
ASPHALT HEAT PLANING

PART 1 GENERAL

1.1 Summary

A. The work under this section shall consist of planing the existing asphalt surface with equipment meeting the requirements hereinafter specified, which shall plane or shave the surface irregularities out of the existing bituminous pavements such as to produce a smooth surface and, in some cases, to cut the pavement down to predetermined grades. The planed and finished surface shall be free from gouges, grooves, ridges, sooting, oil film, and other imperfections of workmanship.

PART 2 MATERIAL (NOT USED)

PART 3 INSTALLATION

3.1 Equipment Performance:

A. The planning work shall be performed with a pavement planing machine of a type that has operated successfully on a considerable mileage of work comparable to that proposed to be done under this specification.

3.2 Equipment Operation:

A. The planning machine to be used for this work shall be designed and built for this type of work, self-propelled, having in combination the means for heating, planing and cutting the old surface, blading the cutting into one windrow, picking up, elevating and discharging the cutting into a truck in one operation, to insure minimum traffic congestion. An optional method of removing windrowed material is the furnishing of loaders and dump trucks if in the view of the City Engineer, the traffic congestion would be minimal.

B. Either Propane or Butane will be used for heating fuel to prevent detrimental sooting or oil coating of aggregate or asphaltic materials and to fully meet all clean air standards.

C. The temperatures at which the work is performed, the nature and condition of the equipment, the manner of performing the work shall be such that the pavement is not torn, gouged, shoved, broken, sooted, oil coated or otherwise injured by the

planning operation. Sufficient passes, or cuts, shall be made such that all irregularities or high spots are eliminated, and that 100 percent of the surface area has been planed, or to the satisfaction of the Engineer.

PART 4 MEASUREMENT AND PAYMENT

4.1 The contractor shall provide all necessary labor, materials, and equipment to load the asphalt and aggregate cuttings into dump trucks supplied by him and hauled to a disposal area designated by the Engineer.

4.2 Asphalt pavement planing performed and provided above shall be measured by one (1) inch depth per square yard for the work performed. Payment for the planing of pavement shall be made at the price bid per square yard planed, which price shall include all labor, equipment, materials, supplies, mobilization, compensation insurance, and equipment repairs.

END OF SECTION 410

SECTION 411
ASPHALT RECYCLING

PART 1 GENERAL

1.1 Summary

A. The work under this section shall consist of heating and scarifying existing pavement, leveling and relaying recycled materials and in the same operation overlaying the hot recycled material with approximately 75 pounds per square yard of SuperPave.

PART 2 MATERIALS (NOT USED)

PART 3 INSTALLATION

3.1 Equipment Performance:

A. The repaving machine to be used under this specification shall be designed and built for this type of work. This is defined as a continuous, multi-step, heated process of reworking and recycling the existing asphalt pavement at the rate of from 10 to 25 feet per minute over a minimum 10-foot width. The machine shall have successfully performed considerable mileage of work comparable to that described herein.

3.2 Equipment Operation:

A. The entire pavement surface shall be heated by radiant heating which evenly emits radiant heat over the entire surface for enough time to soften the existing pavement, allowing for the scarifying of the mix. The scarified mix shall be heated by radiant heaters long enough to raise the temperature of the scarified surface to at least 200°F. There shall be no burning or over-heating of the scarified mix. A transverse blade assembly shall gather the loosened, heated, recycled mix and distribute this mix in a uniform layer over the road surface. The leveling blade is to be preceded by a reversible auger which will remove the reclaimed mix in a transverse direction to provide for profile correction and leveling and will use the reclaimed mix to install uniform surface.

B. In addition to the heaters and scarifies the machine shall be equipped with a receiving and dispersing asphalt mix hopper and a mechanical spreader. The screed or strike-off member shall be capable of adjustment to regulate the depth of the new material to produce the desired cross section. The depth of the mix shall be as specified by the Engineer for each road on which this process is used. The finished

surface shall be of a uniform texture and compaction. There shall be no pull, torn or loosened portions allowed.

C. The tack coat used in this operation only shall be emulsified asphalt meeting the Florida Department of Transportation specifications. The City Engineer shall review the proposed prime coat for approval before any work is started.

PART 4 MEASUREMENT & PAYMENT

4.1 Compensation for the above-described work shall be at the unit price established in be bid proposal for 1-inch of depth per square yard of pavement recycled and shall include all labor, equipment and materials necessary to perform that work.

END OF SECTION 411

SECTION 412
PORTLAND CEMENT CONCRETE

PART 1 GENERAL

1.1 Summary

A. This section specifies the requirements for the materials for all classes of concrete and includes methods and equipment for the handling and storing of materials and mixing and transporting of the concrete to the site.

1.2 Source Quality Control

A. Concrete shall be obtained from only those plants that have been approved and identified by the FDOT. A list of these plants may be obtained from the FDOT. A plant owner or manager may submit a request for approval by writing to:

State Materials and Research Engineer
Florida Department of Transportation
Office of Materials and Research
Post Office Box 1029
Gainesville, Florida 32602

B. Concrete delivered to the job site in transit mixers having no FDOT identification and approval card shall be rejected.

PART 2 MATERIAL

2.1 Composition:

A. The concrete shall be composed of a mixture of Portland cement, fine aggregate, coarse aggregate and water, and where specified or allowed by the specifications, shall include approved admixtures.

2.2 Cement:

A. Cement used will comply with the AASHTO Specifications Designation M85 on Portland Cement. Unless otherwise specified, Normal Portland Cement will be used. (Type I).

2.3 Coarse Aggregate:

A. Coarse aggregate shall consist of clean, tough, durable gravel (quartz), or stone (rock). When subjected to Los Angeles Abrasion Test (AASHTO T96) the loss shall not be more than 50% for gravel or not more than 45% for stone. All coarse aggregate shall be washed and shall be free from disintegrated pieces, salt, alkali, vegetable matter and adherent coatings. The weight of extraneous substances shall not exceed the following percentages:

Coal & lignite.....1.00%
Clay lumps.....0.05%
Soft fragments.....2.00%
Cinders & clinkers.....0.50%
Free shells.....1.00%
Organic Matter (wet).....0.03%
Loss by decantation.....1.125%

The sum of the percentages of all materials noted in the above table shall not exceed 10%.

B. Percent by weight of course aggregate passing square opening sieves:

GRADE	Nominal Size	1-½"	1"	3/4"	1/2"	3/8"	No. 4	No. 8	No. 16	No. 50
FDOT No. 5	1" - 1-1/2"	100	90-100	20-55	0-10	0-5				
FDOT No. 9	No. 4 – No. 16					100	85-100	10-40	0-10	0-5

2.3 Fine Aggregate:

A. Fine aggregate shall consist of sand composed only of hard, strong, durable, uncoated grains of quartz, and reasonably free from lumps of clay, soft or flaky particles, salt, alkali, organic matter, loam or other extraneous substances.

B. The weight of extraneous substances shall not exceed the following percentages:

Loss by decantation.....3.0%
Shale.....1.0%
Coal or Lignite.....1.0%
Clay lumps.....1.0%
Cinders & clinkers.....0.5%

The sum or the percentages of all materials in the above table shall not exceed 5%.

C. Test Requirements: If the fine aggregate produced is darker than the standard solution, the aggregate shall be rejected unless it can be shown by appropriate tests that the impurities causing the color are not of the type that would be detrimental to the concrete. Such tests shall be in accordance with AASHTO T7l and M6.

D. Gradation: The fine aggregate shall be reasonably well graded, from coarse to fine and when tested by means of laboratory sieves, it shall meet the following requirements, in percent of total weight:

TOTAL RETAINED ON:

Sieve	Percent
No. 4	0 to 5
No. 8	0 to 15
No. 16	3 to 35
No. 30	30 to 75
No. 50	65 to 95
No. 100	93 to 100
No. 200	Min 96

2.4 Water for Concrete:

A. Water for use with cement shall be clean and practically free of oil, acid, alkali, chlorides, organic matter, and other deleterious substances. Water from city water supplies or other sources which are approved by the Public Health Department may be accepted without being tested. Water from all other sources shall be tested and approved before use and shall not contain impurities in excess of the following limits:

Acidity or alkalinity calculated in terms of:	
Calcium carbonate	0.05%
Total organic solids	0.05%
Total inorganic solids	0.08%
Total chlorides as sodium chloride	0.05%

2.5 Admixtures:

A. Air-entraining admixtures not already approved by the City many be tentatively approved for use providing they meet the requirements of AASHTO M154. Water reducing and retarding admixtures shall meet the requirements of AASHTO M194.

B. Air-entraining admixtures: Air entrainment will be required in all paving concrete, and in all structural concrete except counterweight concrete, and the amount of air entrained shall be from four (4) to seven (7) percent. Air entrainment shall be

produced by the addition of the air-entraining admixture to the mixing water, during batching, air-entraining cement will not be permitted. The amount of the admixture to be used per batch shall be determined in the field by trial.

2.6 Classification of Concrete:

A. The class or type of concrete shall be designated as to the specific minimum psi compressive strength at 28 days.

B. Maximum Permissible Water-Cement Ratios for Concrete (PCA Standards)

Specified Compressive Strength at 28 days psi Fc	Non-Air-Entrained Absolute Ratio by Weight	Air-Entrained Absolute Ratio by Weight
2500	0.67	055
3000	0.58	0.55
3500	0.51	0.48
4000	0.44	0.48
4500	0.38	0.45

C. Actual Proportions to be Used:

1. The Contractor will be required to designate the actual proportions to be used, in order to produce concrete of the strength required.
2. Prior to mixing any concrete the Contractor shall submit his design mix for approval, and only mixes approved by the City shall be incorporated into the work.
3. The City will exercise control over the concrete by rigid inspection of the consistency, yield strength of the concrete, and of the air content where applicable.

2.7 Curing Materials for Concrete:

A. Burlap:

1. Burlap for curing concrete shall consist either of two layers, weighing 10 to 18 ounces per ten square feet, or of four layers of 6 to 7 ounces each. Burlap which has been used as a container for sugar shall not be used. Burlap that is being used for the first time shall be thoroughly washed in order to remove starches used in sizing the material. Burlap shall be furnished in strips of at least three feet and not more than six feet in width, and it shall be at least three feet longer than the width of surface to be covered.

B. Membrane Curing Compound:

1. Membrane curing compound shall conform to the requirements of AASHTO M 148 (Type 1 for clear compound and Type 2 for white-pigmented compound), and the following additional requirements. The membrane curing compound shall be of a consistency suitable for spraying at temperatures prevalent at the time of construction operations, and which forms a continuous uniform film. It shall be free from precipitated matter caused by conditions of storage or temperature. The compound shall be relatively nontoxic.
2. At least one sample representing each 40 drums or fraction thereof shall be taken for testing. Each sample shall be at least one quart. If the compound has been pretested, only an information card need be submitted. Fourteen days shall be allowed after arrival of the sample at the laboratory for completion of the tests. The curing compound shall be delivered to the job in the manufacturer's original container, labeled with the manufacturer's name, plant location, grade designation of compound, lot number and quantity, and no material will be acceptable unless all such requirements are complied with.

C. Sheet Materials:

1. Waterproof paper, polyethylene film and white burlap-polyethylene sheet, for curing concrete shall meet the requirements of AASHTO M 171, with the additional requirements for waterproof paper and for polyethylene film as shown below. The paper as prepared for use shall be in such dimensions that each unit as laid will extend at least 18-inches beyond the edges of the slab. If laid longitudinally, paper not manufactured in sizes which will provide this width shall be securely sewed or cemented together; the joints being sealed in such manner that they do not open or separate during the curing period.
2. At the option of the Contractor, instead of the single longitudinal strip specified above, the blanket may be furnished in three strips: one strip being the neat width of the pavement, with two side strips. The sheets, as prepared for use, shall be of such dimensions that each unit as laid will extend beyond the edges of the slab by at least twice the thickness dimension of the pavement edge, and the sheets shall overlap by at least 18-inches. No sheet may be reused except after individual inspection and approval by the Engineer. Any sheets determined by the Engineer to be so damaged as to not afford the protection to the concrete in preventing moisture loss during the curing period will be rejected.

2.8 Physical Sampling Requirements

A. Test Samples:

1. The Contractor shall furnish the City sufficient concrete of the design mix as required for test specimens. The number and frequency of test samples which are for the purpose of determining the strength of the concrete placed shall be in accordance with the following requirements or as required by the Construction Inspector:

    a. One set of four test cylinders shall be made for each class of concrete for each 30 cubic yards or fraction thereof, placed each day. As an exception, for seal concrete, only one set of four test cylinders will be required for each pour.
    b. One set of four test cylinders shall be made for each 1000 square yards or fraction thereof.

2. The number and frequency of test samples as required above shall apply to each design mix and each batch plant, separately.
3. The Contractor shall bear the cost of testing and include it in his bid.

B. Test for Strength of Concrete:

1. The method of determining the strength of the concrete shall be in accordance with the following procedures.

    a. One cylinder from the set of four cylinders shall be tested for compressive strength on the seventh (7th) day. The results of this test shall be used to determine the probable strength that will be obtained from the 28-day test.
    b. Two of the remaining three cylinders of the set of four cylinders shall be tested for compressive strength on the 28th day.
    c. The compressive strength of the quantity of concrete placed and represented by one set of four cylinders shall be determined from the highest test result of two cylinders tested on the 28th day.
    d. The fourth cylinder shall be retained by the testing lab if required.
    e. The testing procedure described above is the minimum requirement for all concrete. Additional samples may be cast to determine strengths at other time intervals, as required for prestress work or other considerations.

2. If the seven-day test cylinder indicates probable low-strength concrete, the Project Engineer may request that another cylinder be tested and if the second cylinder is within the required limits, the Contractor may proceed to the 28-day test at his option, or if the 28-day test cylinders indicate low strength concrete, the Contractor, may, at his option, elect to drill core samples from the actual concrete placed. If the Contractor elects to drill core

samples from the hardened concrete, the costs of obtaining the cores and repairing the core holes shall be borne by the Contractor.

3. The cores shall be drilled as directed by the Engineer, at the same approximate locations from which the test cylinder concrete was obtained. The locations of the drilled cores shall be selected so that the remaining structure will not be impaired or sustain permanent damage after the holes are repaired by the Contractor. When the Contractor elects to supply drilled core samples, three (3) will be required. The three drilled samples shall be tested for compressive strength, and the equivalent 28-day strength of the concrete placed and represented by the drilled core samples shall be determined from the average the three drilled cores tested. When the Contractor elects to supply drilled cores and submits acceptable drilled core samples to the City for testing, both the Contractor and the City will accept the results of the tests of the drilled cores in lieu of the results of the tests on the test cylinders.

C. Methods of Testing and Sampling:

1. Test cylinders cast to determine acceptability for minimum strength requirements shall be made and cured in accordance with AASHTO T23 and tested in accordance with AASHTO T22. Test cylinders cast to determine when a precast unit or structure may be put into service or to determine when a tensioning load may be transferred shall be cured by methods identical to those used in curing the concrete member and tested in accordance with AASHTO T22.
2. Drilled core samples shall be taken and tested in accordance with AASHTO T24.
3. Test beams shall be made and cured in accordance with AASHTO T23 and tested in accordance with AASHTO T97.
4. Slump shall be determined in accordance with AASHTO T119 on the job site during each placement.
5. The amount of air entrained shall be determined by pressure or volumetric meters of approved design and in accordance with AASHTO Method T152 or AASHTO Method T196, except that AASHTO Method T199 may be used after the accuracy of the Chace Air Indicator has been determined by comparison tests.

D. Concrete Failing to meet Strength Requirements

1. For concrete which has been mixed and placed in accordance with these specifications, and which fails to meet the minimum 28-day strength requirements shall be removed and disposed of by the Contractor, at his expense, unless specifically authorized by the Engineer, in writing, to remain in place. The removal shall be in such manner as will not cause damage to

the remaining concrete or to other structural units or other facilities and property.

2. The Engineer may, at his discretion, allow concrete which fails to meet the minimum strength requirement to remain in place. Payment for this concrete will be at a reduced price, to compensate the City for loss of durability. The amount of the reduction shall be determined by negotiation and shall be based on the circumstances.

PART 3 INSTALLATION

3.1 Certification (For Ready-Mixed Concrete):

A. The manufacturer of concrete shall furnish the City Inspector with each batch of concrete before unloading at the site, a delivery ticket on which is printed, stamped or written, the following information:

1. Name of ready-mix batch plant.
2. Serial number of tickets.
3. Date & truck number.
4. Name of contractor.
5. Job number.
6. Specific class or designation of concrete.
7. Quantity of concrete (cubic yards).
8. Time loaded, or of first mixing of cement & aggregates.
9. Water added by receiver of concrete (if any), and his initials.
10. Type & name of admixture & amount of same.
11. Mixing time or reading of revolution counter at beginning and end of mixing period.
12. Signature or initials of ready-mix representative.
13. Type and brand of cement.
14. Amount of cement.
15. Total water content by producer (or W/C ratio).
16. Maximum size of aggregate.
17. Weight of fine and coarse aggregate.
18. Indication that all ingredients and mix proportions are certified as being previously approved.
19. Amount of water added at job site (gals.).
20. Signature of inspector authorizing the additional water.

B. A copy of every delivery ticket shall be forwarded to the Chief of the Design Activity involved in the project.

3.2 Placing of Concrete:

A. The free fall distance when placing concrete shall not exceed 5 feet.

B. Before pouring any concrete, the sub-grade shall be saturated to a depth of 1 inch. The availability of water or the lack of it shall be taken into consideration by prospective bidders. The responsibility for furnishing the necessary water belongs solely to the Contractor.

C. The Contractor will notify the Project Engineer or the Construction Inspector 48 hours prior to the placing of ANY concrete. The Project Engineer or the Construction Inspector will notify the Design Activity 24 hours prior to the placing of ANY concrete.

D. If the Contractor elects to place concrete that has been in the mixer (truck) more than the specified time (1-1/2 hours), they will provide an independent testing company with cylinders to be tested at the Contractors expense. If the cylinders do not test at the ultimate strength called for, the Contractor will replace the concrete at their expense.

E. The water tank on the mixer shall be topped out before leaving the plant. All water utilized on the job site will be recorded on the delivery ticket with the signature of the inspector. If water is added or there is a delay in placing the concrete the Contractor will perform additional slump tests to the satisfaction of the construction inspector.

F. Placing Concrete in Cold Weather:

1. No concrete shall be placed when the atmospheric temperature is below 35°F and falling.
2. No concrete shall be placed when the temperature of the concrete at placement is below 45°F.
3. The temperature of the concrete shall be controlled by heating the aggregates and mixing water to a temperature of at least 70°F but not more than 150°F.
4. The aggregates may be heated by either steam or dry heat. The contractor shall supply such heating apparatus as stoves, salamanders or steam equipment, and the necessary fuel. When dry heat is used, a means of maintaining atmospheric moisture shall be provided. If permitted by the Engineer, the torch method of heating mixed concrete may be used provided the heating apparatus shall be such as to heat the mass uniformly and avoid hot spots which will burn the materials.
5. After the concrete has been placed, if the temperature drops (or is forecast to drop) below 35°F for a period of 12 hours or more before the end of the curing period, the contractor shall enclose the structure in such a way that

the concrete and air within the enclosure can be kept above 60°F for a period of seven days after placing the concrete. If high-early-strength cement is used, this period may be reduced, as directed by the Engineer.

6. The Contractor shall assume all risks connected with the placing and curing of concrete under the above conditions, and permission given to place concrete under such conditions will in no way relieve the Contractor of the responsibility for satisfactory results. Should concrete placed under such conditions prove unsatisfactory, it shall be removed, disposed of and replaced at the Contractor's expense.

G. Placing Concrete in Hot Weather:

1. No concrete shall be placed if the temperature of the concrete exceeds 90°F.
2. The Contractor will be required to control the temperature of the concrete mix when it consistently exceeds this limit. The proposed method of control shall be submitted to the Department by the Contractor for review and approval.
3. When the temperature of the concrete as placed exceeds 75°F, a water reducing retarded shall be incorporated in the mix.
4. Deck slabs forms and reinforcing steel shall be sprayed with cool fresh water just prior to placement of concrete.
5. The Contractor shall assume all risks connected with the placing of concrete under the above conditions, and permission given to place concrete under such conditions will in no way relieve the Contractor of the responsibility for satisfactory results. Should concrete placed under such conditions prove unsatisfactory, it shall be removed, disposed of and replaced at the Contractor's expense.
6. Before concrete is cast in hot weather, forms, reinforcing, and subgrade shall be sprinkled with cool water. Concrete shall be speedily placed and finished, to minimize slump loss. For temperatures below 99°F the time limit from mix to placing shall not exceed 1 hour 30 minutes.
7. Continuous water curing gives best results in hot weather. Curing shall be started as soon as the concrete has hardened sufficiently to withstand surface damage. Water shall be applied to formed surfaces while forms are still in place. Surfaces without forms shall be kept moist by wet curing for at least 24 hours. If moist curing is discontinued after the first day, the surface shall be protected with a curing compound.

H. Additional Requirements for Structural/Reinforced Concrete:

1. The slump shall be determined, and any other required testing performed when the concrete truck arrives at the site.

2. If additional water is added by the Contractor, no more than 2 gallons per cubic yard shall be allowed for each load and whatever water is added, must all be added and mixed at one time.
3. Following the addition of the water, the slump shall be retested, and the load rejected if the slump is not within +/-1-inch of the design slump.

3.3 Curing

A. The concrete shall be continuously cured for a period of at least 72 hours. Curing shall be commenced after finishing has been completed and as soon as the concrete has hardened sufficiently to permit application of the curing material without marring the surface. Any curing material removed or damaged during the 72-hour period shall be replaced immediately. Curing may be done in accordance with any of the methods described below except that machine-laid concrete shall be cured with the wet burlap method up until joints are sawed, or for at least 12 hours if joints are constructed in conjunction with placing of concrete.

B. After forms are removed, the surfaces exposed shall be cured by placing a berm of moist earth against them or any of the methods described below, for the remainder of the 72-hour curing period.

C. The curing concrete shall not be exposed to vehicular traffic during the 72-hour curing period. If necessary, the concrete shall be poured and cured in sections so as to facilitate reasonable ingress and egress to commercial establishments.

D. Wet Burlap Method:

1. Burlap shall be placed over the entire exposed surface of the concrete, with sufficient extension beyond each side to insure complete coverage.
2. Adjacent strips shall be overlapped such that it will be in continuous contact with the concrete at all times and no earth shall be permitted between the burlap surfaces at laps or between the burlap and the concrete.
3. The burlap shall be saturated with water before being placed and shall be kept thoroughly wet throughout the curing period.

E. Membrane Curing Compound Method:

1. Clear membrane curing compound or white-pigmented curing compound, shall be applied by a hand sprayer in a single-coat continuous film at a uniform coverage of at least one gallon to each 200 square feet.
2. Any cracks, checks or other defects appearing in the coating shall be recoated immediately.

3. The curing compound shall be thoroughly agitated in the drum prior to application, and during application as necessary to prevent settlement of the pigment.

F. Polyethylene Sheeting Method:

1. Polyethylene sheeting shall be placed over the entire exposed surface of the concrete, with sufficient extension beyond each side to insure complete coverage. Adjacent strips shall be overlapped a minimum of six inches.
2. The sheeting shall be held securely in place such that it will be in continuous contact with the concrete at all times.
3. The sheets, as prepared for use, shall be of such dimensions that each unit as laid will extend beyond the edges of the slab by at least twice the thickness dimensions of the pavement edge, and the sheets shall overlap by at least 18-inches.
4. No sheet may be reused except after individual inspection and approval by the Engineer. Any sheets determined by the Engineer to be so damaged as to not afford the protection to the concrete in preventing moisture loss during the curing period will be rejected.

PART 4 MEASUREMENT AND PAYMENT

4.1 Payment shall be at the contract unit price established in the proposal or on the contract drawings for the concrete structure called for unless specified otherwise in the Special Conditions.

END OF SECTION 412

SECTION 413
RIGID PAVEMENT

PART 1 GENERAL

1.1 Summary

A. Rigid pavement consists of constructing a specified cement concrete paving on a prepared base. The utilities and other items in and beneath the street must be properly coordinated with the construction of the rigid pavement to avoid all conflicts. The work to be done shall include the furnishing of all supervision, labor, materials, equipment and incidentals necessary for the proposed rigid pavement construction in accordance with the approved drawings & specifications.

PART 2 MATERIAL

2.1 Concrete:

A. The materials and acceptance of concrete shall be in accordance with the FDOT Standard Specifications for Road and Bridge Construction, Section 350 Cement Concrete Pavement, latest edition.

2.2 Curing Materials:

A. The materials and acceptance of curing materials shall be in accordance with FDOT's Standard Specifications for Road and Bridge construction, Section 925 Curing Materials, latest edition.

2.3 Embedded Items:

A. The materials and acceptance of embedded items shall be in accordance with the FDOT Standard Specifications for Road and Bridge construction, Section 931 Metal Accessory Materials of Concrete Pavement and Concrete Structures, latest edition.

2.4 Materials for Forming and Sealing Joints:

A. The materials and acceptance of materials for forming and sealing joints shall be in accordance with the FDOT Standard Specifications for Road and Bridge construction, Section 932 Nonmetallic Accessory Materials of Concrete Pavement and Concrete Structures, latest edition.

2.5 Subgrade

A. The top six inches shall be composed of granular or gravely soils that are predominantly sandy with no more than a moderate amount of silt or clay. It shall have a minimum limerock bearing ratio (LBR) of 12.5 and a minimum Florida Bearing Value (FBV) of 25.

2.6 Testing and Inspection:

A. The Contractor should provide for services of an independent testing laboratory to perform specified services and report findings to the Engineer. Test requirements shall conform to Section 350 Cement Concrete Pavement of the FDOT Standard Specifications for Road and Bridge Construction, latest edition.

PART 3 INSTALLATION

3.1 Subgrade Preparation

A. General:

1. The bottom of the excavation for the pavement or top of the earth fill will be known as the pavement subgrade and shall conform to the lines, grade, and cross-sections shown on the Plans.
2. Prior to placing the concrete, the subgrade shall be tested for conformity with the cross-section shown on the Plans. If necessary, material shall be removed or added as required to bring all portions of the subgrade to the correct elevation. It shall be thoroughly compacted to meet the requirements of Section 201 Excavation and Embankment. Concrete shall not be placed on any portion of the subgrade that has not been tested for correct elevation. The subgrade shall be cleared of all loose material. At any time that trucks, construction equipment or slip forming machines cause rutting or displacement of the subgrade materials, the subgrade shall be reshaped and compacted. The subgrade shall be in a moist condition at the time the concrete is placed.

B. Equipment

1. All equipment necessary for the proper preparation of the subgrade, placing, finishing, and curing of the concrete pavement shall be on the project in good working condition before the Contractor will be permitted to begin placing concrete. Throughout the construction of the project, the Contractor shall maintain the equipment in good working condition to assure the proper prosecution of the work.

3.2 Forms:

A. Unless special provision is made for the use of wood, all side forms for this work shall be of metal of a depth equal to the edge thickness of the pavement, except that it is permissible to increase the depth of forms by fastening boards under the forms.

B. The sections shall have a length of at least 10 feet, except on curves of less than 150-foot radius, where other materials may be used. Forms with a height of 8 or more inches shall have a base width of at least 8 inches. Other forms shall have a minimum base width of 6 inches. When set to grade and staked in place, the maximum deviation of the top surface of any section from a straight line shall not exceed 1/8 inch.

C. The method of connection between sections shall be such that the joint formed shall be free from play or movement in any direction. The bracing and support must be ample to prevent deflection of the forms under the pressure of the concrete or the weight or thrust of the machinery operating on the forms.

D. Flexible Forms:

1. Flexible steel or wood forms may be used only when specifically provided for on the Plans or in Special Provision with the exception that their use is herein approved for all curves having a radius of less than 150 feet.
2. Wood forms shall be equal in depth to the edge thickness of the pavement.
3. Forms shall be held by stakes and securely braced at any point where necessary so that no movement will result from pressure of the concrete or the weight or thrust of machinery operating on the forms.

3.3 Concrete Mix Plants

A. Ready Mixed Plants: The plant shall be in accordance with the FDOT Standard Specifications, for Road and Bridge Construction, Section 346 Structural Portland Cement Concrete, Current Edition.

B. Site Central Mix Plants : Either the plant shall be certified to the satisfaction of the responsible testing agency and shall conform to the Current Standards of the Concrete Plant Manufacturer's Bureau, or the plant shall be in accordance with the FDOT Standard Specifications for Road and Bridge Construction, Section 346 Structural Portland Cement Concrete, Current Edition. The trucks used to transport the concrete shall be so constructed to prohibit segregation of the mix and shall meet the approval of the Engineer in all respects.

3.4 Finishing Equipment:

A. Unless otherwise approved by the Engineer in writing, the Contractor shall provide mechanical equipment of either the slip form or form paving type which will strike off, consolidate, and finish the pavement to the required cross-section.

B. When required, approved vibrators for consolidating concrete along the faces of forms and adjacent to joints shall be provided.

C. Concrete saws shall be capable of cutting hardened concrete neatly to the dimensions specified in the Plans. The saw shall be equipped with a suitable guard.

D. Joint Sealing Equipment shall be capable of installing the sealant in joints in accordance with the manufacturer's recommendations.

E. Membrane Sprayer shall be a pressure sprayer capable of applying a continuous uniform film.

3.5 Mixing and Placing of Rigid Pavement

A. General

1. Concrete pavement shall be constructed on the prepared subgrade in accordance with these specifications and in reasonably close conformity with the lines, grades, thickness, and typical cross-sections shown on the Plans.

B. Mixing Concrete:

1. Concrete mixed in truck mixers shall be at the speed designated as mixing speed by the manufacturer for a total of 75-100 revolutions of the drum.
2. Time of mixing in a central mix plant shall be a minimum of 60 seconds.

C. Transporting Concrete:

1. Concrete may be transported any distance providing it is discharged on the grade with the slump within the required slump range and meets time requirements of this section.
2. If additional water is required to maintain the specified slump of concrete transported in truck mixers, it may be added with the permission of the Engineer. In this case, a minimum of 20 additional revolutions of the mixer drum at mixing speed shall be required before discharging the concrete.
3. Concrete Time Limits: The length of time that the concrete can be held in

the truck shall conform to the following:

a. Air Temperature 45° F to 80°F - 90 minutes
b. Air Temperature over 80°F with retarder added to mix - 90 minutes max.
c. Air Temperature over 80°F without retarder added to mix - 60 minutes max.

D. Placing Concrete:

1. The concrete shall be deposited on the grade in such a manner as to require little rehandling as possible. It shall be deposited in successive batches in a continuous operation.
2. The concrete shall be consolidated by suitable means so as to preclude the formation of voids or honeycomb pockets.

E. Placing in Cold Weather:

1. The Contractor shall be responsible for protecting concrete placed in cold weather and any concrete damaged by frost action shall be removed and replaced at the Contractor's expense.
2. No concrete shall ever be placed on a frozen subgrade.

3.6 Finishing for Rigid Pavements

A. General:

1. The concrete shall be struck-off, consolidated, and finished with mechanical equipment in such a manner that after final finishing, it shall conform to the pavement cross-section shown on the Plans.
2. Hand finishing will be permitted in narrow widths, areas of irregular dimensions, and in the event of breakdown of the mechanical equipment only to finish the concrete already deposited on the grade.

B. Final Surface Finish:

1. The final surface of the pavement shall have a uniform, skid-resistant texture. The method of texturing shall be approved by the Engineer and may require changes in the final finishing procedure as required to produce the desired final surface texture.
2. A burlap drag finish is recommended for residential, collector and minor arterial streets.
3. Major arterial and rural roads may require an overlapping stiff bristled broom or steel comb finish at the Engineer's option.

C. Pavement Exposed to Rain during Construction:

1. The Contractor shall always have materials available to protect the surface of the plastic concrete against rain.
2. Areas of the pavement surface that exhibit a smooth sandy appearance after the rain ceases shall be textured and cured. An attempt shall be made to impart the specified texture on these areas before applying the membrane curing material.
3. Areas that have suffered some surface erosion and have coarse aggregate exposed shall be reworked by hand methods or with the finishing machine when the form paving method is used. Fresh concrete containing the same materials and properties as the pavement concrete shall be added to maintain an adequate supply in front of the screeds or machine to assure replacement of the concrete eroded from the surface. The surface shall then be textured and cured as specified.
4. If pavement edges have been severely eroded and the concrete has not set, the edges shall be repaired by setting side forms and replacing eroded concrete. After the side forms are set, fresh concrete shall be placed and finished prior to texturing and curing.
5. After the pavement has hardened, remedial work shall not be permitted. Areas that do not comply with the specifications shall be corrected after the curing period has terminated.

3.7 Curing for Rigid Pavements

A. General:

1. After finishing operations have been completed and immediately after the free water has left the surface of the slab and, for slip formed pavements, the sides of the slab shall be coated and sealed in a uniform layer of membrane curing compound applied at the rate of not less than 1 gallon per 200 square feet of surface. When the forms are removed, curing compound shall be applied to the sides of the slab.
2. Areas in which the curing membrane is damaged within a period of three days shall be re-sprayed with curing compound.
3. Curing compound may be omitted when, in conjunction with protection of the pavement from inclement weather, a polyethylene film or other acceptable material is applied over the pavement and maintained intact for three days.

B. Cracks:

1. Concrete rigid pavement will not be accepted with excessive uncontrolled cracks.

2. The Contractor must avoid shrinkage cracks which occur when evaporation exceeds the rate at which bleed water rises to the surface. Some suggestions to avoid plastic shrinkage cracks include:

    a. Dampen subgrade and forms.
    b. Erect windbreaks, if doing so will reduce evaporation.
    c. Erect sunshades; Protect with wet coverings.
    d. Reduce time between placing and start of curing.
    e. Apply light fog spray for first few hours after placing concrete.

3. Cracks due to settlement or other structural faults must be avoided by adequate base construction.

3.8 Joints in Rigid Pavements

A. General:

1. Transverse and longitudinal joints shall be constructed to the dimensions and at the spacing shown on the Plans. Transverse joints shall extend the entire width of the pavement and through the curbs.
2. Joints may be formed in the plastic concrete or sawed after the concrete has hardened.
3. Formed joints may be constructed by installing a parting strip to the left in place or by depressing an approved tool into the plastic surface.
4. Sawing of joints shall begin as soon as the concrete has hardened sufficiently to permit sawing without excessive raveling and before uncontrolled cracking occurs. If necessary, the sawing operations shall be carried on both day and night, regardless of weather conditions.

B. Construction Joints:

1. All longitudinal joints may be construction joints at the Contractor's option.
2. Transverse construction joints shall be installed whenever the placing of concrete is suspended a sufficient length of time for the concrete to begin to harden.

C. Joint Sealing:

1. Where required, joints shall be sealed before the pavement is exposed to traffic, including construction traffic.
2. Prior to sealing, all foreign material shall be removed from the joints and the joints shall be thoroughly dry.

3.9 Opening of Traffic

A. The pavement shall be closed to traffic after the concrete is placed until it reaches a compressive strength of 2000 PSI under ordinary field conditions This does not include the sawing and sealing equipment or other light miscellaneous equipment.

3.10 Field Quality Control - Inspection

A. Before the final acceptance of the pavement, at the option of the Owner, its thickness may be determined by coring at random locations at various points on the cross-section in each poured strip so that a core represents an area not exceeding 2,500 square yards and determining the depth of each core by average measurements of the core in accordance with AASHTO T148.

B. The Owner will pay for the initial cores or tests. The Contractor shall pay for the extra or exploratory cores or tests to determine the extent of areas deficient in thickness.

C. When the measurement of the core is not deficient by more than 5% from the Plan thickness, full payment for the unit will be made.

D. When the measurement of the core is deficient in thickness by more than 5% but not more than 10% from the Plan thickness, two additional cores will be taken at 25-foot intervals from the original core. If the core deficient in thickness is from a two-lane pour unit, each lane will be cored separately.

1. If the average thickness of the three cores is not deficient by more than 5% from the Plan thickness, full payment for the unit will be made.
2. If the average thickness of the three cores is deficient by more than 5% but not more than 10% from the Plan thickness, an adjusted unit price will be applied for the area represented by these cores as shown in Part 4.
3. Where the thickness of the pavement is deficient by more than 10% and it is the judgment of the Engineer that the area of such deficiency should not be removed and replaced, payment will be 50% of the Contract Price.

PART 4 MEASUREMENT AND PAYMENT

A. The quantity of Rigid Pavement constructed shall be the number of square yards measured in place by the Engineer and verified by the Contractor.

B. Based on cores of finished rigid pavement as outlined in Section 3.10, if the average thickness of pavement is deficient by more than 5% but not more than 10% from the Plan thickness, an adjusted unit price will be applied for the area represented by these cores.

1. For thickness less than 6-1/2-inches, use the following table:

Deficiency in Thickness Determined by Cores	Proportional Part of Contract Price Allowed
0 – 5%	100%
5.1 – 6%	98%
6.1 – 7%	94%
7.1 – 8%	88%
8.1 – 9%	80%
9.1 – 10%	70%

2. For thicker pavements, use AASHTO Guide Specifications
3. Where the thickness of the pavement is deficient by more than 10% and it is the judgment of the Engineer that the area of such deficiency should not be removed and replaced, payment will be 50% of the Contract Price.
4. No additional compensation will be allowed for pavement placed in excess of the specified thickness.

END OF SECTION 413

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SECTION 501
CONCRETE CURB AND GUTTER

PART 1 GENERAL

1.1 Summary

A. The work specified in this section consists of the construction of portland cement concrete curb and gutter, concrete traffic separator, valley gutter, special concrete gutter, and any other types of concrete curb not specified in other sections. The various items shall be constructed in accordance with these specifications and in conformity with the lines, grades, dimensions and notes shown in the plans.

PART 2 MATERIAL

2.1 All Non-structural Portland Cement Concrete work under this section shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 347, latest edition.

2.2 All joint materials shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 932, latest edition.

2.3 All steel reinforcement under this section shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 415, latest edition.

2.4 For toll header curb concrete, use concrete meeting the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 346, Class II.

PART 3 INSTALLATION

3.1 Forms shall be constructed in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 520-3, latest edition.

3.2 Excavation shall be performed as required by FDOT Standard Specifications for Road and Bridge Construction, Section 520-4, latest edition.

3.3 Concrete shall be placed in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 520-5, latest edition.

3.4 Contraction Joints and expansion joints shall be constructed in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 520-6, latest edition.

3.5 Finishing work shall comply with the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 520-7, latest edition.

3.6 Curing shall be conducted in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 520-8, latest edition.

3.7 Backfilling and Compaction shall be performed according to the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 520-9, latest edition.

3.8 Surface Requirements shall be conducted and checked for elevation and cross slope in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 520-10, latest edition.

PART 4 MEASUREMENT AND PAYMENT

4.1 The quantities to be paid for under this section shall be in lengths of feet of, but not necessarily limited to, concrete curb, concrete curb & gutter, concrete traffic separator, special concrete gutter, concrete valley gutter, and concrete shoulder gutter as determined by plan dimensions, completed and accepted. Measurement of curved sections shall be made along the face of the curb.

END OF SECTION 501

SECTION 502
SIDEWALKS AND DRIVEWAYS

PART 1 GENERAL

1.1 Summary

A. The work specified in this section consists of construction of concrete sidewalk, in accordance with these specifications, and in conformity with the lines, grades, dimensions and notes shown in the plans.

PART 2 MATERIAL

2.1 All Non-structural Portland Cement Concrete work under this section shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 347, latest edition.

2.2 All joint materials shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 932, latest edition.

2.3 All steel reinforcement under this section shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 415, latest edition.

2.4 For toll header curb concrete, use concrete meeting the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 346, Class II.

PART 3 INSTALLATION

3.1 Concrete Sidewalks and driveways shall be installed per FDOT Standard Specifications for Road and Bridge Construction, Section 522-3 through 522-9, latest edition with the following additions:

A. Expansion joints shall be preformed joint fillers meeting the requirements of AASHTO M153 or AASHTO 213 and cut to the true shape of the cross section, set to line and grade, and held true while the concrete is being placed. The joint shall be edged and finished in a workmanlike manner as required by the Engineer.
These strips shall be left in place and shall appear every 18 feet, unless otherwise shown on plans or specified by the Engineer. On driveways, these strips shall be

placed adjacent to the paving, curb and driveway aprons or as specified by the Engineer. These strips shall also be placed between truckloads of concrete that exceed the time limits specified in the City Standard Specifications.

B. Contraction and construction joints shall be placed and formed by means of an approved jointer template. The stem of the jointer shall be pressed into the freshly finished concrete forming a groove one-half inch deep. The edges of the groove and adjacent surface shall be neatly finished in a workmanlike manner with proper tools in the hands of skillful workmen. Unless otherwise shown on the plans or designated by the Engineer, these joints shall appear at 6-foot intervals between expansion joints.

C. Concrete sidewalks shall be not less than 4 inches thick in any residential area or less than 5 inches thick in all business and/or commercial districts or as specified by the City Engineer.

3.2 Driveways and Walk Adjustments:

A. Driveways and walk adjustments shall be built of one course of monolithic construction according to Plans. Both shall show a strength of not less than 2,500 pounds in 28 days.

B. Driveways shall be not less than 5 inches thick and a minimum width of 8 feet at the walk. The apron shall have a maximum width of 30 feet and a minimum width of 14 feet at the curb. Driveway aprons larger than 30 feet at the curb shall be consider as exceptions.

C. Walks shall be not less than 4 inches thick.

D. Expansion joints shall be placed adjacent to the paving curb and/or as otherwise directed by the Engineer.

3.3 Removal and Restoration

A. Hedge and Large Shrubbery: The contractor will remove, with care, any hedge of large shrubbery which is found to encroach upon the area of construction. Such hedge or large shrubbery shall be replanted in the immediate vicinity outside the construction area. Root structures must be protected to insure plant life.

B. Fences and Walls: The Contractor will remove and replace to the correct line any fence or wall which encroaches upon the area where sidewalks are to be constructed. The work will be performed to the satisfaction of the Engineer.

C. Removal of Tile Walk: The Contractor will be required to remove and haul to 4767 Moncrief Road any tile walk which may be encountered during the process of construction.

D. Trees: The Contractor will be required to remove all trees that in the opinion of the Engineer are detrimental to the sidewalk to be constructed. This work will be paid for at such prices as may be agreed upon in writing between the Contractor and the Engineer, or in lieu thereof the Engineer may either ask for bids on the removal of said trees or remove same with City forces.

E. Stumps and Roots: All stumps and/or roots in sidewalk space whether above or below ground, and visible or not, will be removed by the Contractor.

PART 4 MEASUREMENT AND PAYMENT:

4.1 The quantity to be paid for under this section shall be the area in square yards of concrete, measured in place, completed and accepted. No deduction will be made for the area occupied by ornamental trees left within the area of the sidewalk. No deduction will be made for any areas occupied by manholes, inlets or other drainage structures or by public utility appurtenances with the normal sidewalk area.

END OF SECTION 502

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SECTION 503
REPLACEMENT OF PAVEMENT, WALKS AND DRIVEWAYS

PART 1 GENERAL:

1.1 Work under this section includes the furnishing of all labor, material and equipment required to provide replacement pavement, curb and gutter, walkways, and driveways as required for the work as specified hereinafter.

PART 2 MATERIAL:

2.1 Pavement Subgrades:

A. Stabilized subgrade shall meet the requirements of Specification Section 401. All stabilized areas shall have a minimum limerock bearing ratio (LBR) of 30.

B. Limerock base course shall meet the requirements of Specification Section 402 constructed to the thickness shown on the drawings for the case involved.

2.2 Asphalt Pavement:

A. Superpave base course shall meet the requirements of Specification Section 403

B. Prime and tack coat materials shall meet the requirements of Specification Section 406

C. Superpave Base Course equipment, materials, workmanship and methods employed in construction of the wearing surface shall be in accordance with City Standard Specifications.

2.3 Concrete Pavement:

A. Concrete Pavement shall meet the requirements FDOT Standard Specifications for Road and Bridge Construction, Sections 346 Structural Portland Cement Concrete and 350 Cement Concrete Pavement, latest edition. Concrete shall be 4,000 psi concrete, Portland Cement Concrete, with the exception that 3,000-psi high-early-strength concrete shall be used for State and Federal Highways.

B. Contraction, expansion and construction joint seals shall be provided in conformance with FDOT Standard Specifications for Road and Bridge Construction, Section 932, latest edition.

2.4 Curb and Gutter:

A. Replacement curbs or curb and gutter shall meet the requirements of Specification Section 501.

B. Portland Cement Concrete and shall meet the requirements of Specification Section 412.

C. Conform to the existing type of construction unless directed otherwise.

2.5 Manhole Adjustment Ring

A. Manholes adjust-to-grade ring shall meet the requirements of ASTM C478.

PART 3 INSTALLATION

3.1 General Requirements:

A. Where construction requires removing pavement or where existing paving is damaged by the Contractor's operation, it is the intent of these specifications that due care be exercised in cutting pavement, backfilling trenches, and replacing pavement so that where no further settlement of trenches will occur, and the paved surfaces will be restored to a condition equal to that existing before construction began.

B. Except as otherwise provided herein, materials and methods of operations required to install new and replacement pavement shall be in accordance with the applicable requirements of the City Standard Specifications.

C. No paving work shall be accomplished until all heavy construction equipment is permanently removed from the site.

D. Where construction work requires removal of the brick pavement, it shall be replaced with asphalt pavement as shown on the drawings and as specified hereinafter.

3.2 Trench Restoration in Pavement

A. The surface of backfilled trenches when dry shall be finished without needless delay. The surface of trenches in unpaved roadways and unpaved sidewalk areas shall conform to the adjacent surfaces and shall be in every respect be equal in quality, character, materials, and workmanship to the surface existing immediately before making the excavation. The surface of backfilled trenches in paved areas

shall be finished with SuperPave, or Portland Cement Concrete as specified in the Plans.

B. All surfaces which have been injured by the Contractor's operations shall be restored to a condition at least equal to that in which they were found immediately before the work was begun. Suitable materials and methods shall be used in such restoration.

C. The Contractor shall be responsible for controlling the widths of excavation for installing underground pipelines and appurtenant work. Unauthorized removal of pavement, curbs, etc., will not be included for payment under the Contract but shall be replaced in accordance with these specifications at no expense to the Owner.

3.3 Removal of Pavement, Walks and Driveways:

A. Bituminous Pavement

1. Bituminous Pavement shall be removed to clean continuous straight lines by saw cutting.
2. Where bituminous pavement adjoins a trench, the edges adjacent to the trench shall be trimmed to neat straight lines before pavement repair to ensure that all areas to be repaired are accessible to rollers used to compact the subgrade or paving materials.

B. Concrete Pavement

1. Concrete Pavement shall be removed to neatly sawed edges.
2. Saw cuts shall be made to a minimum depth of 1-1/2 inches. If a sawcut in concrete pavement falls within 3 feet (10 feet for state and federal highways) of a construction joint, expansion joint or edge, the concrete shall be removed to the joint or edge.
3. The edges of existing concrete pavement adjacent to trenches, where damaged after saw cutting or the pavement, shall again be sawcut to neat straight lines for the purpose of removing the damaged pavement areas. Such saw cuts shall be parallel to the original saw cuts or shall be cut on an angle which departs from the original sawcut not more than 1 inch in each 6 inches.

C. Concrete Curb, Walkways, Gutters and Driveways

1. Concrete sidewalk or driveway to be removed shall be neatly sawed in straight lines parallel to the curb or at right angles to the alignment of the sidewalk.

2. No section to be replaced shall be smaller than 30 inches in either length or width. If sawcut in walkway or driveway would fall within 30 inches of a construction joint, expansion joint, or edge, the concrete shall be removed to the joint or edge except where the sawcut would fall with 12 inches of a score mark, the sawcut shall be made along-the-score mark.
3. Where a paved concrete driveway return apron is cut, the complete return apron shall be replaced from the street roadway back to the approved cut furthest from the roadway beyond the tangent point of the return radius. The finished return radius shall be at least as large as that on the original driveway apron.
4. Existing curbs and curb and gutter sections shall be cut out as necessary to permit construction of the work as authorized by the Engineer.
5. Where FDOT Standard Curb and Gutter has been removed, such shall be replaced with similar construction in accordance with FDOT Standard Specifications, Current Edition.
6. Curb and gutter shall be sawed to a depth 1-1/2 inches on a neat line at right angles to the curb face.
7. All curbs and gutters outside the limit of construction which are willfully or negligently destroyed, broken or otherwise defaced shall be removed, disposed of and replaced in accordance with these specifications at no additional cost to the Owner.

3.4 Replacement of Walkways and Driveways:

A. Bituminous Pavement

1. Work shall be accomplished in the following order:

    a. Stabilizing and compacting of sub-base, when required.
    b. Limerock Base Course
    c. Prime coat.
    d. Asphaltic concrete surface course.

2. Prime tack coat shall be applied at the rate of 0.15 gallons per square yard to the prepared base course in accordance with Specification Section 406. Feather edges to meet existing grade at limits shown on the drawings.
3. The paving shall have a wearing surface of either FDOT SuperPave with a thickness of 1-1/2 inch or equal to the thickness of the existing surface course, whichever is greater.

B. Concrete Pavement

1. Roadbed stabilization, when authorized by the Engineer in writing or shown on the Contract Plan/Profile Drawing, shall extend to a depth of 12 inches below the bottom of the base.
2. When the subgrade has been prepared it shall be moistened sufficiently to prevent rapid leaching of water from the concrete and the concrete spread on the moist subgrade for the full width and depth. It shall be brought to the required grade by means of an approved template and thoroughly compacted and finished by floating and troweling until the surface is dense and smooth, true to grade, free from lumps and depressions, and then given a broom finish.
3. Contraction, expansion and construction joints shall be formed and installed in conformance with FDOT Standard Specifications for Road and Bridge Construction, Section 350-13, latest edition.
4. After the concrete has thoroughly hardened but not more than 24 hours after same is placed, it shall be covered with a layer of clean sand or burlap and thoroughly wet and maintained for a period of 7 days and then removed. Membrane curing compound may be used with the Engineer's approval. Newly placed concrete pavement sections shall be properly barricaded and lighted by the Contractor to exclude traffic during the curing period.

C. Concrete Curb, Walkways, Gutters and Driveways

1. Where damaged or required to be cut by the Contractor's operations, walkways and driveways shall be repaired to conform to the existing type construction. Walkways and driveways other than concrete shall be restored by approved methods and materials, equal to or better than original condition.
2. For the restoration of concrete walkways and driveways, the existing adjacent concrete shall be cut back with a masonry saw or removed to the nearest dummy expansion joint, to remove undermined concrete and provide square edges, per Paragraph 3.3.C, this Section.
3. The area over which the concrete is to be placed shall be filled with Class A-3 Sand to the proper grading and width. The bed shall be thoroughly compacted by approved mechanical compaction equipment to 100 percent of maximum density as determined by the Laboratory Standard Compaction Test (AASHTO T99). In all cases where fill is required to bring the subgrade to the required elevation, the filling shall be made in layers not to exceed six inches in depth before tamping and each layer shall be thoroughly compacted. Filling shall be at +/- 2 percent of optimum moisture content at the time of compaction. A tolerance of minus 2 percent will be allowed in the compaction effort.

4. An approved type of expansion joint shall be inserted across walkways at intervals not exceeding 18 feet with dummy groove joints at 6-foot intervals. Where walkways and driveways must be replaced where they intersect, expansion joints shall be provided on all four sides of the repair.
5. The thickness of concrete walkways and driveways shall be equal to or greater than existing, but not less than 4 inches for walkways and 5 inches for driveways.
6. Concrete walkways and driveways shall be monolithic construction and shall be 3,000 psi Concrete as specified under Section 412, Portland Cement Concrete.
7. Where walks are poured against walls or structures, approved type expansion joints shall be installed between the walks and the wall or structure.

3.5 Manhole Adjustments:

A. The Contractor will be required to adjust all manholes, valve boxes and other like items with the limits of construction and owned and maintained by the Department of Public Works of the City of Jacksonville, Florida, where such adjustments are necessary. Adjustment of all other such facilities shall be by, and at the expense of, their respective owners in coordination with project construction.

B. There are two methods of adjustment that meet both City and State Standards, as directed below:

1. Raise the ring by a concrete collar using 4,000 psi concrete, as shown.
2. By using an adjust-to-grade ring casting approved by the Engineer. These adjusting rings are available in six different styles to fit openings from 20 to 38-1/2 inches and 5 different types of manhole covers. They can be adjusted from 1 to 2-1/8 inches above existing manhole casting without disturbing surrounding paving.

3.6 Tests:

A. Where reference is made to the FDOT Standard Specifications for design mixes, tests of materials, or work performed, or where in the opinion of the Engineer, tests are required to ascertain compliance with the Specifications, the Contractor will have such tests made by an independent testing laboratory. All testing expenses shall be borne by the Contractor.

PART 4 MEASUREMENT AND PAYMENT:

4.1 Measurement

A. Pavement Measurement – Cases I – V and Cases IX – XI:

1. Measurement for pavement removed and replaced under Cases I – V and IX – XI shall be the lineal footage cut measured on the horizontal plane, along the center line of the trench.

2. Measurement shall be from the edge of pavement cut at the beginning of the trench to edge of pavement cut at the end of the trench. Only that pavement located directly over the center line of the trench will be considered eligible for payment. There shall be no duplication of measurement, i.e., pavement replacement measured along the longitudinal axis of a trench cannot be measured again for payment along an intersecting trench.

3. In the event an asphalt overlay is specified in conjunction with any of these cases, it shall be measured separately on a square yard basis according to the limits specified in the contract documents, the FDOT permit document, or as established in the field by the Engineer.

B. Measurement of pavement placed for Cases VI through VIII and Cases VI A through VIII A shall be on a per square yard basis and shall be divided into two categories: (1) limerock base and (2) asphaltic concrete surface course.

1. Limerock Base:

a. For Cases VI through VIII measurement shall be the number of square yards of limerock base in place, 8 inches compacted thickness, measured from curb to curb, or edge to edge of pavement replaced, and between the limits shown on the drawings. At road or street intersections, measurement shall be to the projected edge of the roadway being repaired, across the intersection.

b. For Cases VI A through VIII A measurement shall be the number of square yards of limerock base in place, 12 inches compacted thickness, measured from curb to curb or edge to edge of pavement replaced, and between the limits shown on the drawings. At road or street intersections, measurement shall be to the projected edge of the roadway being repaired, across the intersection.

2. Asphaltic Concrete Surface Course:

    a. For Cases VI through VIII Asphaltic Concrete measurement shall be the number of square yards of Superpave in place, of 1-1/2 inches minimum compacted thickness, measured from curb to curb or edge to edge of pavement replaced, and between the limits shown on the drawings. At road or street intersections, measurement shall be to the projected edge of the roadway being repaired, across the intersection.

    b. For Cases VI A through VIII A measurement shall be the number of square yards of Superpave in place, of 2 inches minimum compacted thickness, measured from curb to curb or edge to edge of pavement replaced, in between the limits shown on the drawings. At road or street intersections, measurement shall be to the projected edge of the roadway being repaired across the intersection.

C. Curb and Gutter Measurement shall be accomplished separately on a lineal footage basis according to the limits of replacement established in the contract documents, the City Standard Specifications and Details, or as may be established in the field by the Engineer.

D. Driveway and Walkway Measurement shall be accomplished separately on a square yard basis according to the limits specified in the contract documents, these City Standard Specifications and Details, or as may be established in the field by the Engineer.

E. Manhole/Valve Box Adjustment Measurement: Manholes/Valve boxes adjusted shall be on a per unit, or each, basis. Manholes/Valve boxes not owned and maintained by the City of Jacksonville; Department of Public Works will not be measured. Of those owned by the City of Jacksonville, Department of Public Works only those which measure in excess of 10 inches in diameter will be counted.

F. Work Not Allowed for Measurement shall include (but not be limited to) any existing pavement, curb and gutter, driveway, walkway, or grassed area damaged or destroyed by the Contractor's operations and beyond the above specified limits. Such damaged or destroyed facilities shall be repaired to original condition or replaced as required by and to the satisfaction of the Engineer at no additional cost to the owner.

4.2 Payment: Except as stated, no separate payment will be made for the work specified in this section. All costs therefore are included in the unit prices set forth in the Contract for items to which such work is incidental or appurtenant.

A. Payment for Cases I – V and Cases IX – XI:

1. Payment for pavement replaced, measured as defined above, shall be at the respective unit prices set forth in the contract.
2. The respective unit prices shall be payment in full for the total work, including replacement traffic markings/reflectors, according to the performance specified in Cases I-V and Cases IX – XI and shown in the City Standard Details.

B. Payment for Cases VI – VII and Cases VI A – VIII A:

1. Payment for pavement replaced, measured as defined above, shall be at the respective unit prices set forth in the contract.
2. The respective unit prices shall be payment in full for the total work, including replacement traffic markings/reflectors, according to the performance specified in Cases VI-VIII and Cases VI-VIII A and shown in the City Standard Details.

C. Payment for Curb and Gutter:

1. Payment for curb and gutter, measured as defined above, shall be made according to the unit price established in the contract.
2. The unit price established shall be payment in full for the performance specified, shown and detailed in the City Standard Specifications and Details.

D. Payment for Driveway and Walkway:

1. Payment for driveways and walkways, measured as defined above, shall be made according to the unit prices established in the contract.
2. The unit price established shall be payment in full for the performance specified, shown and detailed in the City Standard Specifications and Details.

E. Payment for Manholes/Valve Boxes Adjusted:

1. No payment will be made for manholes or valve boxes adjusted which are 10 inches in diameter or smaller, or for any manholes/valve boxes adjusted which are not owned and maintained by the City of Jacksonville Department of Public Works. The cost of this work will be included in the overlay or new surface item which necessitated the adjustment.

2. Manholes and valve boxes over 10 inches in diameter shall be paid in accordance with the unit price established by the Contract. Those owned by the JEA, BellSouth, or any other private utility company shall be adjusted by the respective utility company.

F. Payment Not Allowed:

1. No payment shall be made for work performed outside the measurement limits defined above, or for work performed or materials supplied to repair or replace damage caused by the Contractor (See paragraph 4.1.F above).

END OF SECTION 503

SECTION 504
BRICK STREET REPAIR

PART 1 General

1.1 Summary:

A. This specification includes the repair of historic brick streets within the City.

PART 2 MATERIAL

2.1 Paving Bricks:

A. Paving bricks shall primarily be reused from the project site.

B. If some additional bricks are required due to breakage or other shortage, a limited supply of paving bricks are available at the North Streets and Drainage Yard located at 4767 Moncrief Road, phone number for the Division Office is (904) 472-2900. These bricks are in a mound of construction debris, dirt and other material. They have not been separated, cleaned, culled for breakage, etc.; all of which must be done by user.

C. Excess brick from any excavation shall be delivered to this area to be available for future needs. The contractor is to call the above number at least 48 hours in advance so that he will be advised where to dump.

PART 3 INSTALLATION

3.1 Where existing exposed Brick Streets are being Excavated:

A. The existing brick street paving shall be restored with brick to a condition as good as or better than prior to such excavation.

B. Normally brick removed can be stored on site and replaced when the excavation is completed. If additional bricks are required due to breakage or other shortage, a limited supply is available as noted in Section 2.1.

3.2 Where Brick Street paving is encountered during Excavation:

A. Where brick street paving is encountered during an excavation of a street that has been surfaced with asphalt, bricks removed shall be delivered to the storage yard as described for future use.

B. Restoration of the excavation shall be with either full depth asphalt or standard 6 inches of limerock and 1.5 inches of SuperPave.

PART 4 MEASUREMENT AND PAYMENT

4.1 The quantity to be paid for under this section shall be the area in square yards of brick, measured in place, completed and accepted. No deduction will be made for any areas occupied by manholes, inlets or other drainage structures.

END OF SECTION 504

SECTION 601
LANDSCAPING

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. The scope of work includes all labor, materials, appliances, tools, equipment, facilities, transportation, and services necessary to perform all operations required to supply, deliver, and install plants ("landscaping") complete as shown on the drawings and as specified herein.

1.2 DEFINITIONS

A. **"Booted":** The retention of the dead leaf bases that naturally remain affixed to the palm trunk.

B. **"Container Plants":** Plants that are grown in and/or are currently in a container including boxed trees.

C. **"Cropped" or "Hurricane Cut" Cabbage Palm:** Cabbage palm collected in the wild and then stripped of all leaves before shipment to the job site.

D. **"Engineer":** Based on City of Jacksonville General Condition 20.1.17, the engineer is the person duly appointed by the City to undertake the duties assigned to the "Engineer", acting either directly or through properly authorized agents acting within the scope of the particular duties entrusted to them. In the context of this specification, the duly authorized agent shall be a certified landscape architect.

E. **"Final Acceptance":** The point when the landscape maintenance work required after Initial Acceptance, including all punch list items from the Final Inspection, has been completed to the satisfaction of the Engineer.

F. **"Hardened Off" or "Cured" Field Grown Tree or Palm:** Nursery field grown trees that have been dug, balled and burlapped, and then grown for 4 to 52 weeks in the original hole, a new hole or out of the ground in a holding area until fibrous roots are seen growing through the burlap on the sides of the root ball.

G. **"Hardwood or Conifer Tree Caliper":** Diameter of trunk measured at 6" above the ground if the tree has a trunk diameter of 4½" or less and measured at 12" above the ground if the trunk diameter is greater than 4½".

H. **"Initial Acceptance" or "Substantial Completion**": The date when the Engineer issues a notice of Substantial Completion after construction work, including punch-list items, has been completed in accordance with of the contract documents and to the satisfaction of the Engineer.

I. **"Nursery Grown" Plants:** Plants grown in the nursery from liners or collected.

J. **"Palm":** an unbranched evergreen tree with a crown of long feathered or fan-shaped leaves, and typically having old leaf scars forming a regular pattern on the trunk.

K. **"Palm Caliper":** The diameter of widest portion of the palm trunk measured 3' above the top of the root ball. Existing dead leaf bases or boots are not included in this measurement.

L. **"Regenerated Cabbage Palm":** A collected cabbage palm, which has some type of root ball containment, that is maintained until (1) there are a minimum of 4 new, fully expanded "excellent leaves" and, (2) there are round, whitish-yellow roots with tapered ends that have emerged from all sides of the root ball initiation zone.

M. **"Root Bound" or "Pot Bound":** Root balls from containers which have large or numerous roots encircling the surface of the root ball including plunging roots and roots that are below the surface of the rootball.

N. **"Single Leader" Tree":** Tree with one single trunk growing as a single leader to the top of the tree crown.

O. **"Spaded Trees":** Field grown trees dug, immediately transported, and installed in the final growing site using tree spade equipment.

P. **"Tree":** Hardwood or conifer trees, not including palms.

Q. **"Trunk Flare":** The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

1.3 REFERENCED DOCUMENTS: The latest editions of the following publications, specifications, and standards, plus addenda, when referenced, form a part of this specification. If the requirements of the referenced documents below conflict with this specification section, the requirements of this specification shall prevail. If the requirements of the referenced documents conflict with each other, then the more stringent requirement as determined by the Engineer shall prevail.

A. Florida Grades and Standards for Nursery Plants, (Grades and Standards) Florida Department of Agriculture and Consumer Services, Division of Plant Industry.

B. ANSI Z60.1: American Standard for Nursery Stock.

C. ANSI A300 – Standard Practices for Tree, Shrub and other Woody Plant Maintenance.

D. Manual of Woody Landscape Plants; Michael Dirr; Stipes Publishing, Champaign, Illinois.

E. City of Jacksonville Ordinance Code, Chapter 366 (Groundwater and Surface Water Resource Management), Part 6- Fertilizer Application.

1.4 REGULATORY REQUIREMENTS

A. Obtain all permits related to landscape work unless previously excluded elsewhere in the contract documents.

B. Comply with all laws and ordinances bearing on the operation of the work as drawn and specified. Promptly notify the Contract Manager in writing if there is a conflict between the regulatory requirements and the work shown in the contract documents. Include, in the written notice, the description of the necessary changes and resultant costs, if any.

C. Comply with regulatory agencies requirements established for fertilizer and pesticide composition.

D. Application of Pesticides: Strictly comply with the manufacturer's specimen label and safety data sheet for each pesticide used, and the pest control regulation of the State of Florida and the EPA. The pesticide application shall not interfere with other construction activities or with the public.

1.5 VERIFICATION OF PLANS

A. All scaled dimensions on the drawings provided for a project are approximate. Therefore, carefully check and verify all dimensions and quantities before proceeding with work. Immediately inform the Engineer of any discrepancies between the information on the drawings and the actual site conditions. Do not proceed with work in areas where discrepancies are found until the Contract Manager has resolved the conflicts and approves work in the affected area.

B. If there is a discrepancy between the plant quantities shown on the plans and the quantities noted in the plant call outs, plant list or plant schedule, then the number of individual plant symbols shown on the plans shall prevail. In multiple plant beds where individual plants are not shown, then the number of plants shall

be determined by taking the square footage of each bed area and dividing it by the specified on-center spacing.

1.6 QUALITY ASSURANCE

A. Comply with regulatory agencies requirements established for fertilizer and pesticide composition.

B. Application of Pesticides: Strictly comply with the manufacturer's specimen label and safety data sheet for each pesticide used, and the pest control regulation of the State of Florida and the EPA. The pesticide application shall not interfere with other construction activities or with the public.

C. Ship landscape materials with certificates of inspection required by governmental authorities. All trees and palms shall be FLORIDA NO. 1 or better, as described in the "Florida Grades and Standards for Nursery Plants" and as modified herein.

D. Plant substitutions are not allowed without the Engineer's approval (see Submittals requirements below).

E. Landscape Contractor Qualifications: The Landscape Contractor must have been in business for least the last 5 years and must have successfully completed 3 installations of similar scope during that time.

F. Landscape Contractor's Field Personnel Qualifications

1. Field Supervisor: The field supervisor shall have a minimum of five years' experience as a field supervisor interpreting landscape and irrigation plans and specifications, installing plants of the type, quality, and scale of the proposed project, and who can communicate in English. The field supervisor shall be at the project site when landscape work is in progress.
2. Landscape Crew: The landscape crew shall have a minimum of 3 years' experience in the installation of planting soil, trees, palms and other plants and Irrigation, where applicable.

1.7 SUBMITTALS

A. Landscape Contractor, Field Supervisor, and Field Crew Qualifications: Submit landscape contractor qualifications before award, if requested. Include the date the business was established and a list of three 3 landscape installations of similar scope successfully completed in the past 5 years. Include location; name and address of owner; and date when each project was completed.

B. Nursery Sources: List of nurseries providing plants for the project at the pre-construction conference. Include name and location of each grower and the names and quantity of plants each grower is providing. Submit a photograph taken at the grower's nursery that shows an example of each specified plant species, variety, and size.

C. Plant Substitutions: When a plant as specified is not obtainable, submit at the pre-construction conference proof of non-availability and a written proposal for use of equivalent material.

D. Soil test report of soil with recommendations for pH adjustment of soil.

E. Inspection Certificates, Manufacturer's Data: Submit copies of certificates of inspection required by governmental authorities. Submit manufacturers or vendor's label, certified analysis, and application or installation instructions for the materials noted below. Submit other data requested to substantiate that materials comply with specified requirements. Submit vendors invoice for the materials below, if requested. The invoice shall include the type and quantity of each material delivered to the Contractor.

1. Fertilizers.
2. Pesticides and Herbicides used.
3. Portable water bags and/or the temporary irrigation system components, depending upon what water system is chosen.
4. Tree root ball anchoring and palm staking system components.

F. Plant Certification: Submit the following when requested by the Contract Manager.

1. Certification from each grower providing B & B Trees and Palms for a work order, stating that the B&B Trees and Palms, (except for collected cabbage palms) have been "hardened off" or "cured" before shipment and that the burlap wrap is a natural biodegradable fiber.

2. Certification statement verifying that trees have visible root flares from the grower to the installation contractor. A separate and identical statement should be provided from the installation contractor to the City.

3. Date Palm Variety Certification: Provide with delivery, the supplier's invoice and the supplier's certificate of date palm variety. Include on the certificate the following statement:

a. I, (name), on behalf of (supplier), certify that the palms sold to (landscape contractor name) on Invoice # _____ are the following

variety: genus, _____, species_____, sub-variety _____. signature and date.

G. Samples of Topsoil, Yard Sand, Soil Conditioner, and Mulch. Submit one quart of each item used, if requested.

H. Site Visit reports during the maintenance period.

1.8 ENGINEER'S OBSERVATION OF WORK

A. The Engineer may observe the work at any time and remove samples of materials to determine conformity with the specifications. Immediately remove rejected materials from the site and replace with the specified materials. The Contractor shall pay the cost of testing the materials that fail to meet the specifications.

B. Keep the Engineer informed about the work progress so the work may be observed at the following key times during the landscape construction process. Schedule each site visit in advance with the Engineer. Failure of the Engineer to make field observations does not relieve the Contractor from meeting all the requirements of this specification. Site visits will include the following.

1. Review of soil and drainage conditions before planting preparation.
2. Review of plant layout before plant installation.
3. Review of plant quality either at the time of delivery to the nursery or to the job site.

1.9 NURSERY SOURCES

A. Submit a list of plants that will be provided by each grower, as well as a photograph taken at the grower's nursery that shows a typical example of each specified type and size of tree and palm. Also, submit photographs showing a typical example of other plants listed on the price proposal. Include the name and location of each grower.

B. Include in the photograph of each tree and palm an adult person holding a pole longer than the specified height or spread of the plant and marked in 1-foot increments clearly readable in each photograph. Place pole on top of the root ball when measuring heights.

C. Label each photograph with a complete description of the typical plant shown, including botanical and common name, caliper, height and/or spread, B&B root ball diameter or container size, and other details included in the plant schedule.

D. Include with each group of photographs a statement from the grower that plants supplied will conform to the description attached to each photograph, as well as meet the “Florida #1 Grade” grade for trees and palms established by the *Florida Grades and Standards for Nursery Plants*. Other plants will conform to the “Florida No. 1” grade or better.

E. Do not ship plants from growers until photographs are approved.

1.10 PLANT SUBSTITUTIONS

A. If a plant specified in the plant schedule becomes unavailable, then submit proof of non-availability at least 30 business days before the scheduled plant installation date. Include a list of nurseries contacted in the search for the originally specified plant.

B. Recommend a substitution for the unavailable plant, the name of the nursery source, and how the plant differs from the original plant specified. The substitution may be a smaller or larger size, a different shape or habit, the same genus and species but different cultivar, or other characteristics that may be different from the specified plant. Include a photograph of a typical plant to be used as a replacement.

C. The Engineer will issue a change order for the approved substitutions. However, such replacements will be at no additional cost to the City.

1.11 INSPECTION OF PLANTS BEFORE INSTALLATION

A. Photograph Submittal

1. Include in the photograph of each tree and palm an adult person holding a pole longer than the specified height or spread of the plant and marked in 1-foot increments clearly readable in each photograph. Place pole on top of the root ball. For other plants, show a close-up photo of each type of plant with a person holding a yard stick measuring the spread and then the height above the root ball.
2. Include with each photograph, a complete description of the typical plant shown, including botanical and common name, caliper, height and/ or spread, B&B root ball diameter or container size, and other details included in the plant schedule. Do not ship plants from growers until photographs are approved.
3. Also include with each group of photographs a statement from the grower that plants supplied will conform to the description attached to each photograph, as well as the following grades established by the "Grades and Standards for Nursery Plants." Trees and palms will conform to the “Florida

#1 Grade" grade and other plants will conform to the "Florida No. 1" grade or better.

B. Plant Inspection at the Contractor's nursery or at the Job site prior to planting.

1. The Engineer may inspect plant material at the contractor's nursery and/or at the job site to determine conformance with the specifications. If the Engineer identifies a defect and determines that the defect can be corrected to conform with the specifications, the Contractor may proceed with the mutually agreed remedy before or after planting, so long as the result is in conformance with the specifications. Otherwise, the defective plant will be rejected.
2. The Engineer may also remove soil from the top of the root ball to determine the depth of the trunk flare and presence of encircling roots. Observation may be as frequent and as extensive necessary to verify that the plants meet the requirements of the specifications.

1.12 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Packaged materials: Deliver packaged materials in original containers and protect from deterioration.

B. Plant Shipment

1. Grower shall water root balls just before shipping. Label at least one representative plant of each specified species and variety with a securely attached waterproof tag bearing the botanical and common name, if requested.
2. Ship cabbage palms specified as "hurricane cut" or "cropped" with all fronds removed. Ship regenerated cabbage palms and other palms with dead fronds and fronds below horizontal removed (up to 2/3 of the oldest fronds can be removed). Lift-up remaining fronds in an upright position and tie fronds into a bundle with biodegradable twine. Keep frond bundle tied until after the palm planting is completed and for the additional time recommended by the palm supplier.
3. Provide protective covering over trees and palms during shipment. Tie down trees and palms to the trailer bed to prevent rolling during shipment. Ship other plants in enclosed trucks. Do not bend or bind-tie plants in such a way that will damage bark, break branches, or destroy natural shape. Do not leave plants in trucks parked in the sun during hot weather unless air-conditioned.
4. Do not lift trees by the trunk when unloading. Lift B&B trees under the root ball or by the wire loops if there is a wire basket. Lift large, containerized trees with a forklift under the container. Lift smaller plants by the root ball

or by the lips of the container, not by stems or trunks. Keep container grown stock in containers until planting time.

5. Do not free-fall, drag, roll, strain the bud or otherwise abuse palms. Mechanically lift and relocate palms with a protective device around the trunk to prevent damage to the bud and trunk.
6. Place plants in an irrigated holding area either at the grower's nursery, at the landscape contractor's yard, or at the project site if plants are stored out of the ground for more than 6 hours. Set plants in an erect position. If B&B, cover root balls with mulch or straw. Irrigate plants to keep roots moist and to prevent wilting until planting.
7. Deliver plants to the job site only after planting preparations have been completed.

1.13 JOB CONDITIONS

A. Coordination: Coordinate all landscape work with the Engineer and other Contractors. Plant only after final grades are established.

B. Location of Underground Utilities: Determine location of underground utilities before excavating; hand excavate where required to avoid damage to utilities. After the locations of transplanted trees, new trees and beds have been staked, contact utility-locating services at least 72 hours before any excavation. The utility location service for most utilities is the Florida Utility Locating Service at 800-432-4770.

C. Notification of FDOT and City Traffic Engineering: If work is within a street right-of-way, coordinate work and maintenance of traffic with the appropriate agency. If work is within state highway right-of-way, notify the FDOT Permitting Office 904-360-5200. If work is located in the City right-of-way, contact the City Traffic Engineer at trafficeng@coj.net. Notification shall occur at least 48 hours before starting work in the right-of-way.

D. Maintenance of Traffic: Comply with the FDOT Manual of Traffic Control when working in a FDOT right-of-way and with the maintenance of traffic requirements of the City Traffic Engineer when working in a City right-of-way.

E. Clean Up and Protection

1. During landscape work, store materials and equipment where directed. Keep pavements clean and work area in an orderly condition.
2. Protect vehicular and pedestrian traffic, existing vegetation, above ground and underground utilities and structures during construction by using signs, barricades and/or fencing. In addition, post signs or barricades required by the City. Maintain protection until Initial Acceptance of the landscaping.

3. Protect landscape work from damage by landscape operations, operations by other contractors and trespassers until Initial Acceptance.
4. Maintain grade stakes set by others until all parties agree that the stakes can be removed.
5. Repair or replace all damage to existing improvements caused by the Contractor's operations on the project property, right-of-way, or adjacent property. Repair or replace as directed by the City, and at no cost to the City.

1.14 PLANTING SEASON:

A. Landscape work may proceed at any time or season agreed upon by the Contractor and the Engineer. However, schedule and perform landscape work only when weather and soil conditions are suitable in accordance with local practice. Do not install plant material when temperatures may drop below 35 degrees or above 95 degrees Fahrenheit, nor when wind velocity exceeds 10 miles per hour, unless approved by the Engineer.

B. During periods of extreme drought, the Engineer may instruct the Contractor to delay plant installation until the rainfall returns to normal.

PART 2 MATERIAL

2.1 PLANTS

A. Provide state inspected, nursery-grown plants, unless otherwise specified. Plants shall conform to the plant schedule, the "Florida Grades and Standards for Nursery Plants," local landscape ordinance, and, where applicable, to ANSI Z60.1. Trees and Palms shall conform to FLORIDA #1 GRADEFLORIDA NO. 1 grade or better.

B. Provide healthy, vigorous plants with the color, shape, size and distribution of trunk, stems, branches, buds and leaves normal for the specified plant. Plants shall be free from disease, insects and injury; well branched; with a solid healthy root ball of vigorous, fibrous roots, but not excessively root bound. Plants shall have green, live foliage, except deciduous plants when planted in the dormant season.

C. Provide plants that are true to variety, cultivar, species, quality, size, and flower color.

D. Plants installed during the growing season that show signs of "shock" (plants with dead or dying leaves) soon after planting are subject to rejection.

E. Plants that do not conform to the referenced standards shall be rejected. Plants that have been cut back from larger sizes to meet certain specified requirements are also subject to rejection unless approved by the Engineer.

F. Plants larger than specified may be approved by the Engineer, but at no increase in the contract price. If larger plants are accepted, provide root ball size to meet the requirements of the Grades and Standards. Larger root balls will not be acceptable if the resulting root ball cannot fit into the required or available planting space.

G. If the Engineer approves the substitution of a smaller plant than specified, then a credit will be due the City.

H. Container Plants: Provide healthy, vigorous, plants with a well-established root system reaching the sides of the plastic or wood container that will maintain a firm root ball after removal from the container but shall not be root bound (excessive root growth encircling the inside of the container). Root-bound plants will be rejected unless corrective root pruning is approved by the Engineer. Container size shall conform to the “Florida Grades and Standards for Nursery Plants” for each size and type of plant.

2.2 TREES AND PALMS

A. General

1. Trees and palms may be specified as container grown, balled and burlapped, or tree spaded; other plants are to be container grown.
2. Trees and palms with wounds or bark injuries on the major trunks will be rejected.
3. Single Trunk Trees and Palms: Provide trees and palms with single, straight trunks unless otherwise specified as multi-trunk. The specified trunk caliper is the minimum acceptable caliper size.
4. Multi-trunk Trees and Palms: The specified number of trunks of multi-trunk trees and palms shall originate from the root ball. The specified trunk caliper is the minimum acceptable caliper size of each trunk.
5. Balled and Burlapped (B&B) Trees and Palms

    a. Provide field grown balled and burlapped trees and palms firmly wrapped with biodegradable twine, burlap cloth, and a wire basket.
    b. The grower shall dig trees and palms and then hold them at the grower’s nursery until the plants are “harden-off or “cured” prior to shipping. Dig plants with a firm root ball. Provide ball sizes complying with the "Grades and Standards for Nursery Plants" unless otherwise specified. Plants with cracked or loose balls will be rejected.

6. Spaded Trees and Palms: Provide trees spaded from a commercial nursery field. Use tree spades capable of appropriately moving trees up to the caliper shown. Dig plants with firm balls of earth sufficient in diameter and depth to encompass the fibrous and feeding root system necessary for full recovery of the plant. Increase root ball diameter to at least 8" greater than the sizes recommended by the "Grades and Standards for Nursery Plants," unless otherwise specified.
7. Fabric Container Grown Trees: Fabric container grown trees are not allowed.

B. TREES: Provide a "Florida #1 Grade" tree conforming to the following.

1. Single Trunk Tree: A tree with a single, relatively straight, vertical trunk of the specified caliper growing with a single leader with subordinate limbs to the top of the tree crown unless specified as multi-trunked. If the leader was headed, a new leader (with a live terminal bud) at least one-half the diameter of the pruning cut shall be present. The specified trunk caliper is the minimum acceptable caliper size. If the trunk divides into 2 equal diameter stems in the top 10% of the tree, the tree is still considered acceptable. A tree specified as single trunk with multiple leaders in the lower 90% of the tree height will be rejected.
2. Multi-trunked Tree: A tree with the specified number of trunks, each trunk originating from the root ball and extending to about the same height as the other trunks to create a uniform shaped crown. The Contract Manager may approve additional trunks, if requested.
3. Trunk

    a. Free of wounds (other than properly made pruning cuts) that penetrate to the wood (properly made pruning cuts, closed or not, are acceptable and are not considered wounds), sunburned areas, conks (fungal fruiting bodies), wood cracks, sap leakage, signs of boring insects, galls, cankers, girdling ties, or lesions (mechanical injury).
    b. Caliper and taper are sufficient so that the lower five feet of the trunk remains vertical without a stake. An auxiliary stake may be used to maintain a straight leader in the upper half of the tree.
    c. Tree clear trunk is not more than 40% of the total tree height.

4. Tree Crown: The form and density of crown is typical for a young single trunk or multi-trunk specimen of the species or cultivar.
5. Leaves: The size, color, and appearance of leaves is typical for the time of year and stage of growth of the species or cultivar. Tree shall not show wilted, shriveled or dead leaves, which is an indication of prolonged moisture stress or over watering.
6. Branching:

a. Limb taper (length relative to diameter) throughout the crown is appropriate for the age and size of the species or cultivar.
b. Tree is free of dead, diseased, broken, distorted, or otherwise injured branches.
c. Branch diameter is no larger than two-thirds (one-half is preferred) the diameter of the central leader measured 1 inch above the branch union.
d. The major lateral branches (scaffold branches) are free of "V' crotches of included bark where the branches are attached to the trunk, or where two main trunks are attached. Trees of small or medium ultimate size that produce numerous V crotches (i.e. winged elm, Chinese elm, crepe myrtle, etc.) may be accepted. .

7. Roots:

a. Roots are reasonably free of scrapes, broken or split wood and injury from biotic (insects and pathogens) and abiotic (e.g., herbicide toxicity and salt injury) agents.
b. There are a minimum of three structural roots reasonably distributed around the trunk (not clustered on one side); two of the structural roots reaching the edges of the root ball.
c. The trunk flare is visible at the grade of the root ball soil.
d. The root system is reasonably free of stem girdling roots or kinked roots.

C. PALMS: Provide "Florida #1 Grade" palms conforming to the following:

1. A Single, straight trunk with the specified clear trunk height measured from the original soil line to the point in the canopy where the trunk caliper begins to taper abruptly. **Measure palm trunk caliper 3 feet above the top of the root ball.** The practice of either burying taller palms below the original soil line of the root ball or raising short palms by exposing part of the root ball above the original soil line to achieve the specified height is not allowed. Ship cabbage palms with a "hurricane cut," unless specified as a "regenerated" cabbage palm."
2. Palm Minimum Leaf Count and Root Ball dimension (Florida #1 Grade): A minimum leaf count of excellent leaves and root ball measurements listed below unless modified by the plant schedule. Palm root ball measurement is the horizonal distance from the lowest part of the trunk or trunks exclusive of exposed roots or persistent leaf bases to the outside edge of the root ball. The total root ball diameter is the trunk diameter at the lowest part of the trunk plus two times the root ball dimensions shown below.

a. Sabal Palmetto, Cropped: No leaves and 2-inch root ball measurement.

b. Sabal Palmetto, Regenerated: Minimum 4 leaves and 4-inch root ball measurement.
c. Washingtonia Robusta: Minimum 8 leaves and 12-inch root ball measurement
d. Phoenix dactylifera: Minimum 29 leaves and a 12-inch root ball measurement.
e. Phoenix decora or decipiens: Minimum 29 leaves and a 12-inch root ball measurement.
f. For other palms refer to Table 1 in the Florida Grades and Standards for the minimum leaf count and root ball measurement.

3. A minimum root ball depth of 3.5 feet. Provide palm root balls with a flat bottom perpendicular to the trunk.

2.3 TOPSOIL

A. Fine sand or loamy fine sand indigenous to the area suitable for plant growth that is free of weeds, roots, stumps, rocks larger than ½" diameter, organic muck, hard pan, toxic substances detrimental to plant growth, and construction debris such as limerock, concrete, and asphalt pieces. Deliver in a normally moist condition, neither muddy nor wet. Soil used for topsoil shall meet the following criteria measured in accordance with the appropriate AASHTO and ASTM standard:

1.	USDA Texture:	Fine Sand, Loamy Fine Sand
2.	AASHTO Classification:	A-3
3.	pH	5.0-7.5
4.	Deleterious Material (rocks, roots, sod)	0-2% maximum by mass
5.	Organic Matter Content	1-10% by mass
6.	Sand Content	80-96% by mass
7.	Silt & Clay Content	3-10% by mass

B. Submit a one-quart sample of the topsoil to the Engineer before beginning planting and obtain approval. If requested by the Engineer, submit a soil test report from a commercial soil testing laboratory to verify compliance with the above criteria.

2.4 EXISTING SOIL: Use existing soil in plant pits if the soil complies with the standard for topsoil, unless the soil is contaminated with limerock, clay, brush, weeds, roots, stumps, stones larger than 1 1/2 inches in any dimension, litter and other extraneous or toxic matter harmful to plant growth. Remove contaminated soil and replace with acceptable stockpiled existing soil or new topsoil.

2.5 YARD SAND: Coarse, clean yellow sand, commonly called “yard sand” that is free of limerock, clay, silt, brush, weeds, roots, stumps, gravel, litter and other extraneous or toxic matter harmful to plant growth.

2.6 SOIL CONDITIONER: Provide 100% organic soil conditioner, free of limerock, clay, brush, weeds, roots, stumps, gravel, litter and other extraneous or toxic matter harmful to plant growth. Soil conditioner shall be one of the following:

A. Pine Bark Fines. 100% pine bark fines screened from other pine bark products.in accordance with standards of the Mulch & Soil Council (Web: www.mulchandsoilcouncil.org) with a maximum of 15% pine wood content and at least 90% of particle size 1/4” or less.

B. Compost: A commercially blended and ground mixture of yard waste, tree trimmings, manure, and other biodegradable materials composted at a temperature and for the time necessary for the biological decomposition of the material, which significantly reduces the viability of pathogens and weed seeds, stabilizes carbon, produces high fungal material to benefit plant growth. Compost shall meet the following US Compost Council STA/MECC criteria.

Stability:	≤2 mg CO2-C per G OM per day
Maturity:	90-100% seed emergence and vigor
Moisture Content	35-60% wet weight
Organic Matter Content	35-60% dry weight
Particle Size	3/8”-1/2” screen size to pass through
pH	6.0-7.5
Soluble Salts	Max. 5 dS/m (mmhos/cm) dry weight basis
Physical Contaminants	≤0.5% dry weight basis
Chemical Contaminants	meet or exceed US EPA Class A standard, 40CFR § 503.13 Tables 1 and 3
Biological Contaminants	meet or exceed US EPA Class A standard 40CFR § 503.32(a)

C. Soil Mix: Soil Mix #3 by “Mulch Masters, Inc. Landscape Supply Company” or approved equal.

2.7 FERTILIZER

A. General Use: Granulated commercial grade fertilizer with a ratio of nitrogen (N), phosphorous (P), and potassium (K) recommended by the soil test. The fertilizer shall contain minor elements of iron (Fe), manganese (Mn), and sulfur (S), and trace amounts of zinc (Zn), copper (Cu) and boron (B). Provide 30-50% of N in

slow-release form. If a soil test is waived by the Engineer, then the fertilizer shall contain a ratio of N/P/K close to 1/0/1.

B. Palm Fertilizer: Commercial grade fertilizer of nitrogen (N), phosphorous, (phosphate) (P), potassium (potash) (K) and magnesium (Mg) in a ratio of 8/4/12/4 or 8/2/12/4. The fertilizer shall also contain 1-2% iron (Fe), 1-2% manganese (Mn) and trace amounts of Zink (Zn), copper (Cu) and boron (B). Provide 50% of N, K and Mg in slow-release form.

2.8 SURFACE MULCH: Wood and/or bark mulch free of weed seeds, and other organic or inorganic materials. Provide mulch noted on the drawings. If not noted on the drawings, then the mulch can be one of the following.

A. Pine Bark: Ground bark nuggets derived from the genus Pinus with particle size from 0.75” to 1.75” and maximum wood content of 15%.

B. Pine Straw: Pine needles harvested from pine grooves and then baled with a maximum wood content of 5%.

C. Eucalyptus Mulch: Shredded and screened wood and bark of the genus Eucalyptus with no fillers or sawdust.

D. Melaluka Mulch: Wood and bark of the melaleuca quinquenervia tree shredded and chipped to a particle size not larger than ¾ inch diameter and a length of 1½” and then cured at a high temperature to kill seeds. Bark content not to exceed 10% by volume. Provide *Florimulch* manufacture by Forestry Resources Inc. or approved equal.

2.9 ROOTBALL ANCHORING SYSTEM

A. Anchor System 1:

1. Four 2 x 2 untreated pine posts, pointed on one end or four steel u-channel fence posts with a length equal to the depth of the root ball plus 2 feet into undisturbed soil.
2. Two 2 x 2 untreated pine horizontal anchor boards with a length equal to the diameter the root ball.
3. 3” long galvanized wood screws to connect the stakes and the horizontal boards.

B. Anchor System 2 and 3:

1. “Terra Toggle” Root ball Anchor System by *Tree Stake Solutions* (407) 913-7077 or approved equal.

2. Each anchor includes: two plastic or metal toggles rated at 1000 lb. pull out strength, a ¾" wide, orange UV stabilized woven polyester strap rated at 2400 lb. break strength, one ¾" dichromate coated wire cinch buckle, and one 2 x 4 or 2 x 6 untreated pine plank with a length equal to the diameter of the root ball.
3. Installation tools: tensioning tool, metal water jet, or drive rod driven with slide hammer.

2.10 GUYING AND STAKING MATERIAL – SLOPES OF 4:1 OR GREATER

A. Tree stakes: Three 15" steel eye anchors, 1" dia. eye opening

B. Guy Straps: Green, 3/4 inch wide flat woven green polypropylene straps with a 900 lb. break strength. Use "ArborTie" manufactured by *Deep Root Green Infrastructure* (info@deeproot.com) or approved equal.

2.11 PRE-EMERGENT OR POST-EMERGENT HERBICIDE: Granular or liquid herbicide approved by the Engineer that will control annual grasses and many broadleaf weeds and that is labeled safe for use with the plants in the project.

2.12 NON-SELECTIVE HERBICIDE: Non-selective liquid herbicide, such as 'Roundup, that will kill live vegetation and roots.

2.13 PORTABLE WATERING BAG: Nylon-reinforced, 12mil, UV treated polyethylene portable watering bag or other alternative watering bag system which is wrapped around the trunk of a tree or palm that can slowly apply a minimum of 15 gallons of water through slow-release emitters with each application.

2.14 TEMPORARY IRRIGATION SYSTEM: A run of PVC pipe and emitters with a water truck connection constructed to deliver water from the water truck to a cluster of installed plants. System is typically removed at the end of the maintenance period.

2.15 WATER

A. Provide water of suitable quality for healthy plant growth.

B. If a new automatic irrigation system is included with the construction of the landscaping, then the contractor shall pay for all irrigation water consumption during construction and until Initial Acceptance of the landscaping. The City shall pay for irrigation water consumption beginning on the date of Initial Acceptance,

during the plant establishment period and until Final Acceptance of the landscaping.

C. If landscaping is not covered by a permanent irrigation system, the contractor shall pay for all irrigation water consumption during construction, through the Initial Acceptance of the landscaping, during the plant establishment period, and until Final Acceptance.

PART 3 EXECUTION

3.1 PLANT BED LAYOUT AND INSPECTION:

A. Notify the Project Manager 5 business days before the scheduled plant layout. Do not begin planting work until the layout is approved.

B. Identify with wood stakes, survey flags, or paint the location of each individual tree and palm and the limits of multiple plant beds. When completed, request a layout inspection by the Engineer. Make minor adjustments to the layout requested by Engineer during the inspection.

3.2 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Packaged materials: Deliver packaged materials in original containers and protect from deterioration.

B. Plant Shipment

1. Grower shall water root balls just before shipping. Label at least one representative plant of each specified species and variety with a securely attached waterproof tag bearing the botanical and common name, if requested.
2. Ship cabbage palms specified as “hurricane cut” or “cropped” with all fronds removed. Ship regenerated cabbage palms and other palms with dead fronds and fronds below horizontal removed (up to 2/3 of the oldest fronds can be removed). Lift-up remaining fronds in an upright position and tie fronds into a bundle with biodegradable twine. Keep frond bundle tied until after the palm planting is completed and for the additional time recommended by the palm supplier.
3. Provide protective covering over trees and palms during shipment. Tie down trees and palms to the trailer bed to prevent rolling during shipment. Ship other plants in enclosed trucks. Do not bend or bind-tie plants in such a way that will damage bark, break branches, or destroy natural shape. Do not

leave plants in trucks parked in the sun during hot weather unless air-conditioned.

4. Do not lift trees by the trunk when unloading. Lift B&B trees under the root ball or by the wire loops if there is a wire basket. Lift large, containerized trees with a forklift under the container. Lift smaller plants by the root ball or by the lips of the container, not by stems or trunks. Keep container grown stock in containers until planting time.
5. Do not free-fall, drag, roll, strain the bud or otherwise abuse palms. Mechanically lift and relocate palms with a protective device around the trunk to prevent damage to the bud and trunk.
6. Place plants in an irrigated holding area where plants are protected from sun and wind whether at the grower's nursery, at the landscape contractor's yard, or at the project site if plants are stored out of the ground for more than 24 hours after delivery to the Contractor or to the site. Set plants in an erect position. Cover root balls of B&B plants with mulch or straw. Irrigate plants to keep roots moist and to prevent wilting until planting.
7. Deliver plants to the job site only after the planting preparation for a landscape area has been completed and when there is adequate storage space for the delivered landscape material. If a suitable remote staging area is needed, provide at no additional cost to the City.

3.3 COMMENCEMENT OF LANDSCAPE WORK: Commence landscape work once the following tasks are complete.

A. the permanent irrigation system is operational in the areas to be planted or an approved alternative means of watering has been provided.

B. The Engineer has inspected and approved the plants either at the holding area or job site.

C. The Engineer has approved the plant layout or has waived the inspection.

D. Work by others that may damage the landscaping is completed.

E. Work necessary for proper landscape installation is completed.

3.4 TREE PLANTING DEMONSTRATION: Before planting begins, the Engineer will select a tree planting site shown on the landscape plan for a demonstration tree planting. With the Engineer present, demonstrate the ability to install a tree in accordance with the planting specifications, including soil replacement, soil amendments, root ball correction, (removal of soil and roots above trunk flare and deflected structural roots), placing tree, backfilling, watering, root ball anchoring, and mulching. After requested adjustments are made, this tree will be used as a standard for all other tree planting. If

site conditions require the planting of trees on mounds in areas with poor drainage or on slopes 4:1 or greater, a demonstration tree planting for each condition is also required.

3.5 CORRECTION OF SOIL COMPACTION DURING PLANT DELIVERY AND INSTALLATION:

A. Minimize soil compaction in landscaped areas during delivery to planting sites, digging plant holes, and installing plants.

B. Complete the installation of trees and palms before soil preparation and tilling if heavy mechanized equipment is used for delivery and planting.

3.6 CORRECTION OF CONDITIONS DETRIMENTAL TO PLANT GROWTH

A. When conditions detrimental to plant growth, such as poor drainage, hardpan of clay or silt, rubble fill, obstructions, limerock, petroleum products, and construction debris are encountered during the landscape work, cease landscape work in the affected area and immediately notify Engineer.

B. After the Engineer's review, excavate the area of contaminated soil to the depth approved by the Engineer. If the soil is contaminated by the Contractor's construction operations, then remove and replace with topsoil or yard sand at no additional cost to the City. If contaminated soil is discovered that appears by the Engineer to be pre-existing before the beginning of construction operations, and not identified for removal by the contract documents, then the cost of removal of contaminated soil and replacement with new topsoil or yard sand will be in accordance with the price established by the contract documents.

3.7 REMOVAL OF EXISTING VEGETATION AND DEBRIS IN PLANT BEDS

A. Remove bottles, boards, construction materials, limerock, and other debris to a depth of 6 inches inside all plant beds.

B. If there is no vegetation in plant beds, proceed to bed preparation.

C. Remove existing vegetation throughout the entire limit of multiple plant beds and within the required circumference of each individual tree or palm bed.

D. In plant beds free of surface roots from existing trees remove existing vegetation with a sod cutter or other equipment with blades of sufficient depth to remove the entire plant and root system in one operation. DO NOT REMOVE EXISTING VEGETATION WITH A ROTOTILLER OR OTHER MACHINE THAT WILL BREAK THE ROOTS IN SMALL PIECES DURING THE OPERATION.

E. Where living vegetation still remains in the new plant beds containing extensive surface roots of existing trees, remove all top growth and roots of existing vegetation in a manner that will not damage existing tree roots.

F. Do not remove existing vegetation with a rototiller or other machine that will break the roots into small pieces.

3.8 EXCAVATION OF EXISTING SOIL IN PLANT BEDS WITHIN MEDIANS AND PARKING LOT ISLANDS

A. Excavation of Tree & Palm Plant Beds: After a plant bed is clear of all vegetation, excavate the existing soil within each individual tree or palm location to the depth of the root ball less 2" and a width equal to the root ball diameter plus 24". and multiple plant bed so that the soil level in the bed is 12" below the finish level of the adjacent turf, pavement, or curb. Remove surplus soil, limerock, stones over 1½", sticks, roots, rubbish, and other extraneous matter exposed by this operation. Extend excavation below the location of each tree as detailed if the root ball vertical dimension is greater than 26".

B. Excavation of Plant Beds in Medians and Parking Lot Islands: Extend excavation of existing soil to a depth of 24 inches.

C. Notify the Engineer if the existing soil at the bottom of the tree pit is contaminated with limerock or other debris detrimental to plant growth. After the Engineer's review, excavate the contaminated soil underneath each tree root ball equal to the diameter of the root ball plus 2' and to the depth approved by the Engineer. Remove and replace with yellow sand or topsoil. Soil replacement shall be paid at the unit price established in the proposal.

3.9 PLANT BED PREPARATION

A. After the existing soil has been removed, backfill each bed with topsoil so that the topsoil layer is 17" deep. Adjust the level of the topsoil by excavation or by the application of additional soil in plant beds so that after the application of the soil conditioner, and grading, the soil mix layer at the edge of the beds is 4" below adjacent turf, pavement, or curbs.

B. Spread soil conditioner throughout all individual and multiple plant beds to a minimum depth of 3" (9.2 cub. yds. per 1000 sq. ft.). Obtain Engineer's approval before proceeding further.

C. The application and incorporation of soil conditioner into individual tree and palm beds may be delayed until after the plant has been placed, so long as the finish

soil level is 2” below the top of the root ball and 4” below adjacent turf, pavement or curbs.

D. After the Engineer has approved the application of soil conditioner, mix soil conditioner into the top 9” of topsoil to achieve a uniform mixture of 1/4 soil conditioner and ¾ topsoil to a depth of 12”. In areas free of tree surface roots, use a rototiller to mix soil amendments into existing soil. In areas with surface roots, mix soil amendments into existing soil by hand.

E. Add or remove soil mix necessary to remove ridges and fill depressions so that the soil mix layer at the edge of the plant beds is 4” below adjacent turf, pavement, or curbs. Rake to a smooth, even surface with a loose, uniformly fine texture.

F. If the soil is very dry before planting, water soil sufficiently to moisten the prepared areas. Do not create a muddy soil condition.

3.10 EXCAVATION OF TREE OR PALM PLANTING PITS: Excavate pit with a surface diameter 2 feet larger than the diameter of the root ball and with a depth that will leave top of the root ball 2” above the soil mix layer. If planting date palms, excavate the pit 12” deeper to allow for a layer of yellow sand below the root ball.

3.11 PLANTING

A. General

1. Keep container grown stock in containers until planting time. Pick up plants by ball or container, not by stems or trunks.
2. Perform work in accordance with sound horticultural practice in North Florida.

B. Planting Trees

1. Root Ball Correction Before Planting

a. Container Grown Trees:

1) Remove container before planting. If the first root emerging from the trunk is not visible on the root ball surface, then remove the upper soil layer until the upper structural root is exposed. Remove secondary roots growing over the structural roots.
2) Shave off the outside 1” to 2” layer of roots from the top, sides and bottom of the root ball to remove all circling, descending, and matted root segments not growing radial to the trunk.

b. B&B Trees:

1) If the first root emerging from the trunk is not visible on the root ball surface, then remove the upper soil layer until the upper structural root is exposed. Remove secondary roots growing over the structural root and the trunk flare.
2) Remove all plastic shrink-wrap, straps, and twine from the trunk and the root ball. Before planting, remove roots growing through the burlap and up, down or around the root ball. Also remove the burlap and wire cage from the top of the root ball and the top one or two bands of the wire basket down the sides of the root ball after the tree is properly placed in the pit. Do not bury synthetic fabric in the planting pit.

2. Set the tree plumb in the center of the pit and orient for best appearance.
3. Adjust the depth of the pit so that the top of the root ball is 2" above the soil mix layer.
4. Backfill tree pit with soil mix excavated from the pit. Backfill in 12-inch layers until the soil is 2" below the top of the root ball. Water in and compact each soil layer to eliminate voids. Apply at least 5 gallons of water per inch of trunk caliper during planting and backfilling.

C. Planting Palms

1. Do not free-fall, drag, roll or abuse palms or put a strain on the crown (bud area) at any time. Use a protective device around the trunk of the tree while lifting and relocating. Do not injure the bud, or scar or skin the trunk in any way.
2. For date palms only, place a compacted 12" layer of yellow yard sand in the bottom of the palm pit before planting the palm.
3. Set all palms plumb in the center of the pit and orient for best appearance. If the root ball is B&B, remove twine, shrink-wrap, burlap and wire cage as described for B&B trees. Adjust the depth of the pit so that the top of the root ball is 2" above the soil mix layer.
4. Where underground utilities interfere with the root ball, clear utilities by carefully notching the root ball around the utilities, not by raising the root ball above the finish grade.
5. If the first root emerging from the trunk is not visible on the root ball surface, carefully remove soil from the top of the root ball next to the trunk until the uppermost root is exposed or within 2" of the root ball surface. Pull away soil from the rest of the root ball surface down to the same point. Cut away exposed circling roots.
6. After the palm is set, backfill with soil mix excavated from the pit. Backfill pit with yard sand if the palm tree is a date palm. Backfill soil in 12" layers

until the soil is level with adjacent soil mix. Water in and compact each layer to eliminate voids. Apply at least 5 gallons of water per inch of trunk caliper during planting and backfilling.

7. Contain water applied to the root ball with a 3-4” high temporary earthen dam immediately around the edge of the root ball.
8. After planting, remove excess soil and rake plant bed to a smooth even surface conforming to required soil grade, and so that the soil mix level at the edge of the plant bed is 4” below adjacent turf, pavement, or curbs.
9. Place a 3-4” high immediately apply at least 2" of water throughout each bed. If a temporary dam is desired around the edge of the root ball to help contain the water, then construct the dam with the mulch layer; do not use soil for the dam.

D. Planting Shrubs and Groundcovers.

1. Place shrubs and groundcovers where shown and as detailed, using the specified spacing and in accordance with the planting detail shown on the drawings.
2. If the plant is in a container, remove container before planting. If the plant is balled and burlapped, remove twine and burlap completely from the ball before planting. If the plant is in a 1-gallon container or larger, remove container and shave off the outside layer of roots from all sides and bottom of the root ball to remove root defects before planting. Excavate each pit to slightly larger than the root ball area and with slightly less depth than the root ball. Set plant plumb in center of the pit. If the plant has a root ball smaller than a 1-gallon pot, set the plant so that the top 10% of the root ball is above the level of the soil mix layer. If the root ball is equal to 1-gallon or larger, set the plant so that the top 1½” of the ball is above the soil mix layer. Backfill remainder of pit with excavated soil mix and compact to eliminate voids. Keep top of the root-ball free of any soil.
3. Immediately apply at least 2" of water throughout each bed. If a temporary dam is desired around the edge of each root ball to contain the water, then construct the dam with the surrounding soil.

3.12 PLANTING IN MARGINAL WET AREAS

A. If during the excavation of the plant pits water saturated soil is encountered in the very bottom of the pit, stop work and notify the Engineer. The Engineer may approve the planting if the bottom of the root ball can be raised at least 6” above the water table and no higher that two feet above the existing surrounding grades. In multiple plant beds, raise the entire plant bed to the height requested. Otherwise, the plant bed will be deleted or relocated on the site.

B. Fill the pit with existing soil until the entire root ball, when installed, will be above the water table.

C. After the plant is installed, place existing soil against the exposed sides of the root ball to create an earth mound around the root ball with a 4:1 maximum slope from the edge of the root ball to the edge of the bed.

D. Complete planting as specified for plants.

E. The City will pay for the labor and materials to raise the beds above existing grade with additional soil at the negotiated price for soil replacement or by the unit price established in the bid proposal.

3.13 PLANTING ON SLOPES: When planting on a slope, form a level platform by cutting into the slope on the back side of the tree and then using the cut soil as fill on the front side of the tree so that the volume of cut and fill are equal. The level platform for a shrub or groundcover shall be twice the diameter of the root ball; for a tree or palm, equal to the diameter of the root ball plus 1 foot.

3.14 FINISHING PLANT BEDS

A. After planting, remove excess soil and rake plant beds to a smooth even surface after plants are installed so that the soil mix grade at the edge of the plant beds is 4” below adjacent turf, pavement, or curbs to allow for a 3” layer of mulch, leaving 1” between the top of the mulch and the top of the adjacent turf, pavement or curb. Keep top of each root ball free of any soil.

B. Immediately apply at least 2” of water throughout each bed. DO NOT USE SOIL DAMS around the edge of the root ball. If a temporary dam is desired around the edge of the root ball to help contain the water, then form the dam with the thicker layer of surface mulch.

3.15 WATERING

A. General: Water plants sufficiently to keep roots moist, but not saturated and as needed for the healthy growth and to prevent wilting. (The Agriculture Extension Service recommends watering daily for at least one month after installation during the growing season when there is no rain). Following a rainfall, delay watering until all free moisture (gravitational water) has drained from the soil.

B. After initial watering, where plants are not covered by an automatic irrigation system, provide temporary watering using water bags and/or a temporary irrigation system that will provide to each plant during each watering cycle.

C. If water bags are used to water trees and palms, place water bag around the trunk and fill with water in accordance with manufacturer's instructions to provide a slow water drip of at least 4 hours. Fill water bag with each subsequent watering.

D. If a temporary irrigation system is used, connect the system to a water truck or other water source and pump water until the specified volume of water in the tables below is delivered to each plant through emitters. Apply at a rate that will allow the water to soak into the root ball without runoff.

E. Maintain each water bag or temporary irrigation system in working condition throughout the installation and maintenance period and until final acceptance. Immediately repair or replace each water bag or temporary irrigation system that is damaged, stolen or malfunctioning.

3.16 PRUNING

A. Prune plants in accordance with the ANSI Z60.1 and ANSI A300 standards no less than once every six (6) months to remove sprouts and dead/injured/diseased wood, and to establish a single (unless specified as multi-stemmed) leader with subordinated branches. Use a Natural pruning system unless otherwise specified. Required plant sizes are after pruning. Replace excessively pruned or malformed plants. Do not cut tree leaders except for tip pruning.

B. Prune crape myrtles, ligustrums, and other multi-trunked trees to remove suckers or water sprouts growing from the root ball and from the lower portion of the main trunks. Also remove small, twiggy growth that has developed underneath and within the tree canopy.

C. Crape myrtles: Cut back the tips of all stems approximately one foot to promote branching and blooming. Maintain upright branching character by removing branches that are dropping below a 30-degree angle from vertical. Extend pruning to create a very upright branching tree with a full, gently rounded crown.

3.17 TREE AND PALM ACHORING

A. General: Anchor trees and palms to maintain them in a vertical alignment.

B. Trees: Anchor tree root balls as detailed using "Anchor System 1 or 2."

C. Anchor palm root balls, except date palms, as detailed using Anchor System 1 or 2". Anchor date palms as detailed "Anchor System 2".

3.18 MULCHING: Apply sufficient mulch to maintain 3 inches of mulch in all beds. Rake to neat, finished appearance. Top of mulch to be 1" below adjacent top of pavement, curb or lawn. Pull mulch 8” away from each tree and palm trunk and 3” away from the main stem of smaller plants.

3.19 FERTILIZING

A. Trees: Fertilize as needed in accordance with the ANSI A300 standard and product label. Forward a written record of the date, fertilizer applied, and rate of application to the project manager within five business days of application. .

B. Palms: Immediately after planting, spread 1 ½ pounds of palm fertilizer evenly in a 2’ band around the root ball in accordance with manufacturer’s instructions.

C. Multiple Plant Beds: Apply fertilizer at a rate to achieve 1 lb. of nitrogen per 1000 square feet of bed area.

3.20 APPLICATION OF PRE-EMERGENT HERBICIDE: Rake mulch smooth and apply pre-emergent herbicide throughout all beds. Apply herbicide at the recommended manufacturer’s rates and in strict accordance with the label instructions.

3.21 SUBSTANTIAL COMPLETION INSPECTION AND ACCEPTANCE

A. Inspection shall be made by the Engineer within ten days of written notification from the Contractor that installation is complete.

B. Plants shall be acceptable if in “healthy, vigorous condition” and are in compliance with both the specific specifications for each named plant and the general specifications for all plants.

C. Replace rejected work within 14 days of notification and continue specified maintenance until re-inspected and found to be acceptable. Remove rejected plants and materials promptly from project site.

3.22 MAINTENANCE PERIOD

A. See Specification Section 147-LANDSCAPE MAINTENANCE for specific maintenance requirements.

B. Begin maintenance of landscape work immediately after each area is planted and continue until Initial Acceptance, through the specified maintenance period, and until Final Acceptance of the landscaping.

3.23 LANDSCAPE WARRANTY IF LANDSCAPE MAINTENANCE IS INCLUDED DURING THE WARRANTY PERIOD

A. Warranty that all plants will remain in "healthy, vigorous condition" and meet specifications during the Warranty period from the date of of Substantial Completion until the date of Final Acceptance.

B. If the Final Inspection occurs in the dormant season, then the warranty of deciduous plants shall be extended until the deciduous plants are in full green leaf after dormancy and can be inspected and approved by the Engineer.

3.24 MONTORING OF LANDSCAPE MAINTENANCE BY OTHERS DURING THE WARRANTY PERIOD

A. If landscape maintenance during the Warranty period is not included in the bid price but is provided by the City, the Contractor's warranty remains in effect, so long as the City maintains the plants in a healthy, vigorous condition.

B. To ensure that the plants remain in "healthy, vigorous condition," the Contractor must monitor the City's landscape maintenance during the Warranty period. Make at least 1 visit per month to observe the Owner's maintenance. If maintenance, including watering, is not sufficient to maintain plants in a healthy condition, immediately notify the Engineer in writing describing the problems with the maintenance and the corrective action required so that the Engineer can take corrective action.

C. If the Contractor fails to visit the site and notify the Engineer, in writing, of the maintenance deficiencies, then the lack of maintenance cannot be used by the Contractor as grounds for voiding or modifying the provisions of the warranty.

D. If the City discovers conditions during the warranty period that are not in conformance with the landscape specifications, the Contractor shall take corrective action upon the Engineer's notification.

3.25 FINAL INSPECTION AND ACCEPTANCE

A. When maintenance work is complete, submit written notification to the Engineer. The Engineer shall conduct a final inspection within 10 days after receipt of the Contractor's notification.

B. Plants: Plants shall be acceptable if they are in "healthy, vigorous condition" and remain in compliance with both the specific specifications for each plant named and the general specifications for all plants.

C. Plant Beds: Plant beds shall be acceptable if the plant beds are free of weeds, are well drained and are covered by a uniform layer of mulch of the specified thickness.

D. Replace rejected work with 14 days of notification. Continue landscape maintenance until work is re-inspected and found acceptable.

3.26 MEASUREMENT AND PAYMENT: Measurement and payment of landscaping, completed and accepted, is established in the proposal either as a lump sum or on a unit price basis. The price includes all work specified in this section including materials, soil preparation, planting, watering, pruning, staking, mulching and landscape maintenance until the Initial Acceptance. The price also includes the cost of maintenance during the warrant period, if included in the scope of work.

3.27 REPLACEMENTS AND CONDITIONS

A. The specified plant warranty, including the maintenance, inspection, and acceptance provisions, shall apply to replacement plants. All plants that do not meet specifications or do not reflect a healthy, vigorous condition as specified under Section 144.11 Plants shall be rejected and replaced immediately. All plant material shall meet this criterion at the end of the maintenance period.

B. Replacements shall comply with specified requirements for new plants.

C. After the Substantial Completion acceptance date, the Contractor will not be responsible for damage to work resulting from: neglect by Owner; damage by others; abnormal weather conditions such as floods, excessive winds, severe freezing or abnormal rains; or activities by others beyond the Contractor's control.

END OF SECTION 601

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