PROJECT TECHNICAL SPECIFICATIONS
AND
GEOTECHNICAL REPORTS

FOR

JAMESVILLE ROAD COFFEE CREEK BRIDGE REPLACEMENT

AUGUST 2016
BID PACKAGE

PREPARED FOR:

BOARD OF COUNTY COMMISSIONERS
ESCAMBIA COUNTY, FLORIDA

PREPARED BY:

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JAMESVILLE ROAD COFFEE CREEK BRIDGE REPLACEMENT

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ATTACHMENT A GEOTECHNICAL INVESTIGATIONS

PUBLIC WORKS DEPARTMENT
Engineering Division

Escambia County
Technical Specifications

GENERAL EXCEPTIONS*: Any reference to FDOT *Standard Specifications for Road and Bridge Construction, Latest Edition, Division I General Requirements & Covenants* shall be excluded and not applicable to any specification referred herein or otherwise listed in this document.

Work shall comply with requirements of FDOT *Standard Specifications for Road and Bridge Construction*, latest edition, as modified herein.

**Note: The General Exception above does not apply when utilizing Federal Highway Administration (FHWA) funding.*

County Engineer
Joy D. Blackmon, P.E.

Effective Date: February 01, 2015

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SECTION 01000 – DEFINITIONS

PART 1 - GENERAL

The following terms, when used in the Contract Documents, have the meaning described

Advertisement
The public announcement, as required by law, inviting bids for work to be performed or materials to be furnished, usually issued as “Notice to Contractors,” or “Notice to Bidders.”

Bidder
An individual, firm, or corporation submitting a proposal for the proposed work.

Bridge
A structure, including supports, erected over a depression or over an obstruction such as water, highway or railway, or for elevated roadway, for carrying traffic or other moving loads, and having a length, measured along the center of the roadway, of more than 20 feet between the inside faces of end supports. A multiple-span box culvert is considered a bridge, where the length between the extreme ends of the openings exceeds 20 feet.

Calendar day
Every day shown on the calendar, ending and beginning at midnight.

Contract
The term “Contract” means the entire and integrated agreement between the parties there under and supersedes all prior negotiations, representations, or agreements, either written or oral. The Contract Documents form the Contract between the County and the Contractor setting forth the obligations of the parties thereunder, including, but not limited to, the performance of the Work and the basis of payment.

Contract Documents
The term “Contract Documents” includes: Advertisement for Proposal, Proposal, Certification as to Publication and Notice of Advertisement for Proposal, Appointment of Agent by Nonresident Contractors, Noncollusion Affidavit, Warranty Concerning Solicitation of the Contract by Others, Resolution of Award of Contract, Executed Form of Contract, Performance Bond and Payment Bond, Specifications, plans (including revisions thereto issued during construction), Addenda, or other information mailed or otherwise transmitted to the prospective bidders prior to the receipt of bids, work orders and supplemental agreements, all of which are to be treated as one instrument whether or not set forth at length in the form of contract.

Contract Bond
The security furnished by the Contractor and the surety as a guaranty that the Contractor shall fulfill the terms of the Contract and pay all legal debts pertaining to the construction of the project.

Contract Letting
The date that the County opened the bid proposals.

Contract Time
The number of calendar days allowed for completion of the Contract work, including authorized time extensions.

Contractor
The individual, firm, joint venture, or company contracting with the County to perform the work.

Contractor's Engineer of Record
A Professional Engineer registered in the State of Florida, other than the Engineer of Record or his subcontracted consultant, who undertakes the design and drawing of components of the permanent structure as part of a redesign or Cost Savings Initiative Proposal, or for repair designs and details of the permanent work. The Contractor's Engineer of Record may also serve as the Specialty Engineer. The Contractor's Engineer of Record must be an employee of a pre-qualified firm. Any Corporation or Partnership offering engineering services must hold a Certificate of Authorization from the Florida Department of Business and Professional Regulation.

As an alternate to being an employee of a pre-qualified firm, the Contractor's Engineer of Record may be a pre-qualified Specialty Engineer. For items of the permanent work declared by the State Construction Office to be "major" or "structural", the work performed by a prequalified Specialty Engineer must be checked by another pre-qualified Specialty Engineer. An individual Engineer may become pre-qualified in the work groups listed in the Rules of the Department of Transportation, Chapter 14-75, if the requirements for the Professional Engineer are met for the individual work groups. Pre-qualified Specialty Engineers are listed on the State Construction Website. Pre-qualified Specialty Engineers will not be authorized to perform redesigns or Cost Savings Initiative Proposal designs of items fully detailed in the plans.

Controlling Work Items
The activity or work item on the critical path having the least amount of total float. The controlling item of work will also be referred to as a Critical Activity.

County
Escambia County Public Works Department

Culverts
Any structure not classified as a bridge that provides an opening under the roadway.

Delay
Any unanticipated event, action, force or factor which extends the Contractor's time of performance of any controlling work item under the Contract. The term "delay" is intended to cover all such events, actions, forces or factors, whether styled "delay", "disruption", "interference", "impedance", "hindrance", or otherwise, which are beyond

the control of and not caused by the Contractor, or the Contractor's subcontractors, materialmen, suppliers or other agents. This term does not include "extra work".

Department
State of Florida Department of Transportation.

Developmental Specification
See definition for Specifications.

Engineer of Record
The Professional Engineer or Engineering Firm registered in the State of Florida that develops the criteria and concept for the project, performs the analysis, and is responsible for the preparation of the Plans and Specifications. The Engineer of Record may be County in-house staff or a consultant retained by the County.

The Contractor shall not employ the Engineer of Record as the Contractor's Engineer of Record or as a Specialty Engineer.

Equipment
The machinery and equipment, together with the necessary supplies for upkeep and maintenance thereof, and all other tools and apparatus necessary for the construction and acceptable completion of the work.

Extra Work
Any "work" which is required by the Engineer to be performed and which is not otherwise covered or included in the project by the existing Contract Documents, whether it be in the nature of additional work, altered work, deleted work, work due to differing site conditions, or otherwise. This term does not include a "delay".

Highway, Street, or Road
A general term denoting a public way for purposes of vehicular travel, including the entire area within the right-of-way.

Holidays
Days designated by the Board of County Commissioners as holidays, which include, but are not limited to, New Year's Day, Martin Luther King's Birthday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and the following Friday, and Christmas Day.

Inspector
An authorized representative of the County, assigned to make official inspections of the materials furnished and of the work performed by the Contractor.

Laboratory
The testing laboratory used by the Contractor.

Major Item of Work
Any item of work having an original Contract value in excess of 5% of the original

Contract amount.

Materials
Any substances to be incorporated in the work under the Contract.

Median
The portion of a divided highway or street separating the traveled ways for traffic moving in opposite directions.

Plans
The approved plans, including reproductions thereof, showing the location, character, dimensions, and details of the work.

Proposal (Bid, Bid Proposal)
The offer of a bidder, on the prescribed form, to perform the work and to furnish the labor and materials at the prices quoted.

Proposal Form
The official form or the expedite program generated bid item sheets on which the County requires formal bids to be prepared and submitted for the work.

Proposal Guaranty
The security furnished by the bidder as guaranty that the bidder will enter into the Contract for the work if the County accepts the proposal.

Right-of-Way
The land that the County has title to, or right of use, for the road and its structures and appurtenances, and for material pits furnished by the County.

Roadbed
The portion of the roadway occupied by the subgrade and shoulders.

Roadway
The portion of a highway within the limits of construction.

Section
A numbered prime division of these Specifications.

Special Provisions
See definition for Specifications.

Specialty Engineer
A Professional Engineer registered in the State of Florida, other than the Engineer of Record or his subcontracted consultant, who undertakes the design and drawing preparation of components, systems, or installation methods and equipment for specific temporary portions of the project work or for special items of the permanent works not fully detailed in the plans and required to be furnished by the Contractor such as but not limited to pot bearing designs, nonstandard expansion joints, MSE wall designs and

other specialty items. The Specialty Engineer may also provide designs and details for items of the permanent work declared by the State Construction Office to be “minor” or “non-structural”. The Specialty Engineer may be an employee or officer of the Contractor or a fabricator, an employee or officer of an entity providing components to a fabricator, or an independent consultant. For items of work not specifically covered by the Rules of the Department of Transportation, a Specialty Engineer is qualified if he has the following qualifications:

(1) Registration as a Professional Engineer in the State of Florida.
(2) The education and experience necessary to perform the submitted design as required by the Florida Department of Business and Professional Regulation.

Specifications
The directions, provisions, and requirements contained herein, together with all stipulations contained in the Contract Documents, setting out or relating to the method and manner of performing the work, or to the quantities and qualities of materials and labor to be furnished under the Contract.

A. Standard Specifications: “Standard Specifications for Road and Bridge Construction” a bound book, applicable to all FDOT Contracts containing adopted requirements, setting out or relating to the method or manner of performing work, or to the quantities and qualities of materials and labor.

B. Supplemental Specifications: Approved additions and revisions to the Standard Specifications, applicable to all Department Contracts.

C. Special Provisions: Specific clauses adopted by the Department that add to or revise the Standard Specifications or supplemental specifications, setting forth conditions varying from or additional to the Standard Specifications applicable to a specific project.

D. Technical Special Provisions: Specifications, of a technical nature, prepared, signed, and sealed by an Engineer registered in the State of Florida other than the State Specifications Engineer or his designee, that are made part of the Contract as an attachment to the Contract Documents.

E. Developmental Specification: A specification developed around a new process, procedure, or material.

Standard Specifications
See definition for Specifications.

State
State of Florida.

Subarticle
A headed and numbered subdivision of an Article of a Section of these Specifications.

Subgrade
The portion of the roadbed immediately below the base course or pavement, including below the curb and gutter, valley gutter, shoulder and driveway pavement. The subgrade limits ordinarily include those portions of the roadbed shown in the plans to be constructed to a design bearing value or to be otherwise specially treated. Where no limits are shown in the plans, the subgrade section extends to a depth of 12 inches below the bottom of the base or pavement and outward to 6 inches beyond the base, pavement, or curb and gutter.

Substructure
All of that part of a bridge structure below the bridge seats, including the parapets, backwalls, and wingwalls of abutments.

Superintendent
The Contractor's authorized representative in responsible charge of the work.

Superstructure
The entire bridge structure above the substructure, including anchorage and anchor bolts, but excluding the parapets, backwalls, and wingwalls of abutments.

Supplemental Agreement
A written agreement between the Contractor and theCounty, and signed by the surety, modifying the Contract within the limitations set forth in these Specifications.

Supplemental Specifications
See definition for Specifications.

Surety
The corporate body that is bound by the Contract Bond with and for the Contractor and responsible for the performance of the Contract and for payment of all legal debts pertaining thereto.

Technical Special Provisions
See definition for Specifications.

Traveled Way
The portion of the roadway providing for the movement of vehicles, exclusive of shoulders and auxiliary lanes.

Unilateral Payment
A payment of money made to the Contractor by the Department pursuant to Section 337.11(12), Florida Statutes (2009), for sums the Department determines to be due to the Contractor for work performed on the project, and whereby the Contractor by acceptance of such payment does not waive any rights the Contractor may otherwise have against the Department for payment of any additional sums the Contractor claims are due for the work.

Work
All labor, materials and incidentals required to execute and complete the requirements of the Contract including superintendence, use of equipment and tools, and all services and responsibilities prescribed or implied.

Work Order
A written agreement between the Contractor and the County modifying the Contract within the limitations set forth in these Specifications. Funds for this agreement are drawn against the Initial Contingency Pay Item or a Contingency Supplemental Agreement.

Working Day
Any calendar day on which the Contractor works or is expected to work in accordance with the approved work progress schedule.

END OF SECTION 01000

SECTION 01300 - SUBMITTALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and General and Supplemental Provisions of the Contract, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for submittals required for performance of the Work, including, but not limited to the following:

1. Submittal Procedures
2. Contractor's Construction Schedule
3. Daily Construction Reports
4. Shop Drawings
5. Product Data
6. Samples
7. Quality Assurance Submittals
8. Licenses
9. Pictures, Video of Pre-Construction Conditions

B. Administrative Submittals: Refer to other Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to, the following:

1. Permits
2. Applications for Payment
3. Performance and Payment Bonds
4. Insurance Certificates
5. List of Subcontractors
6. Licenses

1.3 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, inspections, and related activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need

to review submittals concurrently for coordination. The County reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received.

3. Processing: To avoid the need to delay construction as a result of the time required to process submittals, allow sufficient time for submittal review, including time for re-submittals. Allow 2 weeks for initial review. Allow additional time if the County must delay processing to permit coordination with subsequent submittals.

    a. If an intermediate submittal is necessary, process the same as the initial submittal.
    b. Allow 2 weeks for reprocessing each submittal.
    c. No extension of Contract Time will be authorized because of failure to transmit submittals to the County sufficiently in advance of the Work to permit processing.

B. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.

1. Provide a space approximately 4 by 5 inches on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken.

2. Include the following information on the label for processing and recording action taken.

    a. Project Name.
    b. Date.
    c. Name and Address of the Engineer.
    d. Name and Address of the Contractor.

C. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Four copies of each submittal (three hard copy and one digital) shall be transmitted. Transmit each submittal from the Contractor to the County, (copy Engineer) using a transmittal form. The County will not accept submittals received from sources other than the Contractor. Submittals must be approved by Contractor prior to review by County. On the transmittal, record relevant information and requests for data. On the form or on a separate sheet, record deviations from Contract Document requirements, including variations and limitations. Include Contractor's certification that the information complies with Contract Document requirements on each submittal.

1.4 CONSTRUCTION SCHEDULE/DOCUMENTATION

A. Bar-Chart Schedule: Prepare a fully developed, horizontal bar-chart-type, contractor's construction schedule. Submit within 10 days of the issuance of the Notice to Proceed. The contractor shall submit an updated schedule at least once per month, showing any schedule changes. This may be requested up to three times per month by the County. Include dates of shop drawing submittals.

B. Cost Correlation: At the head of the schedule, provide a cost correlation line, indicating planned and actual costs. On the line, show dollar volume of Work performed as of the dates used for preparation of payment requests.

C. Pre-Construction Site Conditions Photos/Video: Contractor shall submit a DVD of photos and video of the site conditions prior to the performance of any work.

D. Licenses: All required licenses to perform work shall be submitted prior to the commencement of construction.

1.5 DAILY CONSTRUCTION REPORTS

Prepare a daily construction report recording the following information concerning events at the site, and submit duplicate copies to the County at weekly intervals including, but not limited to:

1. Work performed.
2. Approximate count of personnel at the site.
3. Count and type of major equipment at the site.
4. High and low temperatures, general weather conditions, including daily rainfall amount from gauge installed on site jointly recorded by contractor and county representative.
5. Accidents and unusual events.
6. Meetings and significant decisions.
7. Stoppages, delays, shortages, and losses.
8. Emergency procedures.
9. Orders and requests of governing authorities.
10. Change Orders received, implemented.
11. Material Expenditures.

1.6 SHOP DRAWINGS

A. Submit shop drawings for structures unless FDOT approved structures are used.

B. Shop Drawings – Including, but not limited to the following information:

1. Dimensions.
2. Identification of products and materials included by sheet and detail number.
3. Compliance with specified standards.

1.7 PRODUCT DATA

Product Data - Include the following information:

1. Manufacturer's printed recommendations.
2. Compliance with trade association standards.
3. Compliance with recognized testing agency standards.
4. Application of testing agency labels and seals.

1.8 SAMPLES

Submit samples as specified in the technical specifications.

1.9 QUALITY CONTROL (QC) / QUALITY ASSURANCE (QA) SUBMITTALS

A. Submit the QC Plan to the County for approval within 21 calendar days after the Notice to Proceed. The County will review the QC Plan and respond to the Contractor within 21 calendar days of receipt.

If at any time the Contractor is not in compliance with the approved QC Plan, or a part thereof, affected portions of the plan will be disapproved. The contractor shall cease work in the affected operation(s) and submit a revision to the County. If the QC Plan, or a part thereof, must be revised, submit the revision to the County. The County will review the revision and respond within seven calendar days of receipt.

Continue to work on operations that are still in compliance with the approved sections of the QC Plan.

B. Certifications: Where other Sections of the Specifications require certification that a product, material, or installation complies with specified requirements, submit to the County a certification from the manufacturer certifying compliance with specified requirements.

C. Inspection and Test Reports: Requirements for specific testing are included in the technical specifications.

1. Submit to the County: Two (2) copies (one hard copy and one digital) of the inspection and test reports from a qualified, independent, geotechnical engineering testing agency, under the direction of a Professional Engineer, licensed in the State of Florida.

2. All testing required by the specifications or the County shall be at the contractors expense.

3. No additional work within/upon the tested area shall proceed until submitted test results confirm compliance with specification requirements.

4. Areas where submitted test results indicate non-compliance shall be removed, replaced, and retested. Extents of area out of compliance shall be determined by testing at 25’ increments, in each direction within the construction area, until passing results are achieved.

5. Variations from testing requirements and frequency of testing may be authorized by the County and will be documented in writing.

1.10 ENGINEER'S ACTION

Except for submittals for the record or information, where action and return is required, the County will review each submittal, mark to indicate action taken, return to contractor within the timeframe allotted herein. Compliance with specified characteristics is the Contractor's responsibility.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01300

SECTION 02230 - CLEARING & GRUBBING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions shall apply to this Section.

B. Florida Department of Transportation*, Standard Specifications for Road and Bridge Construction, Section 110, Latest Edition.*

C. Emerald Coast Utility Authority (ECUA) *Engineering Manual*, *Latest Edition.*

1.2 SUMMARY

A. This Section includes, but is not limited to, the following:

1. Protection of existing trees indicated to remain.
2. Removal of trees and other vegetation.
3. Clearing and grubbing.
4. Removing above-grade improvements.
5. Removing below-grade improvements.

B. Extent of clearing & grubbing shall remain in County right-of-way, easements (temporary or permanent), or approved written work agreement areas, unless otherwise noted or instructed.

1.3 PROJECT CONDITIONS

Provide protection for all public land corners and monuments within the limits of construction. Any Monuments disturbed while performing the work will be replaced at the contractor's expense.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 SITE CLEARING

A. General: Remove trees, shrubs, grass, and other vegetation, improvements, or obstructions, as required, to permit installation of new construction. Remove similar items elsewhere on site or premises as specifically indicated. Removal includes digging out and off-site disposal of stumps and roots.

Carefully and cleanly cut minor roots and branches of trees indicated to

remain in a manner where such roots and branches obstruct installation of new construction.

B. Clearing and Grubbing: Clear site of trees, shrubs, and other vegetation, except for those indicated to remain.

1. Completely remove all stumps within the roadway. Remove roots and other debris to a depth of 12” below the ground surface or finished grade, whichever is lower.

2. Use only hand methods for grubbing inside drip line of trees Indicated to remain.

3. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated in accordance with Section 2300.

C. Removal of Improvements: Remove existing above grade and below grade improvements as indicated and as necessary to facilitate new construction, and other work as indicated.

3.2 DISPOSAL OF WASTE MATERIALS

A. Burning: Burning is not permitted on County property. Requests to burn will be considered on a case by case basis. If approved, Contractor is to acquire permits and provide copies to the County.

B. Removal from County Property: Remove waste materials and unsuitable or excess topsoil from County property, and dispose of off site in a legal manner.

PART 4 - MEASUREMENT/PAYMENT

4.1 METHOD OF MEASUREMENT

A. Lump Sum Payment: When direct payment is provided in the Contract for the quantity to be paid for as the lump sum quantity cleared and grubbed, no additional measurements will be made.

B. Payment By The Acre/Square Yard: For areas of Clearing and Grubbing that are designated to be paid for separately by the acre or square yard, the quantity to be paid for will be determined by measurement of the areas shown on the plans or authorized by the County to be cleared and grubbed, and acceptably completed.

4.2 BASIS OF PAYMENT

A. General: Price and payment will be full compensation for all Clearing and Grubbing required for the roadway right-of-way and for lateral ditches, channel changes, or other outfall areas, and any other Clearing and Grubbing indicated, or required for the construction of the entire project, except for any areas designated to be paid for separately or to be specifically included in the costs of other work under the contract. Price and payment, either lump sum or by the acre/square yard will be full compensation for all the work specified in this Section, including all necessary hauling, furnishing equipment, equipment operation, furnishing any areas required for disposal of debris, leveling of terrain and the landscaping work of trimming, etc., as specified herein.

B. Lump Sum Payment: Payment shall be made at the lump sum contract price for Clearing and Grubbing, lump sum.

C. Payment: Payment shall be made at the per unit contract price for Clearing and Grubbing, per acre or square yard.

END OF SECTION 02230

SECTION 02300 - EARTHWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Florida Department of Transportation*, Standard Specifications for Road and Bridge Construction, Latest Edition*.

1.2 SUMMARY

A. This Section includes preparing and grading for pavement, curb, subgrades, drainage features, and general site work.

B. Related Sections: The following Sections contain requirements that relate to this Section.

1. Section 2230 "Clearing & Grubbing" for clearing, grubbing, and tree protection.

2. Section 2600 “Stormwater System” for installation of stormwater systems.

1.3 DEFINITIONS

A. Excavation consists of the removal of material encountered to subgrade elevations and the reuse or disposal of materials removed.

B. Subgrade: The uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, base, drainage fill, or topsoil materials.

C. Borrow: Soil material obtained off-site when sufficient approved soil material is not available from on-site excavations.

D. Subbase Course: The layer placed between the subgrade and base course in a paving system.

E. Base Course: The layer placed immediately beneath the surface pavement in a paving system.

F. Unauthorized excavation consists of removing materials beyond indicated subgrade elevations or dimensions without direction by the County. Unauthorized excavation, as well as remedial work directed by the Engineer, shall be at the Contractor's expense.

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

H. Utilities include on-site above ground utilities, overhead utilities and underground utilities including: pipes, conduits, ducts, and cables, as well as related appurtenances and underground services within building lines.

I. Unsuitable Material: Any material such as muck, wood, rock, peat, garbage, non-compactable soils in dry condition, and any other material that is considered by the County Engineer to be unsuitable.

J. Topsoil: Topsoil is defined as the surface layer of soil found normally to a depth of at least 4 to 8 inches that typically contains organic materials. Satisfactory topsoil is reasonably free of roots, clay lumps, stones, other objects over 2 inches in diameter, and any other objectionable or deleterious material.

1.4 SUBMITTALS

A. General: Submit the following in accordance with Section 1300, "Submittals."

B. Product Data and Samples of the following:

1. 1-lb representative samples of each proposed fill and backfill soil material from borrow sources as selected by the County.

2. 12-by-12-inch sample of filter fabric.

3. Representative samples of the proposed base and sub-base materials.

C. Test Reports: In addition to test reports required under field quality control, submit the original directly to the County from the testing services, with a copy to the Contractor:

1. Laboratory analysis as specified in 1.1 (Related Documents) of each soil material proposed for fill and backfill from borrow sources.

2. One optimum moisture-maximum density curve for each soil material.

3. Report of actual unconfined compressive strength and/or results of bearing tests of each stratum tested.

1.5 QUALITY CONTROL / QUALITY ASSURANCE

A. Codes and Standards: Perform earthwork complying with all requirements of authorities having jurisdiction.

B. Testing and Inspection Service: A qualified independent geotechnical engineering testing agency, under the direction of a Professional Engineer, licensed in the State of Florida to classify, perform soil tests, and provide inspection services for quality control. All proposed borrow soils will require the testing agency to verify that soils comply with specified requirements and to perform required field and laboratory testing. Contractor shall replace materials removed for testing purposes. Should any work or materials fail to meet the requirements set forth in the plans and specifications, contractor shall reimburse for additional and re-testing.

1.6 PROJECT CONDITIONS

A. Site Information: Data in the subsurface investigation Report, if available, is used for the basis of the design and is available to the contractor for information only. Conditions are not intended as representations or warranties of accuracy or continuity between soil borings. The County will not be responsible for interpretations or conclusions drawn from this data by the Contractor.

B. Existing Utilities: After location of utilities by the appropriate utility company, it is the Contractor's responsibility to protect all such utility lines, including service lines and appurtenances, and to replace at his own expense any that may be damaged by the Contractor's equipment or forces during construction of the Project.

1. Provide a minimum of 48-hours notice to the County and receive written notice to proceed before interrupting any utility.

2. The contractor is responsible for contacting all utility companies to verify locations of all existing utilities, utility-related obstructions, or utility relocations that he may encounter during construction.

3. Adequate provision shall be made for the flow of existing sewers, drains, and water courses encountered during construction, and structures which may be disturbed shall be satisfactorily restored by the Contractor at his expense.

C. Should uncharted, or incorrectly charted, piping or other utilities be encountered during the course of the work, consult the County immediately for directions. Cooperate with the County and utility companies in keeping respective services and facilities in operation.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Soils used as fill shall be clean sands, similar to existing site soil, with less than 5% passing the number 200 sieve when existing subgrade conditions are considered wet as per the County. Soils as described above with less than 15% passing the number 200 sieve and meeting the requirements of Section 902-6 of the FDOT Specifications may be used when existing subgrade conditions are considered dry as per the County. The sand shall have a maximum dry density of at least 100 pounds per cubic foot, according to the Standard Proctor compaction test, AASHTO T-99, ASTM D698. Provide approved borrow soil materials from off-site when sufficient satisfactory soil materials are not available from on-site excavations.

If the Contractor elects to import any materials, then he will do so only with the approval of the County and at his own expense, unless separate payments for such items are called for in these specifications. Provide laboratory certification that soils meet requirements of specifications.

B. Sub-Base Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, or sand. The material shall be stabilized in accordance with FDOT Standard Specification Section 160-5.4. ASTM D 2940, with at least 95 percent passing a 1-1/2-inch sieve, and not more than 8 percent passing a No. 200 sieve.

PART 3 - EXECUTION

3.1 DEWATERING

A. Prevent surface water and subsurface or groundwater from entering excavations, from ponding on sub-grades in work areas, and from flooding project site and surrounding area.

B. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

C. The Contractor shall prevent the accumulation of water in excavated areas, and shall remove, by pumping or other means, any water that accumulates in the excavation. The Contractor shall prevent the accumulation of water in both structural and trench excavations and shall remove, by well point system or by other means, water which accumulates. The Contractor shall provide, install and operate a suitable and satisfactory dewatering system, when needed to dry sub-grades or other work areas. The Contractor shall comply with the latest testing requirements as set forth by the applicable regulatory agency. At a minimum, the contractor shall test once prior to dewatering, once within

the first week of dewatering, and once every thirty (30) days while dewatering.

D. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rainwater and water removed from excavations to collection or runoff areas. Do not use trench excavations as temporary drainage ditches. Discharged water shall be clean, not silt or sediment laden, prior to discharge to untreated system and/or waters of the State.

3.2 EXCAVATION

A. Explosives: Not permitted.

B. Strip topsoil and significant root systems to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material. Remove heavy growths of grass from areas before stripping. Where existing trees are indicated to remain, leave existing topsoil in place within drip lines to prevent damage to root systems.

3.3 STABILITY OF EXCAVATIONS

A. Comply with local codes, ordinances, and requirements of authorities having jurisdiction to maintain stable excavations.

B. All excavation work shall conform to all applicable OSHA Publications, Latest Editions. The Contractor's method of providing protective support to prevent cave-ins shall conform to OSHA requirements. Slope excavations, shoring, and trench box usage in the field must be based on tabulated data and designed by the Contractor. The contractor is solely responsible for job site safety and shall not be compensated for required safety equipment/devices.

3.4 EXCAVATION FOR STRUCTURES

Excavate to indicated elevations and dimensions within a tolerance of plus or minus 0.10 foot. Extend excavations a sufficient distance from structures for placing and removing concrete formwork, maintaining a safe slope, installing services and other construction, and for inspections.

A. Footings and Foundations: Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

B. Pile Foundations: After piles have been installed, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.

C. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Appurtenances: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 0.10 foot.

3.5 EXCAVATION FOR WALKS AND PAVEMENTS

Excavate surfaces under walks and pavements to indicated cross sections, elevations, and grades. Consider Dewatering and other sections as applicable.

3.6 EXCAVATION FOR STORMWATER SYSTEMS

Excavate and compact the backfill of trenches to the densities specified for embankment or subgrade, as applicable, and in accordance with the requirements of Section 2600. Consider Dewatering and other sections as applicable.

3.7 STORAGE OF SOIL MATERIALS

Stockpile excavated materials acceptable for backfill, fill soil, and topsoil materials, including acceptable borrow materials. Stockpile soil materials without intermixing. Stockpiles shall be placed, graded, and shaped to drain surface water and prevent erosion. Cover to prevent wind-blown dust and/or erosion. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.8 BACKFILL

A. Backfill excavations promptly, but not before completing the following:

1. Acceptance of construction below finish grade including, where applicable, filter fabric installation and gravel bedding.

2. Surveying locations of underground utilities for record documents.

3. Testing, inspecting, and approval of underground utilities.

4. Removal of trash and debris from excavation.

5. Removal of temporary shoring, bracing, and sheeting unless specified to remain.

B. No backfill material shall be placed, spread or rolled during unfavorable weather conditions. When the work is interrupted by heavy rain, backfill operations shall not be resumed until the moisture content of the fill is as previously specified to achieve proper compaction.

3.9 FILL

A. Preparation: Remove vegetation, topsoil, debris, wet and unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placing fills. Plow strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing surface. In order to insure proper bond and prevent slipping between the original ground and fill, the surface of the original ground shall be scarified to a depth of at least three inches. Each layer of fill material shall be compacted until the required density is achieved, and the density achieved should be verified in accordance with specifications using in-place density testing.

B. When subgrade or existing ground surface is to receive fill and has a density less than that required for fill, break up ground surface to depth required, pulverize, moisture condition or aerate soil and re-compact to required density.

C. Place fill material in layers to required elevations for each location listed below.

1. Under grass, subbase or base material, use satisfactory excavated or borrow soil material.

2. Under walks and pavements, curbs, steps, ramps, building slabs, footings and foundations use subbase and/or base material.

3.10 MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.

B. Do not place backfill or fill material on surfaces that contain excessive moisture.

C. Remove and replace, or scarify and air-dry satisfactory soil material that is too wet to compact to specified density. Stockpile or spread and dry removed wet satisfactory soil material.

3.11 COMPACTION

A. Place backfill and fill materials in layers or lifts not more than 12 inches in loose depth for material compacted by heavy compaction equipment, and not more than 8 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill materials evenly on all sides of structures to required elevations. Place backfill and fill uniformly along the full length of each structure.

C. Percentage of Maximum Dry Density Requirements: Compact soil to not less than the following percentages of maximum dry density according to ASTM Modified Proctor):

1. Under structures, building slabs, steps, and pavements, compact each layer of backfill or fill material at a minimum of 98% Modified Proctor of the material's maximum dry density.

2. Under lawn or unpaved areas, compact each layer of backfill or fill material at 95% Modified Proctor maximum dry density.

3.12 GRADING

A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between existing adjacent grades and new grades.

2. Cut out soft spots, fill low spots, and trim high spots to conform to required surface tolerances.

B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Lawn or Unpaved Areas: Plus or minus 0.10 foot.

2. Walks: Plus or minus 0.10 foot.

3. Pavements: Plus or minus ½ inch.

3.13 STABILIZED SUBGRADE

A. For stabilized subgrade the type of materials, commercial or local, is at the Contractor's option and no separate payment for stabilizing materials will be made (other than as may be paid for as borrow).

B. When stabilizing is designated as Type B, compliance with the bearing value requirements will be determined by the Limerock Bearing Ratio Method. Minimum LBR shall be 40.

C. It is the Contractor's responsibility that the finished roadbed section meets the bearing value requirements, regardless of the quantity of stabilizing materials necessary to be added. Also, full payment will be made for any areas where the existing subgrade materials meet the design bearing value requirements without the addition of stabilizing additives, as well as areas where the Contractor may elect to place select high-bearing

materials from other sources, within the limits of the stabilizing.

D. After the roadbed grading operations have been substantially completed, the Contractor shall make his own determination as to the quantity (if any) of stabilizing material, of the type selected by him, necessary for compliance with the bearing value requirements. The contractor shall notify the Engineer of the approximate quantity to be added, and the spreading and mixing-in of such quantity of materials shall meet the approval of the County as to uniformity and effectiveness.

3.14 FIELD QUALITY CONTROL

A. Testing Agency Services: Allow testing agency to inspect and test each subgrade and each fill or backfill layer. Do not proceed until test results for previously completed work verify compliance with requirements.

1. Perform field in-place density tests according to ASTM D 1556 (sand cone method), ASTM D 2167 (rubber balloon method), ASTM D 293 (drive cylinder method), or ASTM D 2922 (nuclear method), as applicable.

a. Field in-place density tests may also be performed by the nuclear method according to ASTM D 2922, provided that calibration curves are periodically checked and adjusted to correlate to tests performed using ASTM D 1556. With each density calibration check, check the calibration curves furnished with the speedy moisture meter according to ASTM D 3017.

b. When field in-place density tests are performed using nuclear methods, make calibration checks of both density and speedy moisture meter at beginning of work, on each different type of material encountered, and at intervals as directed by the Engineer.

2. Paved Areas: Make at least one field density test of subgrade, base, and each compacted fill layer for every 300 linear feet of roadway or equivalent area, but in no case less than two tests. Tests shall be staggered to ensure representative sampling.

3. Unpaved Areas: Make at least one field density test of each compacted fill layer or subgrade for every 1000 square yards of area, but in no case less than two tests.

4. Other tests may be required at County’s discretion.

B. If, in the opinion of the County, based on testing service reports and

inspection or the Engineer's observations, subgrades, fills, or backfills are below specified density, scarify and moisten or aerate as needed, or remove and replace soil to the depth required, re-compact, and re-test until required density is obtained at no additional expense.

3.15 REPAIR & CORRECTIONS

A. Protecting Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris. Repair and re-establish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or lose compaction due to subsequent construction operations or weather conditions. Scarify or remove and replace material to depth directed by the Engineer; reshape and re-compact at optimum moisture content to the required density.

B. Settling: Where settling occurs, remove finished surfacing, backfill with additional approved material, compact, and reconstruct surfacing. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

C. When traffic must cross open trenches, the contractor shall provide suitable bridge of graded aggregate base or temporary asphalt paving as directed by County at no additional expense. (See Section 4060 for additional requirements.)

D. Erosion Control: The Contractor shall be responsible for the prevention of erosion from the site and for maintaining filled and graded surfaces for the duration of the project. This includes, but is not limited to, the erection of a silt fence and hay bale barricade as per Florida Stormwater Erosion and Sedimentation Control Inspector's Manual and/or as shown in the construction plans. The Contractor shall take whatever steps necessary to prevent erosion and sedimentation, and will be responsible for any damages which might occur to down-land properties as a result of run-off from the site during sitework construction at no additional cost. Provide erosion control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.16 DISPOSAL OF SURPLUS AND WASTE MATERIALS

Surplus excavated material becomes the property of the Contractor unless otherwise noted. Waste materials, including unsatisfactory soils, trash and debris shall be removed and legally disposed of, off the Owner's property.

3.17 CLEAN-UP AND FINAL INSPECTION

Before final inspection and acceptance the Contractor shall clean ditches, shape

shoulders and restore all disturbed areas, including street crossings, grass plots, re-grassing if necessary, to as good a condition as existed before work started.

PART 4 - MEASUREMENT/PAYMENT

4.1 METHOD OF MEASUREMENT

A. Excavation: When payment for excavation is on a volumetric basis, the quantity to be paid for will be the volume, in cubic yards, calculated by the method of average end areas according to the survey and plans. If actual quantities vary in field, contractor shall communicate with Engineer and/or County to request additional payment. The measurement will include the net volume of material between the original ground surface and the surface of completed earthwork according to the survey and plans. If actual quantities vary in field, contractor shall communicate with the County to request additional payment. Excavation for swales and channels will be included in the total quantity for Excavation. Subsoil Excavation will be measured to the lines and grades indicated on the plans or as approved by the County. Backfill material shall either include normal excavation material from within project limits or borrow material supplied by the Contractor.

B. Embankment: Quantities for Embankment will be calculated by the method of average end or square yard areas, and will include material placed above the original ground line, within the lines and grades indicated on the plans or as directed by the County.

C. Calcium Chloride for Dust Control: The quantity to be paid for will be the weight, in tons, of calcium chloride authorized and acceptably spread on the road, within the limits specified by the County. The quantity will be determined from scales, certified freight bills, or other sources, the accuracy of which can be authenticated.

4.2 BASIS OF PAYMENT

A. General: Prices and payments for the various work items included in this section will be full compensation for all work described herein, including excavating, dewatering, dredging, hauling, placing, and compacting. Separate pay items will be provided for all devices required to maintain control of erosion according to plans and NPDES permit. Additional devices shall be no additional cost.

B. Excavation: Unit prices will be established for required cubic yard volumes of Regular Excavation, Subsoil Excavation, and Borrow Excavation as necessary. When subsoil excavation is required to a depth greater than plans and specifications require, and additional excavation is not due to unsuitable, a change order will be required to establish a new quantity utilizing the current unit price.

C. Embankment: Payment shall be made at the unit contract price for Embankment, cubic yard or square yard, in place, according to plans.

D. Calcium Chloride for Dust Control: Price and payment will be full compensation for all work and materials specified for this item, including specifically all required shaping and maintenance of the treated area and all water furnished and applied to the area.

E. Dewatering: The contractor shall include the cost of dewatering in the unit price bid for the stormwater pipe if there is not a specific line item used in the contract.

END OF SECTION 02300

SECTION 02320 - UNDERDRAIN AND EXFILTRATION TRENCH

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawing and general provisions of Contract, including General and Supplementary Conditions and other Specification Sections, apply to work of this Section.

B. Florida Department of Transportation, *Standard Specifications for Road and Bridge Construction*, *Section 440, and Design Standards, Latest Edition*.

1.2 DESCRIPTION OF WORK

This section shall cover the work of furnishing pipe for underdrain and exfiltration trenches, the type and size shown on the plans or in the proposal in accordance with the requirements of these specifications, and installing such pipe at the locations shown on the plans or designed by the County in substantial conformity with the established lines, trench widths, filter media, and grades. The work shall include furnishing and construction of such joints and connections to other pipes as may be required to complete the work, as shown on the plans or directed, together with the specified trench, filter media, and filter fabric materials. Filter media may be sand, gravel, gravel pack, and/or a combination thereof.

PART 2 - PRODUCTS

A. Underdrain Pipe: Underdrain pipe shall conform to the requirements of Florida Department of Transportation Standard Specification 948-2, Latest Edition. The perforations shall meet the requirements for perforations as specified in AASHTO M294. Pipe shall be perforated polyethylene ADS N-12 or approved equal.

B. Filter Aggregate shall be clean, washed gravel free of organic material and fines with minimum 33% percent voids. Aggregate shall be at least FDOT stone or equivalent.

C. Filter Fabric shall be Terratex EP (Woven) or approved equal meeting the requirements of FDOT Specification Section 985.

D. Filter sand shall be clean sand, free of organic materials and fines, with an effective grains size of 0.20 to 0.55 mm, uniformity coefficient of 1.5 to 4.0, a K value (recommended design permeability) not to exceed 2.5 ft/hr, and the contractor shall provide a grain-size analysis to the County for the project.

PART 3 - EXECUTION

3.1 STANDARD INSTALLATION:

A. Trenches shall be excavated to the dimensions shown on the plans or as directed. A bedding layer of filter aggregate or filter sand of the size shown on the plans shall be placed in the bottom of the filter fabric lined trench for its full width and length and compacted as directed.

B. Subdrainage pipe of the type and size specified shall be embedded firmly in the bedding material. All pipe sections shall be securely joined with the appropriate coupling fittings or bands as per manufacturer's specifications.

C. After the pipe installation has been inspected and approved, the specified filter aggregate, gravel pack, and/or filter sand shall be placed as shown on the drawings and filter fabric wrapped around the filter media with a minimum overlap (as required) on top. Install wire mesh at opening/outfall. Care shall be taken not to displace the pipe.

D. The Contractor shall take every precaution to prevent the entrance of soil and sediments into the filter bed during construction, which would sacrifice the integrity of the filter fabric and aggregate installed. Stormwater runoff and sedimentation controls to be provided so as to protect the underdrain or exfiltration trench system.

E. Installation of the corrugated polyethylene pipe shall be in accordance with the ASTM D-2321 Latest Revision.

F. Gravel packs shall be installed around the filter-drain underdrain pipe an average thickness of at least six inches from the underdrain pipe for all underdrain systems located within pond bottoms and pond banks. The minimum separation between the gravel pack and the top of the filter bed shall be two feet. A permeable filter fabric shall be wrapped around the gravel pack.

G. Cleanouts or inspection boxes shall be installed, at minimum, every 400 feet or as specified by plan, at every directional change or bend, and at the beginning (upstream) and at the terminus (downstream) of the underdrain pipes or exfiltration trench systems.

H. Cleanouts shall have vertical portions non-perforated, include water-tight caps, and shall incorporate fittings (wye fittings or elbow bends) that have an angle no less than 45 degrees.

PART 4 – MEASUREMENT/PAYMENT

4.1 METHOD OF MEASUREMENT

The quantities to be paid for will be the length, in feet, of underdrain, which include trench filter fabric, 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 and cleanouts to be paid for will be the number completed and accepted. When payment for gravel or sand filter media is on a volumetric basis, the quantity to be paid for will be the volume, in cubic yards, calculated based upon the length, width, and depth of the underdrain or exfiltration trench dimensions, minus the pipe volume, as shown on the plans, unless the filter media is specified as a bid item included in the costs of the underdrain or exfiltration system.

4.2 BASIS OF PAYMENT

Prices and payment for this item shall include all labor, equipment and materials necessary to complete the work in accordance with the plans and specifications. Materials covered under this pay item include but are not limited to: pipe including fittings, filter fabric, filter media, filter sand, filter aggregate, cleanout structures and inspections boxes. Payment shall be made for the underdrain or exfiltration pipe based upon the length of pipe. Unit prices will be established for the number of cleanouts structures and inspection boxes, unless otherwise specified as a bid item included in the under underdrain or exfiltration trench system. Unit prices will also be established for required cubic yard volume of gravel or sand filter media based upon the length, width, and depth of the underdrain or exfiltration trench, minus the pipe volume, as shown on the plans, unless otherwise specified as a lump sum bid item included in the costs of the underdrain or exfiltration trench system. No additional payment will be made for filter media overages larger than the specified plan volume. No additional payment will be made for excavation of the trench or lining the trench with filter fabric. No additional payment will be made for underdrain pipe with a sock filter fabric.

END OF SECTION 02320

SECTION 02340 - RIPRAP

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Florida Department of Transportation, *Standard Specifications for Road and Bridge Construction*, *Section 530*, and *Design Standard Index 281*, *Latest Edition*.

1.2 DESCRIPTION OF WORK

This section shall cover the work of furnishing and constructing the Riprap which shall consist of a protective course of stone or other approved materials on embankment slopes, in channels, or other work as shown on the plans or directed, with or without a Filter Blanket, all in accordance with these Specifications and in conformity with the lines and grades noted in the plan details.

PART 2 - PRODUCTS

2.1 MATERIALS

Rubble\Stone Riprap shall comply with Florida Department of Transportation *Standard Specification 530-2.2*

A. Banks and shore protection shall comply with Florida Department of Transportation *Standard Specification 530-2.2.1*.

B. Ditch lining shall comply with Florida Department of Transportation *Standard Specification 530-2.2.2*.

C. Broken stone and broken concrete shall comply with Florida Department of Transportation *Standard Specification 530-2.2.3*.

D. Geotextile fabric shall comply with Florida Department of Transportation *Standard Specification 514* and Florida Department of Transportation *Design Standards, Index No. 199* according to its application.

E. Bedding stone shall comply with Florida Department of Transportation *Standard Specification 530-2.3*.

F. Sand/Cement Riprap: Materials and placement shall comply with Florida Department of Transportation *Standard Specification 530-2.1*.

PART 3 - EXECUTION

3.1 EXECUTION

A. Construction Requirements:

General: All slopes to be treated with riprap shall be trimmed to the lines and grades indicated by the plans or directed, such that the plan grades are the top of the placed riprap, unless otherwise noted. Loose material shall be compacted by methods approved by the Engineer or removed.

Slopes which require a filter blanket under the riprap shall, in addition to the above, be prepared as noted below.

1. Placement of any riprap on a filter blanket shall be by such means that will not damage or destroy the blanket. Any damage to the blanket shall be repaired without additional compensation.

2. Unless directed otherwise by the Engineer or shown by plan details, all outer edges and the top of riprap where the riprap terminates shall be formed so that the surface of the riprap will be embedded and even with the surface of the ground and/or slope.

3. All riprap construction shall begin at the bottom of the slope and progress upward.

4. Filter Blanket: Unless otherwise specified by the plans or ordered in writing, a fabric blanket will not be allowed for soils with 85% by weight passing the No. 200 sieve (U.S. Std.)

5. The bedding stone shall be constructed in accordance with Florida Department of Transportation Specification 530-3.3.

6. Foundation Preparation: Areas on which filter fabrics are to be placed shall be uniformly trimmed and dressed to conform to cross-sections shown by the plans.

B. Plastic Filter Fabric (Geotextile):

Plastic filter fabric shall be placed in the manner and at the locations shown in the plans or as directed by the Engineer. At the time of installation, fabric shall be rejected if it has defects, rips, holes, flaws, deterioration or damage incurred during manufacturer, transportation or storage. The fabric shall be placed with the long dimension parallel to the centerline of the channel or shoreline unless otherwise directed by the Engineer, and shall be laid smooth and free of tension, stress, folds, wrinkles or creases. The strips shall be placed to provide a minimum

width of 24 inches of overlap for each joint with the upstream strip of fabric overlapping the downstream strip. Overlap joints and seams shall be measured as a single layer of cloth. Securing pins with washers shall be inserted through both strips of overlapped cloth as recommended by the manufacturer, but no greater than the following intervals along a line through the midpoint of the overlap.

Pin Spacing	Slope
2 ft.	Steeper than 3:1
3 ft.	3:1 to 4:1
5 ft.	Flatter than 4:1

The fabric shall be turned down and buried two feet at all exterior limits except where a stone-filled key is provided below natural ground.

Additional pins regardless of location shall be installed as necessary to prevent any slippage of the filter fabric. Overlaps in the fabric shall be placed so that any upstream strip of fabric will overlap the downstream strip. Should the Engineer direct that the fabric be placed with the long dimension perpendicular to the centerline of the channel or shoreline, the lower strip of fabric shall underlap the next higher strip. Each securing pin shall be pushed through the fabric until the washer bears against the fabric and secures it firmly to the foundation. The fabric shall be protected at all times during construction from contamination by surface runoff and any fabric so contaminated shall be removed and replaced with uncontaminated fabric. Any damage to the fabric during its installation or during placement of riprap shall be replaced by the Contractor. The work shall be scheduled so that the manufacturer's recommendation for UV exposure is not exceeded or 5 days does not expire between placement of the fabric and the covering of the fabric with riprap, whichever is less.

3.2 STONE AND CONCRETE RUBBLE RIPRAP

General: Unless otherwise shown by plan details or directed, stone or concrete shall not be placed on slopes steeper than the natural angle of repose of the riprap material.

Placement of stone or concrete may, unless otherwise noted hereinafter, be placed by methods and equipment suitable for the purpose of placing the riprap in accordance with the requirements for the class riprap involved without damaging any existing facility or construction material.

The stone or concrete shall be placed in such a manner as to produce a reasonably well graded mass of rock with the minimum practical percentage of voids. Stone or concrete shall be laid with close broken joints and resting on the embankment slope. The top of the riprap shall be constructed to the lines, grades and thickness shown by the plans or as directed. Riprap shall be placed

to its full course thickness in one operation and in such a manner as to avoid displacing or damaging the filter blanket material. The larger stone or concrete shall be well distributed and the entire mass of stone or concrete, in their final position, shall conform to a reasonable uniform gradation. The finished riprap shall be free from objectionable pockets of small stone or concrete and clusters of larger stone or concrete. Open joints shall be filled with spalls, or small stone or concrete in such manner that all stone or concrete are tightly wedged or keyed. Placing riprap by dumping into chutes or by other methods likely to cause segregation of sizes will not be permitted. The desired distribution of the various sizes of stone or concrete throughout the mass shall be obtained by selective loading of the material at the source, by controlled dumping of successive loads during final placing, or by other methods of placement which will produce the specified results. The individual pieces of stone or concrete in each horizontal course shall be laid so that they will not break away from embankment. Rearranging of individual stone or concrete by mechanical equipment, or by hand, will be required to the extent necessary to obtain a reasonably well graded distribution of stone or concrete as specified above.

3.3 SAND/CEMENT RIPRAP

A. Placing: Immediately following mixing, the mixture shall be placed in the bags, tied (so that when laid in position, they will flatten out and give a thickness of not less than six inches) and placed flat on the area designed. Use only one type of bag per structure. Bags shall be layered and wedged against each other to form closed joints, with tied ends of sacks all laid in the same direction. Sacks ripped or torn in placing shall be removed and replaced with sound, unbroken sacks. When required to be placed under water, special care shall be taken to see that bags are closely jointed to give the same tight joints as required on dry slopes. After the riprap is placed, it shall be sprinkled with water as directed and kept damp for not less than three days. No sand/cement riprap shall be mixed in freezing weather.

B. Grouting: Immediately after watering, all openings between sacks shall be filled with dry grout composed of one part Portland cement and five parts sand.

C. Pinned/Staked Bags: Bags shall be pinned/staked when called for on drawings.

3.4 CLEAN UP

Before final inspection and acceptance, the Contractor shall remove all excess material from site and restore all disturbed areas to as good a condition as existed before work started.

3.5 MAINTENANCE

The Contractor shall maintain all riprap until the contract work is accepted, and shall replace, without additional compensation, any damaged or missing riprap.

PART 4 – MEASUREMENT/PAYMENT

4.1 METHOD OF MEASUREMENT

A. Sand-Cement: The quantity to be paid for will be the volume, in cubic yards, of sand actually used in the sand cement mixture and grout, satisfactorily placed and accepted. If sand is proportioned by volume, the sand will be measured loose in an approved measure prior to mixing with cement. If sand cement is proportioned by weight, approved scales will be used for this purpose and the volume will be calculated using a standard conversion factor for sand of 85lbs. /cubic feet. No adjustment of batch weights to allow for varying moisture content of the sand will be made.

B. Stone/Concrete Rubble and Bedding Stone: The quantities to be paid for will be, as per plans/bid schedule, and either by the weight in tons in surface dry natural state; by railroad scales, truck scales, or barge displacement, or by square yards (according to plan thickness.) The Contractor shall determine the weights as follows:

1. Railroad Weights: The Contractor shall weight railroad cars on railroad scales, before and after loading or before and after unloading. If weighed by other than the Engineer, a certified statement of weights will be required. Certificates of weight, furnished by the railroad company, will be accepted without further certification.

2. Truck Weights: The Contractor shall weigh trucks on certified scales, loaded and empty, as prescribed above for railroad weights. The Contractor shall weigh trucks in presence of the Engineer, or furnish certificates of weights.

3. Barge Displacement: The Engineer will measure each barge. The Contractor shall fit each barge with gauges graduated in tenths of a foot increment. The Contractor shall locate a gauge at each corner of the barge near the lower end of the rake. The Contractor shall furnish additional gauges amidships, if the Engineer deems necessary. The Engineer will review and check all computed weights. Weight certificates may be submitted.

4. In Place Measurement: The Contractor shall measure surface area (in square yards) of area riprap has been placed.

4.2 BASIS OF PAYMENT

A. Sand-Cement: Price and payment will be full compensation for all work specified in this Section, including all materials, labor, hauling, excavation, and backfill. The Contractor shall include the cost of dressing and shaping the existing fills (or subgrade) for placing riprap in the Contract unit price for Riprap (Sand-Cement.)

B. Stone/Rubble: Price and payment will be full compensation for all work specified in this Section, including all materials, hauling, excavation, and backfill. The Contractor shall include the cost of dressing and shaping the existing fill (or subgrade) for placing riprap in the Contract unit price for Riprap (Stone/Rubble). As an exception to the above, concrete that is shown to be removed from the project site and subsequently disposed of by being crushed and used in the embankment as riprap will not be paid for under this section. Include the cost of such work order 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. The Contractor shall include the cost of dressing and shaping the existing fills (or subgrade) for placing bedding stone in the Contract unit price for Riprap (Stone/Rubble).

END OF SECTION 02340

SECTION 02400 - GRADED AGGREGATE BASE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including General and Supplementary Conditions and other Specification Sections, apply to the work of this section.

1.2 DESCRIPTION OF WORK

This item shall consist of a base course of graded aggregate constructed on a subgrade prepared in accordance with the specifications and in conformity with the line, grades and typical cross-section as shown on the drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

Use graded aggregate material which yields a satisfactory mixture meeting all the requirements of these Specifications after it has been crushed and processed as a part of the mining operations.

The Contractor may furnish the material in two sizes of such gradation that, when combined in a central mix plant pugmill, the resultant mixture meets the required specifications.

Use graded aggregate base material of uniform quality throughout, substantially free from organic matter, shale, lumps and clay balls, and having a Limerock Bearing Ratio value of not less than 98. Use material retained on the No. 10 sieve composed of aggregate meeting the following requirements:

Soundness Loss, Sodium, Sulfate: AASHTO T 104.....15%
Percent Wear: AASHTO T 96 (Grading A)
Group 1 Aggregates..... 45%
Group 2 Aggregates..... 65%
Group 1 : This group of aggregates is composed of limestone, marble, or dolomite.
Group 2: This group of aggregates is composed of granite, gneiss, or quartzite.
Use graded aggregate base material meeting the following gradation:

Sieve Size	Percent by Weight Passing
2 inch	100
1 1/2 inch	95 to 100
3/4 inch	65 to 90
3/8 inch	45 to 75
No. 4	35 to 60

No. 10	25 to 45
No. 50	5 to 25
No. 200	0 to 10

For Group 1 aggregates, ensure that the fraction passing the No. 40 sieve has a Plasticity Index (AASHTO T 90) of not more than 4.0 and a Liquid Limit (AASHTO T 89) of not more than 25, and contains not more than 67% of the weight passing the No. 200 sieve.

For Group 2 aggregates, ensure that the material passing the No. 10 sieve has a sand equivalent (AASHTO T 176) value of not less than 28.

The Contractor may use graded aggregate of either Group 1 or Group 2, but only use one group on any Contract. (Graded aggregate may be referred to hereinafter as "aggregate".)

2.2 EQUIPMENT

The aggregate shall be spread by mechanical rock spreaders, equipped with a device which strikes off the aggregate uniformly to laying thickness, and capable of producing an even distribution of the aggregate. For crossovers, intersections and ramp areas; for roadway widths of 20 feet or less; for the main roadway area when forms are used and for any other areas where the use of a mechanical spreader is not practicable; spreading may be done by bulldozers or blade graders. All equipment for proper construction of this project shall be in first-class working condition.

PART 3 - EXECUTION

3.1 TRANSPORTING GRADED AGGREGATE

The graded aggregate shall be transported to the point where it is to be used, over aggregate previously placed if practical, and dumped on the end of the preceding spread. Hauling over the subgrade and dumping on the subgrade will be permitted when, in the County's opinion, these operations will not be detrimental to the subgrade.

3.2 SPREADING GRADED AGGREGATE

A. Method of Spreading: The graded aggregate shall be spread uniformly. All segregated areas of fine or coarse aggregate shall be removed and replaced with properly graded aggregate.

B. Number of Courses: When the specified compacted thickness of the base is greater than six 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 material added to bear the weight of the construction equipment without disturbing the

subgrade. When compacted thickness is six inches or less, graded aggregate shall be placed in one lift.

3.3 COMPACTING AND FINISHING BASE

A. Single-Course Base: For single-course base, after the spreading is completed, the entire surface shall be scarified and then shaped so as to produce the required grade and cross-section, free of scabs and laminations, after compaction.

B. Multiple-Course Base: For multiple-course base, the first course shall be cleaned of foreign material and bladed and brought to a surface cross-section approximately parallel to that of the finished base. Prior to the spreading of any material for the upper course, the density tests for the lower course shall be made, and the County shall have proof that the required compaction has been obtained. After the spreading of the material for the second course is completed, its surface shall be finished and shaped so as to produce the required grade and cross-section after compaction, and free of scabs and laminations.

C. Moisture Content: When the material does not have the proper moisture content to ensure the required density, wetting or drying will be required. When water is added, it shall be uniformly mixed-in by disking to the full depth of the course which is being compacted. Water shall be added before beginning compaction operations. Wetting or drying operations shall involve manipulation, as a unit, of the entire width and depth of the course which is being compacted. This shall be performed utilizing the speedy moisture meter.

3.4 DENSITY REQUIREMENTS

As soon as proper conditions of moisture are attained, the material shall be compacted to a density of not less than 98% of the modified proctor maximum density as determined by AASHTO T-180 (Modified Proctor.)

3.5.1 TESTING SURFACE, PROTECTION, AND MAINTENANCE

A. Density Tests: A minimum of at least one field density test on each course of compacted base shall be performed for every 500 square yards, or every 300 linear feet of road pavement, or as directed by the Engineer. Additional tests may be made if deemed necessary by the Engineer and/or County/CEI.

B. During 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.

C. Correction of Defects: Contamination of Base Material: If, at any time, the subgrade material should become mixed with the base course materials, the Contractor shall, without additional compensation, dig out and remove the mixture, reshape and compact the subgrade and replace the materials removed with clean base material, which shall be shaped and compacted as specified above.

D. Cracks and Checks: If cracks or checks appear in the base, either before or after priming, which in the opinion of the County, would impair the structural efficiency of the base, the Contractor shall remove the cracks or checks by re-scarifying, reshaping, adding base material where necessary, and re-compacting, without additional compensation.

E. Compaction of Widening Strips: Where base construction consists of widening strips and the trench width is not sufficient to permit use of standard base compaction equipment, compaction shall be accomplished by use of vibratory compactors, trench rollers, mechanical plate tampers, or other special equipment which will achieve the density requirements specified herein. When multiple-course base construction is required by the plans or specifications, the required compaction shall be achieved in each course prior to spreading material for the overlaying course.

F. Testing Surface: The finished surface of the base course shall be checked from the required crown and ensure longitudinally a smooth, consistent surface for the placement of the asphalt course(s). All irregularities, greater than 1/4 inch per 15' straight edge test, shall be corrected, after which the entire area shall be re-compacted and tested as specified herein before. In the testing of the surface, the measurements will not be taken in small holes caused by individual pieces of rock having been pulled out by the grader.

G. Priming and Maintaining:

Priming: The prime coat shall be applied only when the base meets the specified density requirements and the moisture content in the top half of the base does not exceed 90% of the optimum moisture of the base material. At the time of priming, the base shall be firm, unyielding and in such condition that no undue distortion will occur. See FDOT Prime Coat Specification.

Maintaining: The Contractor will be responsible for assuring that the true crown and template are maintained, with no rutting or other distortions, and that the base meets all the requirements, at the time the surface course is applied.

H. Thickness Requirements:

Measurements: Thickness of the base shall be measured at intervals in

such a manner that each test represents 500 square yards, or every 300 linear feet of road pavement, or as otherwise directed by the County. Measurements shall be taken at various points on the cross-section, through holes not less than three inches in diameter.

Areas Requiring Correction: Where the compacted base is deficient by more than ½ inch from the thickness called for in the plans, the Contractor shall correct such areas. The affected areas shall then be brought to the required state of compaction and to the required thickness and cross-section.

PART 4 - MEASUREMENT/PAYMENT

4.1 METHOD OF MEASUREMENT:

The quantity to be paid for will be the area, in square yards, completed and accepted.

4.2 BASIS OF PAYMENT:

Price and payment will be full compensation for all work specified in this section, including dust abatement, correcting all defective surfaces and deficient thickness, removing cracks and checks, the additional aggregate required for such crack elimination, and the prime coat.

END OF SECTION 02400

SECTION 02410 – RECYCLED CONCRETE AGGREGATE BASE
(CRUSHED CONCRETE)

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including General and Supplementary Conditions and other Specification Sections, apply to the work of this section.

1.2 The County recognizes the beneficial reuse of construction materials where said materials can be used in a manner that provides a construction product meeting specifications adopted by state and/or federal agencies. As such, the County shall allow, as noted below, the use of Recycled Concrete Aggregate (RCA) for the purpose of constructing an aggregate base course for the placement of an asphaltic concrete surface course in accordance with this section.

1.3 This section shall conform to section 2400 G.A.B. except as noted.

1.4 SPECIFIC CONSENT REQUIRED

Recycled Concrete Aggregate may only be used on projects with specific written consent of the County Engineer, or designee, subject to the conditions outlined herein. No such permission shall be given until the requirements of Items 2.1 through 3.1.A-D have been affirmatively addressed by the Engineer of Record for the project. Additionally, construction may not proceed until the requirements of Item 3.2.B have been addressed. Should construction commence more than six months after the date of the geotechnical report and/or roadway locations and/or elevations change, a geotechnical addendum shall be submitted confirming groundwater elevations. Should County staff observe differing construction or material conditions after approval; additional testing or re-evaluation of existing conditions for use may be required. RCA installations not in compliance with these specifications shall be subject to removal and replacement.

PART 2 - PRODUCTS

2.1 MATERIALS

The material requirements of Recycled Concrete Aggregate shall be in accordance with the Florida Department of Transportation Special Provisions Specification Section 204, “Graded Aggregate Base.”

A. Recycled Concrete Aggregate used shall not be required to comply with FDEP source approval requirements specified in FAC 62-701.730 or be qualified as a clean debris source under FDEP rules, as outlined in Florida Department of Transportation Special Provisions Specification Section 204-2.2, “Graded Aggregate Base.” The aggregate supplied shall be

SECTION 02500 – SUPERPAVE ASPHALT CONCRETE

PART 1 - GENERAL

1.1 GENERAL

A. Construct a Type SP Asphalt pavement for local agencies using the type of mixture specified in the Contract, or when offered as alternates, as approved.

B. For this Section only, all references to the Department shall mean the County. All references to the Engineer shall mean the Engineer of Record, designated Engineer of Escambia County and/or CEI.

C. The County will accept the work based on one of the following methods as described in Part 5: 1) Certification, 2) Certification and process control testing by the Contractor, 3) acceptance testing by the County, or 4) other method(s) as determined by the Contract.

1.2 LAYER THICKNESSES

A. Use only fine graded Type SP asphalt mixes. Fine graded mixes are defined as having a gradation that passes above the restricted zone when plotted on an FHWA 0.45 Power Gradation Chart.

B. FINE MIXES: The allowable structural layer thicknesses for fine Type SP Asphalt Concrete mixtures are as follows:

Type SP 9.5	1-1 ½ inches
Type SP 12.5	1 ½ - 2 ½ inches
Type SP 19.0	2-3 inches

In addition to the minimum and maximum thickness requirements, the following restrictions are placed on fine mixes when used as a structural course:

Type SP 9.5 - Limited to the final (top) structural layer, one layer only

Type SP 12.5 - May not be used in the first layer of courses over 3 1/2 inches thick, nor in the first layer of courses over 2 3/4 inches thick on limited access facilities.

The thickness of the new pavement may be checked by core samples, as determined by the Engineer. The Contractor shall be required to correct any deficiency either by replacing the full thickness; or overlaying the area as directed by the Engineer. County inspection shall be performed and all base failures shall be corrected prior to asphalt installation.

Type SP 19.0 - May not be used in the final (top) structural layer.

C. ADDITIONAL REQUIREMENTS: The following requirements also apply to fine Type SP Asphalt Concrete mixtures:

1. A minimum 1 1/2 inch initial lift is required over an Asphalt Rubber Membrane Interlayer (ARMI).

2. When construction includes the paving of adjacent shoulders (5 feet wide or less), the layer thickness for the upper pavement layer and shoulder shall be the same and paved in a single pass, unless shown differently in the plans.

3. Use the minimum and maximum layer thicknesses as specified in 1.2 B above unless shown differently in the plans. On variable thickness overbuild layers, the minimum allowable thickness may be reduced by 1/2 inch, and the maximum allowable thickness may be increased 1/2 inch, unless shown differently in the plans.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

Meet the material requirements specified in FDOT Standard Specifications Division III. Specific references are as follows:

Superpave PG Asphalt Binder or Recycling Agent – Sections 916-1, 916-2
Coarse Aggregate, Stone, Slag or Crushed Gravel – Section 901
Fine Aggregate – Section 902

Aggregates utilized on Escambia County projects must be in accordance with FDOT Qualified Products List

2.2 GRADATION REQUIREMENTS

Combine the coarse and fine aggregate in proportions that will produce an asphalt mixture meeting all of the requirements defined in this Specification and conform to the gradation requirements at design as defined in Table 1 below. Aggregates from various sources may be combined.

Table 1
Aggregate Gradation Control Points
(Gradation Design Ranges)

	Type SP Asphalt Mixture (Percent Passing)					
	SP 9.5		SP 12.5		SP 19.0	
Sieve Size	Min.	Max.	Min.	Max.	Min.	Max
1 inch	-	-	-	-	100	-

3/4 inch	-	-	100	-	90	100
1/2 inch	100	-	90	100	-	90
3/8 inch	90	100	-	90	-	-
No. 4	-	90	-	-	-	-
No. 8	32	67	28	58	23	49
No. 200	2	10	2	10	2	8
For additional information, refer to AASHTO M-323-04, Table 3						

2.3 RESTRICTED ZONE

The gradation identified in 2.2 shall pass above the restricted zone specified in Table 2 below.

Table 2
Aggregate Gradation Restricted Zone
(Design Only)

Sieve Size within Restricted Zone	Boundaries of Restricted Zone Type SP Asphalt Mixture (Percent Passing)					
	SP 9.5		SP 12.5		SP 19.0	
	Min.	Max.	Min.	Max.	Min.	Max
No. 4	-	-	-	-	-	-
No. 8	47.2	47.2	39.1	39.1	34.6	34.6
No. 16	31.6	37.6	25.6	31.6	22.3	28.3
No. 30	23.5	27.5	19.1	23.1	16.7	20.7
For additional information, refer to AASHTO M-323-04, Table 4						

2.4 AGGREGATE CONSENSUS PROPERTIES

A. Meet the following consensus properties at design for the aggregate blend:

1. Coarse Aggregate Angularity: When tested in accordance with ASTM D 5821, meet the coarse aggregate angularity requirement defined in Table 3 below.

Table 3
Coarse Aggregate Angularity Criteria
(Minimum Percent Fractured Faces)

	Depth of Top of Pavement Layer From Surface			
	≤4 inches		>4 inches	
	1 or More Fractured Faces (%)	2 or More Fractured Faces (%)	1 or More Fractured Faces (%)	2 or More Fractured Faces (%)
	85	80	60	-
For additional information, refer to AASHTO M-323-04, Table 5				

2. Fine Aggregate Angularity: When tested in accordance with AASHTO T-304, meet the fine aggregate angularity requirement defined in Table 4 below.

Table 4 Fine Aggregate Angularity Criteria		
	Depth of Top of Pavement Layer From Surface	
	≤4 inches	>4 inches
	Minimum Uncompacted Void Content (%)	Minimum Uncompacted Void Content (%)
	45	40
For additional information, refer to AASHTO M-323-04, Table 5		

3. Flat and Elongated Particles: When tested in accordance with ASTM D 4791, use a ratio of maximum to minimum dimensions of 5:1 and do not exceed 10% as the maximum amount of flat and elongated particles.

2.5 USE OF RECLAIMED (MILLED) ASPHALT PAVEMENT

A. General Requirements: Reclaimed Asphalt Pavement (RAP) may be used as a component material of the asphalt mixture subject to the following:

1. The Contractor assumes responsibility for the design of asphalt mixes which incorporate RAP as a component material.

2. For design purposes, the Contractor assumes responsibility for establishing accurate specific gravity values for the RAP material. This may be accomplished by one of the following methods:

a. Calculation of the bulk specific gravity value based upon the effective specific gravity of the RAP, determined on the basis of the asphalt binder content and maximum specific gravity. The Engineer and/or Engineer of Record will approve the estimated asphalt binder absorption value used in the calculation.

b. Testing of the extracted aggregate obtained through a vacuum extraction or ignition oven extraction.

3. The amount of RAP material used in the mix is not to exceed 50% by weight of total aggregate.

4. Use a grizzly or grid over the RAP cold bin, in-line roller crusher, screen, or other suitable means to prevent oversized RAP material from showing up in the completed recycled mixture.

If oversized RAP material appears in the completed recycled mix, take the appropriate corrective action immediately. If the appropriate corrective actions are not taken immediately, plant operations should be stopped.

5. Provide stockpiled RAP material that is reasonably consistent in characteristics and contains no aggregate particles that are soft or conglomerates of fines.

6. Provide RAP, having minimum average asphalt content of 4.0% by weight of total mix. The Engineer may sample the stockpile to verify that this requirement is met.

B. Binder for Mixes with RAP: Select the appropriate binder based on the table below. The Engineer and/or Engineer of Record reserves the right to change binder type and grade at design based on the characteristics of the RAP binder, and reserves the right to make changes during production. Maintain the viscosity of the recycled mixture within the range of 4,000 to 12,000 poises. Obtain a sample of the mixture for the Engineer within the first 1,000 tons and at a frequency of approximately one per 4,000 tons of mix.

Binder Grade for Mixes Containing RAP	
% RAP	Asphalt Binder Grade
<20	PG 67-22
20-29	PG 64-22
≥ 30	Recycling Agent
Note: When a PG 76-22 Asphalt Binder is called for in the Contract, limit the amount of RAP material used in the mix to a maximum of 15%.	

PART 3 - GENERAL COMPOSITION OF MIXTURE

3.1 GENERAL

Compose the asphalt mixture using a combination of aggregate (coarse, fine or mixtures thereof), mineral filler, if required, and asphalt binder material. Size, grade and combine the aggregate fractions to meet the grading and physical properties of the approved mix design. Aggregates from various sources may be combined.

3.2 MIX DESIGN

A. Design the Type SP asphalt mixture in accordance with AASHTO PP-28, except as noted herein, to meet the requirements of this Specification. Use only previously approved designs. Prior to the production of any Type SP asphalt mixture, submit the proposed mix design with supporting

test data indicating compliance with all Type SP asphalt mix design criteria.

The Engineer and/or Engineer of Record will consider any marked variations from original test data for a mix design or any evidence of inadequate field performance of a mix design as sufficient evidence that the properties of the mix design have changed, and the Engineer and/or Engineer of Record will no longer allow the use of the mix design.

1. Grading Requirements: Meet Gradation Design Ranges in PART 2.

2. Gyratory Compaction: Compact the design mixture in accordance with AASHTO TP-4. Use the number of gyrations as defined in the table below.

Type SP Design Gyratory Compactive Effort			
	$N_{initial}$	N_{design}	$N_{maximum}$
SP Mixes	7	75	115

3. Volumetric Criteria: Use an air void content of the mixture at design of 4.0% at the design number of gyrations (N_{design}). Meet the requirements of the table below.

Mixture Densification Criteria			
	% G_{mm}		
	$N_{initial}$	N_{design}	$N_{maximum}$
SP Mixes	$\geq$ 89.0	96.0	$\leq$ 98.0

4. VMA Criteria: Meet the requirements of the table below for Voids in the Mineral Aggregate (VMA) of the mixture at the design number of gyrations.

VMA Criteria	
Type Mix	Minimum VMA (%)
SP 9.5	15.0
SP 12.5	14.0
SP 19.0	13.0

5. VFA Criteria: Meet the requirements of the table below for voids filled with asphalt (VFA) of the mixture at the design number of gyrations.

VFA Criteria	
	Design VFA (%)
SP Mixes	65 - 75

6. Dust Proportion: Use an effective dust-to-binder ratio as defined in FDOT Section 334-3.2.5.

7. Moisture Susceptibility: Provide a mixture (4 inch specimens) having a retained tensile strength ratio of at least 0.80 and a minimum tensile strength (dry and unconditioned) of 100 psi.

8. Additional Information: In addition to the requirements listed above, provide the following information with each proposed mix design submitted for use:

   a. The design number of gyrations (N_{design}).

   b. The source and description of the materials to be used.

   c. The FDOT source number product code of the aggregate components furnished from an FDOT approved source.

   d. The gradation and proportions of the raw materials as intended to be combined in the paving mixture. The gradation of the component materials shall be representative of the material at the time of use. Compensate for any change in aggregate gradation in handling and processing as necessary.

   e. A single percentage of the combined mineral aggregate passing each specified sieve. Degradation of the aggregate due to processing (particularly -No. 200 [-75 µm]) should be accounted for and identified for the applicable sieves.

   f. The bulk specific gravity value for each individual aggregate (and RAP) component as identified in the FDOT aggregate control program.

   g. A single percentage of asphalt binder by weight of total mix intended to be incorporated in the completed mixture, shown to the nearest 0.1%.

   h. A target temperature at which the mixture is to be discharged from the plant and a target roadway temperature (per 30-6.3). Do not exceed a target temperature of 340°F for modified asphalts and 315°F for unmodified asphalts.

   i. Evidence that the completed mixture conforms to all specified physical requirements.

   j. The name, seal, and/or certification of the Mix Designer.

3.3 REVISION OF MIX DESIGN

During production, the Contractor may request a target value revision to a mix design, subject to: (1) the target change falls within the limits defined in the table below, (2) appropriate data exists demonstrating that the mix complies with production air voids specification criteria, and (3) the mixture gradation meets the basic gradation requirements defined in 2.2 and 2.3.

Limits for Potential Adjustments to Mix Design Target Values	
Characteristic	Limit from Original Mix Design
No. 8 sieve and Coarser	± 5.0%
No. 16 sieve	± 4.0%
No. 30 sieve	± 4.0%
No. 50 sieve	± 3.0%
No. 100 sieve	± 3.0%
No. 200 sieve	± 1.0%
Asphalt Binder Content (1)	± 0.3%
(1) Reductions to the asphalt binder content will not be permitted if the VMA during production is lower than 1.0% below the design criteria.	

Submit all requests for revisions to mix designs, along with supporting documentation, to the Engineer. In order to expedite the revision process, the request for revision or discussions on the possibility of a revision may be made verbally, but must be followed up by a written request. The initial mix design will remain in effect until a change is authorized by the Engineer and/or Engineer of Record. In no case may the effective date of the revision be established earlier than the date of the first communication between the Contractor and the Engineer regarding the revision.

A new design mix will be required for any substitution of an aggregate product with a different aggregate code, unless approved by the Engineer and/or Engineer of Record.

3.4 PAVING EQUIPMENT

A. Mechanical Spreading and Screeding Equipment:

1. General: Provide mechanical spreading and screeding equipment of an approved type that is self-propelled and can be steered. Equip it with a receiving and distribution hopper and a mechanical screed. Use a mechanical screed capable of adjustment to regulate the depth of material spread and to produce the desired cross-section.

2. Automatic Screed Control: For all asphalt courses, placed with mechanical spreading and finishing equipment, equip the paving

machine with automatic longitudinal screed controls of either the skid type, traveling stringline type, or non-contact averaging ski type. Ensure that the length of the skid, traveling stringline, or non-contact averaging ski is at least 25 feet. On the final layer of base, overbuild, structural, and friction courses, use the joint matcher in lieu of the skid, traveling stringline, or non-contact averaging ski on all passes after the initial pass. Furnish a paving machine equipped with electronic transverse screed controls when required by the Contract Documents.

3. Inflation of Tires: When using paving machines equipped with pneumatic tires, the Engineer may require that the tires be ballasted.

4. Screed Width: Provide paving machines on full width lanes that have a screed width greater than 8 feet. Does not use extendable screed strike-off devices that do not provide preliminary compaction of the mat in place of fixed screed extensions. The Contractor may use a strike-off device on irregular areas that would normally be done by hand and on shoulders 4 feet or less in width. When using the strike-off device on shoulders in lieu of an adjustable screed extension, the Contractor must demonstrate the ability to obtain an acceptable texture, density, and thickness. When using an extendable screed device to extend the screed's width on the full width lane or shoulder by 24 inches or greater, an auger extension, paddle, or kicker device is required unless the Contractor provides written documentation from the manufacturer that these are not necessary.

5. Motor Graders: Provide two motor graders for spreading widening courses with prior approval from the Engineer only. Use motor graders that are rated at not less than 6 tons and are self-propelled and power-controlled. Mount them on smooth tread or rib-type tires (no lug types allowed) with a wheel base of at least 15 feet. Equip the front motor grader with a spreader box capable of spreading the mix at the required rate.

6. Rollers:

   a. Steel-Wheeled Rollers: Provide compaction equipment capable of meeting the density requirements described in these Specifications. Provide a tandem steel-wheeled roller weighing a minimum of 8 tons for seal rolling, and for the final rolling, use a separate roller with a minimum weight of 8 tons. Variations from these requirements shall be approved by the Engineer.

b. Traffic Rollers: Provide compaction equipment capable of meeting the density requirements described in these specifications. Provide a self-propelled, pneumatic-tired traffic roller equipped with at least seven smooth-tread, low pressure tires, equipped with pads or scrapers on each tire. Maintain the tire pressure between 50 and 55 psi or as specified by the manufacturer. Use rollers with a minimum weight of 6 tons. Do not use wobble-wheeled rollers. Variations from these requirements shall be approved by the Engineer.

c. Prevention of Adhesion: Do not allow the mixture to adhere to the wheels of any rollers. Do not use fuel oil or other petroleum distillates to prevent adhesion. Do not use any method which results in water being sprinkled directly onto the mixture.

7. Trucks: Transport the mix in trucks of tight construction, which prevents the loss of material and the excessive loss of heat. Provide each truck with a tarpaulin or other waterproof cover mounted in such a manner that it can cover the entire load when required. When in place, overlap the waterproof cover on all sides so that it can be tied down.

8. Coring Equipment: Furnish a suitable saw or drill for obtaining the required density cores.

9. Hand Tools: Provide the necessary hand tools such as rakes, shovels, etc., and a suitable means for keeping them clean.

PART 4 - CONTRACTOR'S PROCESS CONTROL

4.1 GENERAL

A. Personnel: Provide qualified personnel (certified technician) for sampling, testing (by certified lab), and/or sign-off by P.E., and inspection of materials and construction activities. Ensure that qualifications are maintained during the course of sampling, testing and inspection.

Construction operations that require a qualified technician must not begin until the Department verifies that the technician is on the CTQP (Construction Training Qualification Program) list of qualified technicians. The CTQP lists are subject to satisfactory results from periodic Independent Assurance evaluations.

B. Calibration of the Gyratory Compactor: Calibrate the Gyratory Compactor in accordance with the manufacturer's recommendations prior to

producing the mixture for any project. Check the height calibration, the speed of rotation; ram pressure and angle of gyration.

C. Plant Testing Requirements: During the initial production of a mix design, test mix to ensure proper performance and provide results to the department.

D. Roadway Testing Requirements: Areas that demonstrate concerns of the mix design quality or poor/improper compaction efforts may be subject to additional coring and testing as seen fit by the Engineer.

E. Extraction Gradation Analysis: Sample the asphalt mixture at the plant and perform extraction test prior to asphalt being delivered to project. The percent asphalt binder content of the mixture will be determined in accordance with FM 5-563 (ignition oven). The gradation of the extracted mixture will be determined in accordance with FM 1-T 030. All test results will be shown to the nearest 0.01. All calculations will be carried to the nearest 0.001 and rounded to the nearest 0.01. All results shall be provided to the department prior to placement of asphalt on any project.

Run an extraction gradation analysis on the mixture at a minimum frequency of once per 1,000 tons or a maximum of four consecutive days of paving, which ever comes first.

The target gradation and asphalt content will be as shown on the mix design. Any changes in target will require a change in the mix design.

If the percentage of asphalt binder deviates from the optimum asphalt binder content by more than 0.55%, or the percentage passing any sieve falls outside the limits in the table below, immediately resample the mix and test to validate the previous test result, and if needed, make the necessary correction. If the results for two consecutive tests deviate from the optimum asphalt binder content by more than 0.55%, or exceed the limits in the table for any sieve, notify the Engineer and take immediate steps to identify and correct the problem, then resample the mix. If the results from this test deviate from the optimum asphalt binder content by more than 0.55%, or exceed the limits in the table for any sieve, stop plant operations until the problem has been corrected.

Tolerances for Quality Control Tests (Extraction Gradation Analysis)	
Size	Percent Passing
1 inch	7.0
3/4 inch	7.0
1/2 inch	7.0
3/8 inch	7.0
No. 4	7.0
No. 8	5.5
No. 16	5.0
No. 30	4.5
No. 50	4.5
No. 100	3.0
No. 200	2.0

F. Volumetric Control: During production of the mix, monitor the volumetric properties of the Type SP asphalt mix with a Type SP Gyratory Compactor to determine the air voids, VMA, VFA, and dust-to-effective asphalt binder ratio (dust proportion) at N_{design}.

Take appropriate corrective actions in order to maintain an air void content at N_{design} between 3.0 and 5.0% during production. When the air void content at N_{design} drops below 2.5 or exceeds 5.5%, stop plant operations until the appropriate corrective actions are made and the problem is resolved to the satisfaction of the Engineer and/or Engineer of Record. Evaluate any failing material in accordance with Part 6.

Determine the volumetric properties of the mixture at a minimum frequency of once per production day when the daily production is less than 1,000 tons. If the daily production exceeds 1,000 tons, monitor the volumetric properties two times per production day.

During normal production, volumetric properties of the mixture will not be required on days when mix production is less than 100 tons. However, when mix production is less than 100 tons per day on successive days, run the test when the accumulative tonnage on such days exceeds 100 tons.

Testing required for volumetric property determination includes AASHTO TP-4, FM 1-T 209, FM 5-563 and FM 1-T 030. Prior to testing samples in accordance with AASHTO TP-4 and FM 1-T 209, condition the test-sized sample for one hour at the compaction temperature in a covered container.

G. Plant Calibration: At or before the start of mix production, perform an extraction gradation analysis of the mix to verify calibration of the plant.

The sample tested at the start of any project may be utilized for this requirement.

H. Process Control of In-Place Compaction: Develop and implement a method to control the compaction of the pavement and ensure its compliance with the minimum specified density requirements. The department may require the use of a nuclear gauge to test areas suspected of not having proper compaction. Other density measuring devices may be used in lieu of the nuclear density gauge, provided that it is demonstrated to the satisfaction of the Engineer and/or Engineer of Record that the device can accurately measure the relative level of density in the pavement on a consistent basis.

PART 5 - ACCEPTANCE OF THE MIXTURE

5.1 GENERAL

The asphalt mixture will be accepted based on one of the following methods as determined by the Engineer and/or Contract Documents:

1. Certification by the Contractor
2. Certification and Process Control Testing by the Contractor
3. Acceptance testing by the Engineer
4. Other method(s) as determined by the Contract

5.2 CERTIFICATION BY THE CONTRACTOR

Submit a Notarized Certification of Specification Compliance letter on company letterhead to the Engineer that all material produced and placed on the project was in substantial compliance with these specifications.

5.3 CERTIFICATION AND PROCESS CONTROL TESTING BY THE CONTRACTOR

Submit a Notarized Certification of Specification Compliance letter on company letterhead to the Engineer that all material produced and placed on the project was in substantial compliance with these specifications, along with supporting test data documenting all process control testing. Utilize an Independent Laboratory as approved by the Engineer for the Process Control testing.

5.4 ACCEPTANCE TESTING BY THE ENGINEER

A. Acceptance at the Plant:

1. The asphalt mixture will be accepted, with respect to gradation and asphalt binder content, based on the results from the start up test. However, any load or loads of mixture which, in the opinion of the Engineer and/or Engineer of Record, are unacceptable for reasons of excessive segregation, aggregates improperly coated, or of excessively high or low temperature will be rejected for use in the work.

2. Acceptance Procedures: Control all operations in the handling, preparation, and production of the asphalt mix so that the percent asphalt binder content and the percents passing the No. 8 and No. 200 sieves will meet the targets from the mix design within the tolerances shown in the table below.

Tolerances for Acceptance Tests	
Characteristic	Tolerance*
Asphalt Binder Content	±0.55%
Passing No. 8 Sieve	±5.50%
Passing No. 200 Sieve	±2.00%
*Tolerances for sample size of n=1.	

Calculations for the acceptance test results for asphalt binder content and gradation (percentages passing the No. 8 and No. 200 sieves) will be shown to the nearest 0.01. Calculations for arithmetic averages will be carried to the 0.001 and rounded to the nearest 0.01.

Payment will be based on the acceptance of the project by the Engineer.

B. Acceptance of the Roadway:

1. Density Control: The in-place density of any questionable section of a course of asphalt mix will be evaluated by the use of a nuclear gauge and/or by the testing of 6 inch diameter roadway cores.

The Engineer will not perform density testing on leveling courses, open-graded friction courses, or any course which does not show signs of poor /improper compaction efforts. In addition, density testing will not be performed on the following areas when they are less than 1,000 feet in length: crossovers, intersections, turning lanes, acceleration lanes or deceleration lanes. Compact these courses (with the exception of open-graded friction courses) in accordance with the appropriate rolling procedure as specified in these specifications or as approved by the Engineer.

2. Acceptance**:** The completed pavement will be accepted with respect to overall ride, overall appearance, and overall yield as determined by the Engineer or Engineer of Record.

   Areas of question may be tested with a nuclear gauge or by the testing of the density of the cores, as determined by the engineer.

3. Additional Density Requirement: On shoulders with a width of 5 feet or less, Compact the pavement in accordance with the rolling procedure (equipment and pattern) as specified herein or as approved by the Engineer. Stop the production of the mix if the rolling procedure deviates from the approved procedure.

4. Surface Tolerance: The asphalt mixture will be accepted on the roadway with respect to surface tolerance by the use of a 15 ft rolling straight edge. The department will determine if the use of a straight edge test is warranted. Unevenness of the course shall not vary more than plus or minus 3/16 inch in 15 feet.

5.5 ADDITIONAL TESTS

The Department reserves the right to run any test at any time for informational purposes and for determining the effectiveness of the Contractor's quality control.

PART 6 - DISPOSITION OF FAILING MATERIAL

Any material that is represented by failing test results will be evaluated to determine if removal and replacement is necessary. Remove and replace any material, if required, at no cost to the Department. The evaluation will be conducted by the Engineer and/or Engineer of Record. If so directed, obtain an engineering analysis, as directed by the Engineer, by the independent laboratory (as approved by the Engineer) to determine if the material can (a) remain in place, for this case the appropriate pay factor will be applied, or (b) be removed and replaced at no cost to the Department. The analysis will be a signed and sealed report by a Professional Engineer licensed in the State of Florida.

PART 7 – MEASUREMENT/PAYMENT

7.1 METHOD OF MEASUREMENT

For the work specified under this Section the quantity to be paid for will be the in-place measurement of the area in square yards unless otherwise stated in the project plan details.

The bid price for the asphalt mix will include the cost of the liquid asphalt or the asphalt recycling agent. There will be no separate payment or unit price adjustment for the asphalt binder material in the asphalt mix.

7.2 BASIS OF PAYMENT

Price and payment will be full compensation for all the work specified under this section.

END OF SECTION 02500

SECTION 02600 - STORMWATER SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Specification Sections, specifically 2300, 3300, and *Design Standard Indexes*, apply to this Section.

B. Florida Department of Transportation, *Standard Specifications for Road and Bridge Construction, Sections 425, 430 and 530*, *Latest Edition*.

1.2 SUMMARY

This Section includes stormwater system piping and appurtenances. All labor, material, equipment, appurtenances, services, and other work or costs necessary to construct the facilities and place them into operation shall be furnished by the Contractor.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract.

B. Shop drawings for drainage pipe, pre-cast concrete storm drainage manholes and catch basins, including frames, covers, and grates.

C. Shop drawings for cast-in-place concrete or field-erected masonry storm drainage manholes and catch basins, including frames and covers.

1.4 QUALITY ASSURANCE

A. Environmental Compliance: Comply with applicable portions of local, state, and federal environmental agency regulations pertaining to stormwater systems impacts.

B. Utility Compliance: Comply with local utility regulations and standards pertaining to relocation, clearances, etc related to installation of stormwater systems.

C. Quality control to adhere to QA/QL Plan.

1.5 PROJECT CONDITIONS

Site Information: Perform site inspection, research public utility records, and verify existing utility locations. Verify that stormwater system piping may be installed in compliance with design plans and referenced standards. Locate existing stormwater system piping and structures that are out of service and

closed as per 3.8 this section.

1.6 SEQUENCING AND SCHEDULING

A. Notify the County Inspector assigned to the subdivision or project coordinator assigned to project prior to pouring backfilling or form work.

B. Coordinate connection to existing private and public drainage system with Owner and/or County.

C. Coordinate with adjacent utilities work.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 PIPE

Meet the following requirements of *FDOT Specifications*, *Latest Edition*:

Reinforced Concrete Pipe	Section 449
Round Rubber Gaskets	Section 942
Corrugated Steel Pipe & Pipe Arch	Section 943
Corrugated Aluminum Pipe & Pipe Arch	Section 945
Corrugated Polyethylene Pipe	Section 948
Polyvinyl Chloride (PVC)	Section 948

2.1.2 MANHOLES

A. Precast Concrete Manholes: Per FDOT Standard Specification 425-5 and ASTM C 478, precast reinforced concrete, of depth indicated with provision for rubber gasket joints.

B. Cast-in-Place Manholes: Per FDOT Standard Specification 425 Cast reinforced concrete of dimensions and with appurtenances indicated.

C. Manhole Frames and Covers: Construct Per FDOT Standard Specification 425-3.2 and Standard Indexes. All units shall bear the lettering "STORM SEWER" cast into cover. All proposed substitutes must have equal or greater opening sizes and weights.

2.1.3 INLETS

A. Precast Concrete Catch Basins Inlets: Construct per FDOT Standard Specification 425-5.

B. Cast-in-Place Inlets: Construct per FDOT Standard Specification 425 to dimensions and with appurtenances indicated.

1. Bottom, Walls, and Top: Reinforced concrete.
2. Channel and Bench: Concrete.

C. Inlet Frames and Grates: Per FDOT Standard Specification 425-3.2 & Standard Indexes. All units shall bear the lettering "STORM SEWER" cast into cover.

2.1.4 END TREATMENT

General: Head wall, apron, and mitered ends, per FDOT Standard Specification 430-4.6.

2.2 CONCRETE AND REINFORCEMENT

A. Concrete: Portland cement mix, 3,000 psi; shall be in accordance with Section 03300.

1. Cement: ASTM C 150, Type II.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

B. Reinforcement: Steel conforming to the following:

1. Fabric: ASTM A 185, welded wire fabric, plain.
2. Reinforcement Bars: ASTM A 615, Grade 60, deformed.

C. Forms:

1. Form Materials: Plywood, metal, metal-framed plywood, or other acceptable panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces without distortion or defects. Material shall be of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal.

2. Form Release Agent: Provide commercial formulation form-release agent with a maximum of 350 mg/l volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces. Release agent to be within allowable volatile limits according to applicable local, state and federal codes.

2.3 MASONRY

Materials for accessories shall be per FDOT Standard Specification 949. Mortar shall be one part Portland cement and three parts masonry sand to which shall

be added lime putty in the amount of 50% of the volume of cement. Special commercial mortar mixes may be used if approved by the Engineer. All masonry materials shall conform to the latest applicable ASTM specifications. Set all masonry units in full beds of mortar, with full joints and strike all joints flush. Masonry reinforcements shall be galvanized Dur-O-Wal, or approved equal, and shall be installed at every other bed joint. Hollow block shall be poured solid with re-bar as designed.

2.4 CURING MATERIALS

Conform to FDOT Standard Specification 520-8.

2.5 BEDDING STONE

Subbase or base materials meeting requirements of FDOT Standard Specification 530-2.3.

PART 3 - EXECUTION

3.1 EXCAVATIONS FOR MANHOLES, INLETS, AND PIPE

Excavation shall be sufficient enough to leave at least 12 inches in the clear between their outer surfaces and the embankment. Excavation for all structures shall be made to the dimensions and elevations indicated on the drawings. Where the excavation is made below the indicated elevations, the excavation shall be restored to the proper elevation with compacted suitable material without extra compensation.

3.2 PREPARATION OF FOUNDATION FOR BURIED STORMWATER SYSTEMS

A. Grade trench bottom to provide a smooth, firm, stable, and rock-free foundation, throughout the length of the pipe.

B. Remove unstable, soft, and unsuitable materials at the surface upon which pipes are to be laid, and backfill with bedding stone per FDOT Standard Specification 530-2.3 to indicated level.

C. Shape bottom of trench to fit bottom of pipe. Fill unevenness with tamped sand backfill. Dig bell holes at each pipe joint to relieve the bells of all loads and to ensure continuous bearing of the pipe barrel on the foundation.

3.3 PIPE INSTALLATION

A. Drawings (plans and details) indicate the general location and arrangement of the underground stormwater system piping. Location and arrangement of piping layout takes into account many design considerations. Install the piping as indicated, to the extent practical.

Deviations shall be approved by the County.

B. Install piping beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. When installing gaskets, seals, sleeves, and couplings, follow manufacturer's recommendations for use of lubricants, cements, and other installation requirements. Maintain swab or drag in line and pull past each joint as it is completed.

The pipe shall be carefully examined for defects and the inside cleaned. After placing pipe in the ditch, the ends shall be wiped free from all dirt, sand and foreign material. All pipe and joints shall be made, handled, and installed in strict accordance with the manufacturer's recommendations and instructions. Install pipe in accordance with FDOT Standard Specification 430.

C. Install piping pitched down in direction of flow, at minimum slope per plans and in accordance with manufacturer's recommendations, specifications, and design plans.

D. Boring: Install pipe under streets or other obstructions that cannot be disturbed, by boring, jacking, or a combination of both. These methods of installation are not allowed for newly paved roadways. Utility conduit should be installed prior to paving.

E. All RCP joints shall be sock/filter wrapped prior to backfilling unless a manufacturer recommended coupling is used.

F. Field repairs of pipeline shall be in strict accordance with manufacturer's recommendations and specifications.

G. Only conventional concrete pipe shall be allowed under dedicated County roads.

H. Pipe Cover: Cover shall be a minimum of 12", unless approved by the County.

I. Pipe Size: Minimum Pipe size shall be 18" diameter or equivalent, unless approved by the County.

3.4 MANHOLES

A. General: Install manholes complete with accessories as indicated. Form continuous concrete or split pipe section channel and benches between inlets and outlet. Set tops of frames and covers flush with finish surface where manholes occur in pavements. Elsewhere, set tops 3 inches above finished grade, unless otherwise indicated.

B. Place precast concrete manhole sections as indicated, and install in accordance with ASTM C 891.

C. Construct cast-in-place manholes as indicated.

D. Provide rubber joint gasket complying with ASTM C 443 at joints of sections; or apply bituminous mastic coating at joints of sections.

3.5 INLETS

A. Construct inlets to sizes and shapes indicated per FDOT Standard Specification 425-6, or as modified in the plans.

B. Set frames and grates to elevations indicated.

3.6 OUTFALL STRUCTURES

A. Pipe systems shall be utilized for primary outfall of retention/detention areas.

B. Weirs and flumes will not be acceptable for use as primary pond outfall structures or to primarily route stormwater to retention/detention areas at the end of down-gradient roadways.

3.7 END TREATMENT

Construct End Treatment per FDOT Standard Specification 430-4.6.

3.8 STORMWATER SYSTEM BACKFILL

Place and compact backfill material in accordance with Section 02300 and FDOT specification 125-8.

3.9 CLOSING OUT-OF-SERVICE STORMWATER SYSTEMS

A. Out-of-Service Piping: Close open ends of out of service underground piping that is indicated to remain in place. Provide sufficiently strong closures to withstand hydrostatic or earth pressure that may result after pipe ends have been closed and grout filled with non-shrink grout.

1. Close open ends of concrete pipe or structures with not less than 8-inch-thick brick masonry bulkheads and grout fill.

2. Close open ends of other piping with plastic plugs, or other acceptable methods suitable for size and type of material being closed. Wood plugs are not acceptable.

B. Out-of-Service Structures: Remove structure and close open ends of the

remaining piping or remove top of structure down to not less than 3 feet below final grade; fill structure with stone, rubble, gravel, compacted dirt, or flowable fill to within 1 foot of top of structure remaining, and fill with concrete.

3.10 FIELD QUALITY CONTROL

A. Refer to Section 03300 for Concrete Testing and 02300 for Earthwork Testing.

B. Cleaning: Interior of piping and structures shall be cleared of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed.

1. In large, accessible piping, brushes and brooms may be used for cleaning.

2. Place plugs in ends of uncompleted pipe at end of day or whenever work stops.

3. Flush piping between manholes, to remove collected debris.

C. Interior Inspection: Inspect piping to determine whether line displacement or other damage has occurred.

1. Make inspections after pipe between manholes has been installed, cleaned and approximately 2 feet of backfill is in place, and again at completion of project. Each section of pipe between structures is to show from either end on examination, a full circle of light. Each appurtenance to the system shall be of the specified size and form, to be neatly and substantially constructed, with the top set permanently to exact position and grade.

2. If inspection indicates poor alignment, debris, displaced pipe, infiltration, or other defects, correct such defects and re-inspect. All repairs shown necessary by the inspections are to be made, broken, cracked, or punctured pipe replaced, all deposits removed and the pipe left true to line and grade as herein specified, or shown on the plans, entirely clean and free from abnormalities and ready for use at no additional expense to the County.

3. All storm pipes will be subject to video camera inspection by County staff.

D. Trench Backfill Around and Above Pipe:

1. In each compacted backfill layer, perform density test as specified in Section 02300.

2. Other tests may be required at County's discretion.

E. Clean Up: Before final inspection and acceptance, the Contractor shall clean ditches, shape shoulders and restore all disturbed areas, including street crossings, grass plots, to as good as condition as existed before work started. All trenches shall be leveled and loose material removed from pavement gutters, sidewalks, pipelines, and inlet sediment traps, employing hand labor, if necessary.

PART 4 - MEASUREMENT/PAYMENT

4.1 METHOD OF MEASUREMENT

The quantities to be paid for will be (1) the number of inlets, manholes, end walls, mitered end sections, flared end sections, junction boxes, and yard drains, including fittings and appurtenances, completed and accepted; (2) length of pipe to the nearest foot of type specified; and (3) the number of structures of these types (including also valve boxes and monument boxes) satisfactorily adjusted.

4.2 BASIS OF PAYMENT

Price and payment will be full compensation for finishing 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 the gratings, frames, covers, and any other necessary fittings.

END OF SECTION 02600

SECTION 02900 - GRASSING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Specifications Sections apply to this Section.

B. Florida Department of Transportation, *Standard Specifications for Road and Bridge Construction,* Section 570 and Section 981, *Latest Edition*

1.2 SUMMARY

Extent of grassing work is as specified or shown on the construction plans. Sodded areas disturbed during construction shall be re-sodded to match existing. Areas disturbed beyond specified construction area shall be sodded, at no additional expense, either to match existing or as per County direction.

1.3 SUBMITTALS

See paragraph 1.9 A *Quality Control/Quality Assurance Submittals*, Section 1300.

1.4 DELIVERY AND STORAGE

A. General: Seed, fertilizer, sod and other grassing materials shall be stored under cover and protected from damaged which would make them unacceptable for use.

B. Seed: All seed shall be labeled in accordance with U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act in effect on the date of invitation for bids. All seed shall be furnished in sealed standard containers, unless exception is granted in writing. Seed, which has become wet, moldy, or otherwise damaged in transit or in storage, shall not be used.

C. Fertilizer: Fertilizer shall be delivered to the site in the original, unopened containers, each bearing the manufacturer's guaranteed analysis. Any fertilizer, which becomes caked or otherwise damaged, making it unsuitable for use, shall not be used.

D. Sod: Do not use sod which has been cut (stripped) for more than 48 hours. Stack all sod that is not planted 24 hours after cutting and maintain proper moist condition.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Lime: Lime shall be ground limestone (Dolomite) containing not less than 85 percent of total carbonates, and shall be ground to such a fineness that 50-percent will pass a 100-mesh sieve and 90-percent will pass a 20-mesh sieve.

B. Fertilizer: Apply fertilizer at the following rates:
10-10-10 1000 lbs/acre=0.2 lbs/sq yd
13-13-13 770 lbs/acre=0.16 lbs/sq yd

C. Seed: Apply seed at the rate as specified:

GRASS SEEDING RATES (Lbs/Ac)								
TYPE OF SEED	**ZONE I**				**ZONE II**			
	COASTAL*		**INLAND**		**COASTAL***		**INLAND**	
	Mar.-Nov.	Nov.-Mar.	Mar.-Nov.	Nov.-Mar.	Mar.-Nov.	Nov.-Mar	Mar.-Nov.	Nov.-Mar.
PERMANENT GRASSES								
Unhulled Bermuda**		90		20		90		20
Hulled Bermuda**	60		15		60		15	
Bahia (Argentine or Pensacola)			180	180			180	180
QUICK GROWING GRASS								
Annual Rye Grass		90		90		90		90
TOTAL POUNDS PER ACRE	60	180	195	290	60	180	195	290
* Locations where salt sensitive plants may be adversely affected by high concentrations of salt in soils, water, or air. This may include seaside locations, low-lying areas subjected to periodic saltwater inundation from storms or high tides, or where salt intrusion into groundwater supply has occurred.								
** Bermuda shall not be used in areas adjacent to existing or proposed landscaping.								
NOTE: All seeding shall be performed meeting the requirements of Section 570 of the Standard Specifications								

Activities such as clearing, grading, and excavating that will disturb one or more acres of land require coverage under the Generic Permit for Stormwater Discharge from Large and Small Construction Activities from the Florida Department of Environmental Protection, and implementation

of appropriate pollution prevention measures to minimize erosion and sedimentation. Please refer to the National Pollutant Discharge Elimination System (NPDES) Permit.

E. Mulch: The mulch material shall be dry straw or hay, consisting of oat, rye, or wheat straw, or of pangola, peanut, coastal Bermuda or Bahia grass, hay or compost; and shall be free from noxious weeds and plants. Any plant officially listed, as being noxious or undesirable by any Federal Agency, any agency of the State of Florida or any local jurisdiction in which the project is being constructed shall not be used. Furnish to the engineer, prior to incorporation onto the project, a certification from the Florida Department of Agriculture and Consumer Services, Division of Plant Industry, stating that the Mulch materials are free of noxious weeds. Any such noxious plant or plant part found to be delivered shall be removed by the Contractor at his expense. Only undeteriorated mulch, which can readily be cut into the soil, shall be used. The "air-dry" weight (as defined by the Technical Association of the Pulp and Paper Industry, for wood cellulose) shall be marked on each package by the producer. Apply mulch at a rate of 2 ton/acre or 1 lb/sq yd.

E. Sod: All sod shall be healthy Centipede Sod unless otherwise required. Sod shall be strongly rooted, free of weeds and undesirable grasses and capable of providing vigorous growth and development when planted. Sod shall match existing species where restoration is required as a result of the Contractor's work.

PART 3 - EXECUTION

3.1 REQUIREMENTS

All areas disturbed by the Contractor's operations, shall be grassed, unless otherwise noted.

3.2 PLANTING SEED

A. Grading: Areas to be grassed shall be graded to remove depressions, undulations, and irregularities in the surface before grassing. Adhere to grades as shown on plans.

B. Tillage: The area to be grassed shall be thoroughly tilled to a depth of four inches using a plow and disc harrow or rotary tilling machinery until a suitable bed has been prepared and no clods or clumps remain larger than 1½ inches in diameter. Remove sticks, roots, and rubbish.

C. Applying Lime: The pH of the soil shall be determined. If the pH is below 5.0, sufficient lime shall be added to provide a pH between 5.5 and 6.5. The lime shall be thoroughly incorporated into the top three to four inches

of the soil. Lime and fertilizer may be applied in one operation.

D. Applying Fertilizer: Fertilizer shall be applied in accordance with the rates specified in Part 2, and shall be thoroughly incorporated into the top three to four inches of soil before sod is installed. FDOT Section 982.

E. Seed and Mulch: Apply in accordance with the rates specified in Part 2.

F. Maintenance: Maintenance shall begin immediately following the last operation of grassing and continue until final acceptance. Maintenance shall include watering, mowing, replanting, and all other work necessary to produce a uniform stand of grass, all at the contractor's expense.

3.3 PLACING SOD

A. Use Centipede sod (Eremochloa ophiuroides) unless otherwise required. The sod shall have a thick mat of roots (minimum 2") with enough adhering soil to assure growth. Apply sod within 48 hours of stripping. Protect sod against drying and breaking of rolled strips.

B. Placement: Prepare the ground by loosening the soil. Place sod perpendicular to the slope. Place sod on the prepared soil to form a solid mass with tightly fitted joints. Ensure the butt ends and sides of sod strips do not overlap. The seam should have a flush tight transition from new to existing sod with no overlap. Stagger strips to avoid a continuous downhill seam. Tamp or roll lightly to ensure contact with subgrade. Tamp the outer edges of the sodded area to produce a smooth contour. Work sifted soil into minor cracks between pieces of sod; remove excess to avoid smothering of adjacent grass. Water sod thoroughly with a fine spray immediately after planting.

C. Pinning: All sod placed on a slope steeper than 3:1 shall be pinned, at the top of the sod, at a rate listed in the table below:

Sod Size	Pins Required
Square Sod	2 pins per sod square
Mini Roll	3 pins per roll
Standard Rolls	1 pin per linear foot

C. Watering: Keep sod continuously moist to a depth below the root zone for three weeks after placement. If there is no water available to the site, the Contractor shall provide the water. Do not water in excess of 1" (one inch) per square yard per week for establishment.

D. Clean-Up: All excess soil, excess grass materials, stones, pallets and other waste shall be removed from the site daily and not allowed to accumulate. All paved areas shall be kept clean at all times.

E. Maintenance: Maintain sod by watering, fertilizing, weeding, mowing, trimming and other operations such as rolling, re-grading, and re-planting as required to establish a lawn free of eroded or bare areas and acceptable to the County. Where inspected work and materials do not comply with requirements, replace rejected work and continue maintenance until re-inspected by County and found to be acceptable. Remove rejected materials promptly from the project site. FDOT Section 570-4.

PART 4 - MEASUREMENT/PAYMENT

4.1 METHOD OF MEASUREMENT

The quantities to be paid for will be for the following items, completed and accepted: square yards of seeding, square yards of seeding and mulching, and square yards of sodding.

4.2 BASIS OF PAYMENT

Prices and payments will be full compensation for all work and materials specified in this Section.

END OF SECTION 02900

SECTION 03300 – PORTLAND CEMENT CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Florida Department of Transportation (FDOT), *FDOT Material's Manual, Chapter 9.2, Volume II, FDOT Standard Specifications for Road and Bridge Construction, Section 346, 347, 350, 400, 522, & 925, Latest Edition.*

1.2 SUMMARY

This Section includes concrete work for the following:

1. Roadways
2. Parking lots
3. Curbs and gutters
4. Walkways
5. Pads
6. Flumes
7. Curb Ramps
8. Cast in Place Structures

1.3 SUBMITTALS

A. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, joint systems, curing compounds, dry-shake finish materials, and others if requested by the County.

B. Design mixes for each class of concrete. Include revised mix proportions when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

C. Material certificates in lieu of material laboratory test reports when permitted by the County. Material certificates shall be signed by manufacturer and Contractor certifying that each material item complies with or exceeds requirements. Provide certification from admixture manufacturers that chloride content complies with requirements.

1.4 PROJECT CONDITIONS

A. Traffic Control: Comply with requirements of Escambia County Specification, Section 04060, "Maintenance of Traffic."

B. Utilize flagmen, barricades, warning signs and warning lights as required, as shown on plans, or as directed by the County.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Concrete shall conform to requirements of FDOT Standard Specification, Sections 346, 347, & 522 for curbs, gutters, sidewalks, structures and miscellaneous concrete.

B. Concrete for pavement shall conform to requirements of FDOT Standard Specification, Section 350.

C. Curb Ramps shall conform to FDOT Standard Index 304.

2.2 REINFORCING MATERIALS

A. Reinforcing Bars and Tie Bars: ASTM A 615, Grade 60, deformed.

B. Welded Steel Wire Fabric: ASTM A 185.

1. Furnish in flat sheets, not rolls.

C. Deformed-Steel Welded Wire Fabric: ASTM A 497.

D. Fabricated Bar Mats: Welded or clip-assembled steel bar mats, ASTM A 184. Use ASTM A 615, Grade 60 steel bars, unless otherwise indicated.

E. Joint Dowel Bars: Plain steel bars, ASTM A 615, Grade 60. Cut bars true to length with ends square and free of burrs.

F. Hook Bolts: ASTM A 307, Grade A bolts, internally and externally threaded. Design hook bolt joint assembly to hold coupling against pavement form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.

G. Supports for Reinforcement: Chairs, spacers, dowel bar supports and other devices for spacing, supporting, and fastening reinforcing bars, welded wire fabric, and dowels in place. Use wire bar-type supports complying with CRSI specifications. Use supports with sand plates or horizontal runners where base material will not support chair legs.

2.3 CONCRETE MATERIALS

A. Portland Cement: Type I, Type IP, Type IS, Type IP (MS), Type II, or Type III.

1. Use one brand of cement throughout Project.

2. All concrete shall develop a 28-day compressive strength of 3000 psi for non-structural (NS). If any concrete should fail to meet the strength requirement the structure shall be removed as necessary to remove the defective concrete and shall then be rebuilt at the Contractor's expense.

B. Fly Ash: ASTM C 618, Class C or Class F.

C. Normal-Weight Aggregates: ASTM C 33, Class 4, and as follows. Provide aggregates from a single source.

1. Maximum Aggregate Size: 1-1/2 inches.

2. Do not use fine or coarse aggregates that contain substances that cause spalling.

3. Local aggregates not complying with ASTM C 33 that have been shown to produce concrete of adequate strength and durability by special tests or actual service may be used when acceptable to Engineer.

D. Water: Potable.

E. Fiber Reinforcement: Synthetic fibers engineered and designed for secondary reinforcement of concrete slabs, complying with ASTM C 1116, Type III.

2.4 ADMIXTURES

A. Provide concrete admixtures that contain not more than 0.01 per cent chloride ions.

B. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

C. Water-Reducing Admixture: ASTM C 494, Type A.

D. High-Range Water-Reducing Admixture: ASTM C 494, Type F or Type G.

E. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.

F. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

2.5 CONCRETE MIX

A. Prepare design mixes for each type and strength of normal-weight concrete

per FDOT Standard Specification, Section 346-6.2 and FDOT Material's Manual, Chapter 9.2, Volume II. Use a qualified independent testing laboratory for preparing and reporting proposed mix designs. Do not use the Owner's field quality-control testing laboratory as the independent testing laboratory.

B. Fiber Reinforcement: Add to mix at rate of 1.5 lb per cu. yd., unless manufacturer recommends otherwise.

C. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, project conditions, weather, test results, or other circumstances warrant.

2.6 CONCRETE MIXING

Ready-Mixed Concrete: Comply with requirements of FDOT Standard Specification, Section 346-7 and FDOT Material's Manual, Chapter 9.2, Volume II.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION FOR CONCRETE PAVEMENT

A. Proof-roll prepared base or subgrade surface to check for unstable areas and verify need for additional compaction. Do not begin concrete work until such conditions have been corrected and are ready to receive paving.

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

3.2 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install sufficient forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement.

B. Check completed formwork and screeds for grade and alignment to following tolerances:

1. Top of Forms: Not more than 1/8 inch in 10 feet.

2. Vertical Face on Longitudinal Axis: Not more than 1/4 inch in 10 feet.

C. Clean forms after each use and coat with form release agent as required ensuring separation from concrete without damage.

3.3 PLACING REINFORCEMENT

A. General: Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars" for placing and supporting reinforcement. Comply with FDOT Standard Specification, Section 350-7.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers and hangers, as required. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces. Maintain minimum cover to reinforcement.

D. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction. Use of chairs is required. Welded wire fabric shall not be “pulled” to center of slab.

E. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities or replace units as required before placement. Set mats for a minimum 2-inch overlap to adjacent mats.

3.4 JOINTS

A. General: Construct control (contraction) joints, construction, and isolation joints true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to the centerline, unless indicated otherwise. When joining existing paving, place transverse joints to align with previously placed joints, unless indicated otherwise.

B. Control (Contraction) Joints: Control joints are grooved, formed, or sawed into sidewalks, driveways and concrete pavements so that cracking will occur in these joints randomly. If not specified on drawings, intervals shall be not greater than 10 feet or less than 5 feet. Construct control joints for a depth equal to at least 1/4 of the concrete thickness, as follows:

1. Tooled Joints: Form contraction joints in fresh concrete by grooving and finishing each edge of joint with a radiused jointer tool.

2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into hardened concrete when cutting action will not tear, abrade, spawl or otherwise damage surface and before development of

random contraction cracks.

3. Inserts: Form contraction joints by inserting premolded plastic, hardboard, or fiberboard strips into fresh concrete until top surface of strip is flush with paving surface. Radius each joint edge with a jointer tool. Carefully remove strips or caps of two-piece assemblies after concrete has hardened. Clean groove of loose debris.

C. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than ½ hour, unless paving terminates at isolation joints.

1. Provide preformed galvanized steel or plastic keyway-section forms or bulkhead forms with keys, unless indicated otherwise. Embed keys at least 1-1/2 inches into concrete.

2. Continue reinforcement across construction joints unless indicated otherwise.

D. Expansion Joints: Form expansion joints of preformed joint filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.

1. Locate expansion joints at intervals of 30 feet, unless indicated otherwise or directed by County.

2. Extend joint fillers full width and depth of joint, not less than ½ inch or more than 1 inch below finished surface where joint sealant is indicated. Place top of joint filler flush with finished concrete surface when no joint sealant is required.

3. Furnish joint fillers in one-piece lengths for full width being placed wherever possible. Where more than one length is required, lace or clip joint filler sections together.

4. Protect top edge of joint filler during concrete placement with a metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

E. Filler and Sealants: Submit specifications to Engineer for approval.

F. Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one half of dowel length to prevent concrete bonding to one side of joint.

3.5 CONCRETE PLACEMENT

A. Comply with requirements of FDOT Standard Specification, Sections 350-8

and 400-7 for placing concrete.

B. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place. No concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. Deposit concrete as nearly as practical to its final location to avoid segregation. When concrete placing is interrupted for more than ½ hour, place a construction joint.

C. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

D. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, floating, or tamping. Use equipment and procedures to consolidate concrete complying with FDOT Standard Specification, Section 350-9.

E. Screed paved surfaces with a straightedge and strike off. Use bull floats or darbies to form a smooth surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces prior to beginning finishing operations.

F. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay welded wire fabric or fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed. Remove and replace portions of bottom layer of concrete that have been placed more than 15 minutes without being covered by top layer or use bonding agent if acceptable to County.

G. Curbs and Gutters: Shall be constructed in accordance with FDOT Specs. When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not acceptable, remove and replace with formed concrete.

H. Slip-Form Pavers: When automatic machine placement is used for paving, submit revised mix design and laboratory test results that meet or exceed requirements. Produce paving to required thickness, lines, grades, finish, and jointing as required for formed paving. Compact subgrade of sufficient width to prevent displacement of paver machine during operations.

I. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength, or sufficient strength to carry loads without damage or injury. Maturity Method Testing, as outlined in FDOT Standard Specification, Section 353-10.2, should be used to determine concrete

strength.

J. Cold-Weather Placement: Comply with provisions of FDOT Standard Specification, Sections 346-7.4 and 400-7.1.1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

K. Hot-Weather Placement: Place concrete complying with FDOT Standard Specification, Sections 346-7.5 and 400-7.1.2, and as specified when hot weather conditions exist.

3.6 CONCRETE FINISHING

A. Float Finish: Begin floating when bleed-water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand-floating if area is small or inaccessible to power units. Finish surfaces to true planes within a tolerance of 1/8 inch in 10 feet as determined by a 10-foot-long straightedge placed anywhere on the surface in any direction. Cut down high spots and fill low spots. Refloat surface immediately to a uniform granular texture.

1. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across concrete surface perpendicular to line of traffic to provide a uniform fine line texture finish.

2. Tine Finishes: Apply to curb cut ramps and other areas as noted on the drawings. Finish shall be applied by an approved hand method and shall consist of transverse grooves which are 0.03 to 0.12 inch in width and 0.10 to 0.15 inch in depth, spaced at approximately ½ inch center to center.

B. Final Tooling: Tool edges of paving, gutters, curbs, and joints formed in fresh concrete with a jointing tool to the following radius. Repeat tooling of edges and joints after applying surface finishes. Eliminate tool marks on concrete surfaces. Radius: ½ inch.

3.7 CONCRETE PROTECTION AND CURING

General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with the recommendations of FDOT Standard Specification, Sections 350-11 and 925.

3.8 QUALITY CONTROL TESTING

A. A qualified, accredited testing and inspection laboratory, under the direction of a Professional Engineer, licensed in the State of Florida, shall sample materials, perform tests, and submit test reports during concrete placement as follows:

1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94. All concrete should be sampled by ACI certified technicians.

   a. Slump: ASTM C 143; one test at point of placement for each compressive-strength test but no less than one test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.

   b. Air Content: ASTM C 231, pressure method; one test for each compressive-strength test but no less than one test for each day's pour of each type of air-entrained concrete.

   c. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.

   d. Compression Test Specimens: ASTM C 31; one set of four standard cylinders for each compressive- strength test, unless directed otherwise. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.

   e. Compressive-Strength Tests: ASTM C 39; one set for each day's pour of each concrete class, plus one set for each additional 50 cu. yd. Test one specimen at 7 days, two specimens at 28 days, and retain one specimen in reserve for earlier or later testing if required. Class I Concrete NS compression test specimens cylinders are not required, except as directed by County.

   f. Contractor shall repair the area to the satisfaction of the Engineer where material was removed for testing purposes. Should any work or materials fail to meet the requirements set forth in the plans and specifications, contractor shall pay for retesting of same.

2. Basis for acceptance of concrete will be per FDOT Standard Specification, Sections 346-8 through 346-11.

B. Test results will be reported in writing to the County, within 24 hours of testing. Reports of compressive strength tests shall contain the Project identification name and number, date and location of concrete placement, name of concrete testing laboratory, concrete type and class, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day and 28-day tests.

C. Nondestructive Testing: Non-destructive test methods may be used with approval of the Engineer, but shall not be used as the sole basis for acceptance or rejection.

D. Additional Tests: The testing laboratory will make additional tests of the concrete when test results indicate slump, air entrainment, concrete strengths, or other requirements have not been met, as directed by Engineer. Testing laboratory may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

3.9 REPAIRS AND PROTECTION

A. Remove and replace concrete work that is broken, damaged, or defective, or does not meet the requirements of this Section.

B. Drill test cores where directed by the County when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory concrete areas with Portland cement concrete bonded to paving with epoxy adhesive.

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

D. Maintain concrete work free of stains, discoloration, dirt, and other foreign material. Sweep concrete paving not more than 2 days prior to date scheduled for Substantial Completion inspections.

PART 4 - MEASUREMENT/PAYMENT

4.1 METHOD OF MEASUREMENT

The quantities to be paid for will be the plan quantity, in square yards, of Plain Cement Concrete Pavement, Reinforced Cement Concrete Pavement, square yards of sidewalk, and linear feet of curb and/or gutter.

4.2 JOINTS AND CRACKS

The Contractor shall include the cost for Cleaning and Sealing Joints in the cost of the newly constructed pavement for: (1) transverse and longitudinal joint construction for new pavement; and (2) abutting joints between existing pavement and new pavement.

For replacing joint seals and sealing random cracks in existing Portland cement concrete pavement, the quantity to be paid for will be as specified below:

A. The length of pavement joint that has been satisfactorily cleaned and sealed in existing Portland cement concrete pavement, as determined by field measurement along the joints, will be paid for at the Contract unit price per foot for Cleaning and Resealing Joints.

B. The length of random cracks in existing Portland cement concrete pavement that have been satisfactorily cut, cleaned, and sealed, as determined by field measurement along the joints, will be paid for at the Contract unit price per foot for Cleaning and Sealing Random Cracks.

4.3 BASIS OF PAYMENT

Prices and payment will be full compensation for all work specified in this Section, including any preparation of the subgrade not included in the work to be paid for under another Contract item; all transverse and longitudinal joint construction, including tie-bars and dowel bars; the furnishing of test specimens; repair of core holes; and all incidentals necessary to complete the work.

END OF SECTION 03300

SECTION 04000 - TRAFFIC CONTROL SIGNS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and other Specifications Sections, apply to work of this section.

B. Unless otherwise specified on the work orders, plan sheets, or in other sections of this contract, all materials and work shall conform to the applicable requirements in the following document:

1. USDOT, Federal Highway Administration, *Manual on Uniform Traffic Control Devices for Streets and Highways*, *Latest Edition*.

2. USDOT, Federal Highway Administration, *Standard Alphabets for Highway Signs and Pavement Markings*, *Latest Edition.*

3. Florida Department of Transportation, *Design Standards for Design, Construction, Maintenance and Utility Operations on the State Highway System*, *Latest Edition*.

4. Florida Department of Transportation, *Standard Specifications for Road and Bridge Construction*, section 700, *Latest Edition*.

1.2 DESCRIPTION OF WORK

The work under this section includes the fabrication and installation of standard and special traffic control signs (warning, regulatory, and guide). The Contractor shall furnish all labor, materials, tools, supplies, equipment, and machinery necessary to fully complete the works shown in the plans and in these specifications.

PART 2 - PRODUCTS

2.1 MATERIALS

All materials shall be new and of good quality unless otherwise specified. The Contractor, at his own expense and if requested by the County, shall furnish samples of material and/or shall certify that the material meets all FDOT requirements. All material or work that has been rejected shall be remedied by the Contractor at his own expense and without delay. If the Contractor fails to promptly remove and/or dispose of rejected material and replace the same, the County may remove and replace the same and deduct the cost of the work from the contract amount.

If the Contractor chooses to use material other than specified herein, a sample of the material with supporting manufacturer's literature and specifications must be submitted to the County for prior approval.

PART 3 - EXECUTION

3.1 UTILITY SPOTS

All street name signs shall be fabricated and installed in accordance with the plans and related documents. Contractor shall contact Sunshine State One Call of Florida (811 or 800-432-4770) at least 48 hours prior to digging or driving posts.

3.2 SIGN INSTALLATION

A. Signs shall be placed at the locations illustrated and/or specified in the plans or related documents. The soil around the post shall be solidly tamped so that the sign will stand vertically.

B. If a sign cannot be placed where indicated due to a conflict, the Contractor shall immediately notify the County for an alternate location.

C. The date when each sign is installed shall be marked in permanent ink on the rear side of each sign.

PART 4 - MEASUREMENT/PAYMENT

4.1 METHOD OF MEASUREMENT

The quantity to be paid for will be plan quantity, unless otherwise provided.

4.2 BASIS OF PAYMENT

Price and payment will constitute full compensation for all work specified in this section. Payment for all items relating to traffic control signs will be included in the lump sum Maintenance of Traffic pay item.

END OF SECTION 04000

SECTION 04020 - POST MOUNTED STREET NAME SIGNS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and other Specifications Sections, apply to work of this section.

B. Unless otherwise specified on the plan sheets or in other sections of this contract, all materials and work shall conform to the applicable requirements in the following document:

1. USDOT, Federal Highway Administration *Manual on Uniform Traffic Control Devices for Streets and Highways*, *Latest Edition*.

2. USDOT, Federal Highway Administration *Standard Alphabets for Highway Signs and Pavement Markings*, *Latest Edition*.

3. Florida Department of Transportation, *Standard Specifications for Road and Bridge Construction, Section 700*, *Latest Edition*.

4. FDOT *Design Standards for design, Construction, Maintenance, and utility operations on the State Highway System*, *Latest Edition*.

5. Escambia County *Standard Details for Street Name Signs, Latest Edition.*

1.2 DESCRIPTION OF WORK

The work under this section includes the fabrication and installation of post mounted street name signs as shown or noted on plans. The Contractor shall furnish all labor, materials, tools, supplies, equipment, and machinery necessary to fully complete the work shown in the work order and in these specifications.

PART 2 - PRODUCTS

2.1 MATERIALS

All materials shall be new and of good quality unless otherwise specified. The Contractor, at his own expense, shall, if requested by the County, furnish samples of material and/or shall certify that the material meets all FDOT requirements. All material or work that has been rejected shall be remedied by the Contractor at his own expense and without delay. If the Contractor fails to promptly remove and/or dispose of rejected material and replace the same, the County may remove and replace the same and deduct the cost of the work from the contract amount.

If the Contractor chooses to use material other than specified herein, a sample of the material with supporting manufacturer's literature and specifications must be submitted to the County Contract Administrator for prior approval.

Sign-blades reflective sheeting and posts shall conform to the details for street name signs.

PART 3 - EXECUTION

3.1 UTILITY SPOTS

All street name signs shall be fabricated and installed in accordance with the plans and related documents. Contractor shall contact Sunshine State One Call of Florida (811 or 800-432-4770) at least 48 hours prior to digging or driving posts.

3.2 SIGN LAYOUT AND LEGEND

Letter shape and width of stroke shall comply with FHWA & MUTCD standards. For street name signs, lettering, border and blade dimensions shall be consistent with the County's standard detail for street name signs.

3.3 SIGN INSTALLATION

A. Signs shall be placed at the typical locations shown in the plans. The soil around the post shall be solidly tamped so that the sign will stand vertically.

B. If a sign cannot be placed where indicated due to a conflict, the Contractor shall immediately notify the County for an alternate location.

C. The Contractor shall submit a *Fabricate, Install, and Removal Daily Report Sheet* (Exhibit D) of each sign installation placed for inspection by the County. Contractor shall repair or replace signs deemed unacceptable by the County, at no expense to the County.

3.4 REMOVAL OF SIGNS AND MARKERS

A. Existing metal street name signs and painted concrete street name markers specified for removal shall be removed from the site, delivered, and unloaded, as directed by the County.

B. Holes created by the removal of the signs and markers shall be filled with clean soil, which shall be firmly hand tamped to match the level of the surrounding ground.

PART 4 – MEASUREMENT/PAYMENT

4.1 METHOD OF MEASUREMENT

The quantities to be paid for will be:

1. The number and type of street name signs assemblies plus the number and type of auxiliary signs of each designated class complete.

2. The number of existing metal street name signs and concrete markers removed, relocated, modified, and placed on specified supports, of each designated class of assembly complete.

3. The number of each existing sign panel removed, complete.

4.2 BASIS OF PAYMENT

Price and payment will be full compensation for furnishing and installation of all materials necessary to complete the signs in accordance with the details shown in the plans; including sign panels complete with sheeting, painting, and message; sign posts and supports, footings, excavation, etc.; and all other work specified in this Section, including all incidentals necessary for the complete item.

END OF SECTION 04020

SECTION 04040 – PAVEMENT MARKINGS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and other Specifications Sections, apply to work of this section.

B. Unless otherwise specified on the plan sheets or in other sections of this contract, all materials and work shall conform to the applicable requirements in the following documents:

1. Florida Department of Transportation *Roadway and Traffic Design Standards*, Indices 17344 through 17359, *Latest Edition*.

2. Florida Department of Transportation *Standard Specifications for Road and Bridge Construction*, Sections 701, 705, 706, 710, 711, 970, 971, and 993, *Latest Edition*.

3. USDOT, Federal Highway Administration *Manual on Uniform Traffic Control Devices for Streets and Highways*, *Latest Edition*.

1.2 DESCRIPTION OF WORK

The work under this section includes the installation and removal of temporary and permanent pavement markings, textured pavement, reflective markers, galvanized posts, flex posts, delineators, wheel stops, and audible and vibratory pavement markings. The Contractor shall furnish all labor, materials, tools, supplies, equipment, and machinery necessary to fully complete the work shown in the plans and in these specifications. Pavement marking notes on plan sheets shall take precedence over and modify conflicting Technical Specifications.

PART 2 – PRODUCTS

2.1 MATERIALS

All materials shall be new and of good quality unless otherwise specified. The Contractor, at his own expense and if requested by the County, shall furnish samples of material and/or shall certify that the material meets all FDOT requirements. All material or work that has been rejected shall be remedied by the Contractor at his own expense and without delay. If the Contractor fails to promptly remove and/or dispose of rejected material and replace the same, the County may remove and replace the same and deduct the cost of the work from the contract amount.

2.2 TEMPORARY PAVEMENT MARKINGS

Materials for temporary pavement marking shall meet all requirements of FDOT Specs, Section 710, *Latest Edition.*

2.3 PERMANENT PAVEMENT MARKINGS

Materials for permanent pavement markings shall meet all requirements of FDOT Specs, Section 711, *Latest Edition*.

2.4 REFLECTIVE PAVEMENT MARKERS

Materials for reflective pavement markers shall meet all requirements of FDOT Specifications, Sections 706, *Latest Edition*.

2.5 OBJECT MARKERS AND DELINEATORS

Materials for object markers shall meet all requirements of FDOT Specifications, Sections 705, *Latest Edition*.

2.6 AUDIBLE AND VIBRATORY PAVEMENT MARKINGS

Materials for audible and vibratory pavement markings shall meet all requirements of FDOT Specifications, Sections 701, *Latest Edition*.

PART 3 – EXECUTION

3.1 GENERAL

All pavement markings shall be applied in accordance with FDOT requirements.

3.2 TEMPORARY PAVEMENT MARKINGS

Temporary pavement markings shall be installed at the end of each day on new pavement surfaces and shall be maintained until permanent markings are installed.

3.3 PERMANENT PAVEMENT MARKINGS

Permanent pavement markings, including painted stripes, thermoplastic stripes, and reflective pavement markers, shall be installed as shown in the plans. Materials and installation shall conform to applicable standards in the documents referenced in Section 1.1. Installation of permanent markings on all final asphaltic concrete surfaces shall not be accomplished prior to 14 calendar days, nor later than 30 calendar days, after placement of the final surfaces.

3.4 RETROREFLECTIVITY

The Contractor shall, within thirty days of completion, furnish retroreflectivity

readings certifying the materials meet all FDOT requirements as per Part I, 1.1.B.2, Sections 710 and 711.

PART 4 – MEASUREMENT/PAYMENT

4.1 METHOD OF MEASUREMENT

The engineer or project manager may specify a lump sum or measurement of quantities.

The quantities to be paid for under this Section will be the length in feet or gross mile of Skip Traffic Stripes, the length in feet or gross mile of Solid Traffic Stripes, the number of directional arrows and pavement messages, painted, the area in square feet or of Reflective Paint (Island Nose), and the area in square feet or the length in feet to Remove Existing Markings. Measurement will be taken as the distance from the beginning of the first painted stripe to the end of the last painted stripe with proper deductions made for unpainted intervals will not be included in pay quantity.

4.2 BASIS OF PAYMENT

Prices and payment will be full compensation for all work specified in this Section, including, all cleaning and preparing of surfaces, furnishing all materials, application, curing and protection of all items, protection of traffic, furnishing of all tools, machines and equipment, and all incidentals necessary to complete the work. Final payment will be withheld until all deficiencies are corrected.

END OF SECTION - 04040

SECTION 04060 - MAINTENANCE OF TRAFFIC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Specifications Sections, apply to work of this section.

B. Unless otherwise specified on the plan sheets or in other sections of the specifications, all materials and work shall conform to the applicable requirements in the following documents:

1. *Florida Department of Transportation Design Standards*, *Latest Edition*.

2. *Florida Department of Transportation Standard Specifications for Road and Bridge Construction*, Section 102, *Latest Edition*.

3. USDOT, Federal Highway Administration *Manual on Uniform Traffic Control Devices for Streets and Highways*, *Latest Edition*, Part 6 Temporary Traffic Controls.

4. *FDOT Minimum Specifications for Traffic control and Devices*, *Latest Edition*.

1.2 SUMMARY OF WORK

The work under this section includes the maintenance of traffic within the limits of the project for the duration of construction.

PART 2 – PRODUCTS - Not Used.

PART 3 - EXECUTION

3.1 RESPONSIBILITIES OF CONTRACTOR

A. Control and maintain traffic and provide for the safety of the work area in accordance with Maintenance of Traffic (MOT) Plan included in the contract documents. Contractor shall comply with all aspects of said plan. Conduct operations in a manner that will not interrupt pedestrian and vehicle traffic except as approved by the County Engineer/Traffic Division. Confine the work area to the smallest area practical to allow the maximum use of the street and sidewalk and to reduce any hazard to vehicles and pedestrians to a minimum.

B. Maintain access to properties that adjoin the work. Contact property owners

and assure that access is coordinated prior to commencing work that may block access.

C. Furnish all labor, materials, tools, supplies, equipment, and machinery needed to fully comply with the specifications described on the plan sheets and in this Section. At all times, the Contractor shall use workers and traffic control devices necessary to comply with all applicable provisions contained in the reference documents listed in Section 1.1.

D. The Contractor shall notify the agencies and media listed below in writing, 48 hours in advance, of any work within the road right-of-way that may interfere with vehicle and/or pedestrian traffic.

1. WCOA Radio – Tel: 478-6011; Fax: 478-3971

2. Pensacola News Journal Tel: 435-8500; Fax: 435-8633; Email: news@pensacolanewsjournal.com

3. Escambia County Emergency Management Tel: 471-6315; Fax: 471-6322; Email: bob_boschen@co.escambia.fl.us

4. Escambia County Engineering Tel: 595-3440

5. Escambia County Sheriff Tel: 436-9630; Fax: 436-9128; Email: traffic@escambiaso.com

6. Florida Highway Patrol Tel: 484-5000; Fax: 393-3405; Email: stevepreston@flhsmv.gov

7. Escambia County School District Tel: 469-5591; Fax: 469-5661; Email: transportation@escambia.k12.fl.us and rdoss@escambia.k12.fl.us

8. Escambia County Administration Tel: 595-4900; Fax: 595-4908; Email: Cheryl_Lively@co.escambia.fl.us

9. Escambia County Area Transit Tel: 595-3228; Fax: 595-3222; Email: Ted_Woolcock@co.escambia.fl.us

3.2 PENALTIES AND SUSPENSION OF WORK

The County may verbally direct the Contractor to immediately suspend work if appearance of violation of safety regulations is found. In such an event, Contractor shall immediately stop work and secure any potential hazards from the public until the potential violation is confirmed and/or corrected to satisfaction of the County. Law enforcement officers may be called to assist the County in suspending work if the Contractor is not responsive. Suspension of work for violation of safety

regulations shall not be grounds for a contract time extension or additional payment.

PART 4 - MEASUREMENT/PAYMENT

4.1 METHOD OF MEASUREMENT

A. Maintenance of Traffic: Where the plans require the use of trucks and truck mounted impact attenuators, these items will not be paid for separately but shall be included in the cost of Maintenance of Traffic. Only use those attenuators that have been tested by a facility approved by the Engineer and certified as meeting the requirements as specified in NCHRP 350 and that have been properly maintained.

B. Law Enforcement Services: The quantity to be paid for will be at the Contract unit price per hour for the actual number of officers on the project site. Payment will be made only for those off-duty law enforcement officers specified in the MOT and authorized by the CountyI.

C. When the plans show more than one detour facility is included in the proposal, payment will be made under Maintenance of Traffic.

D. Materials for Driveway Maintenance: The quantity to be paid for will be, in square yards, of all materials authorized by the County, acceptably placed and maintained for driveway maintenance. The quantity will be determined by in place measurement.

4.2 BASIS OF PAYMENT

A. MAINTENANCE OF TRAFFIC (GENERAL WORK): Price and payment will be full compensation for all work and costs specified under this Section except as may be specifically covered for payment under other items.

B. LAW ENFORECEMENT: Prices and payment will be considered full compensation for the services of the off-duty law enforcement officer, including a marked law enforcement vehicle and all other direct and indirect costs.

C. SPECIAL DETOURS: Price and payment will be full compensation for providing all detour facilities shown on the plans and all costs incurred in carrying our all requirements of this Section for general maintenance of traffic within the limits of the detour, as shown on the plans.

END OF SECTION 04060

ATTACHMENT A

GEOTECHNICAL INVESTIGATIONS

Geotechnical Engineering
Drilling Services
LMJ
Materials Testing
Since 1976

September 10, 2015

Mr. Jason Lashley
Sigma Consulting Group
3298 Summit Boulevard, Suite 32
Pensacola, FL 32503

SUBJECT: Pile Recommendations for Beulah Landfill Bridge Replacement
Escambia County, FL
LMJ File #: 15-191

Dear Jason:

This letter forwards our recommendations for establishing the concrete arch bridge on pile foundations. We discussed the poor conditions at the planned footing foundation depth and agreed that the footings and undercutting alternative was probably not practical because sheeting and dewatering was needed and substantial compaction of select soils or graded aggregate backfill would be needed to achieve only moderate allowable soil pressure because of the reductions due to saturated soil conditions. In addition, appropriate erosion control would be needed to keep footings from being undermined.

I reviewed our borings from 1997 (BR-1 and BR-2) which were drilled north and south of the selected bridge abutment locations as well as the two borings drilled by Universal in 2008 which were closer to the existing abutments. Every boring had some similarities mostly in the top part with loose or very loose soils and medium dense soils and layers of black silty sand, but all borings had substantial differences in the bottom portion of the boring indicating erratic soil conditions. The north abutment appears to be better than the south abutment with generally firmer deeper soils in BR-1, and some firmer soils with intermediate loose layers in the Universal boring B-1 near the north abutment which had a stiff sandy clay from roughly 17-22 feet below existing grade and the BR-1 boring did not encounter clay. The Universal boring B-2 located near the south abutment refused in debris and trash at 10 feet. Our boring BR-2 south of the abutment encountered soft clay from 14.5 feet to 19 feet over 1.5 foot of medium stiff clay over relatively consistent midrange medium dense soils to the bottom of the boring at 51 feet. Groundwater depths ranged from 8-12 feet in our borings and was at 13 feet in the Universal B-1 boring.

I considered all borings in looking for a practical pile alternative. Attachment #1 shows the boring locations and the four logs of boring. The Universal B-1 boring indicated that loose soils were present at 25 and 35 feet below existing grade and were again loosening at 45-50 feet, which would indicate a 30 foot or 40 foot embedment below existing grade was needed. The current elevation of the bottom of the stream bed is not known, but I would suspect that the stiff clay at B-1 at 17 feet below grade was a resistant layer limiting erosion, although there is no guarantee that deeper erosion could not occur. Or that the stiff clay layer is even consistent across the stream bed. That would eliminate the 30 foot tip embedment as it would be insufficient to provide protection against scour so a 40 foot below existing grade tip embedment appears to be the only practical alternative. Assuming a pile cutoff somewhere around elevation 23 feet based on the old drawings and an existing grade of roughly elevation 36 feet, that would result in an approximate pile length of 40 -13 = 27 feet.

Most contractors prefer to jet the piles in sufficiently to stand them up, and then switch to the pile hammer to drive them in. We will want to drive the piles into the medium dense soils to increase their friction angle and lateral force on the piles as much as practical, and I would suggest jetting or predrilling on the south abutment to roughly 10 feet below cutoff, and driving the piles to or to near the 27 foot embedment. If conditions are firmer at the north abutment, the depth of jetting could be increased to help penetrate the dense soils around 17+ feet below elevation 23 feet if needed. It would probably be advisable to drive 1 or 2 probe piles at each embedment before jetting in the rest of the piles to get a better determination of the jetting and driving concerns. I doubt that the landfill materials were buried deeper than the creek/groundwater level, and it would appear that a bottom of pile cap at or near the elevation 23 feet shown on the plans would hopefully be below the rubble depth. If the refusal was due to repairs of old erosion at the bridge abutment, it may extend deeper, and should be removed prior to pile placement to prevent damage to the piles.

Precast prestressed piles are well suited to this installation, and driven piles allow the capacity of each pile to be verified at the time of installation. If piles fail to come up, an additional pile can be added if needed. The Universal B-1 boring indicates that deeper penetration is not a good idea, as capacity will drop off if the soil density does. We used the soil density at BR-2 to estimate the pile capacities, as the conditions at the loosest boring will control the pile design. Table #1 below shows the estimated allowable compression loadings for 14, 16, and 18 inch square prestressed concrete piles, jetted and driven as noted above.

TABLE #1

Pile Description	Approximate Depth of Penetration Below Elevation 23 Feet	Estimated Compression Capacity in Tons
14x14 Prestressed	27	46
16x16 Prestressed	27	60
18x18 Prestressed	27	74

Pile capacities should be verified by a PDA and the driving criterion established incorporating the PDA results. We should have a technician on site to record all pile driving results, and provide a direct connection to our engineering staff in the event that some of the piles do not come up due to erratic soil conditions.

Earthwork for backfill behind the bridge will be somewhat dependent on the plan for the landfill. If it will be turned into a park or athletic area in the future, care should be taken in removing poor material and achieving a minimum of 95% of the Modified Proctor Test (ASTM D 1557) density in the backfill to minimize subsidence of the fill relative to the pile supported bridge which will probably settle on the order of ½ inch. Drainage will be needed to dry wet soil areas to facilitate compaction and keep the fill from rewetting. On the order of .6 inch of settlement is estimated for the soft clay soils encountered in BR-2, and these will likely occur over a period of a few months after loading. Additional settlements will occur with the first major flooding, and the better compacted the backfill, the less the settlement.

If use of the area is unlikely, and it will remain a closed landfill, less care would be needed if subsidence behind the bridge is not a significant issue. Backfill behind the bridge abutments should be free of

substantial organic materials and significant accumulations of debris. Inclusions of small inert debris in the lower portion of the backfill is tolerable as long as the materials can be compacted in the soil matrix. Initial compaction on the order of 90% of the Modified Proctor test is acceptable low in the fill when filling in marginal conditions, but density should improve with each lift achieving a minimum of 95% within 3-4 feet of filling or in the top 3 feet of filling in limited fill areas whichever is greater, and maintaining a minimum density of 95% of the modified proctor test to the top of subgrade elevation. We should have a technician onsite to evaluate materials for reuse, communicate to our engineering staff so we can be knowledgeable of the actual encountered conditions, and to run field density tests as appropriate. Soil density should be checked in every other lift of fill, with 2-3 tests/lift on each side of the bridge.

We hope that this letter provides sufficient information for your current requirements. If you have any questions or require any further information, please call us at your convenience.

Respectfully yours,

LARRY M. JACOBS & ASSOCIATES, INC.

LARRY M. JACOBS LICENSE No 19690 STATE OF FLORIDA PROFESSIONAL ENGINEER

9 Sept 15

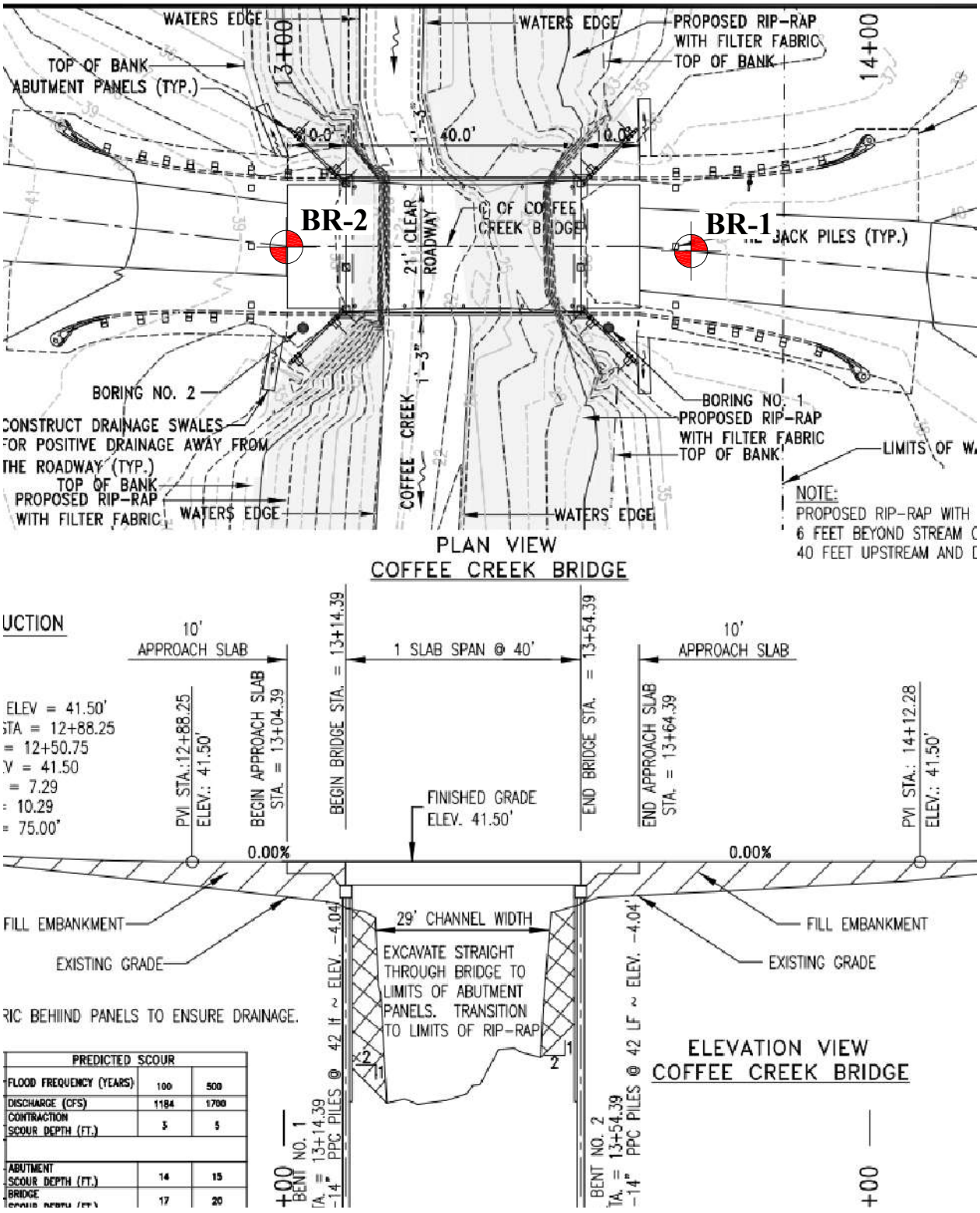
Larry M. Jacobs, PE

Principal Engineer

Florida Reg. #19690

BORING LOCATION PLAN

Figure #1



STANDARD PENETRATION TEST BORING
ALL BORING LOCATIONS ARE APPROXIMATE

Project #: 15-191	**Scale: NTS**
Date: 09/10/2015	**Checked By: LMJ**
Project: **Beulah Landfill Bridge Replacement**	
Location: **Escambia County, Florida**	

Geotechnical Engineering
LMJ
Drilling Services
Materials Testing

Larry M. Jacobs & Associates, Inc.

Geotechnical Engineering / Material Testing / Drilling

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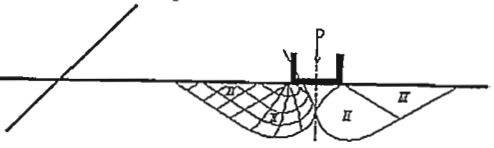

LOG OF BORING

PROJECT: Beulah Landfill
Escambia County, Florida

JOB NO.: 97-293

ELEVATION: N/A

BORING NO.: BR-1

TYPE BORING: ASTM-D1586

DATUM: Existing Grade

LOCATION: North Side of Bridge;
As Per Client

DATE: 9/10/97

GR. WATER: 8' Below Datum
At Time of Boring

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. Nf	S.P.T. Nc	W.C. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.L.	UNIT WT. pcf	% MINUS #200	SHEAR STRENGTH	Visual U/S
0		Orange loose slightly silty sand (0 to 3 inches)	1	14								SM/SP
		Orange loose silty sand (3 to 6 inches)	2	28								SM
5		Soil cement (6 to 12 inches)	3	14								SM
		Orange medium dense silty sand	4	7								SM/SP
10		Black medium dense slightly silty sand with organics	5	8								SP/SM+ SM/SP
		Gray medium dense slightly silty sand with layers of black slightly silty sand with organics										SP+ML
15		Off-white loose sand with seams of black fine sandy silt with organics	6	7								SP
20		Off-white loose sand	7	10								SP
		White, yellow, and orange loose layered sand										
25		Red and orange medium dense slightly silty medium to coarse sand	8	20								SP/SM
30		Light orange dense sand with seams of brown sand and yellow silt	9	41								SP+ML
35		Red medium dense slightly silty sand with seams of white sand	10	30								SM/SP+ SP
40		Red medium dense to dense silty sand with seams of purple silty sand and gravel	11	24								SM
45			12	33								
50		Yellow medium dense sand	13	21								SP
55												
60												

REMARKS: All soil classifications visual unless test results are shown.

North SIDE

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	1730.0800095.0000
REPORT NO.:	
PAGE:	2

PROJECT: Coffee Creek Bridge Replacement
Beulah Landfill, Escambia County, Florida

BORING DESIGNATION: **B-1**

SHEET: **1 of 1**

GPS COORDINATES:

CLIENT: Sigma Consulting Group

REMARKS: Please note the potential for a transient seepage zone above the CL layer encountered from about 17 to 22 feet below existing grade.

G.S. ELEVATION (ft): NG
WATER TABLE (ft): 13.5
DATE OF READING: 7/17/2008
EST. W.S.W.T. (ft): 12.5

DATE STARTED: 7/17/08
DATE FINISHED: 7/17/08
DRILLED BY: UES-PC
TYPE OF SAMPLING: SPT-STAN

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	pH	ORGANIC CONTENT (%)
0						Dark orange loose clayey SAND (SC)						
		2-2-4	6									
		4-4-4	8									
5		4-7-5	12			Brown medium dense silty SAND (SM)						
		9-7-10	17			Black medium dense silty SAND with a heavy organic stain and organics (SM)						
		8-8-11	19									
10		8-10-9	19									
				▽		Gray medium dense slightly silty SAND (SP-SM)						
15		8-8-8	16	▼			24	23				
						Dark brown stiff sandy CLAY (CL)						
20		7-3-9	12									
						Brown and gray loose silty SAND with pieces of clay (SM)						
25		2-3-2	5									
						Dark brown/orange dense silty coarse SAND (SM)						
30		8-16-20	36									
						Yellow/tan loose silty SAND (SM)						
35		6-4-3	7									
						Orange/brown medium dense slightly silty coarse SAND (SP-SM)						
40		12-11-12	23									
						Dark red medium dense silty coarse SAND (SM)						
45		6-5-7	12									
						Dark red and brown loose silty coarse SAND with gravel (SM+GW)						
50		3-4-4	8									

BORING LOG WITH ORG & PH BEULAH LANDFILL BRIDGE.GPJ UNIENGSC.GDT 9/8/08

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	1730.0800095.0000
REPORT NO.:	
PAGE:	3

PROJECT: Coffee Creek Bridge Replacement
Beulah Landfill, Escambia County, Florida

BORING DESIGNATION: **B-2**

SHEET: **1 of 1**

GPS COORDINATES:

CLIENT: Sigma Consulting Group

G.S. ELEVATION (ft): NG

DATE STARTED: 7/17/08

REMARKS: Boring was terminated because of refusal due to trash and debris encountered at about 10 feet below existing grade. Further, please note the potential for a transient seepage zone(s) above the clayey (SM-SC, SC) soils encountered throughout this boring.

WATER TABLE (ft): CNE

DATE FINISHED: 7/17/08

DATE OF READING: 7/17/2008

DRILLED BY: UES-PC

EST. W.S.W.T. (ft): >10

TYPE OF SAMPLING: SPT-STAN

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	pH	ORGANIC CONTENT (%)
0						Dark orange loose slightly clayey silty SAND (SM-SC)						
		3-2-3	5									
		3-7-17	24			Dark orange medium dense slightly clayey silty SAND with trace gravel (SM-SC+GW)						
5						Dark brown/orange slightly clayey coarse SAND (SM-SC)						
10						Brown/orange clayey coarse SAND (SC) BORING TERMINATED DUE TO REFUSAL FROM TRASH AND DEBRIS						
15												
20												
25												
30												
35												
40												
45												
50												

BORING LOG WITH ORG & PH BEULAH LANDFILL BRIDGE.GPJ UNIENGSC.GDT 9/8/08

Larry M. Jacobs & Associates, Inc.

Geotechnical Engineering / Material Testing / Drilling

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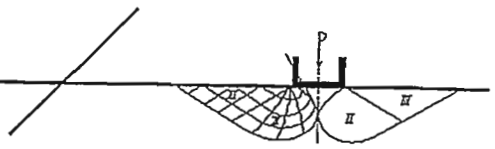

LOG OF BORING

PROJECT: Beulah Landfill
Escambia County, Florida

JOB NO.: 97-293

ELEVATION: N/A

BORING NO.: BR-2

TYPE BORING: ASTM-D1586

DATUM: Existing Grade

LOCATION: South Side of Bridge;
As Per Client

DATE: 9/11/97

GR. WATER: 12' Below Datum
At Time of Boring

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. N1	S.P.T. Nc	W.C. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.L.	UNIT WT. pcf	% MINUS #200	SHEAR STRENGTH	Visual U/S
		Orange medium dense silty sand	1	20								SM
		Black and gray medium dense to very loose silty sand with organics	2	6								SM
5			3	4								
		Black and gray very loose clayey silty sand and sandy clay	4	4								SM/SC+ CL
10			5	18								SM
		Black and gray medium dense silty sand with organics										SP
15		Off-white medium dense to very loose sand	6	2		31	34	18				
		Light gray very soft silty clay										CL
20		Red and tan medium clay	7	5								CL
		Multicolored loose slightly clayey silty sand										SM/SC
25		Multicolored loose slightly silty fine sand with seams of clay and gravel	8	7								SM/SP+ CL
		Multicolored medium dense sand										
30			9	18								SP
35		Orange and red medium dense sand	10	16								SP
40		Pink, yellow and red/brown medium dense sand and slightly silty sand	11	16								SP+ SP/SM
45		Red medium dense silty fine to coarse sand	12	17								SM
50			13	23								
		Yellow medium dense sand										SP
55												
60												

REMARKS: All soil classifications visual unless test results are shown.

Geotechnical Engineering
Since 1976
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Materials Testing

February 11, 2015

Mr. Jason Lashley, PE
SIGMA CONSULTING GROUP, INC.
ENGINEERING CONSULTANTS
Via email: jlashley@sigmacg.com

SUBJECT: Geotechnical Evaluation Proposal
Beulah Landfill Coffee Creek Bridge
Escambia County, Florida

Dear Jason:

Larry M. Jacobs & Associates, Inc. (LMJ) sincerely appreciates the opportunity to submit the following proposal for providing a geotechnical evaluation for the subject project. The purpose of this evaluation is to use the previous two borings we drilled near the bridge in 1997 to provide recommendations for earthwork and foundation design for a precast arch span bridge. The following sections outline our recommended scope of services, a cost estimate for providing these services, and the proposed terms and conditions.

PROJECT AND SITE DESCRIPTION

The site is the bridge over Coffee Creek at the Beulah Landfill in Escambia County, Florida. We drilled two borings for the bridge in 1997 to a depth of 51 feet. We understand that a precast arch bridge is planned for the replacement of the existing bridge. Based on the provided plans from 1997, the previously planned bridge had a top of wing wall elevation of 39 feet and bottom of footing elevation of roughly 23 feet with a 42-foot span. Our approximate boring locations are shown on the 1997 plans.

PROPOSED SCOPE OF SERVICES

- Evaluate the 1997 borings.
- Provide recommendations for site preparation including general comments, subgrade preparation, fill placement, compaction, testing requirements, etc.
- Provide recommendations for foundation design for the bridge including an allowable soil bearing pressure and estimated settlement.

ESTIMATED COST

We propose to provide the scope of services in this proposal for a lump sum of **$690.00** (6 hours).

AUTHORIZATION

To authorize us to proceed with this project, please complete, sign, and return a copy of the attached ***Agreement for Professional Services*** **(Figure #1)** to our office. If the authorization for this work is faxed or emailed, the original signed authorization is needed for our records.

LMJ appreciates the opportunity to present you with this proposal, and we look forward to working with you on this project. If you have any questions or comments, please do not hesitate to call.

Respectfully Yours,
LARRY M. JACOBS & ASSOCIATES, INC.

Keith V. Jacobs, PE
Principal Engineer

Attachments

Figure #1

Geotechnical Engineering
Since 1976
Drilling Services
Materials Testing

AN AGREEMENT FOR PROFESSIONAL SERVICES

CLIENT: Mr. Jason Lashley, PE
SIGMA CONSULTING GROUP, INC. ENGINEERING CONSULTANTS
Via email: jlashley@sigmacg.com

DATE: February 11, 2015
PHONE #: 850-432-8870

SUBJECT: Geotechnical Evaluation Proposal
Beulah Landfill Coffee Creek Bridge

The attached letter forwards our cost proposal for performing a Geotechnical Exploration for the subject project. We have estimated the cost for our services as described and under the conditions present in the attached letter to be: **$690.00**.

We look forward to working with you on this project. Please have the party responsible for payment of our services ***FILL IN THE BOXED SECTION*** of this form, **SIGN YOUR AUTHORIZATION** and **RETURN ONE ORIGINAL** of this form to our office to activate our services including the distribution of our report. ***If the authorization for this work is faxed to initiate the work, we will still need the signed original authorization for our records, which can be forwarded by return mail.*** If you have any questions or comments, please feel free to call.

THE TERMS AND CONDITIONS ON PAGE TWO OF THIS FORM ARE PART OF THIS AGREEMENT.

FOR: LARRY M. JACOBS & ASSOCIATES, INC.

BY: _____
(President)

TERMS: [X] Net 30 Days

Herein constitutes my authorization to proceed with and obligates payment for the subject services referenced above in the proposal and if necessary personally guarantees said payment. Invoices are due when rendered. *Invoices shall be considered past due if not paid within 30 days after the invoice date,* unless a previous agreement for extended time for payment has been arranged, and Larry M. Jacobs & Associates, Inc. (LMJ) may without waiving any claim or right against Client, and without liability whatsoever to the Client, terminate the performance of the service. Retainers shall be credited on the final invoice. A service charge will be charged at 1.5% (or the legal rate) per month on the past due balance(s). In the event any portion or all of an account remains unpaid 90 days after billing the Client agrees to pay cost of collection, including all credit bureau, collection agency, and/or reasonable attorney's fees.

PROPERTY OWNER:

Name _____ Phone #: (___) _____
Address _____ Fax #: (___) _____
City, State _____ Zip Code _____ Email: _____

PARTY RESPONSIBLE FOR PAYMENT (If different than Client):

Name _____ Phone #: (___) _____
Address _____ Fax #: (___) _____
City, State _____ Zip Code _____ Email: _____

CLIENT'S NAME: _____

AUTHORIZED BY: _____ _____ _____
(Please Print or Type) Title Date

Signature: _____
(**Must be signed by a Principal or Officer of the Company**)

Figure #1

TERMS AND CONDITIONS

Larry M. Jacobs & Associates, Inc. (LMJ) its officers, stockholders, and employees**,** hereinafter referred to as the Geotechnical Engineer of Record (GER), shall perform the services outlined in this agreement for the stated fee agreement.

Access To Site and Hidden Utilities

Unless otherwise stated, the GER will have access to the site for activities necessary for the performance of the services. The GER will take precautions to minimize damage due to these activities, but has not included in the fee the cost of restoration of any resulting damage. The GER shall not be responsible for damage to hidden utilities. It is the Clients' responsibility to provide the GER with the locations of said hidden utilities.

Fee

The total fee shall be understood to be an estimate, based on an agreed upon Scope of Services, and shall not be exceeded without approval of the Client.

Indemnification

The Client shall indemnify and hold harmless the GER and all of its personnel from and against any and all claims, damages, losses and expenses (including reasonable attorneys fees) arising out of or resulting from the performance of the services, provided that any such claims, damage, loss or expense is caused in whole or in part by the negligent act of omission, and/or strict liability of the Client, anyone directly or indirectly employed by the Client (except the GER) or anyone for whose acts any of them may be liable.

Hidden Conditions

A geotechnical condition is hidden if it is not encountered in the planned geotechnical investigation which incorporates currently accepted standards of Geotechnical Engineering. If the GER has reason to believe that such a condition may exist, the client shall authorize and pay for all costs associated with the investigation of such a condition and, if necessary, all costs necessary to correct said condition. If (1) the client fails to authorize such investigation or correction after due notification, or (2) the GER has no reason to believe that such a condition exists, the client is responsible for all risks associated with this condition, and the GER shall not be responsible for the existing condition or any resulting damages to persons or property. The GER shall also not be responsible for the release or aggravation of any hazardous materials encountered by the geotechnical investigation.

Risk Allocations

In recognition of the relative risks, rewards and benefits of the project to both the Client and the GER, the risks have been allocated so that the Client agrees that, to the fullest extent permitted by law, the GER's total liability to the Client, for any and all injuries, claims, losses, expenses, damages or claim expenses arising out of this agreement, from any cause or causes, shall not exceed the total amount of $50,000, the amount of the GER's fee (whichever is greater) or other amount agreed upon when added under special conditions. Such causes, include, but are not limited to the GER's negligence, errors, omissions, strict liability, breach of contract or breach of warranty.

Termination of Services

This agreement may be terminated upon 10 days written notice by either party should the other fail to perform his obligations hereunder. In the event of termination, the Client shall pay the GER for all services, rendered to the date of termination, all reimbursable expenses, and reimbursable termination expenses.

Ownership Documents

All documents produced by the GER under this agreement shall remain the property of the GER and may not be used by this Client for any other endeavor without the written consent of the GER.

Applicable Law

Unless otherwise specified, the laws of the principal place of business of the GER shall govern this agreement.

Mediation

In an effort to resolve any conflicts that arise during the design or construction of the project or following the completion of the project, the Client and the GER agree that all disputes between them arising out of or relating to this agreement shall be submitted to non-binding mediation unless the parties mutually agree otherwise.

Geotechnical Engineering principles and practices, and experience with similar soil/groundwater conditions. Should final project design information differ from the design information used in this report, our office should be notified and retained so that this report can be modified as needed.

Regardless of the care exercised in performing a Geotechnical Investigation, the possibility always exists that soil and/or groundwater conditions between the test borings will differ from those encountered at the specific boring locations. In addition, construction operations may alter the soil conditions. Therefore, it is recommended that either the Geotechnical Engineer-of-Record or a representative from Larry M. Jacobs & Associates, Inc. be involved throughout construction phases addressed in this report. Furthermore, considering our familiarity with the project, the subsurface conditions present, and the intent of the design and recommendations, we recommend that Larry M. Jacobs & Associates, Inc. be retained as the testing laboratory in the event differing subsurface conditions are encountered during construction.

4.2 Subsurface Conditions

Two Standard Penetration Test borings (BR-1 and BR-2) were drilled, one on either side of the current bridge, to evaluate the subsurface conditions for a pile foundation for the proposed precast concrete bridge. Appendix D shows the Logs of Boring of these two test borings. The bridge borings encountered different subsurface conditions and will be discussed separately below.

Boring BR-1, which was drilled on the north side of the existing bridge, generally encountered medium dense slightly silty and silty sand from the ground surface to a depth of 6± feet underlain by off-white loose sand with seams of black fine sandy silt with organics to 12± feet underlain by off-white loose sand to 23± feet. From roughly 23-29 feet, the boring encountered red and orange medium dense slightly silty sand underlain by light orange dense sand with seams of brown sand and yellow silt to 34± feet underlain by multicolored medium dense and dense sand, slightly silty sand, and silty sand to the bottom of the 51 foot deep boring BR-1.

Boring BR-2, which was drilled on the south side of the existing bridge, generally encountered black loose silty sand with organics from the ground surface to a depth of 9± feet underlain by off-white medium dense to very loose sand to 14± feet underlain by light gray very soft silty clay to 20± feet. From roughly 20-27 feet, the boring encountered multicolored loose silty and clayey sand underlain by multicolored medium dense sand to 43± feet underlain by red medium dense silty sand to the bottom of the 51 foot deep boring BR-2. Atterberg limits and water content tests performed on the split spoon sample of the light gray silty clay encountered from roughly 14-20 feet yielded a liquid limit of 34%, a plastic limit of 18%, and a water content of 31%.

Groundwater was encountered roughly 8-12 feet below existing grade at the time of drilling, which was during a period of below normal seasonal rainfall. The difference in the depth to groundwater can be attributed to the difference in ground surface elevations between the two boring locations. Groundwater levels will fluctuate with rainfall and could vary 2± feet during typical seasonal fluctuations. Larger fluctuations are possible under severe weather conditions. Note that the near surface silty and clayey sands are relatively slow draining, and that perched/slowly infiltrating groundwater could be present in and above these soils during periods of increased rainfall.

Drilling fluids and cuttings from the two bridge borings were pumped into disposal pits excavated in landfill areas adjacent to the test borings. These pits were backfilled with the excavated materials several days after completion of the test borings as attested to in Section 8.0.

4.3 Foundation Recommendations

Based on the subsurface conditions encountered in the test borings, we recommend embedding the proposed piles in the medium dense sands encountered 35± feet below existing grade. Table #3 below shows allowable pile capacities for both timber and prestressed concrete piles jetted from the ground surface to a depth of 30± feet below existing grade and driven to bearing 35± feet below existing grade. Note that "existing grade" refers to the grade at the boring locations, and that the pile capacities in Table #3 assume that the top of the piles will be at/near the surface water elevation in Coffee Creek.

TABLE #3

Pile Size/Description	Compression Capacity (1)	Tension Capacity (1)
8" Dia. Tip Timber Pile	9 kips	3 kips
10" Dia. Tip Timber Pile	13 kips	3.5 kips
10"x10" Prestressed Concrete Pile	17 kips	4 kips
12"x12" Prestressed Concrete Pile	24 kips	5 kips

(1) Factor of Safety = 2.0

As noted above, the piles should be jetted from the ground surface to a depth of 30± feet below existing grade and driven to bearing 35± feet below existing grade to obtain the capacities shown in Table #1. Note that boring BR-1 encountered firmer soils at a depth of 25-35 feet below existing grade which will increase driving resistances in this area. It may be necessary to adjust the depth of jetting to achieve the recommended pile embedment and the corresponding top of pile elevation without excessive cut-offs.

Field determination of the actual pile capacities developed should be analyzed using a dynamic pile driving formula (i.e. Hiley, WAVE, etc.). This analysis required knowledge of the piles and pile

driving equipment to be used on the site. We would be happy to calculate required pile driving resistances to obtain the pile capacities given above when the equipment to be used is known. A field technician from our office should be on the site during driving so that an accurate evaluation of the pile driving resistances achieved can be made to verify the capacities of the piles.

5.0 SOFT SURFACE DEPRESSION INVESTIGATION

Two Standard Penetration Test borings (S-1 and S-2) were drilled in apparent soft areas in the South Area of the landfill to evaluate the subsurface conditions present. Due to the unknown nature and strength of the area, the test borings were drilled with a portable aluminum tripod derrick which was hand carried to the boring locations determined in the field by Mr. Joe O'Neill, P.E. of SCS Engineers and erected for drilling. Appendix E shows the Logs of Boring of these two borings.

6.0 LOW PERMEABILITY BORROW SOURCE TELEPHONE SURVEY

A telephone survey of local borrow sources was conducted to determine the availability of soils suitable for the construction of the proposed cover system, specifically the low permeability cap. The primary requirements to be met were a maximum permeability of $1x10^{-5}$ cm/sec and the availability of up to 94,000 yd^3 (in place). Table #4 below summarizes the results of the telephone survey in the format requested.

Table #4

Landfill Cap Material - Telephone Survey Results

Borrow Source	Contact Name	Phone Number	Test Results	In-Situ Moisture	Delivered Price	Comments
Clark Sand Company	Richard Clark	(850) 433-2273	Yes[1]	NA	$5-$8/yd^3	Quantity obtainable
Gulf Coast Paving	John Simms	(850) 456-8611	NA	NA	$5/yd^3	Quantity obtainable
Kingry Trucking	Dick Kingry	(850) 969-0201	NA	NA	$6/yd^3	Quantity obtainable
Russell Sand Mine	Pete Russell	(850) 626-7777	NA	NA	$5/yd^3	Quantity obtainable
Green's Fill Dirt	Tony Green	(850) 477-3533	NA	NA	$4-$5/yd^3	Quantity available
Seminole Materials	Byron Cook	(850) 474-0212	Yes[2]	NA	$4-$6/yd^3	Quantity available

Notes: (1) Proctor test
(2) Proctor tests, hydrometer grainsize tests, LBR tests

7.0 BORROW SOURCE TEST BORING

A 30 foot deep Standard Penetration Test boring (SB-1) was drilled north of the existing borrow pit to determine if soils suitable for use in constructing the low permeability cover system are present in this area. Appendix F shows the Log of Boring for this boring.

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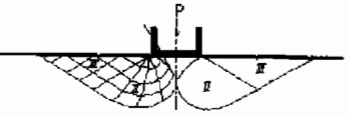

LOG OF BORING

PROJECT: Beulah Landfill
Escambia County, Florida

JOB NO.: 97-293

ELEVATION: N/A

BORING NO.: BR-1

TYPE BORING: ASTM-D1586

DATUM: Existing Grade

LOCATION: North Side of Bridge;
As Per Client

DATE: 9/10/97

GR. WATER: 8' Below Datum
At Time of Boring

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. N1	S.P.T. Nc	W.C. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.L.	UNIT WT. pcf	% MINUS #200	SHEAR STRENGTH	Visual U/S
		Orange loose slightly silty sand (0 to 3 inches)	1	14								SM/SP
		Orange loose silty sand (3 to 6 inches)	2	28								SM
5		Soil cement (6 to 12 inches)	3	14								SM
		Orange medium dense silty sand	4	7								SM/SP
												SP/SM+
10		Black medium dense slightly silty sand with organics	5	8								SM/SP
												SP+ML
		Gray medium dense slightly silty sand with layers of black slightly silty sand with organics										
15			6	7								SP
		Off-white loose sand with seams of black fine sandy silt with organics										
20		Off-white loose sand	7	10								SP
		White, yellow, and orange loose layered sand										
25		Red and orange medium dense slightly silty medium to coarse sand	8	20								SP/SM
30		Light orange dense sand with seams of brown sand and yellow silt	9	41								SP+ML
35		Red medium dense slightly silty sand with seams of white sand	10	30								SM/SP+ SP
40		Red medium dense to dense silty sand with seams of purple silty sand and gravel	11	24								
45			12	33								SM
50		Yellow medium dense sand	13	21								SP
55												
60												

REMARKS: All soil classifications visual unless test results are shown.

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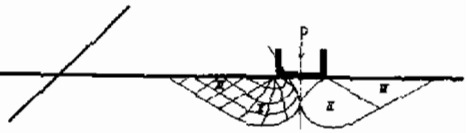

LOG OF BORING

PROJECT: Beulah Landfill
Escambia County, Florida

JOB NO.: 97-293

ELEVATION: N/A

BORING NO.: BR-2

TYPE BORING: ASTM-D1586

DATUM: Existing Grade

LOCATION: South Side of Bridge;
As Per Client

DATE: 9/11/97

GR. WATER: 12' Below Datum
At Time of Boring

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. Nf	S.P.T. Nc	W.C. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.L.	UNIT WT. pcf	% MINUS #200	SHEAR STRENGTH	Visual U/S
		Orange medium dense silty sand	1	20								SM
		Black and gray medium dense to very loose silty sand with organics	2	6								SM
5			3	4								
			4	4								
		Black and gray very loose clayey silty sand and sandy clay	5	18								SM/SC+ CL
10		Black and gray medium dense silty sand with organics										SM
		Off-white medium dense to very loose sand										SP
15			6	2		31	34	18				
		Light gray very soft silty clay										CL
20		Red and tan medium clay	7	5								CL
		Multicolored loose slightly clayey silty sand										SM/SC
25		Multicolored loose slightly silty fine sand with seams of clay and gravel	8	7								SM/SP+ CL
		Multicolored medium dense sand										SP
30			9	18								
		Orange and red medium dense sand	10	16								SP
35												
		Pink, yellow and red/brown medium dense sand and slightly silty sand	11	18								SP+ SP/SM
40												
		Red medium dense silty fine to coarse sand	12	17								SM
45												
			13	23								
50		Yellow medium dense sand										SP
55												
60												

REMARKS: All soil classifications visual unless test results are shown.