ALVA BOAT RAMP RENOVATION
CONSTRUCTION SPECIFICATIONS
June 7, 2019

CS-1.0 SCOPE OF WORK

The WORK to be performed under the CONTRACT consists of furnishing all labor, equipment, supplies, materials, transportation, fuel, power and water, providing environmental protection, and performing all operations in connection with the Alva Boat Ramp Renovation Project.

The property is located at 21580 Pearl Street, Alva, Florida along the Caloosahatchee River in Section 22, Township 43 South, Range 27E, Lee County.

This WORK must be completed according to the CONTRACT documents within the time specified in the CONTRACT and within compliance with the conditions of the Federal, State, and local permits. The CONTRACTOR is solely responsible for all construction means, methods, techniques, procedures, lay out, and the sequence of the WORK except as set forth in section "Order of Work".

Prior to the submission of a bid form, bidders shall examine the documents, visit the site, and fully inform themselves as to all existing conditions and limitations that affect the WORK to be performed under the CONTRACT. Bidders are required to examine each WORK Area and make determinations of quantities and plant equipment needed to perform the WORK. No consideration shall be given to any claims for additional payments based on the failure of the CONTRACTOR to inspect each WORK Area and assess plant equipment needs and accurately calculate the quantities necessary to perform the WORK. All bid forms shall be presumed to include all such existing conditions as may affect any WORK to be done on this Project. Failure to familiarize himself with such conditions will in no way relieve the successful bidder from the necessity of furnishing any materials or performing any WORK that may be required to complete the WORK in accordance with the CONTRACT Plans and these Specifications.

CS-2.0 BASIS OF AWARD

The basis of award will be the overall lowest most responsive responsible bidder meeting all specifications. The COUNTY unconditionally reserves the right to award to the vendors whose prices, in its sole judgment, is the most realistic in terms of provision of the best services. Additionally, the COUNTY reserves the right to reject any and all bids at any time, unconditionally and without cause.

All items listed on the Bid Schedule at the units shown, values of which shall be inclusive of all plant, labor, equipment, supplies, and shall also include all other items of overhead, profit, labor, material and any other costs incident to perform and complete all WORK specified herein.

CS-3.0 SUBMITTALS

CS-3.1 Work Plan

Prior to commencement of WORK the CONTRACTOR shall submit to the COUNTY and ENGINEER for approval, a WORK plan to cover all specified operations. The WORK plan shall include, but not be limited to, the means and methods to be employed to accomplish: construction access, staging, and restoration; upland site work; dock demolition and reconstruction; boat ramp demolition and reconstruction; armormat scour protection installation; riprap installation; site restoration; turbidity controls; best management practices; storm emergency plan; health and safety plan; turbidity monitoring including personnel qualifications; endangered species protection plans and observer qualifications subject to approval by Permit agencies; environmental protection plan; pollution control plan; required shop drawings; and required manufacturers' specifications and certifications. The Work Plan shall also include the Progress Schedule, Schedule of Values, Construction Sequence, and Order of Work. The COUNTY and ENGINEER shall review the WORK Plan and the CONTRACTOR shall make necessary revisions prior to acceptance of the WORK Plan.

CS-3.2 Administrative Records

CS-3.2.1 Notification of Discovery of Historical Sites

The CONTRACTOR shall immediately notify the COUNTY and ENGINEER if any shipwreck, artifact, treasure trove, or other objects of antiquity that have scientific or historical value, or are of interest to the public, are discovered, located, and/or recovered.

CS-3.2.2 Notice of Misplaced Material

The CONTRACTOR shall notify the U.S. Coast Guard and COUNTY of any misplaced material as outlined in section CS-10.0 MISPLACED MATERIAL.

CS-4.0 CONSTRUCTION SEQUENCE

CS-4.1 Order of WORK

In general, the Order of WORK shall be as follows. Any changes in the Order of WORK must be submitted in writing and approved by the COUNTY and ENGINEER prior to initiation of the specific WORK activity.

(1) Pre-construction submittals and notifications
(2) Mobilize
(3) Prepare construction access and staging areas
(4) Establish residential access to private driveway
(5) Install turbidity controls and best management practices
(6) Stabilize existing structures
(7) Demolish and reconstruct boat ramp
(8) Install armormat scour protection
(9) Install riprap
(10) Demolish and reconstruct boat dock

(11) Construct ADA Timber Ramp
(12) Upland site work
(13) Remove turbidity controls and related construction materials
(14) Complete site restoration
(15) Demobilize

CS-4.2 Time of Operations

The CONTRACTOR is allowed to conduct work activities during daylight hours Monday through Friday, excluding weekends and Holidays, at the CONTRACTOR's discretion, provided that the CONTRACTOR complies with all applicable labor laws. The CONTRACTOR may request in writing with minimum 5-day notice to the COUNTY to conduct work on weekends. The COUNTY will review each request individually.

CS-5.0 PAYMENT

CS-5.1 Mobilization and Demobilization

Payment for the cost of mobilization and demobilization including construction access and restoration of construction access and staging area is included in this CONTRACT. Payment for all appropriate costs in connection therewith or incidental thereto; which shall also include all other items of cost required by the CONTRACT for which a separate payment is not provided for herein. This WORK shall be included in the applicable CONTRACT lump sum price for Bid Item "Mobilization and Demobilization." Fifty percent (50%) of the lump sum price will be paid after commencement of the existing boat ramp demolition. The remaining fifty percent (50%) will be included in the final payment for WORK under this CONTRACT.

In the event the COUNTY or ENGINEER considers that the amount in this item (50%), which represents mobilization, does not bear a reasonable relation to the cost of the WORK in this CONTRACT, the COUNTY may require the CONTRACTOR to produce cost data to justify this portion of the bid. Failure to justify such price to the satisfaction of the COUNTY will result in payment of actual mobilization costs, as determined by the COUNTY and ENGINEER at the completion of mobilization, and payment of the remainder of this item in the final payment under this CONTRACT. The determination of the COUNTY and ENGINEER is not subject to appeal.

CS-5.2 Boat Ramp Replacement

Payment shall be made for materials and WORK specified in connection with the site preparation, stabilization of existing structures, demolition, and disposal of the construction debris at an approved off-site location; grading and installation of geotextile and bedding stone; fabrication and installation of concrete and steel piles; fabrication and installation of concrete panels and concrete testing; formwork, placement of reinforcing steel, backfill and fill compaction, grading, casting of concrete slabs and curbs, and concrete testing; installation of vinyl sheet piling and grouting; and installation of bollards; and all other appropriate costs in connection therewith or incidental thereto. This WORK shall be included in the applicable CONTRACT unit pricing for Bid Item "Boat Ramp Replacement."

CS-5.3 Armormat Scour Protection

Payment shall be made for materials and WORK specified in connection with the grading and installation of geotextile and bedding stone, and installation of armormat scour protection, and all other appropriate costs in connection therewith or incidental thereto. This WORK shall be included in the applicable CONTRACT unit price per square foot for Bid Item "Armormat Scour Protection."

CS-5.4 Riprap

Payment shall be made for materials and WORK specified in connection with grading, slope preparation, and existing riprap adjustments; installation of geotextiles; installation of riprap; and all other appropriate costs in connection therewith or incidental thereto. This WORK shall be included in the applicable CONTRACT unit price per square foot for Bid Item "Riprap."

CS-5.5 Dock Replacement

Payment shall be made for materials and WORK specified in connection with the stabilization of existing structures, demolition, and disposal of the construction debris at an approved off-site location; installation of docks; installation of timber piles; installation of fender piles; and, all other appropriate costs in connection therewith or incidental thereto. This WORK shall be included in the applicable CONTRACT unit pricing for Bid Item "Dock Replacement."

CS-5.6 ADA Timber Ramp

Payment shall be made for materials and WORK specified in connection with the installation of the ADA Timber Ramp, installation of timber piles, and all other appropriate costs in connection therewith or incidental thereto. This WORK shall be included in the applicable CONTRACT unit price per square foot for Bid Item "ADA Timber Ramp."

CS-5.7 Upland Site Work

Payment shall be made for materials and WORK specified in connection with site preparation, stabilization of existing structures, demolition, and disposal of the construction debris at an approved off-site location; grading; paving and striping; concrete sidewalk and pads; bumper guards and bollards; shell parking; ADA parking; fence removal and replacement; tree removal; riprap overflow structure; signage; site amenities; and landscaping; and all other appropriate costs in connection therewith or incidental thereto. This WORK shall be included in the applicable CONTRACT unit pricing for Bid Item "Upland Site Work."

CS-5.8 Environmental Protection Measures

Payment shall be made for materials and WORK specified in connection with installation and maintenance of turbidity and erosion controls; best management practices; turbidity monitoring; implementing state and federal endangered and threatened species protection conditions; implementing habitat and resource protection measures; environmental permit compliance; and all other appropriate costs in connection therewith or incidental thereto. This

WORK shall be included in the applicable CONTRACT lump sum price for Bid Item "Environmental Protection Measures."

CS-6.0 WORK AREA

CS-6.1 Limits of Construction

Areas in the vicinity of the Project area contain sensitive environmental habitats. The CONTRACTOR shall avoid these habitats and is responsible for environmental protection. All WORK must be confined to the CONTRACTOR's WORK area. No plant or equipment may operate or transit outside the property boundary or WORK limits. All construction areas shall be restored to pre-construction conditions, or better as part of demobilization.

The CONTRACTOR shall maintain residential access to the private driveway throughout construction. The CONTRACTOR shall work cooperatively with the COUNTY and the private landowner. The CONTRACTOR must give one (1) week written notice prior to temporary closure of the driveway for pavement work adjacent to the driveway.

CS-6.2 Security

The CONTRACTOR is permitted to exclude the public from his WORK area as necessary to perform the WORK and to operate in accordance with the General Conditions of the CONTRACT. Enforcement shall be the CONTRACTOR's responsibility at no additional cost to the COUNTY. The enforcement shall be coordinated with local enforcement agencies and will be subject to approval of the COUNTY.

CS-6.3 Construction Access

Construction access and staging shall be confined to the CONTRACTOR's WORK area. Procurement of any additional access routes for ingress and egress to the construction area shall be obtained by and at the expense of the CONTRACTOR. The CONTRACTOR shall confine his plant, equipment, materials, and operations of personnel to areas permitted by law, ordinances, permits and the requirements of the CONTRACT Documents, and shall not unreasonably encumber the premises with plant, equipment, and materials. The CONTRACTOR must control noise and must control wind-blown sand, silt and dust while using the accesses. The CONTRACTOR is responsible for preparation and restoration of the access areas. The CONTRACTOR is required to submit a construction access and staging plan including restoration measures prior to their usage. The costs for, but not limited to, earthwork, grading, signage, fencing, walls, guardrails, curbing, paving, stairways, and vegetation removal and reinstallation, along with removal and installation of any other facilities are included in the lump sum price for Bid Item "Mobilization and Demobilization". Disposal of any cleared vegetation, debris and rubbish shall be in a manner acceptable to the COUNTY and ENGINEER.

CS-6.4 Protection of Existing Facilities

During all phases of the WORK including but not limited to staging, construction access, construction, and site restoration, the CONTRACTOR shall implement best management practices to protect and stabilize the existing facilities within and adjacent to the WORK Area and to prevent

damage thereto by the CONTRACTOR's operations. Where existing facilities are damaged, they shall be immediately repaired in conformance with the best construction standards of practice. All existing signage and kiosks within the Work Area shall be removed and provided to the County.

CS-6.5 Noise

The CONTRACTOR shall conduct their operations so as to comply with all Federal, State, and local laws pertaining to noise. The CONTRACTOR shall use a decibel meter and keep records as necessary to verify the WORK is being conducted accordingly.

CS-6.6 Existing Utilities

It shall be the responsibility of the CONTRACTOR to acquaint themselves with the exact location of existing underground structures and utilities and to avoid conflict with all existing facilities. The CONTRACTOR shall be responsible for notifying, in writing and in advance of construction activities, the COUNTY and ENGINEER and all government and private agencies and entities that may have an area of responsibility, jurisdiction or involvement for any items of WORK being constructed, or whom shall assume responsibility for the items after construction. This list of agencies and entities shall include, but is not limited to:

a. Florida Power and Light
b. Sprint
c. Comcast
d. Lee County Utilities

These agencies require a minimum of 48 hour written notice of activities within their jurisdiction. The CONTRACTOR shall also call Sunshine 811 before beginning any WORK at the WORK area.

Protection of all utilities shall be the responsibility of the CONTRACTOR who shall provide adequate protection to maintain proper service. The CONTRACTOR is to include within its line item bid prices, the costs to protect, and/or support, all underground utilities which may be in conflict with the construction of this Project. Attention is called to the Florida Underground Facility Damage Prevention and Safety Act, Chapter 556, Florida Statues. This act provides for a one-call center charged with helping prevent damages to underground utilities.

Any expense of utility repair or other damage caused by the CONTRACTOR’s operations shall be borne by the CONTRACTOR. Where existing utilities are damaged, they shall be immediately repaired by the CONTRACTOR in accordance with the requirements of the government, private agencies, and entities that may have an area of responsibility, jurisdiction or involvement for the utilities. If the COUNTY of the utility elects to make such repairs with his own forces, the CONTRACTOR shall make sure that specific arrangements are made to protect the COUNTY from all damages. Where such conflicts are unavoidable, every effort shall be made to construct the WORK so as to cause as little interference as possible with the services rendered by the structure disturbed.

CS-7.0 CONTRACTOR'S PLANT AND EQUIPMENT

The CONTRACTOR agrees to keep on the job sufficient plant and equipment to meet the requirements of the WORK. The plant and equipment shall be in satisfactory operating condition and capable of safely and efficiently performing the WORK as set forth in the specifications and the plant shall be subject to access by the COUNTY and ENGINEER at all times. The Plant and Equipment to be utilized by the CONTRACTOR shall be submitted by the CONTRACTOR with their Bid. The Plant listed on the Plant and Equipment Schedule is the minimum which the CONTRACTOR agrees to place on the job unless otherwise determined by the COUNTY and its listing thereon is not to be construed as an agreement on the part of the COUNTY that it is adequate for the performance of the WORK. No reduction in the capacity of the Plant employed on the WORK shall be made except by written permission of the COUNTY. The measure of the "Capacity of the Plant", shall be its actual performance on the WORK to which these Specifications apply.

CS-8.0 TRANSPORTATION FACILITIES

The CONTRACTOR shall make his own investigation of available roads or other means of conveyance for transportation, load limits for bridges, barges and roads, and other road or waterside conditions affecting the transportation of all equipment to the site.

CS-9.0 WATER, SEWER, AND ELECTRIC

The responsibility shall be upon the CONTRACTOR to provide and maintain, at his own expense, an adequate supply of water for his use for construction, and to install and maintain necessary supply connections and piping for same, and necessary portable sanitary facilities but only at such locations and in such manner as may be approved by the COUNTY and ENGINEER. In the event water is made available by the COUNTY, the CONTRACTOR shall, at his own expense, install a meter to determine the amount of water used by him and such water will be paid for by, or charged to, the CONTRACTOR at prevailing rates. All electric current required by the CONTRACTOR shall be furnished at his own expense. All temporary lines will be furnished, installed, connected, and maintained by the CONTRACTOR in a workmanlike manner satisfactory to the COUNTY and ENGINEER and shall be removed by the CONTRACTOR in like manner at his expense prior to completion of the construction and final acceptance.

CS-10.0 MISPLACED MATERIAL

Should the CONTRACTOR, during the progress of the WORK, loose, dump, throw overboard, sink, or misplace any material, plant, or equipment, which in the opinion of the COUNTY and ENGINEER may be dangerous to, or obstruct navigation, the CONTRACTOR shall recover and remove the same with the utmost dispatch. The CONTRACTOR shall give immediate notice, with description and location of such obstructions, to the U.S. Coast Guard, COUNTY and ENGINEER and when required, shall mark or buoy such obstructions until the same are removed. In the event of refusal, neglect, or delay in compliance with the above requirements, such obstructions may be removed by the COUNTY, and the cost of such removal may be deducted from any money due or to become due to the CONTRACTOR or may be recovered under CONTRACTOR’s bond.

CS-11.0 VINYL SHEET PILES

CS-11.1 General

The WORK shall consist of furnishing, transporting, and installing vinyl sheet piles as shown on the CONTRACT Plans. The CONTRACTOR shall provide vinyl sheet piles to be used as forms for grouting along the edges of the boat ramp panels. Selection of vinyl shape to be determined by the CONTRACTOR.

CS-11.2 Site Preparation

All clearing or other site preparation within the vinyl sheet pile alignments shall be completed before the sheet piles are installed as shown on the CONTRACT Plans.

CS-11.3 Installation of Vinyl Sheet Piles

The CONTRACTOR shall provide equipment and other devices for installing sheet pile that conform to the recommendations of the manufacturer. The vinyl sheet piles shall be installed in such a manner as to insure lock engagement and integrity throughout the entire length of each sheet pile. The sheet piles shall be held in proper alignment during installation by means of assembling frames or other suitable temporary guide structures. Temporary guide structures shall be removed when they have served their purpose. The CONTRACTOR shall not attempt to drive sheet piles beyond the point of refusal, as indicated by excessive bouncing of the hammer or kicking of the sheet pile as concurred by the ENGINEER. The purpose of the sheet pile is to act as a form during grouting of the ramp structure. The CONTRACTOR may submit an alternate form material to the ENGINEER for review and approval.

CS-11.4 Cutting Off Sheet Piles

Prior to cutting off sheet piles, the CONTRACTOR shall obtain approval by the ENGINEER. The CONTRACTOR shall cut off the sheet pile at the specified elevations. The length of the sheet pile cut off shall be sufficient to permit the removal of all damaged material.

CS-11.5 Defective Sheet Piles

Defective or damaged sheet piles shall not be driven and any sheet pile ruptured in the interlock or otherwise damaged during installation shall be pulled and replaced.

CS-12.0 TIMBER

CS-12.1 General

The CONTRACTOR shall construct the timber components in accordance with the CONTRACT Plans and these Specifications.

CS-12.2 Wood Marine Piling

CS-12.2.1 Timber Treatment

The work specified in this Section is the treating of structural timber, timber piling and timber posts. The method of treatment for all such timber materials shall be in accordance with American Association of State Highway and Transportation Officials (AASHTO) M 133, American Section of the International Association for Testing Materials (ASTM) D 25 and D 1143, or American Wood Protection Association (AWPA) Use Category Standard (UCS) - U1, with the exceptions and additions as specified herein.

CS-12.2.2 Penetration Requirements.

(a) For Structural Timber: The penetration of the treatment shall be in accordance with the applicable AWPA standards, with the exceptions as specified herein.

(b) For Round Piles and Fence Posts: Any round pile or post, which does not show complete sapwood penetration will be rejected or shall be retreated to meet such penetration requirement.

(c) Retreatment: The necessity for retreatment of structural timber, piling and posts shall be avoided as far as practicable and if it becomes apparent that due measures are not being taken to prevent such necessity, the acceptance of retreated materials may be withdrawn. When retreatment is necessary the maximum limits for temperature of steam or preservative, and for preservative pressure, which apply to the original treatment shall not be exceeded during the retreatment.

(d) Handling Salt Treated Piling: In handling of piles that have been treated with chromated copper arsenate or ammoniacal copper arsenate, cable slings shall be used. Mechanical grabbers or pointed tools shall not be permitted. Rough or careless handing shall be avoided at all times.

Identification of Treating Plants for Round Piling: The treating plant shall brand, or place a distinctive permanent mark, on each round pile, approximately 6 feet from the butt end, such that the plant responsible for the treatment can be readily determined at any time during the service life of the piling.

CS-12.2.3 Submittals

The CONTRACTOR shall submit the following Manufacturer’s Catalog Data: driving equipment, driving helmet, pile shoes, and cushion block; and certificates: driving hammer and timber piles.

CS-12.2.4 Quality Assurance

The CONTRACTOR shall be responsible for the quality of treated wood products. The CONTRACTOR shall provide the COUNTY and ENGINEER with the inspection report of an independent inspection agency, approved by the COUNTY and ENGINEER that offers products that comply with applicable AWPA standards. The AWPA or the Quality Mark of an equivalent inspection organization on each pile will be accepted, in lieu of inspection reports, as evidence of compliance with applicable AWPA treatment standards. The CONTRACTOR shall store piles in accordance with AWPA.

CS-12.2.5 Products

The CONTRACTOR shall provide Douglas Fir or Southern Pine clean-peeled piles conforming to ASTM D 25. Minimum butt circumference measured at 3 feet from the butt shall be 31 inches. Piles shall be in one piece. Splices will not be permitted. Each treated pile shall be branded by the producer, in accordance with AWPA. The piles shall be treated by the full-cell pressure process in accordance with AWPA – U1 for marine piling with waterborne preservatives chromated copper arsenate (CCA).

CS-12.2.6 Installation

The CONTRACTOR shall inspect the piles when delivered and when in the leads immediately before driving. The piles shall be cut at cutoff grade with pneumatic tools by sawing or other approved method. Where required, the CONTRACTOR shall provide bolt holes that will ensure a driving fit.

CS-12.2.6.1 Driving Piles

When driving piles, the CONTRACTOR shall operate the hammer at the manufacturer's rated speed, drive the piles without interruption indicated tip elevation to reach a driving resistance and minimum depth of penetration in accordance with the manufacturer's schedule, drive piles with same hammer, cushion, or cap block, and using the same operating conditions as test piles. If, in driving, it is found that a pile is not of sufficient length to give the capacity specified, the CONTRACTOR shall notify the COUNTY and ENGINEER, who will determine the corrective procedure to be followed.

CS-12.2.6.2 Driving Equipment

The CONTRACTOR shall select and use a pile hammer of sufficient weight and energy to install the specified pile without damage into the soils as indicated, and place driving helmet, or cap and cushion block combination capable of protecting the head of the pile between tip of pile and the ram to prevent impact damage to pile. If the block is damaged, split, highly compressed, charred or burned, or has become spongy or deteriorated; the CONTRACTOR shall replace it with a new block. The helmet or block shall uniformly transmit energy to pile with a minimum loss of energy.

CS-12.2.6.3 Tolerances in Driving Bearing Piles

At the cutoff elevation, the butts shall be within 6 inches of the location indicated. Manipulation to move the pile into position shall be permitted only within the aforementioned tolerance to return the pile to the design location. However, the piles shall not be manipulated more than 1.5 percent of the exposed length above the ground mudline surface. A variation of not more than ¼ inch per foot of pile length from the vertical for plumb piles shall be permitted. The CONTRACTOR shall remove and replace with new piles those damaged, misplaced, driven below the design cutoff, or driven out of alignment, or provide additional piles, driven as directed.

CS-12.2.6.4 Records

The CONTRACTOR shall keep a complete and accurate record of each pile driven indicating the pile location, deviations from design locations, diameter, original length, mudline elevation, tip elevation, cutoff elevation, penetration in blows per foot for entire length of

penetration for test piles, penetration in blows per foot for the last five feet for job piles, hammer data including rate of operation, make, and size, and unusual pile behavior or circumstances experienced during driving such as redriving, heaving, weaving, obstructions, predrilling, and unanticipated interruptions. The CONTRACTOR shall provide the pile driving records to the COUNTY and ENGINEER a maximum of 24 hours after each day of pile driving.

CS-12.2.7 Jetting of Piles

The CONTRACTOR may use water jets in driving provided that jetting is discontinued when the pile tip is approximately five feet above the indicated pile tip elevation and the pile is driven the final five feet of penetration.

CS-12.2.8 Protection of Piles

The CONTRACTOR shall square the heads and tips of piles to the driving axis, laterally support the piles during driving, and not unduly restrain piles from rotation in the leads. Swinging leads shall not be permitted. Where pile orientation is essential, the CONTRACTOR shall take precautionary measures to maintain the orientation during driving. The CONTRACTOR shall handle, protect, and field treat piles in accordance with AWPA.

CS-12.2.9 Pile Inspection

When the COUNTY and ENGINEER'S inspections result in product rejection, the CONTRACTOR shall promptly segregate and remove the rejected material from the premises.

CS-12.3 Timberwork

CS-12.3.1 Submittals

The CONTRACTOR shall submit the inspection report of an independent inspection agency, for approval by the COUNTY and ENGINEER that offered products complying with applicable AWPA Standards.

The AWPA Quality mark or equivalent quality mark, on each piece will be accepted, in lieu of inspection reports, as evidence of compliance with applicable AWPA treatment standards.

The CONTRACTOR shall field inspect and submit a verification list to the COUNTY and ENGINEER of each treated timber member and each strapped bundle of treated lumber indicating the wording and lettering of the quality control markings, the species and the condition of the wood. The CONTRACTOR shall not incorporate materials damaged in transport from the manufacturer/supplier to the WORK area.

CS-12.3.2 Delivery and Storage

The CONTRACTOR shall open-stack untreated timber and lumber material on skids at least 12 inches aboveground, in a manner that will prevent warping and allow shedding of water; close-stack treated timber and lumber material in a manner that will prevent long timbers or pre-framed material from sagging or becoming crooked; keep ground under and within five feet of such piles free of weeds, rubbish, and combustible materials; protect materials from weather;

handle treated timber with ropes or chain slings without dropping, breaking outer fibers, bruising, or penetrating surface with tools; protect timber and hardware from damage; and shall not use cant dogs, peaveys, hooks, or pike poles.

CS-12.3.3 Materials

CS-12.3.3.1 Lumber and Timbers

The CONTRACTOR shall provide solid sawn lumber and timbers of stress-rated Southern Pine or Fir-Larch, with the following minimum allowable design stresses:

F_b = 1,400 psi
F_v = 120 psi
F_t = 1,200 psi
F_c = 400 psi

Lumber and timber shall be identified by the grade mark of a recognized association or independent inspection agency using the specific grading requirements of an association recognized as covering the species used. The association or independent inspection agency shall be certified by the Board of Review, American Lumber Standards Committee, to grade the species used. The CONTRACTOR shall use commercial grade lumber for secondary members such as decking, joists, and railings. Preservative treatment shall be with waterborne preservative chromated copper arsenate (CCA) in accordance with AWPA as follows:

Timbers	**Retention (pcf)**
Knee and cross braces …….	2.5
Clamps and stringers ……..	0.6
Decking and handrails ……	0.4

Each piece of treated timber or lumber shall be branded, by the manufacturer, in accordance with AWPA. The CONTRACTOR shall be responsible for the quality of treated wood products.

CS-12.3.3.2 Hardware

The CONTRACTOR shall provide bolts with necessary nuts and washers, timber connectors, drift pins, dowels, nails, screws, spikes, and other fastenings. The bolts and nuts shall conform to ASTM F593. The CONTRACTOR shall provide plate or cut washers where indicated; provide bolts with washers under nut and head; provide timber connectors and other metal fastenings of type and size shown; and provide 304 alloy stainless steel hardware unless specified otherwise on CONTRACT Plans. Decking shall be fastened with 304 alloy stainless steel #10 star or square pan-head composite deck screws.

CS-12.3.4 Construction

The CONTRACTOR shall cut, bevel, and face timbers prior to plant preservative treatment and provide protective equipment for personnel fabricating, field treating, or handling materials treated with creosote or water-borne salts.

CS-12.3.4.1 Framing

The CONTRACTOR shall cut and frame lumber and timber so that joints will fit over contact surface, and secure timbers and piles in alignment. Open joints are unacceptable. Shimming is not allowed. The CONTRACTOR shall bore holes for drift pins and dowels with a bit 1/16 inch less in diameter than the pin or dowel, bore holes for truss rods or bolts with a bit 1/16 inch larger in diameter than rod or bolt, bore holes for lag screws in two parts, make lead hole for shank the same diameter as shank, make lead hole for the threaded portion approximately two-thirds of the shank diameter, bore holes in small timbers for bolt or wire spikes with a bit of the same diameter or smallest dimension of the spike to prevent splitting, and counterbore for countersinking wherever smooth faces are specified.

CS-12.3.4.2 Bracing

The CONTRACTOR shall align bents before bracing is placed, and provide bracing of sufficient length to provide a minimum distance of 8 inches between outside bolt and end of brace. Bracing and girths shall bear firmly against piles or timber to which secured. The CONTRACTOR shall place fillers to avoid bending the bracing more than one inch out of line when bracing bolts or other fastenings are drawn up tight. Built-up fillers will not be permitted. The CONTRACTOR shall make filler a single piece of the same treated lumber as that in the brace, with a width of at least 6 inches and a length of at least 12 inches; bolt ends of bracing through pile, post, or cap with a bolt of at least the indicated diameter; and bolt or spike intermediate intersections as indicated.

CS-12.3.4.3 Clamps

The CONTRACTOR shall place clamps on both sides of piles at an elevation that will provide the specified elevation of the deck planks; secure clamps with two through bolts, each pile; and align and treat the ends of the clamps according to section CS-12.3.6 Field Treatment.

CS-12.3.4.4 Stringers

The CONTRACTOR shall place the crown up and, if possible, the better edge of deck stringers down. The tops of stringers shall not vary from a plane more than will permit bearing of the deck on stringers. The CONTRACTOR shall butt-joint and splice outside stringers, but lap interior stringers to take bearing over full width of cap or floor beam at each end; break joints if stringers cover two spans; toenail or drift bolt stringers as indicated. Stringers may be of sufficient length to cover two spans, except on sharp horizontal curves. Between stringers, the CONTRACTOR shall frame and toenail the cross-bridging or solid-bridging at each end with at least two nails for the cross-bridging and four nails for the solid-bridging, and make size and spacing of the bridging as indicated.

CS-12.3.4.5 Decking

The CONTRACTOR shall make the decking of a single thickness of the plank supported by stringers or joists. Unless otherwise indicated, the CONTRACTOR shall lay the plank with tight joints. The CONTRACTOR shall screw each plank to each joint or nailing strip with at least two screws, provide screws at least 1½ inches greater than the thickness of the plank, place screws

at least 1½ inches from edges of the plank, cut ends of planks parallel to center line of pier, and grade planks as to thickness and lay so that adjacent planks vary less than 1/16 inch.

CS-12.3.4.6 Fastening

Vertical bolts shall have nuts on the lower end. Where bolts are used to fasten timber to timber, timber to concrete, or timber to steel, the CONTRACTOR shall bolt members together when they are installed and retighten immediately prior to final acceptance. The CONTRACTOR shall provide bolts having sufficient additional threading to provide at least 3/8 inch per foot thickness of timber for future retightening, provide timber connectors of types indicated, install split-ring and shear-plate connectors in pre-cut grooves of the dimensions as recommended by the manufacturer, force toothed-ring and spike-grid connectors and clamping plates into the contact surfaces of timbers joined by means of proper pressure tools, and at the joints, embed connectors of these types simultaneously and uniformly. CS-12.3.5 Field Treatment

CS-12.3.5.1 Timberwork

The CONTRACTOR shall field treat cuts, bevels, notches, refacing and abrasions made in the field in treated piles or timbers in accordance with AWPA; trim cuts and abrasions before field treatment; paint depressions or openings around bolt holes, joints, or gaps including recesses formed by counter boring with preservative treatment used for piles or timber.

CS-12.3.5.2 Piling Protection

In accordance with AWPA, immediately after pile tops are cut off and prior to placement of the pile cap, the CONTRACTOR shall protect the pile top with several heavy applications of the same preservative used to treat the pile, or else copper naphthenate solutions containing a minimum of 2 percent copper metal may be used with treated products. The CONTRACTOR shall seal ends with a heavy application of coal-tar pitch or other appropriate sealer.

CS-13.0 CONCRETE

CS-13.1 Description

Construct concrete structures and other concrete members, with the exception of incidental concrete construction (which are specified in other Sections). Refer to FDOT Section 450 for prestressed construction requirements additional to the requirements of this Section.

CS-13.2 Materials

Meet the following FDOT requirements:

Concrete ..... Sections 346 and 347
Reinforcing Steel .....Section 415
Curing Materials .....*Section 925
Epoxy Bonding Compounds .....Section 926
Joint Materials .....Section 932

* The ENGINEER will allow clean sand and sawdust for certain curing, when and as specified.

Meet the following ASTM requirements:

Reinforcing Steel .....ASTM A123 and A153

CS-13.3 Submittals

Furnish the following:

1. Complete data on the concrete mix in accordance with ASTM C94, Alternate 3.
2. Ready mix delivery tickets for each truck with the following information:
   a. Name of concrete firm.
   b. Serial number of ticket.
   c. Date.
   d. Truck number.
   e. Specific class of concrete.
   f. Amount of concrete.
   g. Time loaded.
   h. Water added.
   i. Time unloaded.

CS-13.4 Concrete

A. Ready-mixed meeting ASTM C-94 and these Specifications.
B. Portland Cement: Type II with microsilica (minimum 50 pounds) and fly ash. Minimum cement content shall be 700 pounds with a maximum water-cement ration of 0.44.
C. Mix Design:
   1. Minimum Allowable 28-Day Compressive Field Strength: 5,000 psi when cured and tested in accordance with ASTM C-31 and C-39.
   2. Coarse Aggregate Size: ¾ inch. Other aggregate gradations must be submitted for review and approved in writing before use on the project.
   3. Slump Range: 5 inches ± 1 inch.
   4. Air Entrainment: 4 percent by volume.
D. Mixing: Minimum 70 and maximum 270 revolutions of mixing drum. Nonagitating equipment is not allowed. Concrete shall be placed within 1½ hours after the cement has been added to the mix.
E. CONTRACTOR shall coordinate and schedule concrete sampling and testing with an independent testing laboratory in accordance standard FDOT test methods for each batch of concrete.

CS-13.5 Falsework

CS-13.5.1 Plans

The CONTRACTOR shall furnish detailed plans for falsework for review and approval by the COUNTY and ENGINEER. The CONTRACTOR is responsible for results he obtains by using these plans.

CS-13.5.2 Design and Erection

Design and construct all falsework to provide the necessary rigidity and to support the loads without appreciable settlement or deformation. Use screw jacks or hardwood wedges to take up any settlement in the framework, either before or during the placing of concrete. If any weakness develops and the centering shows undue settlement or distortion, stop the work, remove any masonry affected, and strengthen the falsework before resuming work. Support falsework which cannot be founded on a satisfactory footing on piling. Space, drive, and remove the piling in an approved manner.

CS-13.5.3 Camber

Provide camber to correct for settlement and deflection of falsework.

CS-13.6 Forms

CS-13.6.1 General

Provide forms, either of wood or metal, as follows: (a) externally secured and braced where feasible; (b) substantial and unyielding; (c) of adequate strength to contain the concrete without bulging between supports and without apparent deviation from the neat lines, contours, and shapes shown in the plans. Design forms to withstand the additional forces of vibration without apparent deviation from the desired shape or position. Assemble forms to be mortar tight. If using lumber forms, construct them of dressed wood of uniform thickness. Use form liners on wooden forms where FDOT Class 3 surface finish is specified. Construct assembled forms to render a concrete surface of smooth, uniform finish. Make provisions to remove forms without injury to concrete surfaces. Remove blocks and bracing with the forms, and do not leave any portion of the forms in the concrete.

CS-13.6.2 Inspection and Approval

Do not place concrete in a form until the form has been inspected and approved by ENGINEER. Although the ENGINEER inspects and approves the forms, the CONTRACTOR is responsible for obtaining satisfactory concrete surfaces, free from warping, bulging, or other objectionable defects. Pay special attention to the ties and bracing. Where the forms appear to be insufficiently braced or unsatisfactorily built, stop and correct defects to the satisfaction of the ENGINEER.

CS-13.6.3 Non-metallic Form Materials

Lumber: For all surfaces, use lumber that is not less than ¾ inches in thickness, dressed, and free of knot holes, loose knots, cracks, splits, warps, and other defects. Proportion the spacing of studs, joists, and wales to exclude warps and bulges and to produce true and accurate concrete surfaces. Only use structurally sound lumber.

Form Liners: Use form liners of durable, abrasion resistant materials that are unaffected by water. Use liners with a hard surface texture capable of rendering concrete surfaces of a smooth, uniform texture, without grain marks, patterns, or blemishes. Use form liner material of sufficient thickness to eliminate the reflection of irregularities, undesirable patterns, and marks from the forms to the surfaces. Replace liners as necessary to produce a consistent concrete surface texture. Use form liners in large sheets and with true, tight-fitted joints. Obtain the ENGINEER's approval

of the layout of sheets. Do not use patch work and do not illogically locate the joints. Use liner material of the same stock throughout.

Plywood: The CONTRACTOR may use plywood of not less than 5/8 inches in thickness manufactured with waterproof glue or protected with an approved impervious coating. Do not use pieces with bulged plies or raveled, untrue edges.

CS-13.6.4 Special Requirements

Re-entrant Angles: Use chamfered forms for re-entrant angles, and use filleted forms for corners. Use chamfers and fillets that are 3/4 inch by 3/4 inch and are mill-dressed on all sides to uniform dimensions.

CS-13.6.5 Form Alignment, Bracing, and Ties

Construct forms in such manner that they may be adequately secured for alignment, shape, and grade. Use bracing systems, ties, and anchorages that are substantial and sufficient to ensure against apparent deviation from shape, alignment, and grade. Do not drive nails into existing concrete. Do not use bracing systems, ties, and anchorages which unnecessarily deface or mark, of have an injurious or undesirable effect on surfaces that will be a part of the finished surface.

If metal ties and anchorages are to remain in the concrete, construct them so as to permit the removal of metal to at least 2 inches beneath the finished surface of concrete. Use accessories for metal ties and anchorages that allow the removal of metal to the prescribed depth while leaving the smallest possible repairable cavity.

When using wire ties, cut them back from the finished surface of the concrete a minimum of 1 1/2 inches deep. Do not use internal ties of wire when forming surfaces exposed to view.

CS-13.6.6 Preparation and Cleaning

Meet the following requirements for the condition of forms at the time of beginning concrete casting:

(a) Treat all forms with an approved form-release agent before placing concrete. Do not use material which adheres to or discolors the concrete.
(b) Clean forms of all dirt, sawdust, shavings, and other debris.
(c) Close and secure all inspection and clean-out holes.

CS-13.7 Weep Holes

Provide weep holes that are at least 1 1/2 inch in diameter and not more than 4 feet apart. Place the outlet ends of the weep holes just above the high water elevation as shown on the CONTRACT Plans. Cover the inside ends of all weep holes with filter cloth.

CS-13.8 Placing Concrete

CS-13.8.1 Temperature Restrictions

CS-13.8.1.1 *Concreting in Cold Weather:* Do not place concrete when the temperature of the concrete at placement is below 7° C .

Meet the air temperature requirements for mixing and placing concrete in cold weather as specified in FDOT Sections 346 and 347.

The CONTRACTOR is responsible for all risks connected with the placing and curing of concrete. Although the ENGINEER may give him permission to place concrete, the CONTRACTOR is responsible for satisfactory results.

CS-13.8.1.2 *Concreting in Hot Weather:* Meet the temperature requirements and special measures for mixing and placing concrete in hot weather as specified in FDOT Section 346.

When the temperature of the concrete as placed exceeds 24° C, incorporate in the concrete mix a water-reducing retarder or water reducer if allowed by FDOT Section 346.

Spray deck slab forms and reinforcing steel with cool fresh water just prior to placing the concrete.

The CONTRACTOR is responsible for all risks connected with the placing and curing of concrete. Although the ENGINEER may give him permission to place concrete, the CONTRACTOR is responsible for satisfactory results. Should concrete the CONTRACTOR places prove unsatisfactory, the CONTRACTOR shall remove, dispose of, and replace the concrete at no expense to the COUNTY.

CS-13.8.2 Inspections before Placing Concrete

Do not place concrete until the depth and character of the foundation and the adequacy of the forms and falsework have been approved by the ENGINEER. Do not deposit any concrete until all reinforcement is in place and has been inspected and approved by the ENGINEER. The CONTRACTOR shall notify the COUNTY and ENGINEER a minimum of 48 hours prior to placing the concrete so that the ENGINEER may inspect the steel.

CS-13.8.3 General Requirements for Placing Concrete

Deposit concrete as nearly as possible in its final position. Do not deposit large quantities at one point and then run or work it along the forms. Take special care to fill each part of the forms, to work coarse aggregate back from the face, and to force concrete under and around reinforcing bars without displacing them.

Use a method and manner of placing concrete that avoids the possibility of segregation or separation of aggregates. If the ENGINEER determines that the quality of concrete as it reaches its final position is unsatisfactory, remove it and discontinue or adjust the method of placing until the ENGINEER determines that the quality of the concrete as placed is satisfactory.

Use metal or metal-lined open troughs or chutes. Where steep slopes are required, use chutes that are equipped with baffles or are in short lengths that reverse the direction of movement. Where placing operations would involve dripping the concrete freely more than 3 feet, deposit it through pipes, troughs, or chutes of sheet metal or other approved material. Keep all troughs, chutes, and pipes clean and free from coatings of hardened concrete by thoroughly flushing them with water after each run or more often if necessary.

CS-13.8.4 Placing Concrete by Pumping

In general, use concrete pumping equipment that is suitable in kind and adequate in capacity for the work proposed. Use a pump discharge line that has a minimum diameter of 2.5 inches. Use a pump and discharge lines that are constructed so that no aluminum surfaces are in contact with the concrete being pumped. Operate the pump to produce a continuous stream of concrete, without air pockets. When using cement slurry or similar material to lubricate the discharge line when pumping begins, collect such material at the point of discharge. The CONTRACTOR shall dispose of the collected slurry in areas provided by the CONTRACTOR. Control the pump discharge locations so that the placement locations of the various lots of concrete represented by strength test cylinders can be identified in the event the test cylinders indicate deficient strength. When concrete is placed by pumping, take all test samples of concrete at the end of the discharge line, except in accordance with the provisions of the FDOT Standard Operating Procedures for Quality Control Concrete.

CS-13.8.5 Consolidation

Consolidate the concrete by continuous working with a suitable tool in an acceptable manner, or by vibrating as set forth in CS-13.8.8. When not using vibrators, thoroughly work and compact all thin-section work with a steel slicing rod. Spade all faces, and flush the mortar to the surface by continuous working with a concrete spading implement.

CS-13.8.6 Obstructions

In cases where, because of obstructions, difficulty is encountered in puddling the concrete adjacent to the forms, bring the mortar content of the mix into contact with the interior surfaces by vibrating the forms. Produce the vibrations by striking the outside surfaces of the forms with wooden mallets or by other satisfactory means. In placing concrete around steel shapes place it only on one side of the shape until it flushes up over the bottom flange of the shape on the opposite side, after which place it on both sides to completion. After the concrete has taken its initial set, exercise care to avoid jarring the forms or placing any strain on the ends of projecting reinforcing bars.

CS-13.8.7 Requirements for Successive Layers

Generally, place concrete in continuous horizontal layers, approximately 12 inches thick. In any given layer, follow each separate batch with the next so closely, place and consolidate each one before the preceding one has taken initial set, in order that there will be no plane of separation between the batches. Do not allow the time before placing the next successive layer to exceed 20 minutes, unless the ENGINEER determines that initial set has not yet occurred. Generally, leave each layer of concrete unfinished to secure efficient bonding with the overlying layer. Consolidate a succeeding layer placed before the underlying layer has become set in a manner that will avoid completely the tendency to produce a construction joint between the layers. To avoid visible joints as far as possible on exposed faces, finish the top surface of the concrete immediately adjacent to the forms of the exposed face, smoothing with a plaster mason's trowel. Form, by inset form work, horizontal layers so located as to produce a construction joint wherein a "featheredge" might be produced in the succeeding layer such that the succeeding layer will end in a body of concrete not less than 6 inches thick. Conduct the operation of depositing and consolidating the concrete so as to form a dense, impervious mass of uniform texture with smooth faces on exposed surfaces.

Remove, dispose of, and replace defective concrete as directed by the ENGINEER and at no expense to the COUNTY.

CS-13.8.8 Vibration of Concrete

CS-13.8.8.1 *Where Required:* Consolidate all concrete except seal, culvert floors, steel pile jackets, and concrete for incidental construction by the use of mechanical vibrators.

CS-13.8.8.2 *Vibrators:* Provide adequate vibrators on the project that are approved by the ENGINEER before beginning concrete work. Generally, provide vibrators of the internal type. For thin sections, where the forms are especially designed to resist vibration, the CONTRACTOR may use external vibrators. Use a vibrating frequency that is not less than 4500 impulses per minute and is of sufficient intensity and duration to cause complete consolidation of the concrete. Do not continue vibration until it causes segregation of the materials. For vibrating thin, heavy reinforced sections, use heads of such size to secure proper vibration of the concrete without disturbance of either the reinforcing steel or the forms.

CS-13.8.8.3 *Number of Vibrators Required:* Use a sufficient number of vibrators to secure the compaction of each batch before the next batch is delivered, without delaying the delivery. In order to avoid delays due to breakdowns, provide at least one stand-by vibrator, with an appropriate power source.

CS-13.8.8.4 *Method of Vibration:* Use vibrators to consolidate properly placed concrete. Do not use them to move concrete about in the forms. Insert the vibrators in the surface of concrete at points spaced to ensure uniform vibration of the entire mass of the concrete. Insert the vibrator at points that are no further apart than the radius over which the vibrator is visibly effective. Allow the vibrator to sink into the concrete by its own weight, and allow it to penetrate into the underlying layer sufficiently so that the two layers are thoroughly consolidated together. After thoroughly consolidating the concrete, withdraw the vibrator slowly to avoid formation of holes.

CS-13.8.8.5 *Hand Spading:* When necessary in order to secure well-filled forms, free from aggregate pockets, honeycomb, bubbles, etc., spade the concrete by hand, along the surfaces of the forms and in all corners, following the vibration.

CS-13.9 Seals

CS-13.9.1 General

Wherever practicable, dewater all foundation excavations, and deposit the concrete in the dry as defined in FDOT Section 455-15.2. Where conditions are encountered which render it impracticable to dewater the foundation before placing concrete, the ENGINEER may authorize the construction of a concrete foundation seal of the required size. Then, dewater the foundation, and place the balance of the concrete in the dry.

When required to place a seal concrete, the CONTRACTOR is responsible for the satisfactory performance of the seal in providing a watertight excavation for placing structural concrete. The CONTRACTOR will provide and pay for the seal concrete as an aid to the construction of the structure. Repair seal concrete as necessary to perform its required function at no expense to the COUNTY.

CS-13.9.2 Method of Placing

Carefully place concrete deposited under water in the space in which it is to remain by means of a tremie or other approved method. Do not disturb the concrete after depositing it. Deposit all seal concrete in one continuous placement. Do not place any concrete in running water and ensure that all formwork designed to retain concrete under water is watertight.

CS-13.9.3 Use of Tremie

Use a tremie consisting of a tube having a minimum inside diameter of 6 inches, constructed in sections having watertight joints. Do not allow any aluminum parts to have contact with the concrete. Ensure that the discharge end is entirely seated at all times, and keep the tremie tube full to the bottom of the hopper. When dumping a batch into the hopper, keep the tremie slightly raised (but not out of the concrete at the bottom) until the batch discharges to the bottom of the hopper. Stop the flow by lowering the tremie. Support the tremie such as to permit the free movement of the discharge end over the entire top surface of the work and to permit its being lowered rapidly when necessary to choke off or retard the flow. Provide a continuous, uninterrupted flow until completing the work. Exercise special care to maintain still water at the point of deposit.

CS-13.9.4 Use of Bottom-dump Bucket

When placing the concrete by means of a bottom-dump bucket, lower the bucket gradually and carefully until it rests upon the concrete already placed. Raise the bucket very slowly during the discharge travel, the intent being to maintain, as nearly as possible, still water at the point of discharge and to avoid agitating the mixture. Do not use aluminum buckets.

CS-13.9.5 Time of Beginning Pumping

Do not commence pumping to dewater a sealed cofferdam until the seal has set sufficiently to withstand the hydrostatic pressure, and in no case earlier than 24 hours after placement of the concrete.

CS-13.10 Construction Joints

CS-13.10.1 Location

Make construction joints only at locations shown in the CONTRACT Plans or in the placement schedule, unless otherwise approved in writing.

CS-13.10.2 Preparations of Surfaces

Before depositing new concrete on or against concrete which has hardened, re-tighten the forms. Roughen the surface of the hardened concrete in a manner that will not leave loosened particles, aggregate, or damaged concrete at the surface. Thoroughly clean the surface of foreign matter and laitance, and saturate it with water.

CS-13.10.3 Placing Concrete

Continuously place concrete from joint to joint. Carefully finish the face edges of all joints which are exposed to view true to line and elevation.

CS-13.10.4 Joints in Sea Water or Brackish Water

For concrete placed in seawater or brackish water, do not place any construction joints between points 2 feet below extreme low tide and 2.5 feet above extreme high tide.

CS-13.11 Expansion Joints

CS-13.11.1 General

Construct expansion joints so as to permit absolute freedom of movement. Carefully remove all loose or thin shells of mortar likely to cause a spall with movement at a joint from all expansion joints as soon as possible.

CS-13.11.2 Filling Joints

Fill expansion joints with a preformed joint filler. Cut the filler to conform to the cross-section of the structure, and furnish it in as few pieces as practicable, using only a single piece in each curb section. Do not use small pieces that would tend to come loose.

CS-13.11.3 Sealing Joints

Prepare joints to be sealed and apply the sealer in accordance with approved manufacturer's directions.

CS-13.11.4 Anchor Bolts and Dowels

Set anchor bolts and dowels as provided in FDOT 460-30. Galvanize all anchor bolts as specified in FDOT 460-30.

CS-13.11.5 Epoxy Bonding Compounds

Where epoxy bonding compounds for bonding concrete are specified or required, apply the epoxy bonding materials only to clean, dry, structurally sound concrete surfaces. Provide surface preparation, application, and curing of epoxy bonding compound in strict accordance with the manufacturer's recommendations for each particular application.

CS-13.12 Finishing Concrete

CS-13.12.1 General Surface Finish (Required for All Surfaces)

After placing and consolidating the concrete, strike-off all exposed surfaces to the lines and grades indicated in the plans in a manner that will leave a surface of uniform texture free of undesirable surface. After removing excess mortar and concrete and while the concrete is still in a workable state, carefully tool all construction and expansion joints. Leave joint filler exposed for

its full length with clean edges. Ensure that finished work in addition to that specified above is compatible and complementary to the class of surface finish required.

Immediately after removing forms from any exposed concrete surface, remove all fins and irregular projections flush with the surface. Clean, saturate with water, and carefully point with mortar all holes, material tie cavities, honeycomb, chips, and spalls.

In the event the CONTRACTOR obtains unsatisfactory surfaces, the CONTRACTOR shall repair them by methods approved by the COUNTY or the ENGINEER will reject the affected concrete. The CONTRACTOR shall repair any surface or remove rejected concrete at no expense to the COUNTY.

For pointing, use mortar that is a blended mixture of cement and fine aggregates, finished and composed of materials from the same source as used in the class of concrete being placed. To prevent shrinkage, allow the mortar to take its initial set, then rework and apply it without adding water. Carefully roughen and clean cavities to be filled with mortar to provide a mechanical bond. Exercise care during the roughening process to prevent additional defacement and damage to the formed surface.

CS-13.12.2 Surface Finishes

In addition to the general surface work specified for all exposed concrete surfaces, the ENGINEER may require a specific surface finish as indicated on the CONTRACT Plans. For all such exposed surfaces, begin finish work for the applicable class specified, along with the general finish work, immediately after removal of the forms. In order to further ensure the required quality of the finish, remove forms no later than the minimum time specified for the forms to remain in place. Satisfactorily repair finished concrete surfaces which are subsequently disfigured or discolored at no expense to the COUNTY.CS-13.13 Curing Concrete

CS-13.13.1 General

CS-13.13.1.1 Methods and Curing Time

Remove forms after concrete has obtained 70% of the specified 28-day strength or approval is obtained in writing from ENGINEER.

Remove forms with care to prevent scarring and damaging the concrete surfaces. The CONTRACTOR shall have on site slump tests performed and test cylinders taken and tested by a testing laboratory approved by the COUNTY and ENGINEER as follows. The number of tests shall be determined mutually by the COUNTY and CONTRACTOR and depend upon the performance and demonstration that the CONTRACTOR is meeting the Specifications for compressive strength of the concrete.

When using the percent of required strength, cast test cylinders from representative concrete for compressive strength determination. A minimum of three cylinder breaks, established at different curing times and concrete strength, will be used to develop a curve relating curing time to concrete strength. Cure such test cylinders as nearly as practical in the same manner as the concrete in the corresponding structural component, and test them in accordance with AASHO T 22 and AASHTO T 23. Perform casting, curing, and testing at no expense to the COUNTY as a

basis for form removal. When concrete strength tests indicate a compressive strength equal to or greater than the indicated percentage of specified strength, the CONTRACTOR may remove the forms. The CONTRACTOR may continue to use curing periods so established so long as the ambient temperature is equal to or greater than the temperature existing during the curing of the test cylinders. When the temperature falls 8° C or more below the ambient temperature existing during the test cylinder curing period, repeat the test procedure outlined above, and establish a different curing period for the different ambient temperature.

Do not remove forms at any time without the consent of the COUNTY and ENGINEER. Although the COUNTY and ENGINEER will provide their consent to remove the forms, the CONTRACTOR is responsible for the WORK.

CS-13.13.1.2 Curing Methods

The CONTRACTOR may use continuous-moisture curing, steam curing, membrane curing compound, or an impervious covering for any concrete parts. Mix membrane curing compound with a mechanically operated mixer immediately prior to each use to provide uniform consistency. Apply curing compound in accordance with the manufacturer's recommendations, subject to the rate of application specified herein. If curing compound is to be applied by spraying, use a compressor driven sprayer of sufficient size to provide uniform spray at the nozzle. Keep all nozzles clean, and ensure that they provide uniform mist. The ENGINEER will require standby equipment in case of mechanical failure. The ENGINEER will allow hand held pump-up sprayers for standby equipment. However, do not use the hand held pump-up sprayers except in case of mechanical failure or for applying compound on Class I Concrete (non-pavement). If the CONTRACTOR fails to comply with these requirements, the ENGINEER will suspend further concrete placements until the CONTRACTOR re-establishes proper control. Apply membrane curing compound at a rate of at least one liter to every 15 square feet of exposed surface to be cured. Provide a membrane curing compound and impervious covering that is continuous, flexible, and without defects and that retains the required moisture in the concrete.

Keep cover materials used in continuous moisture curing methods continuously wet for a period of 72 hours.

CS-13.14 Concrete Panels

Concrete panels shall be installed plumb with a vertical tolerance of 1 inch using a 5-foot long straight edge.

CS-14.0 GEOTEXTILE

CS-14.1 General

The geotextile shall be a woven monofilament or multifilament pervious sheet of polymeric yarn, Mirafi FW500, or approved equivalent. Fibers used in the manufacture of the geotextile fabric shall consist of long-chain synthetic polymers composed of at least 85 percent by weight polyolefins, polyesters, or polyamides. Stabilizers and/or inhibitors shall be added to the base polymer if necessary to make the filaments resistant to deterioration by ultraviolet light, oxidation, and heat exposure. Reclaimed or recycled fibers (post-consumer) or polymer shall not be added to the formulation. Geotextiles shall be formed into a network such that the filaments or

yarns retain dimensional stability relative to each other (including the filaments or yarns at the edges of the fabric).

The geotextile shall be finished so that the filaments will retain their relative position with respect to each other. The edges of woven fabric shall be finished to prevent the outer material from pulling away from the fabric. The CONTRACTOR shall provide the manufacturer's certificate of compliance attesting that the geotextile meets the requirements of these specifications and the mill certificates stating the length and width of fabric contained on each roll to the COUNTY and ENGINEER prior to construction.

CS-14.2 Placing Geotextile

The CONTRACTOR shall prevent exposure of the geotextile to light until needed for construction. The geotextile laying and subsequent covering with succeeding courses shall proceed in such a manner as to limit exposure to light to a maximum period of 24 hours.

The surface to receive the geotextile shall be smooth, free from obstructions, depressions, and sharp objects. The CONTRACTOR shall notify the COUNTY and ENGINEER 72 hours prior to placing the geotextile so that the ENGINEER may observe the surface to receive the geotextile. The CONTRACTOR shall lay the geotextile so as to minimize the number of joints and seams, lay the geotextile loosely, but without creases, and provide at least three feet overlap at joints.

The CONTRACTOR shall not operate machinery directly on the geotextile. When placing material over joints, the CONTRACTOR shall place the material in the direction from the overlying geotextile to the underlying geotextile. The CONTRAR shall prevent puncture, tear, or displacement of the geotextile and protect it from damage; and replace torn areas and holes by placing an overlay of geotextile having dimensions at least three feet greater than the tear or hole.

CS-15.0 FILL

Clean backfill material shall be required to achieve the design elevations. The CONTRACTOR shall import clean fill material consisting of fine grained quartz sand to achieve the final grades and tolerances as specified on the CONTRACT Plans. The CONTRACTOR shall place and compact the fill as shown on the CONTRACT Plans.

CS-16.0 ARMORMAT SCOUR PROTECTION

CS-16.1 General

The CONTRACTOR shall prepare the channel bottom and install the armormat in accordance with the CONTRACT Plans and these Specifications.

CS-16.2 Cellular Concrete Blocks

CS-16.2.1 References

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 33 (1993) Concrete Aggregates

ASTM C 140 (1996) Sampling and Testing Concrete Masonry Unit

ASTM C 150 (1995; Rev. A) Portland Cement

ASTM C 207 (1991) Hydrated Lime for Masonry Purposes

ASTM C 595 (1994; Rev. A) Blended Hydraulic Cements

ASTM C 618 (1996) Coal Fly Ash and Raw or Calcined Natural Pozzolan for use as a Mineral Admixture in Portland Cement Concrete

ASTM C 4419(19950 Clear Permeability of Geotextiles by Permittivity

ASTM C 4632(1991) Grab Breaking Load and Elongation of Geotextiles

ASTM C 4651(1993) Isobutane Thermophysical Property Tables

ASTM C 4833(1996) Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products

ASTM C 5101(1996) Measuring the Soil-Geotextile System Clogging Potential by the Gradiant Ratio

CS-16.2.2 Submittals

The CONTRACTOR shall submit the following information to the COUNTY and ENGINEER.

CS-16.2.2.1 Manufacturer's Catalog Data

Submit all manufacturer's performance research results and calculations in support of the cellular concrete mat system and geotextile proposed for use.

CS-16.2.2.2 Drawings

Submit all manufacturer's specifications, shop drawings for the fabrication of the mats, literature and any recommendations, if applicable, 14 days prior to assembly of the cellular mats.

CS-16.2.2.3 Certificates

Submit manufacturer's certificates of compliance for cellular concrete blocks/mats, revetment cable, and any revetment cable fittings and connectors prior to the start date of mat fabrication.

CS-16.2.3 Products

All cellular concrete mats shall be pre-manufactured as an assembly of concrete blocks, with specific hydraulic capacities, bound into mats by the use of revetment cables. Individual blocks in the cellular mats shall be staggered and interlocked for enhanced stability. The mats shall be constructed of closed cell blocks. Parallel strands of cable shall extend through ducts in each block in a manner which provides for longitudinal binding of the blocks within the mats. Each row of blocks shall be laterally offset by one-half block width from the adjacent row so that any given block is cabled to four other blocks (two in the row above and two in the row below).

The gross area of each individual block in direct contact with the protected subgrade shall be no less than one square foot. Each block shall incorporate interlocking surfaces that prevent lateral displacement of the blocks within the mats when they are lifted by the longitudinal revetment cables. The interlocking surfaces shall not protrude beyond the perimeter of the blocks to such an extent that they reduce the flexibility or articulation capability of the cellular mats of become damaged or broken when the mats are lifted during shipment or placement. Once the mats are in place, the interlocking surfaces shall prevent the lateral displacement of the blocks even if the cables should become damaged or removed. The mats must be able to flex a minimum of 45° in the downward direction.

The cables shall be inserted into the mats in such a manner to form lifting loops at one end of the mat and the corresponding cable ends shall be spliced together to form a lifting loop at the other end of the mat. The cellular concrete mats shall be placed on a filter fabric.

CS-16.2.4 Concrete Blocks

CS-16.2.4.1 Materials

Cementitious materials shall conform to the following ASTM specifications:

ASTM C 150, for Portland Cement

ASTM C 595, for Blended Hydraulic Cements

ASTM C 207, for Hydrated Lime Types

ASTM C 618, for Pozzolans

ASTM C 33, for Concrete Aggregates, except for grading requirements

CS-16.2.4.2 Physical Requirements

At the time of delivery to the WORK area, the units shall have a minimum compressive strength of 4,000 pounds per square inch and maximum water absorption of 12 pounds per cubic foot.

CS-16.2.4.3 Durability

The CONTRACTOR shall provide the manufacturer certification of proven field performance that the concrete units have adequate durability even if they are subjected to a freeze-thaw environment.

CS-16.2.4.4 Testing

The CONTRACTOR shall sample and test units in accordance with ASTM C 140.

CS-16.2.4.5 Visual Inspection

All units shall be sound and free of defects that would interfere with the proper placing of the unit or impair the strength or performance of the construction. Surface cracks incidental to the usual methods of handling in shipment and delivery shall not be deemed grounds for rejection.

Cracks exceeding 0.25 inch in width and or 1.0 inch in depth shall be deemed grounds for rejection.

Chipping resulting in a weight loss exceeding 10% of the average weight of the blocks shall be deemed grounds for rejection.

Blocks rejected shall be replaced or repaired with structural grout with the COUNTY and ENGINEER'S approval at the expense of the CONTRACTOR.

CS-16.2.4.6 Sampling and Testing

The COUNTY and ENGINEER shall be accorded access to facilities to inspect and sample the units at the place of manufacturer from lots ready for delivery.

CS-16.2.5 Revetment Cable and Fittings

CS-16.2.5.1 Polyester Revetment Cable and Fittings

The revetment cable shall be constructed of high tenacity, low elongating, continuous filament polyester fibers. The cable shall consist of a core construction comprised of parallel fibers contained within an outer jacket or cover. The weight of the parallel core shall be between 65% to 70% of the total weight of the cable. The revetment cable shall have the following physical characteristics.

Nominal	Approx. Avg.	Weight / 100 Feet	
Cable Dia. – Circum.	Strength Lbs.	Min Lbs.	Max Lbs.
1/4" – 20mm	3,700	2.47	2.74
5/16" – 27mm	7,000	3.99	4.42
3/8" – 30mm	10,000	4.75	5.25
1/2" – 40mm	15,000	8.93	9.90

Elongated requirements specified below are based upon stabilized, new, dry cable. Stabilization refers to a process in which the cable is cycled fifty (50) times between a load corresponding to $200D^2$ and a load equal to 10%, 20% or 30% of the cable's approximate average breading strength. Relevant tolerance on these values is ± 5%.

	% Breaking Strength		
	10%	20%	30%
Permanent Elongation (while working)	0.7	1.8	2.6
Elastic Elongation	0.6	1.4	2.2
Total Strength	1.3	3.2	4.8

The revetment cable shall exhibit good to excellent resistance to most concentrated acids, alkalis and solvents. The cable shall be impervious to rot, mildew and degradation associated with marine organisms. The materials used in the construction of the cable shall not be affected by continuous immersion in fresh or salt water.

Selection of cable and fittings shall be made by the CONTRACTOR in a manner that insures a safe design factor for mats being lifted from both ends, thereby forming a catenary. Consideration shall be taken for the bending of the cables around hooks or pins during lifting. Revetment cable splicing fittings shall be selected so that the resultant splice shall provide a minimum of 60% of the minimum rated cable strength. Fittings such as sleeves and stops shall be aluminum and washers shall be galvanized steel unless otherwise shown on the Contract Plans.

CS-16.2.5.2 Size of Cellular Concrete Mats

The cellular concrete blocks, cables and fittings shall be fabricated into mats with a width of up to eight (8) feet and a length which is approved by the COUNTY and ENGINEER.

CS-16.2.6 Execution

CS-16.2.6.1 Foundation Preparation

CS-16.2.6.2 General

Areas on which filter fabric and cellular concrete blocks are to be placed shall be constructed to the lines and grades shown on the Contract Plans and to tolerances specified in the Contract Documents, and approved by the COUNTY and ENGINEER.

CS-16.2.6.3 Grading

The final grade shall be graded to a smooth plane surface to ensure that intimate contact is achieved between grade and the geotextile (filter fabric), and between the geotextile and the entire bottom surface of the cellular concrete blocks. All slope deformities, roots, grade stakes, and stones which project normal to the local slope face must be regraded or removed. No holes, "pockmarks", slope board teeth marked, footprints, or other voids greater than 1.0 inch in depth normal to the local slope face shall be permitted. No grooves or depressions greater than 0.5 inches in depth normal to the local slope face with a dimension exceeding 1.0 foot in any direction shall be

permitted. Where such areas are evident, they shall be brought to grade by placing homogeneous material.

CS-16.2.6.4 Inspection

Immediately prior to placing the filter fabric and cellular concrete blocks, the prepared area shall be inspected by the COUNTY and ENGINEER. No fabric or blocks shall be placed thereon until that area has been approved.

CS-16.2.7 Placement of Cellular Concrete Blocks/Mats

CS-16.2.7.1 General

Cellular concrete block/mats shall be constructed within the specified lines and grades shown on the Contract Plans.

CS-16.2.7.2 Placement

The cellular concrete blocks shall be placed on the filter fabric in such a manner as to produce a smooth plane surface in intimate contact with the filter fabric. No individual block within the plane of placed cellular concrete blocks shall protrude more than 2.0 inches or as otherwise specified.

If assembled and placed as large mattresses, the cellular concrete mats shall be attached to a spreader bar or other approved device to aid in the lifting and placing of the mats in their proper position by the use of a crane or other approved equipment. The equipment used should have adequate capacity to place the mats without bumping, dragging, tearing or otherwise damaging the underlying fabric. The mats shall be placed side by side and/or end to end, so that the mats abut each other. Mat seams or openings between mats greater than two (2) inches shall be filled with grout. They may be placed either by hand or in large mattresses. Distinct changes in grade that result in a discontinuous revetment surface in the direction of flow shall require a grout seam at the grade change location so as to produce a continuous surface.

CS-17.0 LIMESTONE RIPRAP

All stone for the Work shall be durable stone as approved by the COUNTY and ENGINEER. The stone shall be free of cracks, soft seams or other structural defects. The pieces shall be roughly angular in shape, with the least dimension of any stone not less than one third of its greatest dimension. Flat stones will not be accepted.

All stone shall be of a density of not less than 130 pounds per cubic foot. The CONTRACTOR shall provide the COUNTY and ENGINEER with results of testing by a certified laboratory showing that all rock materials proposed for use meet these specifications, prior to transport of rock to the WORK areas.

The average stone diameter required for construction will vary between 8 inches and 12 inches. No more than 25% of the rock shall be pieces weighing less than 50 pounds each. At least 50% of the rock shall be pieces weighing 100 pounds or more each.

The CONTRACTOR shall grade the existing bank, adjust the existing riprap, and import new riprap, to achieve the design slopes shown on the CONTRACT Plans. Stone of the quality and gradations specified shall be placed in such a manner so as to minimize the void spaces between the stones. The finished surface shall be relatively uniform and shall contain the maximum amount of large stone as can be obtained by performing the WORK as specified.

Riprap shall be individually placed in a manner that will prevent rolling or sliding of stone down the slope. Riprap should be oriented with the longest dimension perpendicular to the structure's alignment, where possible. Placing the stone by dropping by crane, dumping into chutes or by similar methods will not be permitted. Riprap shall be individually placed so as to be in contact with adjacent stones and should interlock to form a compact stable mass. The quality of the chinking stone shall be the same as the riprap. Chinking stone shall be placed to fill voids within the riprap layers using the largest chinking stone possible to fill each void. Multiple small chinking stones shall not be used to fill a void. All necessary measures shall be taken to ensure that excessive stone fragments are not produced during stone storage and placement operations. No fragments are to remain on the uplands.

CS-18.0 CLEARING AND GRUBBING

The CONTRACTOR shall conduct their work in accordance with the latest version of the FDOT Standard Specification for Roadway and Bridge Construction, Section 110 “Clearing and Grubbing.”

Clearing and grubbing of the applicable WORK sites shall consist of the complete removal and disposal of all timber, brush, stumps, roots, grass, weeds, rubbish and all other obstructions resting on or protruding through the ground surface. In cut areas, all stumps, roots, and other debris shall be removed. In areas outside the grading limits, stumps and roots may be cut flush with the ground in lieu of being removed. All loose boulders and debris lying on the ground shall also be removed and disposed of by the CONTRACTOR. Timber, stumps, brush, roots, rubbish, and other objectionable material resulting from clearing and grubbing shall be disposed of by the CONTRACTOR off-site and by methods approved by the COUNTY and ENGINEER, subject to applicable laws, ordinances and/or regulations, and shall be done at locations where trees and shrubs outside the limits of clearing will not be injured. Burning of such materials is not permitted on this site. The waterway shall not be blocked by the disposal of debris.

Individual trees that the COUNTY may designate shall be provided with protective barriers as per local regulations and be left standing and uninjured. Care shall be taken to avoid damaging trees to be left intact during clearing operations. Where trees cannot be felled in such a manner as to avoid damaging trees outside the area to be cleared, such trees shall be cut in sections from the top down. Selective clearing shall be defined on a specific project basis. Areas designated for selective clearing shall be protected by the CONTRACTOR.

Property obstructions which are to remain in place, such as buildings, sewers, drains, water or gas pipes, conduits, poles, walls, posts, bridges, etc., are to be carefully protected from damage and are not to be displaced except as might be directed by the COUNTY for unusual cases.

CS-19.0 PAVING

CS-19.1 Stabilized Subgrade

The CONTRACTOR shall conduct their work in accordance with the latest version of the FDOT Standard Specification for Roadway and Bridge Construction, Section 160 “Stabilizing”, and Section 911 “Limerock Material for Base and Stabilized Base.”

The materials to be used for this stabilizing shall be high bearing value soil, sand-clay, ground limestone, crushed limerock, oyster shell, coquina shell, rock screenings or any other material which is suitable for stabilization. Unless shown otherwise on the plans, the material used for stabilized subgrade shall have a minimum Florida Bearing Value (FBV) of 75 or a minimum Limerock Bearing Ratio (LBR) of 40. Lime or other approved material which will reduce plasticity by chemical reaction, may be mixed in with the stabilizing material, or with the mixed stabilized section of the roadbed, where necessary, to reduce the plasticity. Material having a plasticity index of more than 10 or a liquid limit greater than 40 shall not be used. All material used for stabilizing the roadbed shall be able to pass through a 3-1/2 inch ring.

Prior to the beginning of stabilizing operations, the area to be stabilized shall have been constructed to an elevation such that upon completion of stabilizing operations, the completed stabilized subgrade will conform to the lines, grades and cross-section shown on the CONTRACT Plans. Prior to the spreading of any additive stabilizing material, the surface of the roadbed shall be brought to a plane approximately parallel to the plane of the proposed finished surface.

The subgrade to be stabilized may be processed in one course, unless the equipment and methods being used do not provide the required uniformity, particle size limitation, compaction, or other desired results, in which case, the COUNTY will direct that the processing be done in more than one course. The stabilizing material shall be applied in such quantity as is necessary to produce the required bearing value. It shall be incorporated with the subgrade by plowing, discing, harrowing, blading or mixing with rotary tillers until the mixed materials are of a uniform bearing value for the full width and depth of the course before compaction. Regardless of the character or bearing value, all materials in the stabilizing course that will not pass through a 3-1/2 inch ring shall be removed or broken down to a size not larger than 3-1/2 inch. Where the bearing value of the existing subgrade is adequate without addition of stabilizing material, the subgrade shall be scarified, disced, harrowed, bladed, or tilled to assure uniformity and thorough mixing of material to the full width and depth of required stabilization.

Compaction shall be accomplished by rolling with any type of equipment which will produce the required density. Compaction shall continue until the entire depth to be stabilized has a density of not less than 98% of the maximum density as determined by modified proctor test performed in accordance with AASHTO T180. Field Density tests shall be made at intervals not greater than 500 feet for roads or 1000 square yards for parking lots and shall be performed in each course or layer in accordance with AASHTO T-205. Payment for bearing value and density tests shall be borne by the CONTRACTOR.

CS-19.2 Limerock Base Course

The CONTRACTOR shall conduct their work in accordance with the latest version of the FDOT Standard Specification for Roadway and Bridge Construction, Section 200 “Rock Base”, and Section 911 “Limerock Material for Base and Stabilized Base.”

Limerock base course materials shall meet the requirements as outlined in Section 911. The limerock shall be spread uniformly, with equipment acceptable to the COUNTY. All segregated or otherwise unacceptable areas shall be removed and replaced with properly graded rock. After spreading is completed, the entire surface shall be scarified and then shaped so as to produce the required grade, thickness and cross-section after compaction.

The CONTRACTOR shall be responsible for checking the finished grade of the limerock base course prior to paving. If the grade is found to vary by more than 0.1 foot from the design grade, the CONTRACTOR shall correct to within 0.1 foot prior to paving. When the material does not have the proper moisture content to insure the required density, wetting or drying will be required. Added water shall be uniformly mixed to the full depth of the course which is being compacted. After attaining proper conditions of moisture, the material shall be compacted to a density not less than 98 percent of maximum density as determined by AASHTO T-180 (modified proctor test). A test shall be required every 500 L.F. of road or 1000 S.Y. of parking lot. Payment for density tests shall be borne by the CONTRACTOR. If, in the opinion of the COUNTY, the surface of the base is glazed or cemented to the extent that the prime coat could not penetrate properly, he will direct that the surface be hard-planed with a blade grader and broomed, immediately prior to the application of the prime coat. Hard-planing shall remove only the glazed or cemented surface, leaving a granular or porous condition that will allow free penetration of the prime material.

CS-19.3 Prime Coat For Base Courses

The CONTRACTOR shall conduct their work in accordance with the latest version of the FDOT Standard Specification for Roadway and Bridge Construction, Section 300 “Prime and Tack Coats for Base Courses”.

Cut-back asphalts shall meet the requirements of Section 916 and emulsified asphalts shall meet the requirements of section 916, FDOT, Standard Specifications for Road and Bridge Construction. If cut-back asphalt is used for the prime coat, the cover material shall be either sand or screenings. If emulsified asphalt is used for the prime coat, the cover material shall consist of a sand-bituminous hot mix or screenings. In either case, Section 300 of the FDOT, Standard Specifications for Road and Bridge Construction shall be met.

No bituminous material shall be applied when the temperature of the air is less than 40°F in the shade and falling, or when in the opinion of the COUNTY, the weather conditions or the condition of the existing surface is unsuitable.

Application of prime coat and tack coat shall be in accordance with Section 300 of FDOT Road and Bridge Standard Specifications, latest edition.

CS-19.4 Asphaltic Concrete Surface Course

The CONTRACTOR shall conduct their work in accordance with the latest version of the FDOT Standard Specification for Roadway and Bridge Construction, Section 334 "Superpave Asphalt Concrete".

The work covered by this Section consists of furnishing labor, equipment, and materials for the installation of asphaltic concrete surface course composed of a mixture of aggregate, mineral filler (if necessary, to produce the desired stability hereinafter described) and asphaltic cement. This shall be properly laid and compacted upon a prepared base in accordance with these Specifications and in conformity with the lines, grades, thickness and typical cross-section shown on the CONTRACT Plans. A 15-foot manual straightedge shall be available at the job site at all times during the paving operation for checking joints and surface irregularities.

Asphaltic Concrete shall comply with the general construction requirements of FDOT Standard Specification for Roadway and Bridge Construction Section 330 concerning the preparation and transportation of the mixture, and placing, compacting and finishing of the surface course.

Existing pavement shall be milled 1-1/2" prior to resurfacing. The CONTRACTOR may propose the option to do an overlay in lieu of milling subject to review and approval by the COUNTY.

The finish grade of the pavement shall not vary by more than 0.1 foot from the design grade. Variations greater than 0.1 foot may be corrected by the CONTRACTOR at the COUNTY's discretion. Costs incurred correcting finished grades shall be borne by the CONTRACTOR.

CS-19.5 Bituminous Surface Treatment

The CONTRACTOR shall conduct their work in accordance with the latest version of the 2000 FDOT Standard Specification for Roadway and Bridge Construction, Section 310 "Bituminous Surface Treatment", and Section 916 "Bituminous Materials". 2007 FDOT Standard Specification for Roadway and Bridge Construction, Section 901 "Course Aggregate", and Section 916 "Bituminous Materials".

The tables below show the composition and proportioning for the various types of bituminous surface treatment and for mineral seal coat. Consider the limiting ranges of bituminous material and of cover material, as specified in the tables, and the proportions shown for Type 1-B, as general only. The COUNTY may extend the ranges up or down if considered appropriate.

Proportions for Bituminous Surface Treatment

Cover Material			Bituminous Material			
Type	Appl.	Aggregate Size No.	Cubic Feet of Stone per S.Y.	Cubic Feet of Slag per S.Y.	Gallons of Asphalt Cement per S.Y.	Gallons of Emulsified Asphalt per S.Y.
1-A		56	0.42-0.46	0.45-0.52	0.30-0.45	0.36-0.54
1-B		6	0.32-0.38	0.35-0.42	0.20-0.30	0.24-0.36
*1-B		6	0.34	0.38	0.30	0.33
2	1st	56	0.42-0.46	0.46-0.52	0.18-0.22	0.22-0.26
	2nd	7	0.18-0.24	0.22-0.26	0.26-0.31	0.31-0.37

3	1st	56	0.42-0.46	0.46-0.52	0.18-0.22	0.22-0.26
	2nd	7	0.18-0.24	0.22-0.26	0.25-0.29	0.30-0.35
	3rd	89	0.10-0.16	0.10-0.16	0.18-0.22	0.22-0.26
*For use in conjunction with Asphaltic Concrete.						

The COUNTY will also allow cut-back asphalt, in the same proportions as shown for Asphalt Cement.

Proportions for Mineral Seal Coat			
Cover Material			Bituminous Material
Aggregate Size No.	Cubic Feet per S.Y.	Gallons of AC or RC per S.Y.	Gallons of Emulsified Asphalt per S.Y.
6	0.32 - 0.38	0.22 - 0.35	0.25 - 0.40
7	0.18 - 0.26	0.15 - 0.22	0.17 - 0.25
**89	0.13 - 0.18	0.12 - 0.18	0.14 - 0.23
** Use Size No. 89 unless other grade is specifically specified.			

The materials shall meet the following requirements:

A. Bituminous Material:
1. Asphalt Cement, Viscosity Grade AC-5, per FDOT Standard Specifications for Road and Bridge Construction 2000 Section 916-1.
2. Asphalt Cement, Viscosity Grade AC-10, per FDOT Standard Specifications for Road and Bridge Construction 2000 Section 916-1.
3. Cut-back Asphalt, Grade RC-3000, per FDOT Standard Specifications for Road and Bridge Construction 2007 Section 916-3.
4. Emulsified Asphalt, Grade CRS-2 and CRS-2H per FDOT Standard Specifications for Road and Bridge Construction 2007 Section 916-4.
5. Emulsified Asphalt, Grade RS-2 per FDOT Standard Specifications for Road and Bridge Construction 2007 Section 916-4

B. Cover Material:
1. Limestone, slag or granite per FDOT Standard Specifications for Road and Bridge Construction 2007 Section 901.

Except for surface treatment used in conjunction with asphaltic concrete, the proposal will call for the use of either asphalt cement or emulsified asphalt as the bituminous material. If asphalt cement is stipulated in the CONTRACTOR's bid, the Owner' representative will restrict its actual use by seasonal requirements as provided for in the FDOT Standard Specifications.

For surface treatment used in conjunction with asphaltic concrete, the alternate items will not be shown, and the CONTRACTOR may choose the type to use, except as limited below for seasonal requirements.

For the asphalt cement alternate or option, in the event that the surface treatment or mineral seal coat is to be applied during the months of November through April, use cut-back asphalt or emulsified asphalt, Grade RS-2 or CRS-2, instead. During the remaining months of the year, the CONTRACTOR may use cut-back asphalt or emulsified asphalt in lieu of asphalt cement. When the CONTRACTOR uses emulsified asphalt and the CONTRACTOR based his bid on the use of asphalt

cement, the Owner will reduce the Contract unit price for bituminous material used in bituminous surface treatment or mineral seal coat by 10%.

Unless first obtaining written permission from the COUNTY, the CONTRACTOR shall not use coarse aggregates of different color.

The CONTRACTOR's equipment shall meet the following requirements:

A. Provide a pressure distributor that meets the requirements per FDOT Standard Specifications for Road and Bridge Construction 2007 Section 300-3.1.

B. Provide sufficient trucks and aggregate spreaders at the site of the work to ensure continuous spreading of the aggregate on the uncovered bituminous material.

C. Use a spreader of the mechanical type that is self-supported (towed) or self-propelled and is capable of producing a smooth, uniform distribution of the cover material.

D. Do not use spreaders of the type attached directly to the rear of the truck body (tail gate spreaders).

E. Provide rollers that are 3 to 5 ton steel-tired, or combination steel and rubber-tired, rollers and self-propelled, pneumatic-tired traffic type rollers equipped with at least seven smooth-tread, low-pressure tires and capable of carrying a gross load of at least 8 tons. Maintain the inflation of the tires such that in no two tires the air pressure varies more than 5 psi. Load the traffic roller as directed by the COUNTY.

The CONTRACTOR shall sweep the surface to be covered clean and free of sand, dirt, dust, and other deleterious material by means of mechanical rotary sweepers, hand brooms, or other approved methods, and keep the surface free from moisture.

Where a prime coat has previously been applied to the surface, do not apply bituminous material until the prime coat has become thoroughly cured, as determined by the COUNTY. Do not apply surface treatment over any pavement mixture when, due to heat from the sun or insufficient length of the curing period, the stability of the existing pavement is such as to allow penetration or displacement of the existing surface by the cover material during the rolling operations.

Where applying these surface courses adjacent to curb and gutter, valley gutter, or any other concrete surface, cover the concrete surfaces with heavy paper or other protection as approved by the Owner' representative during application of the bituminous material. Immediately remove any bituminous material deposited on such concrete surfaces.

Do not apply bituminous material when the air temperature in the shade and away from artificial heat is less than 60ºF at the location where application is to be made, or when weather conditions or the surface conditions are otherwise unfavorable.

After cleaning the surface to be treated to the satisfaction of the COUNTY, uniformly spray the bituminous material over the surface by means of a pressure distributor. When a surface constructed under this Section is on a paved shoulder, use a stringline or other approved method to

produce a uniform line along the edge of the applied bituminous material adjacent to the traffic lanes. Use a distributor that maintains a pressure of at least 20 psi, but not more than 75 psi.

For asphalt cement, maintain an application temperature between 300 and 350ºF. For emulsified asphalt, maintain an application temperature between 100 and 170ºF. For cut-back asphalt, maintain an application temperature between 175 and 275ºF.

Take special precautions to obtain an even and uniform distribution of bituminous material and adjust and operate the distributor so as to maintain uniform, even distribution of the type of material being applied. Immediately remove excessive deposits of bituminous material upon the road surface caused by stopping or starting the distributor, by leakage, or otherwise.

Ensure that the area to be covered by any one application of bituminous material is not greater than the aggregate can cover without interruption due to limitations of hauling and spreading equipment or to any other cause. For double and triple application surface treatments, apply the second and third applications of bituminous and cover materials the same day as the first application, as far as is practicable and consistent with the curing requirements specified herein.

Spread the cover material immediately following each application of bituminous material. Uniformly distribute the cover material over the bituminous surface in one, two, or three courses, as specified. Perform spreading using approved mechanical spreaders. Use only drivers experienced in this type of work for driving the spreaders (or trucks when using towed spreaders). Do not drive trucks or spreaders on the uncovered bituminous material.

For double application, distribute the cover material alternately over the bituminous surface in two separate courses. Apply the coarse size immediately after the first application of bituminous material, and uniformly distribute an amount that will cover the surface completely with a single layer of material. Broom the first application as needed to obtain a uniform surface, ensuring that no piece of cover material rests on top of another, and then roll it. After rolling and curing the first application as specified herein, apply the second application of bituminous material, and immediately thereafter distribute the fine size cover material uniformly over the surface in the quantity specified or in an amount that completely fills the voids of the first application. Then, broom the fine size cover material as needed to secure a smooth and uniform surface, and roll it as specified herein.

For triple application surface treatment, apply the cover material in three applications in the proportions specified. Spread, broom, and roll the first and second applications of bituminous and cover materials as provided herein for double application surface treatment. Then, spread, broom, and roll the third application of bituminous and cover material as provided for the second application.

Immediately after each application of cover material, broom the surface in order to secure a uniform distribution of cover material and a smooth surface. Place additional aggregate by hand on any areas not properly covered. If deemed necessary by the COUNTY, drag the surface with a light drag broom or other dragging equipment approved by the COUNTY, of a type that will not disturb the embedded aggregate. Supplement this operation by additional hand brooming until obtaining a smooth and even surface. Repeat the dragging and brooming in conjunction with the rolling for as long as required to ensure a uniform surface. Apply these dragging requirements for each application of cover material.

Immediately after the spreading and dragging of each application of cover material, roll the entire surface. Begin the rolling within 30 minutes after the spreading of cover material. Begin rolling

at the edges and progress to the center of the surface, uniformly lapping each preceding pass and thoroughly covering the entire surface. During rolling, perform additional dragging and hand brooming as specified herein.

First, roll the entire surface with a traffic roller, followed immediately with a steel-wheeled roller. Cover the entire surface one time with the steel-wheeled roller. Then, roll the cover material again with the traffic roller. Continue the rolling as long as is necessary to ensure thorough keying of the cover material into the bituminous material and to secure a uniformly closed surface.

On stabilized bases or where the surface to be covered is irregular, the CONTRACTOR may omit rolling with the steel-tired roller, if so directed by the COUNTY.

When covering the surface treatment with an asphaltic concrete course, thoroughly cure the surface treatment for a period of at least 30 days prior to applying the overlying course. When constructing the roadway under traffic, or otherwise wherever feasible to route traffic over the section, place traffic on the surface treatment for this 30-day curing period. In the event the Owner' representative considers that such traffic is sufficient to effect the required curing of the surface treatment in less than 30 days, he may shorten this 30-day period and notify the CONTRACTOR, in writing, that the surface treatment is cured sufficiently for placing the asphaltic concrete.

Provide a finished surface that is uniform and conforms to the lines, grades, and typical cross-section of the existing pavement. Remove all portions of the completed surface that are defective, are not properly finished, have fat joints, or are not in reasonably close conformance with these Specifications, and replace them with a satisfactory surface. The Owner will not pay for the defective work and its removal.

When placing an asphaltic concrete course over the surface treatment, remove, or otherwise correct, any joint showing an excess of bituminous material before placing the overlying surface course.

After applying the bituminous material, do not allow traffic to use the road until placing and thoroughly rolling the cover material. If practicable, keep traffic off the finished surface for the first 48 hours after completing finishing. Where it is impracticable to keep traffic off the finished surface for such period, restrict traffic to a maximum speed of 15 mph during this time. For this purpose, furnish and maintain suitable barricades and lights, and provide watchmen and vehicles to lead traffic through the sections of the roadway being protected. Keep at least two such watchmen on duty continuously during this 48-hour restricted period, and provide a sufficient number to ensure enforcement of the 15 mph maximum speed.

CS-20.0 SIGNS AND STRIPING

The WORK consists of the furnishing and installation of signs, and the striping of pavement at the locations shown on the CONTRACT Plans. All signs shall be placed in accordance with COUNTY standards and the FDOT "Manual on Uniform Traffic Control Devices." Yellow and white reflective paint shall be used in accordance with FDOT Standard Specifications for road and bridge construction. All pavement striping work shall be carefully laid out and all lines and markings shall be of the width, length and pattern as shown or specified.

CS-21.0 LANDSCAPING

CS-21.1 General

The WORK includes all materials, transport, planting, watering, fertilizing, and guaranteeing the landscaping as shown on the CONTRACT Plans. Ship landscape materials in covered trucks with certificates of inspection required by governing authorities. Comply with regulations applicable to landscape materials. Do not make substitutions. If specified landscape material is not obtainable, submit proof of non-availability to the COUNTY, so that the COUNTY can determine equivalent material. Package standards products with manufacturers certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists, wherever applicable.

Provide landscaping of the quantity, size, genus, species, and variety shown and scheduled for landscape work and complying with recommendations and requirements of ANSI Z60.1 "American Standard for Nursery Stock"; and, where applicable, the latest edition of "Grades and Standards for Nursery Plants," Florida Department of Agriculture and Consumer Services. Provide healthy, vigorous stock, container grown in recognized nursery (field grown palms) in accordance with good horticultural practice and free of disease, insects, eggs, larvae, and defects such as knot, sun-scale, broken limbs, abrasions, or disfigurement. All plants are to be Florida #1 or better.

The COUNTY may inspect landscaping at place of growth or at site before planting for compliance with requirements for genus, species, variety, size, and quality. The COUNTY retains the right to further inspect landscaping for size and condition of root systems, insects, injuries, and latent defects, and to reject unsatisfactory or defective material at any time during progress of work. The rejected material will be immediately removed from site and replaced with suitable material.

Submit certificates of inspection as required by governmental authorities. Submit manufacturer's or vendor's certified analysis for fertilizers materials. Submit other data substantiating that materials comply with specified requirements. Provide proposed planting schedule, indicating dates for each type of landscape work. Once accepted by the COUNTY, revise dates only as approved in writing indicating reasons for adjustments. Submit typewritten instructions recommending procedures to be established by the COUNTY for maintenance of landscaping. Instructions to include watering schedule, fertilizing requirements, mowing, and pruning schedules. Submit prior to completion of the WORK.

Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration and theft during delivery and while stored at site. Provide container grown plants. Do not prune prior to delivery unless otherwise approved by the COUNTY. Do not bend or bind-tie landscaping in such manner as to damage bark, breach branches, or destroy natural shape. Provide protective covering during delivery. Do not drop landscaping during unloading from delivery trucks. Do not remove landscaping from containers until planting time.

CS-21.2 Planting

The Contractor shall determine location of underground utilities and perform work in a manner which will avoid possible damage to underground utilities. Hand excavate planting holes is

required. Maintain or restore finish grade set by others. When conditions detrimental to plant growth are encountered, such as construction debris, adverse drainage conditions, or obstruction, notify the COUNTY before planting. Construction debris shall be removed and disposed of by Contractor. The COUNTY shall determine best way to resolve drainage conditions or adjustment of planting. Plant landscaping after final grades are established, unless otherwise acceptable to the COUNTY. Hand rake all planting areas prior and after planting and remove weeds, rocks, and construction debris.

Water must be available prior to starting the planting and transplanting. Set container plants in holes plumb and in center of hole with top of root ball at same elevation as finish grade. Remove containers in such a manner as to not damage or loosen the soil on the root ball. When set, place backfill around base and sides of root ball, and work backfill with shovel to settle backfill and eliminate voids and air pockets. Backfill planting holes with soil amended with compost at rates of one (1) shovel full per shrub and two (2) shovels full per tree. Provide fertilizer with percentage of nitrogen required to provide 5 pounds of 8-10-10. Broadcast fertilizer in dry weather evenly by hand around base of trees prior to installing mulch. Water when planting area is completely planted until no more water is absorbed. Rake disturbed ground smooth to blend with surrounding finish grade, and mulch planting areas at a 2" thickness throughout. Prune as directed by the COUNTY.

During landscaping, keep pavements clean and WORK area in an orderly condition. Protect landscaping from damage due to landscape work, operations by other contractors and trades, and trespassers. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work as directed by the COUNTY.

When landscaping is completed, the COUNTY will, upon request, make an inspection to determine acceptability. When inspected WORK does not comply with the CONTRACT Plans or these Specifications, the CONTRACTOR shall replace rejected WORK and continue maintenance until reinspected by the COUNTY and found to be acceptable. Remove rejected plants and materials promptly from the WORK area.

All water and watering required subsequent to the beginning of the period of establishment for the plants, which is necessary and authorized for the proper establishment of the plant, shall be included in the contract unit price for plants.

CS-21.3 Warranty

The CONTRATOR shall provide to the COUNTY a written warranty on trees, palms, and shrubs for a period of one (1) year after date of the COUNTY’s acceptance of landscape, against death and unsatisfactory growth to be determined by COUNTY two (2) months after landscape acceptance, except for defects resulting from neglect by the COUNTY or unusual phenomena or incidents which are beyond the Contractor's control.

CS-22.0 BEST MANAGEMENT PRACTICES

Activities shall be conducted in a manner, which does not cause violations of state water quality standards. The CONTRACTOR shall implement best management practices for erosion and pollution control to prevent violations of state water quality standards. Temporary erosion control shall be implemented prior to and during construction, and permanent control measures shall be completed within seven (7) days of any construction activity. Turbidity barriers shall be installed and

maintained at all locations where the possibility of transferring suspended solids into the receiving waterbody exists due to the permitted work. Turbidity barriers shall remain in place at all locations until construction is completed and soils are stabilized and vegetation has been established. Thereafter the CONTRACTOR shall be responsible for the removal of the barriers. The CONTRACTOR shall correct any erosion or shoaling that causes adverse impacts to the water resources.

Best management practices for erosion and turbidity control, including but not limited to the use of staked hay bales, turbidity barriers, and silt screens, shall be used and maintained as necessary at all times during project construction. Turbidity control devices shall be maintained and shall remain in place for the duration of construction to ensure that turbidity levels outside the WORK area do not exceed 29 NTUs above background levels. The construction area shall be that area where active WORK is taking place and surrounded by turbidity control devices. The CONTRACTOR shall be responsible for ensuring that turbidity control devices are inspected daily and maintained in good working order so that there are no violations of state water quality standards outside of the turbidity screens.

The CONTRACTOR shall take measures to ensure that turbidity levels within waters of the State surrounding the project area do not exceed allowable levels. Such measures include, but are not limited to, working during a slack tide, working at a time when the tidal ranges are minimal/less frequent, and working when currents within the project area are at minimal intensity.

Stabilization measures shall be initiated for erosion and sediment control on disturbed areas as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than seven (7) days after the construction activity in that portion of the site has temporarily or permanently ceased.

The CONTRACTOR shall conduct his WORK in a manner to prevent damage to the submerged bottom (rutting, prop-scouring, and equipment sitting on the bottom) outside of the construction areas. WORK in the shallow water areas shall occur during high tides to prevent damage to the submerged bottom.

Prior to clearing, silt fence (trenched 4 inches deep and backfilled on the uphill side), also hay bales (that are trenched 4 inches deep, backfilled on the uphill side, and staked with at least two 2” x 2” wooden stakes) shall be installed where required.

A rock access road (that is 50ft long with a 6 inch depth of FDOT #1 stone and lined with filter fabric) shall be constructed to minimize the effects of truck traffic and sedimentation tracking both on and off of the site.

During the clearing, grubbing and site grading stages, areas that are disturbed more than 7 days shall be stabilized with rye grass applied at manufacturer’s recommendations. After seeding, each area shall be mulched with hay per manufacturer’s recommendations. All exposed slopes that are equal to or greater than 5% shall be stabilized using an erosion control blanket until the area achieves final stabilization.

After the initial site grading work, all proposed inlets/outfalls, once installed, shall be protected from erosion and sediment runoff by the use of filter fabric and properly installed hay bales.

Disturbed portions of the site where construction activities have permanently ceased for at least 21 shall be stabilized with permanent seed or other permanent stabilization methods no later than 14 days after the last construction activity. Seeding shall be the same as in temporary seeding.

CS-23.0 TURBIDITY MONITORING

The CONTRACTOR shall conduct any Permit required turbidity monitoring and reporting. If monitoring reveals turbidity levels at the compliance locations that appear to violate the State Water quality standards, the CONTRACTOR shall cease all construction activities immediately and not resume until corrective measures have been taken and turbidity has returned to acceptable levels. Any such occurrence shall be immediately reported by the COUNTY to the DEP South District Office, SLERP Compliance and Enforcement Section in Fort Myers. Monitoring reports shall be submitted by the COUNTY to the Department's South District Office, P.O. Box 2549, Fort Myers, FL 33902.

In the event visible turbidity plumes are evident outside of the turbidity control devices surrounding the active work area, the COUNTY shall conduct additional turbidity monitoring to document the plume and current ambient levels of turbidity. The COUNTY and CONTRACTOR shall then take measures, such as but not limited to, stopping all construction activities until turbidity levels return to normal, or installing additional turbidity control devices. The COUNTY shall immediately inform the DEP South District Office, P.O. Box 2549, Fort Myers, FL 33902, Environmental Resource Section at (239) 332-6975 or by fax machine at (239) 332-6969.

CS-24.0 POLLUTION CONTROL

The CONTRACTOR shall control and conduct such operations and institute maintenance procedures to eliminate pollution of adjacent surface waters caused by either material runoff or discharges of any kind from the construction area (roof drains discharge excepted). No off-site discharge is allowed. The CONTRACTOR shall comply with the provisions of Chapters 253 and 403, Florida Statutes, regarding control of air and water pollution and with all rules and regulations of the Department of Environmental Protection. If non-compliance with the aforementioned Federal, State or Local laws or regulations occurs, the CONTRACTOR shall immediately inform the COUNTY and ENGINEER of proposed corrective action and take such action as may be approved. If the CONTRACTOR fails or refuses to comply promptly, the COUNTY, through the ENGINEER, may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs or damages by the CONTRACTOR.

CS-25.0 ENVIRONMENTAL PROTECTION

CS-25.1 General

For the purpose of this specification, environmental protection is defined as the retention of the environment in its natural state to the greatest possible extent during project construction and to enhance the natural appearance in its final condition. Environmental protection requires consideration of air, water, and land, and involves noise, solid waste-management as well as other pollutants. In order to prevent any environmental pollution arising from the construction activities

in the performance of this CONTRACT, the CONTRACTOR and his SUBCONTRACTORS shall comply with all applicable Federal, State and local laws and regulations concerning environmental pollution control and abatement.

CS-25.1.1 Subcontractors

Compliance with the provisions of this section by SUBCONTRACTORS will be the responsibility of the CONTRACTOR.

CS-25.1.2 Landscape Protection

The environmental resources within the project boundaries and those affected outside the limits of permanent WORK under this CONTRACT shall be protected during the entire period of this CONTRACT. The CONTRACTOR shall confine his activities to areas defined by the CONTRACT plans and specifications.

Prior to the beginning of any construction, the CONTRACTOR shall identify all land resources to be preserved within the CONTRACTOR's WORK area. The CONTRACTOR shall not remove, cut, deface, injure, or destroy land resources, including trees, shrubs, vines, grasses, top soil, and land forms without special permission from the COUNTY and ENGINEER. Vegetation damaged beyond restoration shall be removed and disposed of by the CONTRACTOR in a manner approved by the COUNTY and ENGINEER. Vegetation or trees that are to be removed because of damage shall be replaced at the CONTRACTOR's expense by nursery-grown plants or trees of the same species or a species approved by the COUNTY and ENGINEER. The size and quality of nursery-grown plants or trees shall also be approved by the COUNTY and ENGINEER. No ropes, cables, or guys shall be fastened to or attached to any trees for anchorage unless specifically authorized. Where such special emergency use is permitted, the CONTRACTOR shall provide effective protection for land and vegetation resources at all times.

Prior to any construction the CONTRACTOR shall mark the areas that are not required to accomplish all WORK to be performed under this CONTRACT. Isolated areas within the general WORK area which are to be saved and protected shall also be marked or fenced. The CONTRACTOR shall protect from damage all existing vegetation designated to remain and protect roots from noxious materials in solution caused by run-off or spillage. No materials, trailers, or equipment shall be stored within the drip line of any protected tree. Monuments and markers shall be protected before construction operations commence. Where construction operations are to be conducted during darkness, the markers shall be visible. The CONTRACTOR shall convey to his personnel the purpose of marking and/or protection of all necessary objects.

Trees and their roots, shrubs, vines, grasses, landforms, and other landscape features indicated and defined on the CONTRACT plans to be preserved shall be clearly identified and protected by fencing or any other approved techniques. The CONTRACTOR shall place tree protection fencing before excavation or grading is begun and maintain in place until construction is complete; remove branches of protected trees, if required, to clear for construction and extend pruning operation to restore the natural shape of the entire tree; cut branches or roots, if required, with sharp pruning instruments, (do not break or chop); and repair any damage to tree crowns or roots promptly after damage occurs.

CS-25.1.3 Location of Storage Facilities

The CONTRACTOR's storage areas required in the performance of the WORK shall be located upon existing cleared portions of the job site or areas to be cleared, and shall require written approval of the COUNTY and ENGINEER. The CONTRACTOR shall not store oil or fuel on-site, or equipment that is not required for the daily construction activities. A metal pan with sides a minimum of four (4) inches high shall be placed under the equipment or adjacent area during refueling. The pan shall have a capacity equal to the capacity of the gas cans used and catch any spills or leaks during the refueling activity. Fuel caught in the pan shall be contained and either transported off-site or used in the equipment. Under no condition shall the material be discharged on-site or into adjacent waters.

CS-25.1.4 Post-Construction Cleanup or Obliteration

The CONTRACTOR shall obliterate all signs of construction WORK areas, waste materials, or any other vestiges of construction as directed by COUNTY and ENGINEER. The area will be restored to near natural conditions.

CS-25.1.5 Spillage

Special measures shall be taken to prevent bilge pumpage or effluent, chemicals, fuels, oils, greases, bituminous materials, waste washing, herbicides and insecticides, and concrete drainage from entering public waters.

CS-25.1.6 Disposal

Disposal of any materials, wastes, effluent, trash, garbage, oil, grease, chemicals, etc., in areas adjacent to streams or other waters of the State shall not be permitted. If any waste material is dumped in unauthorized areas, the CONTRACTOR shall remove the material and restore the area to the original condition before being disturbed. If necessary, contaminated ground shall be excavated, disposed of as directed by the COUNTY, and replaced with suitable fill material, compacted and finished with topsoil and planted as required to re-establish vegetation.

CS-25.2 Manatees

In order to ensure that Manatees are not adversely affected by the construction activities, the CONTRACTOR shall abide by the STANDARD MANATEE CONSTRUCTION CONDITIONS contained within the Permits.

CS-25.3 In-Water Sea Turtle and Smalltooth Sawfish

In order to ensure that In-Water Sea Turtles and Smalltooth Sawfish are not adversely affected by the construction activities, the CONTRACTOR shall abide by the SEA TURTLE AND SMALLTOOTH SAWFISH CONSTRUCTION CONDITIONS contained within the Permits.