

City of West Park

PROJECT MANUAL

COUNTYLINE ROAD IMPROVEMENT

PHASE 1

CITY COMMISSION

Mayor: Felicia M. Brunson

Vice Mayor: Brandon Smith

Commissioners: Marvin Price

Joy B. Smith

Dr. Katrina V. Touchstone

ADMINISTRATION:

City Manager: W. Ajibola Balogun

City Attorney: Burnadette Norris Weeks

PREPARED BY:

City of West Park
1965 S. State Road 7, West Park, FL 33023

Date:

JULY 2023

PROJECT SITE



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SECTION 00200

INSTRUCTION TO BIDDERS

1. BID FORM

All bids must be submitted in conformity with the requirements of the Project Manual and on the Bid Form included herewith (Section 300). Also include the Contractor's Questionnaire (Section 00350, with copies if applicable licenses and certifications, latest financial statement, and a list of similar projects completed), and Bid Bond (Section 00410). The **entire** Project Manual and attachments shall be placed in a sealed envelope, marked on the outside with the Contractor's name, address, phone number and Project Name, with the words "SEALED – DO NOT OPEN UNTIL OFFICIAL BID OPENING DATE" clearly marked on the outside. Bids, which contain irregularities of any kind or incomplete bids, may be rejected as informal.

2. BID GUARANTY

The bid must be accompanied by a Bid Guaranty which shall be for an amount equal to five percent (5%) of the proposal and at the option of the bidder may be a certified check, cashier's check, or bid bond. Cash deposits will not be accepted. The Guaranty shall be forfeited if the successful bidder fails to enter into a contract in the form shown within ten (10) working days of the Notice of Award of the Contract. The checks and bid bonds of all except the three lowest bidders will be returned immediately after the opening of bids and the remaining checks or Bid Bonds will be returned within ten (10) working days after the signing of the contract by the successful bidder.

3. TIME FOR RECEIVING BIDS

Bids received prior to the time of opening will be securely kept, unopened. All bids shall be delivered to the City Clerk's Office, 1965 South State Road West Park, FL 33023. No bids will be received after 3:00 P.M. on date of bid opening.

4. QUESTIONS DEADLINE

Deadline for submitting questions is at **5:00 p.m.** on **August 2, 2023**. All questions shall be submitted in writing by letter or fax or email the City Clerk only.

5. WITHDRAWAL OF BIDS

Bids may not be withdrawn for a period of One Hundred and Twenty (120) days from the opening thereof.

6. BIDDERS PRESENT

At or shortly after 3:05 P.M. the bids will be opened and their contents will be made public for the information of the bidders and others properly interested, who may be present either in person or by representative.

7. AWARD OF CONTRACT

The contract will be awarded not later than (4) months from the bid opening date, to the lowest responsible bidder, complying with the conditions of the Notice of Bid Invitation, provided the bid is reasonable, and it is in the interest of the City to accept it. The City however, reserves the right to reject any or all bids.

8. QUALIFICATIONS OF BIDDERS

Possession of a valid State of Florida General Contractor's license is required for this project. In the event portions of the work called for in the specifications are to be installed, constructed, or assembled by a sub-contractor or sub-contractors, the bidder must fill in the applicable information requested in the Proposal.

9. WARRANTY

Neither the final payment nor any provision of the Contract Documents, nor the use of the equipment by the City shall constitute an acceptance of items found not to comply with stipulations of the Contract Documents. The Contractor shall furnish suitable warranty and guarantee.

10. INSURANCE

The bidder to whom a Contract is awarded shall take out and maintain Worker's Compensation Insurance to cover all his/her employees as well as maintain public liability and property damage insurance. See Section 00800, subsection 9 for more details.

11. ELIGIBLE BIDDERS

The City reserves the right, before awarding a Contract, to require a Bidder to submit evidence of his/her qualifications, as may be deemed necessary, and consider any evidence available to it of the financial, technical, and other qualifications and abilities of the bidder. The Contract will be awarded only to a Bidder fully qualified to undertake the proposed work. All material or services must meet all applicable Federal, State and Local specifications.

12. SAFETY PRECAUTIONS

The Contractor shall maintain suitable and sufficient guards and barriers and, at night, suitable and sufficient safety standards required by Municipal, County, State and Federal ordinances and laws.

13. PRE-BID INSPECTION

The Bidder, before submitting a Proposal, is required to visit and examine the site of the work and satisfy himself/herself about the character of the work, any possible difficulties, and all conditions and circumstances which do and may affect the work.

14. CONTRACTOR'S QUESTIONNAIRE

Section 00350 contains the form entitled "Contractor's Questionnaire." This form must be completed and submitted as an integral part of the bid package.

15. QUALIFICATION OF SURETIES

- A. General: The following requirements shall be met by all surety companies furnishing bid, performance payment or other type of bonds:
- B. Qualifications: As to companies being rated acceptable:
 1. The Surety shall be rated as "A" or better as to General Policyholders Rating and Class X or better as to Financial Category by Best's Key Rating Guide, published by Alfred M. Best Company, Inc., of 75 Fulton Street, New York, New York, 10038.

2. The Surety shall be listed on the U.S. Department of the Treasury, Fiscal Service, Bureau of Government Financial Operations, Circular 570, (1982 Revision) entitled, "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies."
 3. All Surety Companies are subject to approval and may be rejected by the Owner without cause, in the same manner that bids may be rejected.
- C. Limitations: Bonding Limits or Bonding Capacity refer to the limit or amount of Bond acceptable on any one risk.
1. The bonding limit of the Surety shall not exceed ten percent (10%) of the policyholder surplus (capital and surplus) as listed by the aforementioned Best's Key Rating Guide, on any one risk (penalty or amount of any one bond).
- D. Requirements:
1. Policy Holders Surplus is required to be 5 times the amount of any one bond.
 2. The Agent countersigning the bond shall be a resident of Broward County

16. E-VERIFY

All bidders must be authorized to transact business by the State of Florida and must be enrolled in the E-Verify system to confirm the eligibility of all new employees.

END OF SECTION

SECTION 00300

PROPOSAL

(BID FORM)

Submitted: _____, 20____.

City Clerk's Office City Hall
1965 South State Road 7
West Park, FL 33023

Bidders:

The undersigned, as Bidder, hereby declares that the only person or persons interested in the Proposal, as principal or principals, is or are named herein and that no other person than herein mentioned has any interest in the Proposal of the Contract to which the work pertains; that this Proposal is made without connection or arrangement with any other person, company, or parties making a bid or proposal and that the Proposal is in all respects fair and made in good faith without collusion or fraud.

The Bidder further declares that he has examined the site of the work and that from personal knowledge and experience, or that he has made sufficient observations of the conditions of the project site to satisfy himself that such site is a correct and suitable one for this work and he assumes full responsibility therefore, that he has examined the Drawings and Specifications for the work and from his own experience or from professional advice that the Drawings and Specifications are sufficient for the work to be done and he has examined the other Contractual Documents relating thereto, including the Notice of Bid Invitation, Instructions to Bidders, Proposal, Contract, General and Special Conditions, Technical Specifications, Drawings and has read all addenda prior to the receipt of bids, and that he has satisfied himself fully, relative to all matters and conditions with respect to the work to which this Proposal pertains.

The Bidder further proposes and agrees, if this Proposal is accepted, to contract with the City of West Park (Owner), in the form of contract specified, to furnish all necessary materials, all equipment, all necessary machinery, tools, apparatus, means of transportation, and labor necessary to complete the work specified in the Proposal and the Contract, and called for by the Drawings and Specifications and in the manner specified. The Bidder further proposes and agrees to comply in all respects with the time limits for commencement and completion of the work as stated in the Contract Form.

The Bidder further agrees that the deductions for liquidated damages, as stated in the Contract Form, constitute fixed, agreed, and liquidated damages to reimburse the Owner for additional costs to the Owner resulting from the work not being completed within the time limit stated in the Contract Form.

The Bidder further agrees to execute a Contract and furnish satisfactory Performance and Payment Bonds each in the amount of one-hundred percent (110%) of the Contract price, within ten (10) consecutive calendar days after written notice being given by the Owner of the award of the Contract, and the undersigned agrees that in case of failure on his part to execute the said Contract and Performance and Payment Bonds within the ten (10) consecutive calendar days after the award of the Contract, the cashier's check or Bid Bond accompanying his bid and the money payable thereon shall be paid to the Owner as liquidation of damages sustained by the Owner; otherwise, the check accompanying the Proposal shall be returned to the undersigned after the Contract is signed and the Performance and Payment Bonds are filed.

NOTICE TO ALL BIDDERS

The undersigned agrees to accept in full compensation therefore the total of the lump sum prices for the items named in the following schedule, based on the quantities actually constructed as determined by the applicable measurement and payment portion of the technical specifications.

Bidders Certificate of Competency No. _____

Bidders Occupational License No. _____

Acknowledgment is hereby made of the following Addenda received since issuance of the Project

Manual: Addendum No. _____ Dated: _____ Addendum No. _____ Dated: _____

Addendum No. _____ Dated: _____ Addendum No. _____ Dated: _____ Addendum No.

_____ Dated: _____ Addendum No. _____ Dated: _____

Attached hereto is a cashier's check on the _____

_____ Bank of _____ Dollars

(\$ _____), made payable to the City West Park, Florida.

_____ L.S. (Name of Bidder) (Affix Seal)

_____ L.S. Signature of Officer

_____ L.S. (Title of Officer)

Address: _____

City: _____ State: _____

The full names and residences of persons and firms interested in the foregoing bid, as principals, are as follows:

Name of the executive who will give personal attention to the work: _____

Attach list of subcontractors

1-The City of West Park reserves the right to waive any information in any bid, to reject any and all bids and to delete any part of the above items.

2-Changes in the Contract Price and Contract Time require prior authorization in writing from Owner and the Engineer, in the form of a Change Order or Work Change Directive. The Contractor is responsible for verification of all bid quantities and to report to the Engineer any discrepancies found prior to ordering materials and or equipment for construction. Refer to General Conditions.

3-Bid prices for the various divisions and work items are intended to establish a total price for completing the project in its entirety. The Contractor shall include in the Bid, any item for which a separate division has not been established in the Base Bid Form (under any related division), to reflect the total price for completing the project in its entirety, as specified in the Project Manual and Construction Drawings.

4-Contractor is responsible for restoring all areas disturbed during construction, including swale, sidewalk, and landscaped areas. Swale must be restored with St. Augustine grass unless otherwise instructed. Field restoration shall be as specified or as otherwise directed by Engineer. Cost of restoration and watering of areas disturbed during construction must be included as part of the entire bid.

5-Contractor shall ensure that all landscaping related work, including tree trimming and/or root pruning where necessary, is done under the supervision of a ***Certified Arborist***.

Name of Bidder

Signature of Bidder

Bid Form Project Name: COUNTYLINE ROAD IMPROVEMENT- PHASE 1

City's Project No.: IFB No. 23-0811

BID FORM

Bid prices stated in the proposal include all costs and expenses for mobilization, taxes, labor, equipment, materials, contractors' overhead and profit. The quantities for payment under this Contract will be determined by completed items in place, ready for service and accepted by the Owner. Contract prices are intended to establish a total price for completing the project in its entirety. All work not listed in the Bid Form but required in order to furnish and install all elements as intended, shall be included in the proposal. All work, mobilization, funding agency compliance requirements, general and supplementary conditions, quality control requirements, utility coordination, dust control, Florida Trench Safety Act, Pollution prevention and incidental costs shall be included in the overall contract, no separate payment or additional payment will be made.

Item No./ Description	Qty.	Unit	Unit Price	Total Price
A. GENERAL				
1.0 Clearing & Grubbing (Includes removal & disposal of concrete curb, asphalt pavement, rocks, sod, dirt; tree trimming, tree root & vegetation removal; sawcutting & dust control)	0.516	AC.	\$ _____	\$ _____
2.0 Maintenance of Traffic (MOT)	1	L.S.	\$ _____	\$ _____
3.0 Inlet Protection System	4	EA.	\$ _____	\$ _____
4.0 Tree Protection	351	LF	\$ _____	\$ _____
5.0 Performance & Payment Bond	1	L.S.	\$ _____	\$ _____
6.0 Owners Contingency (Do Not Bid)			\$ <u>10,000.00</u>	\$ <u>10,000.00</u>
SUBTOTAL GENERAL				\$ _____
B. ROADWAY				
7.0 Regular Excavation (Base/subbase)	466	C.Y.	\$ _____	\$ _____
8.0 Embankment	3	C.Y.	\$ _____	\$ _____
9.0 Type B Stabilization, LBR-40, 12"	1,635	S.Y.	\$ _____	\$ _____
10.0 Optional Base, Base Group 09 (10" Limerock Base Option)	1,433	S.Y.	\$ _____	\$ _____
11.0 Superpave Asphalt, Traffic C, SP-12.5 (2-inch structural course)	155	TON	\$ _____	\$ _____
12.0 Asphalt Concrete Friction Course Traffic C, FC 9.5 (1-inch)	80	TON	\$ _____	\$ _____
13.0 Concrete Curb & Gutter, Type F (Includes flumes)	500	L.F.	\$ _____	\$ _____
14.0 Retro Reflective Pavement Markers	26	EA.	\$ _____	\$ _____
15.0 Thermoplastic, STD, White, Solid, 6"	0.197	GM.	\$ _____	\$ _____

16.0 Thermoplastic, STD, Yellow, Solid, 0.190 GM. \$ _____ \$ _____
6"

SUBTOTAL ROADWAY \$ _____

C. BIOSWALE

17.0 Bio-Swale Construction 460 L.F. \$ _____ \$ _____
(Includes excavation & disposal,
And furnishing, installation/backfilling,
and grading of all specified materials
such as soil mix, rock, fabric in preparation
for plants and sod)

18.0 Performance Turf, Sod (St. Aug) 575 S.Y. \$ _____ \$ _____

19.0 Plant Mix (includes mulch layer)
Tickseed 600 EA \$ _____ \$ _____
Blue-eyed Grass 450 EA \$ _____ \$ _____
Muhly Grass 225 EA \$ _____ \$ _____

20.0 Informational Signs (Install) 3 EA. \$ _____ \$ _____

21.0 Project Signage (Furnish/Install) 1 EA \$ _____ \$ _____
(See section 950 for Sign
Requirement)

SUBTOTAL BIOSWALE \$ _____

TOTAL BID PRICE (A+B+C) \$ _____

TOTAL BID AMOUNT (IN WORDS)

BIDDER (Company Name):

NAME OF REPRESENTATIVE (PRINT) _____

TITLE: _____

BIDDER'S CONTACT INFO.

PHONE NO.: _____

PHONE NO.: _____

EMAIL : _____

NOTES:



END OF SECTION

LIST OF MAJOR SUB CONTRACTOR

Bidders are required to list with the Proposal, on this attached sheet all major sub-contractors included for the prosecution of the work. Failure to complete the list may be cause for declaring the Proposal irregular.

The successful bidder shall employ the sub-contractors listed hereunder for the class of work indicated, which list shall not be modified in any way without the written consent of the City of West Park.

The Bidder expressly agrees that:

If awarded a contract as a result of this proposal, the major sub-contractors used in the prosecution of the work will be those listed below.

The Bidder represents that the sub-contractors listed below are financially responsible and are qualified to do the work required.

All pavement marking and signing sub-contractors shall have an active Broward County Certificate of Competency if applicable.

Landscaping personnel performing tree trimming and root pruning shall be supervised by an onsite Certified arborist.

CATEGORY OR CLASS NAME OF SUB-CONTRACTOR ADDRESS OF WORK

END OF SECTION

SECTION 00350

CONTINUED QUESTIONARE

Submitted to: The Mayor and City Commission of the City of West Park, Florida:

By _____

Principal Office _____

How many years has your organization been in business as a General Contractor under your present business name? _____

Does your organization have current occupational licenses entitling it to do the work contemplated in this Contract? _____

State of Florida License: (State type and number):

Federal I.D. No: _____

Broward County Certificate of Competency: (State type and number):

~~City of West Park Contractor Registration: (State type and number): n/a (Pre-registration not required)~~

Include copies of above licenses and certifications with proposal: _____

How many years experience in similar work has your organization had?

(A) As a General Contractor _____

(B) As a Sub-Contractor _____

(C) What contracts has your organization completed within the last five (5) years? State below:

Contract Amount	Class of Work	when completed	Name & Address of Owner
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Are you a Certified Minority Contractor with Broward County?

Have you ever failed to complete any work awarded to you? _____

If so, where and why? _____

Has any officer or partner of your organization ever failed to complete a contract handled in his own name? _____

If so, state name of individual, name of owner, and reason thereof:

In what other lines of business are you financially interested or engaged?

Give references as to experience, ability and financial standing:

What equipment do you own that is available for the proposed work and where is it located?

Financial Statement: _____

END OF SECTION

SECTION 00410

BID BOND

STATE OF FLORIDA)
 : ss
COUNTY OF BROWARD)

KNOW ALL MEN BY THESE PRESENTS, that _____ as Principal, and _____, as Surety, a Corporation chartered and existing under the laws of the State of _____, with its principal offices in the City of _____, and authorized to do business in the State of Florida are held and firmly bound unto the Owner, _____ in the penal sum of _____ Dollars (\$ _____) or 5% of bid amount lawful money of the United States, for the payment of which sum will and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal has submitted the accompanying bid, dated _____, 20____, for:

Project Description _____

Project No: _____

NOW, THEREFORE:

- A. If the principal shall not withdraw said bid within sixty (60) days after date of opening of the same, and shall within ten (10) days after the prescribed forms are presented to him for signature, enter into a written contract with the Owner in accordance with the bid as accepted, and give bonds with good and sufficient surety or sureties, as may be required, for the faithful performance and proper fulfillment of such contract, then the above obligations shall be void and of no effect, otherwise to remain in full force and effect.
- B. In the event of the withdrawal of said bid within the period specified, or the failure to enter into such contract and give such bonds within the time specified, if the principal shall pay the Owner the difference between the amount specified in said bid and the amount for which the Owner may procure the required work and supplies, if the latter amount be in excess of the former, then the above obligations shall be void and of no effect, otherwise to remain in full force and effect.

IN WITNESS WHEREOF, the above bounded parties have executed this instrument under their several seals, this day of _____, A.D., 20____, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

WITNESSES: (If Sole Ownership or Partnership, two (2) witnesses required).
(If Corporation, Secretary Only will attest and affix seal).

WITNESSES:

PRINCIPAL:

Name of Firm

Signature of Authorized (Affix Seal)

Title

Business Address

City, State & Zip Code

SURETY:

Corporate Surety

Attorney-in-Fact (Affix Seal)

Business Address

City, State & Zip Code

Name of Local Insurance Agency

END OF SECTION

SECTION 00500

CONTRACT AGREEMENT

CONTRACT AGREEMENT

THIS IS AN AGREEMENT, dated the ___ day of _____, 20___, between:

CITY OF WEST PARK
a Florida municipal corporation, hereinafter "CITY,"

and

_____ a for profit corporation, authorized to do business in the State of Florida, hereinafter "CONTRACTOR."

WITNESSETH:

In consideration of the mutual terms and condition, promises, covenants, and payments hereinafter set forth, CITY and CONTRACTOR agree as follows:

ARTICLE 1
PREAMBLE

In order to establish the background, context and form of reference for this Agreement and to generally express the objectives, and intentions, of the respective parties herein, the following statements, representations and explanations shall be accepted as predicates for the undertakings and commitments included within the provisions which follow and may be relied upon by the parties as essential elements of the mutual considerations upon which this Agreement is based.

1.1 CITY is in need of an independent contractor to perform work related to site improvements for the Countyline Road Improvement- Phase 1 project within the City of West Park.

1.2 CITY requested sealed bids from qualified licensed contractors for the Countyline Road Improvement- Phase 1 project through IFB No: 23-0811; and

ARTICLE 2
SCOPE OF WORK

2.1 The CONTRACTOR shall furnish all of the materials, tools, supplies, and labor necessary to perform all of the work described in the Invitation for Bid - IFB No: 23-0811 - Countyline Road Improvement- Phase 1, a copy of which is attached hereto and specifically made a part of this Agreement as Exhibit "A" and in the Bid Response

("Bid") from CONTRACTOR, dated _____, a copy of which is attached hereto and specifically made a part of this Agreement as Exhibit "B".

2.2 CONTRACTOR hereby represents to CITY, with full knowledge that CITY is relying upon these representations when entering into this Agreement with CONTRACTOR, that CONTRACTOR has the professional expertise, experience and manpower to perform the services to be provided by CONTRACTOR pursuant to the terms of this Agreement.

2.3 CONTRACTOR assumes professional and technical responsibility for performance of its services to be provided hereunder in accordance with applicable recognized professional standards. If within twelve (12) months following completion of its services, such services fail to meet the aforesaid standards, and the CITY promptly advises CONTRACTOR thereof in writing, CONTRACTOR agrees to re-perform such deficient services without charge to the CITY.

2.4 None of the work or services under this contract shall be subcontracted beyond that shown on List of Major Sub-Contractors submitted to the CITY by CONTRACTOR, unless CONTRACTOR obtains prior written consent from the CITY. Approved subcontractors shall be subject to each provision of this contract and CONTRACTOR shall be responsible and indemnify the CITY for all subcontractors' acts, errors or omissions.

ARTICLE 3 TIME FOR COMPLETION AND LIQUIDATED DAMAGES

3.1 The CONTRACTOR shall commence work as directed by CITY and in accordance with a project timeline to be provided to CONTRACTOR by the CITY. CONTRACTOR shall complete all work in a timely manner, but no later than **60 calendar days from the date of NTP**, as directed by CITY and as stated in Exhibit "A" to this Agreement.

3.2 It is mutually agreed that time is of the essence of this Contract and should the CONTRACTOR fail to complete the work within the specified time, or any authorized extension thereof, there shall be deducted from the compensation otherwise to be paid to the CONTRACTOR, and the CITY will retain as liquidated damages the amount of Two Thousand Five Hundred Dollars (\$2,500.00) **per calendar day** for each calendar day elapsing beyond the specified time for completion or any authorized extension thereof, which sum shall represent the actual damages which the CITY will have sustained by failure of the CONTRACTOR to complete the work within the specified time. It is further agreed that said sum is not penalty, but is the stipulated amount of damage sustained by the CITY in the event of such default by the CONTRACTOR.

5.2 Certificates of insurance, reflecting evidence of the required insurance, shall be filed with the City prior to the commencement of the work. These Certificates shall contain a provision that coverage afforded under these policies will not be canceled until at least thirty (30) days prior written notice has been given to the CITY. Policies shall be issued by companies authorized to do business under the laws of the State of Florida.

5.3 Financial Ratings must be no less than "A" in the latest edition of "Bests Key Rating Guide", published by A.M. Best Guide.

5.4 Insurance shall be in force until all work required to be performed under the terms of the Contract is satisfactorily completed as evidenced by the formal acceptance by the CITY. In the event the insurance certificate provided indicates that the insurance shall terminate and lapse during the period of this contract, then in that event, the CONTRACTOR shall furnish, at least thirty (30) days prior to the expiration of the date of such insurance, a renewed certificate of insurance as proof that equal and like coverage for the balance of the period of the contract and extension thereunder is in effect. The CONTRACTOR shall not continue to work pursuant to this contract unless all required insurance remains in full force and effect.

5.5 Comprehensive General Liability insurance to cover liability bodily injury and property damage. Exposures to be covered are premises, operations, products/completed operations, and certain contracts. Coverage must be written on an occurrence basis, with the following limits of liability:

- a) Workers' Compensation Insurance - as required by law;
- b) Employer's Liability Insurance - \$500,000 per occurrence;
- c) Automobile Liability Insurance - \$500,000 per occurrence, \$500,000 per Accident for bodily injury and \$500,000 per accident for property damage.

5.6 The CONTRACTOR shall hold the CITY, its agents, and employees, harmless on account of claims for damages to persons, property or premises arising out of the operations to complete this Agreement and name the CITY as an additional insured under their policy.

5.7 The CITY reserves the right to require any other insurance coverage it deems necessary depending upon the exposures.

ARTICLE 6 PROTECTION OF PROPERTY

6.1 At all times during the performance of this Contract, the CONTRACTOR shall protect the CITY's property and properties adjoining the Project site from all damage whatsoever on account of the work being carried on pursuant to this Agreement.

ARTICLE 7
CONTRACTOR'S INDEMNIFICATION

7.1 The CONTRACTOR agrees to release the CITY from and against any and all liability and responsibility in connection with the above-mentioned matters. The CONTRACTOR further agrees not to sue or seek any money or damages from CITY in connection with the above-mentioned matters.

7.2 The CONTRACTOR agrees to indemnify and hold harmless the CITY, its trustees, elected and appointed officers, agents, servants and employees, from and against any and all claims, demands, or causes of action of whatsoever kind or nature, and the resulting losses, costs, expenses, reasonable attorneys' fees, liabilities, damages, orders, judgments, or decrees, sustained by the CITY or any third party arising out of, or by reason of, or resulting from the CONTRACTOR's negligent acts, errors, or omissions.

7.3 If a court of competent jurisdiction holds the City liable for certain, tortuous acts of its agents, officers, or employees, such liability shall be limited to the extent and limit provided in 768.28, Florida Statutes. This provision shall not be construed as a waiver of any right or defense that the City may possess. The City specifically reserves all rights as against any and all claims that may be brought.

ARTICLE 8
INDEPENDENT CONTRACTOR

8.1 This Agreement does not create an employee/employer relationship between the parties. It is the intent of the parties that the CONTRACTOR is an independent contractor under this Agreement and not the CITY's employee for all purposes, including but not limited to, the application of the Fair Labor Standards Act minimum wage and overtime payments, Federal Insurance Contribution Act, the Social Security Act, the Federal Unemployment Tax Act, the provisions of the Internal Revenue Code, the State Workers Compensation Act, and the State unemployment insurance law. The CONTRACTOR shall retain sole and absolute discretion in the judgment of the manner and means of carrying out the CONTRACTOR's activities and responsibilities hereunder provided. This Agreement shall not be construed as creating any joint employment relationship between the CONTRACTOR and the CITY and the CITY will not be liable for any obligation incurred by CONTRACTOR, including but not limited to unpaid minimum wages and/or overtime premiums.

ARTICLE 9
PERFORMANCE BOND

9.1 A performance bond shall be required for this Agreement in the amount of 110% of the total construction cost.

ARTICLE 10
CHANGES TO SCOPE OF WORK AND ADDITIONAL WORK

10.1 CITY or CONTRACTOR may request changes that would increase decrease or otherwise modify the Scope of Services/Basic Services to be provided under this Agreement as described in Article 2 of this Agreement. Such changes or additional services must be in accordance with the provisions of the Code of Ordinances of the CITY and must be contained in a written amendment, executed by the parties hereto, with the same formality and with equality and dignity prior to any deviation from the terms of this Agreement, including the initiation of any additional or extra work. Each amendment shall at a minimum include the following information on each project:

PROJECT NAME
PROJECT DESCRIPTION
ESTIMATED PROJECT COST
ESTIMATED COST FOR ADDITION OR CHANGE TO PROJECT CONTRACT
ESTIMATED PROJECT COMPLETION DATE

10.2 In no event will the CONTRACTOR be compensated for any work, which has not been described in a separate written agreement executed by the parties hereto.

ARTICLE 11
TERM AND TERMINATION

11.1 This Agreement may be terminated by either party for cause, or the CITY for convenience, upon thirty (30) days written notice by the CITY to CONTRACTOR in which event the CONTRACTOR shall be paid its compensation for services performed to termination date. In the event that the CONTRACTOR abandons this Agreement or causes it to be terminated, he shall indemnify the CITY against any loss pertaining to this termination up to a maximum of the full contracted fee amount. All finished or unfinished documents, data, studies, plans, surveys, and reports prepared by CONTRACTOR shall become the property of CITY and shall be delivered by CONTRACTOR to CITY.

11.2 This Agreement shall take effect as of the date of execution as shown herein below and continue for such time as is contemplated by the CITY.

ARTICLE 12
CONTRACT DOCUMENTS

12.1 CONTRACTOR and CITY hereby agree that the following Specification and Contract Documents, which are attached hereto and made a part thereof, are fully incorporated herein and made a part of this Agreement, as if written herein word for word: this Agreement; Invitation for Bid - IFB No: 23-0811 - Countyline Road Improvement- Phase 1, as set forth in and made a part of this Agreement as Exhibit "A"; CONTRACTOR's Bid in response to IFB No. 23-0811, as set forth and made a part of this Agreement as Exhibit "B"; and all other exhibits thereto.

ARTICLE 13
MISCELLANEOUS

13.1 Legal Representation. It is acknowledged that each party to this Agreement had the opportunity to be represented by counsel in the preparation of this Agreement and, accordingly, the rule that a contract shall be interpreted strictly against the party preparing same shall not apply due to the joint contribution of both parties.

13.2 Assignments. This Agreement, or any interest herein, shall not be assigned, transferred or otherwise encumbered, under any circumstances, by CONTRACTOR without the prior written consent of CITY; provided however, that claims for money by the CONTRACTOR from the CITY under this contract may be assigned, transferred or pledged to a bank, trust company, or other financial institution without the CITY's approval. Written notice of any assignment, transfer or pledge of funds shall be furnished within ten (10) days by the CONTRACTOR to the CITY. For purposes of this Agreement, any change of ownership of CONTRACTOR shall constitute an assignment, which requires CITY approval. However, this Agreement shall run to the CITY and its successors and assigns.

13.3 Records. CONTRACTOR shall keep books and records and require any and all subcontractors to keep books and records as may be necessary in order to record complete and correct entries as to personnel hours charged to this engagement, and any expenses for which CONTRACTOR expects to be reimbursed, if applicable. Such books and records will be available at all reasonable times for examination and audit by CITY and shall be kept for a period of three (3) years after the completion of all work to be performed pursuant to this Agreement. Incomplete or incorrect entries in such books and records will be grounds for disallowance by CITY of any fees or expenses based upon such entries.

13.4 Ownership of Documents. Reports, surveys, plans, studies and other data provided in connection with this Agreement are and shall remain the property of City.

13.5 No Contingent Fees. CONTRACTOR warrants that it has not employed or retained any company or person, other than a bona fide employee working solely for

the CONTRACTOR, to solicit or secure this Agreement, and that it has not paid or agreed to pay any person, company, corporation, individual or firm, other than a bona fide employee working solely for CONTRACTOR, any fee, commission, percentage, gift, or other consideration contingent upon or resulting from the award or making of this Agreement. For the breach or violation of this provision, the CITY shall have the right to terminate the Agreement without liability at its discretion, to deduct from the contract price, or otherwise recover the full amount of such fee, commission, percentage, gift or consideration.

13.6 Notice. Whenever any party desires to give notice unto any other party, it must be given by written notice, sent by registered United States mail, with return receipt requested, addressed to the party for whom it is intended and the remaining party, at the places last specified, and the places for giving of notice shall remain such until they shall have been changed by written notice in compliance with the provisions of this section. For the present, the CONTRACTOR and the CITY designate the following as the respective places for giving of notice:

CITY: W. Ajibola Balogun, City Administrator
 City of West Park
 1965 S. State Road 7
 West Park, Florida 33023

Copy To: Burnadette Norris-Weeks, City Attorney
 Burnadette Norris-Weeks, P.A.
 401 North Avenue of the Arts
 Fort Lauderdale, Florida 33311

CONTRACTOR:

13.7 Binding Authority. Each person signing this Agreement on behalf of either party individually warrants that he or she has full legal power to execute this Agreement on behalf of the party for whom he or she is signing, and to bind and obligate such party with respect to all provisions contained in this Agreement.

13.8 Exhibits. Each Exhibit referred to in this Agreement forms an essential part of this Agreement. The exhibits if not physically attached should be treated as part of this Agreement and are incorporated herein by reference.

13.9 Headings. Headings herein are for convenience of reference only and shall not be considered on any interpretation of this Agreement.

13.10 Severability. If any provision of this Agreement or application thereof to any

person or situation shall, to any extent, be held invalid or unenforceable, the remainder of this Agreement, and the application of such provisions to persons or situations other than those as to which it shall have been held invalid or unenforceable shall not be affected thereby, and shall continue in full force and effect, and be enforced to the fullest extent permitted by law.

13.11 Governing Law. This Agreement shall be governed by the laws of the State of Florida with venue lying in Broward County, Florida.

13.12 Disputes. Any claim, objection, or dispute arising out of the terms of this Agreement shall be litigated in the Seventeenth Judicial Circuit Court in and for Broward County.

13.13 Attorney's Fees. To the extent authorized by law, in the event that either party brings suit for enforcement of this Agreement, the prevailing party shall be entitled to attorney's fees and court costs in addition to any other remedy afforded by law.

13.14 Extent of Agreement. This Agreement together with Contract Documents, attached as an Exhibit hereto, as amended herein above represents the entire and integrated agreement between the CITY and the CONTRACTOR and supersedes all prior negotiations, representations or agreements, either written or oral.

13.15 Waiver. Failure of the CITY to insist upon strict performance of any provision or condition of this Agreement, or to execute any right there in contained, shall not be construed as a waiver or relinquishment for the future of any such provision, condition, or right, but the same shall remain in full force and effect.

(This space intentionally left blank)

IN WITNESS OF THE FOREGOING, the parties have set their hands and seals the day and year first written above.

CITY OF WEST PARK

ATTEST:

Alexandra Grant, City Clerk

BY: _____
Felicia Brunson., Mayor

APPROVED AS TO FORM

Burnadette Norris-Weeks, City Attorney

W. Ajibola Balogun, City
Administrator

CONTRACTOR

WITNESSES:

BY: _____

ATTEST:

SECRETARY

STATE OF FLORIDA)
)SS:
COUNTY OF BROWARD)

BEFORE ME, an officer duly authorized by law to administer oaths and take acknowledgments, personally appeared _____ as _____, of _____, a Florida corporation, and acknowledged executed the foregoing Agreement as the proper official of _____, for the use and purposes mentioned in it and affixed the official seal of the corporation, and that the instrument is the act and deed of that corporation.

IN WITNESS OF THE FOREGOING, I have set my hand and official seal at in the State and County aforesaid on this __ day of _____, 2023.

NOTARY PUBLIC

My Commission Expires:

See attached document for Exhibit "A"

Invitation for Bid - IFB No: 23-0811
(Countyline Road Improvement- Phase 1)

(This space intentionally left blank)

See attached document for Exhibit "B"

(Contractor's Bid in Response to IFB _____ - Dated _____, 2023)

(This space intentionally left blank)

SECTION 00610

PERFORMANCE BOND

STATE OF FLORIDA)
 : ss
COUNTY OF BROWARD)

KNOW ALL MEN BY THESE PRESENTS, that _____ as Principal, hereinafter called Contractor, and _____, as Surety, hereinafter called Surety, are held in firmly bound unto the City of West Park, as Obligee hereinafter called Owner, in the amount of _____ Dollars (\$ _____) for the payment whereof Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, contractor has by written agreement dated _____, 20____, entered into Contract with Owner for:

Project Description _____
City's Project No.: _____

In accordance with Drawings and Specifications prepared by _____ which Contract is by reference made a part hereof and is hereinafter referred to as the Contract.

NOW, THEREFORE, THE CONDITIONS OF THIS OBLIGATION ARE SUCH, that, if the Principal shall in all respects promptly and faithfully perform and comply with the terms and conditions of said Contract and his obligations thereunder and shall indemnify the Owner and the Consulting Engineer and save either or all of them harmless against and from all costs, expenses and damages arising from the performance of said Contract or the repair of any work thereunder, then this obligation shall be void; otherwise, this Bond shall remain in full force and effect, in accordance with the following terms and conditions:

- A. The Principal and Surety jointly and severally agree to pay the Owner any difference between the sum of which the said Principal would be entitled on the completion of the Contract, and that sum which the Owner may be obliged to pay for the completion of said work by Contractor or otherwise, and any damages, direct or indirect or consequential,

which the said Owner may sustain on account of such work, or on account of the failure of said Contractor to property and in all things, keep and excuse all of the provision of said Contract.

- B. And this Bond shall remain in full force and effect for a period of one (1) year from the date of acceptance of the project by the Owner and shall provide that the Contractor guarantees to repair or replace for said period of one (1) year all work performed and materials and equipment furnished that were not performed or furnished according to the terms of the Contract, and shall make good, defects thereof which have become apparent before the expiration of said period of one (1) year. If any part of the project, in the judgment of the Owner, for the reasons above stated needs to be replaced, repaired or made good during that time, the Owner shall notify the Contractor in writing. If the Contractor refuses or neglects to do such work within five (5) days from the date of service of such Notice, the Owner shall have the work done by others and the cost thereof shall be paid by the Contractor or his Surety.
- C. And the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder or the specifications accompanying the same shall in any way affects its obligations on this board, and it does hereby waive Notice of any change, extension of time, alteration or addition to the terms of the Contract or to the work or to the Specifications.
- D. The Surety represents and warrants to the Owner that they have a Best's Key Rating Guide General Policyholder's Rating of "_____" and Financial Category of "Class_____."

IN WITNESS WHEREOF, the above bounded parties have executed this instrument under their several seals, this ____ day of _____, A.D., 20____, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

WITNESSES: (If Sole Ownership or Partnership, two (2) witnesses required).
(If Corporation, Secretary Only will attest and affix seal).

WITNESSES:

PRINCIPAL:

Signature of Authorized Officer (Affix Seal)

Title

Business Address

City, State & Zip Code

WITNESSES:

SURETY:

Corporate Surety

Title

Business Address

City, State & Zip Code

Name of Local Insurance Agency

END OF SECTION

CERTIFICATES AS TO CORPORATE PRINCIPAL

I, _____, certify that I am the Secretary of the Corporation named as Principal in the within Bond; that _____ who signed the said bond on behalf of the Principal, was then _____ of said Corporation; that I know his signature, and his signature hereto is genuine; and that said bond was duly signed, sealed, and attested for and on behalf of said Corporation by authority of its governing body.

Secretary (Corporate Seal)

STATE OF FLORIDA)
 : ss
COUNTY OF BROWARD)

Before me, a Notary Public, duly commissioned, qualified and acting, personally appeared _____ to me well known, who being by me first duly sworn upon oath, says that he is the Attorney-in-Fact, for the _____ and that he has been authorized by _____ to execute the foregoing bond on behalf of the Contractor named therein in favor of the City of West Park, Florida.

Sworn and subscribed to before me this _____ day of _____, 20__ A.D.
(Attach Power of Attorney)

Notary Public – State of Florida At Large
My Commission Expires:

END OF SECTION

SECTION 00620

PAYMENT BOND

STATE OF FLORIDA)
 : ss
COUNTY OF BROWARD)

KNOW ALL MEN BY THESE PRESENTS, that _____
as Principal, hereinafter called Contractor, and _____, as Surety,
hereinafter called Surety, are held and firmly bound unto the CITY OF WEST PARK, as Obligee,
hereinafter called Owner, in the amount of _____ Dollars (\$ _____) for the
payment whereof Contractor and Surety bind themselves, their heirs, executors, administrators, successors
and assigns, jointly and severally, firmly by these presents.

WHEREAS, contractor has by written agreement dated _____, 20____,
entered into a Contract with Owner for:

Project Description: _____
City's Project No.: _____

In accordance with Drawings and Specifications prepared by _____, which Contract
is by reference made a part hereof and is hereinafter referred to as the Contract.

NOW, THEREFORE, THE CONDITIONS OF THIS OBLIGATION ARE SUCH, that, if
the Principal shall promptly make payment to all claimants, as herein below defined, then this obligation
shall be void; otherwise, this Bond shall remain in full force and effect, subject to the following terms and
conditions:

- A. A claimant is defined as any person supplying the Principal with labor, material and supplies, used directly or indirectly by the said Principal or any subcontractor in the prosecution of the work provided for in said Contract, and is further defined in Section 255.05(1) of the Florida Statutes.
- B. The above named Principal and Surety hereby jointly and severally agree with the Owner that every claimant as herein defined, who has not been paid in full before the expiration of a period of ninety (90) days after performance of the labor or after complete delivery of materials and supplies by such claimant, may sue on this Bond for the use of such claimant, prosecute the suit to final judgment for such sum or sums as may be justly due

claimant, and have execution thereon. The Owner shall not be liable for the payment of any costs or expenses of any such suit.

C. No suit or action shall be commenced hereunder by any claimant:

1. Unless claimant, other than one having a direct contract with the Principal, shall within forty-five (45) days after beginning to furnish labor, materials or supplies for the prosecution of the work, furnish the Principal with a notice that he intends to look to this bond for protection.
2. Unless claimant, other than one having a direct contract with the Principal, shall within ninety (90) days after such claimant's performance of the labor or complete delivery of materials and supplies, deliver to the Principal written notice of the performance of such labor or delivery of such material and supplies and the nonpayment therefore.
3. After the expiration of one (1) year from the performance of the labor or completion of delivery of the materials and supplies; it being understood, however, that if any limitation embodied in this Bond is prohibited by any law controlling the construction hereof such limitations shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.
4. Other than in a state court of competent jurisdiction in and for the county or other political subdivision of the state in which the project, or any part thereof, is situated, or in the United States District Court for the district in which the project, or any part thereof, is situated, and not elsewhere.

A. The Principal and the Surety jointly and severally, shall repay the Owner any sum which the Owner may be compelled to pay because of any lien for labor or materials furnished for any work included in or provided by said Contract.

B. The Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration of or addition to the terms of the Contract or to the work to be performed thereunder or the Specifications applicable thereto shall in any way affect its obligations on this Bond, and the Surety hereby waives notice of any such change, extension of time, alterations of or addition to the terms of the Contract, or to the work or to the Specifications.

C. The Surety represents and warrants to the Owner that they have a Best's Key Rating Guide General Policyholder's Rating of "_____ " and Financial Category of "Class_____."

IN WITNESS WHEREOF, the above bounded parties have executed this instrument under their several seals, this _____ day of _____, A.D., 20____, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

WITNESSES: (If Sole Ownership or Partnership, two (2) witnesses required).
(If Corporation, Secretary Only will attest and affix seal).

WITNESSES:

PRINCIPAL:

Signature of Authorized Officer (Affix Seal)

Title

Business Address

City, State & Zip Code

WITNESSES:

SURETY:

Corporate Surety

Title

Business Address

City, State & Zip Code

Name of Local Insurance Agency

END OF SECTION

SECTION 00650

CERTIFICATE OF INSURANCE

(Sample)

THIS IS TO CERTIFY THAT THE _____
(Insurance Company)

Address _____

of _____

has issued policies of insurance, as described below and identified by a policy number, to the insured named below; and to certify that such policies are in full force and effect at this time. It is agreed that none of these policies will be canceled or changed so as to affect the interest(s) of the City of West Park (hereinafter sometimes called the Owner) until thirty (30) days after written notice of such cancellation or change has been delivered to the Engineer: _____

Insured _____

Address _____

Status of Insured: _____ Corporation _____ Partnership _____ Individual

Location of Operations Insured _____

Description of Work:

Project Description: _____
City's Project No.: _____

INSURANCE POLICIES IN FORCE:

Forms of Coverage	Policy Number	Exp. Date
*Workers' Comp./Employer's Liability	_____	_____
+Comprehensive Automobile Liability	_____	_____
°Comprehensive General Liability	_____	_____
+Excess Liability	_____	_____
Other (Please specify type: _____)	_____	_____

POLICY INCLUDES COVERAGE FOR:

YES

NO

- | | | | |
|----|---|-------|-------|
| 1. | Additional Insured: Owner & Engineer | _____ | _____ |
| 2. | *Liability under the United States Longshoremen's and Harbor Workers' Compensation Act. | _____ | _____ |
| 3. | +All owned, hired, or non-owner automotive equipment used in connection with work done for the Owner. | _____ | _____ |
| 4. | Contractual Liability | _____ | _____ |
| 5. | Damage caused by explosion, collapse or structural injury, and damage to underground utilities. | _____ | _____ |
| 6. | Products/Completed Operations | _____ | _____ |
| 7. | Owners and Contractors Protective Liability | _____ | _____ |
| 8. | Personal Injury Liability | _____ | _____ |
| 9. | +Excess Liability applies excess of: | _____ | _____ |
| | (a) Employers Liability | _____ | _____ |
| | (b) Comprehensive General Liability | _____ | _____ |
| | (c) Comprehensive Automobile Liability | _____ | _____ |

TYPES OF POLICY FORMS OF COVERAGE LIMITS OF LIABILITY

Workers' Compensation	Bodily Injury	\$	Statutory
Employers Liability	Bodily Injury	\$ _____	Each Accident
	Disease	\$ _____	Each Person
	Disease	\$ _____	Policy Limit
Comprehensive Auto Liability	Combined Single Limit BI/PD	\$ _____	Each Accident
Comprehensive General Liability	Bodily Injury	\$ _____	Each Occurrence
		\$ _____	Aggregate
	Property Damage	\$ _____	Each Occurrence

OR

\$ _____ Aggregate

Combined Single
Limit BI/PD

\$ _____ Each Occurrence

\$ _____ Aggregate

Excess Liability

Combined Single

Limit BI/PD

\$ _____ Aggregate

Other

The Insurance Company hereby agrees to deliver, within ten (10) days, two (2) copies of the above policies to the Engineer when so requested.

NOTE: Entries on this certificate are limited to the Authorized Agent or Insurance Company Representative.

Date _____

(SEAL) _____

Insurance Company

Issued at _____

Authorized Representative

Insurance Agent or Company

-Send original to:

-Send two (2) copies to:

Attention: _____, Principal in Charge

**City of West Park
City Clerk's Office
1965 South State Road 7
West Park, Florida 33023**

Attention: W. Ajibola Balogun, City Manager

END OF SECTION

SECTION 00660

ACKNOWLEDEMENT OF CONFORMANCE WITH OSHA

TO THE CITY OF WEST PARK:

We, _____, hereby acknowledge and agree that as Contractors for the construction of _____, Engineer's Project _____, within the limits of the City of West Park, Florida, that we have the sole responsibility for compliance with all the requirements of the Federal Occupational Safety and Health Act of 1970, and all State and Local Safety and Health regulations, and agree to indemnify and hold harmless the City of West Park and its Consulting Engineers against any and all legal liability or loss the City or the Engineer may incur due to _____ failure to comply with such act.

ATTEST

CONTRACTOR

BY: _____
NAME

ATTEST

DATE

END OF SECTION

SECTION 00665

TRENCH SAFETY ACT COMPLIANCE

Bidder acknowledges that the Florida Trench Safety Act, Section 553.60 et seq., which became effective October 1, 1990, shall be in effect during the period of construction for the project. The Bidder, by signing and submitting the bids, in writing, assuring that it will perform any trench excavation in accordance with applicable trench safety standards. The bidder further identifies the following separate item costs of compliance with the applicable trench safety standards as well as the methods of compliance:

Methods of Compliance

(fill in methods)

Total \$ _____

Bidder acknowledges that this cost is included in the applicable items of the Proposal and in the Grand Total Bid Price. Failure to complete the above will result in the bid being declared non-responsive.

The Bidder is, and the Owner and Engineer are not, responsible to review or assess Bidder's safety precautions, programs or costs, or the means, methods, techniques or technique adequacy, reasonable of cost, sequences or procedures of any safety precaution, program or cost, including but not limited to, compliance with any and all requirements of Florida Statute Section 553.60 et seq. cited as the "Trench Safety Act". Bidder is, and the Owner and Engineer are not, responsible to determine of any safety or safety related standards apply to the project, including but not limited tom the "Trench Safety Act".

Signature of Authorized Representative (Manual)

Name of Authorized Representative (Typed or Printed)

Sworn to and subscribed before me in the Sate and County first mentioned above of the _____ day of _____, 20____.

(affix seal)
Notary Public

My Commission Expires:

END OF SECTION

SECTION 00700

GENERAL CONDITIONS

ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.1 Defined Terms

- A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.
 3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Asbestos*—Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
 5. *Bid*—The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 6. *Bidder*—The individual or entity who submits a Bid directly to Owner.
 7. *Bidding Documents*—The Bidding Requirements and the proposed Contract Documents (including all Addenda).
 8. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.
 9. *Change Order*—A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.

10. *Claim*—A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
11. *Contract*—The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.
12. *Contract Documents*—Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.
13. *Contract Price*—The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).
14. *Contract Times*—The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any; (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer’s written recommendation of final payment.
15. *Contractor*—The individual or entity with whom Owner has entered into the Agreement.
16. *Cost of the Work*—See Paragraph 11.01 for definition.
17. *Drawings*—That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.
18. *Effective Date of the Agreement*—The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.
19. *Engineer*—The individual or entity named as such in the Agreement. The term “engineer” used throughout also refers to the architect.
20. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.
21. *General Requirements*—Sections of Division 1 of the Specifications.
22. *Hazardous Environmental Condition*—The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto.

23. *Hazardous Waste*—The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.
24. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
25. *Liens*—Charges, security interests, or encumbrances upon Project funds, real property, or personal property.
26. *Milestone*—A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.
27. *Notice of Award*—The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.
28. *Notice to Proceed*—A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.
29. *Owner*—The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.
30. *PCBs*—Polychlorinated biphenyls.
31. *Petroleum*—Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
32. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
33. *Project*—The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
34. *Project Manual*—The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.
35. *Radioactive Material*—Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

36. *Resident Project Representative*—The authorized representative of Engineer who may be assigned to the Site or any part thereof.
37. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
38. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.
39. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.
40. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
41. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.
42. *Specifications*—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.
43. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.
44. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.
45. *Successful Bidder*—The Bidder submitting a responsive Bid to whom Owner makes an award.
46. *Supplementary Conditions*—That part of the Contract Documents which amends or supplements these General Conditions.
47. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or Subcontractor.

48. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
49. *Unit Price Work*—Work to be paid for on the basis of unit prices.
50. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.
51. *Work Change Directive*—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.2 Terminology

- A. The words and terms discussed in Paragraph 1.02.B through F are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. Intent of Certain Terms or Adjectives:

1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

C. Day:

1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.

D. Defective:

1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - a. does not conform to the Contract Documents; or
 - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

A. Furnish, Install, Perform, Provide:

1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
4. When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, “provide” is implied.

- F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.1 Delivery of Bonds and Evidence of Insurance

- A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.

- B. *Evidence of Insurance*: Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.2 *Copies of Documents*

- A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

2.3 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

2.4 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

2.5 *Before Starting Construction*

- A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:
1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;
 2. a preliminary Schedule of Submittals; and
 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.6 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.7 Initial Acceptance of Schedules

- A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.
 - 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
 - 2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
 - 3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.1 Intent

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner.

C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

3.2 Reference Standards

A. Standards, Specifications, Codes, Laws, and Regulations

1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
2. No provision of any such standard, specification, manual, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.3 Reporting and Resolving Discrepancies

A. Reporting Discrepancies:

1. *Contractor's Review of Contract Documents Before Starting Work:* Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.
2. *Contractor's Review of Contract Documents During Performance of Work:* If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. Resolving Discrepancies:

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:
 - a. the provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.4 Amending and Supplementing Contract Documents

- A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.
- B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:
 1. A Field Order;
 2. Engineer's approval of a Shop Drawing or Sample (subject to the provisions of Paragraph 6.17.D.3); or
 3. Engineer's written interpretation or clarification.

3.5 Reuse of Documents

- A. Contractor and any Subcontractor or Supplier shall not:
 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions; or
 2. reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

3.6 Electronic Data

- A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.
- B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.
- C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

4.1 Availability of Lands

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.
- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.2 Subsurface and Physical Conditions

A. Reports and Drawings: The Supplementary Conditions identify:

1. those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site; and

2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the “technical data” contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such “technical data” is identified in the Supplementary Conditions. Except for such reliance on such “technical data,” Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
1. the completeness of such reports and drawings for Contractor’s purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any “technical data” or any such other data, interpretations, opinions, or information.

4.3 *Differing Subsurface or Physical Conditions*

- A. *Notice:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed either:
1. is of such a nature as to establish that any “technical data” on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or
 2. is of such a nature as to require a change in the Contract Documents; or
 3. differs materially from that shown or indicated in the Contract Documents; or
 4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

- B. *Engineer’s Review:* After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of

Owner's obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer's findings and conclusions.

C. Possible Price and Times Adjustments:

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and
 - b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:
 - a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or
 - b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or
 - c. Contractor failed to give the written notice as required by Paragraph 4.03.A.
3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

4.4 Underground Facilities

- A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data provided by others; and
2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all such information and data;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents;
 - c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and
 - d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. Not Shown or Indicated:

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

4.5 Reference Points

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to

Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.6 Hazardous Environmental Condition at Site

- A. *Reports and Drawings:* The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the “technical data” contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such “technical data” is identified in the Supplementary Conditions. Except for such reliance on such “technical data,” Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
1. the completeness of such reports and drawings for Contractor’s purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
 2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any “technical data” or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.
- D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 4.06.E.

- E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered written notice to Contractor: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.
- F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.
- G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 – BONDS AND INSURANCE

5.1 Performance, Payment, and Other Bonds

- A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.
- B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed each bond.
- C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.2 Licensed Sureties and Insurers

- A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.3 Certificates of Insurance

- A. Contractor shall deliver to Owner, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.
- B. Owner shall deliver to Contractor, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.
- C. Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency

in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.

- D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.
- E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

5.4 Contractor's Insurance

- A. Contractor shall purchase and maintain such insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:
 - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;
 - 2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;
 - 3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;
 - 4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:
 - a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or
 - b. by any other person for any other reason;
 - 5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and
 - 6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.
- B. The policies of insurance required by this Paragraph 5.04 shall:
 - 1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of

each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;
3. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;
4. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);
5. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and
6. include completed operations coverage:
 - a. Such insurance shall remain in effect for two years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

5.5 Owner's Liability Insurance

- A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

5.6 Property Insurance

- A. Unless otherwise provided in the Supplementary Conditions, Owner shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:
 1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee;

2. be written on a Builder's Risk "all-risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.
 3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
 4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;
 5. allow for partial utilization of the Work by Owner;
 6. include testing and startup; and
 7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued.
- B. Owner shall purchase and maintain such equipment breakdown insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.
- C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other loss payee to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.
- D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

- E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under this Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order. Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.

5.7 Waiver of Rights

- A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or loss payees thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for:
 - 1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
 - 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them.

5.8 Receipt and Application of Insurance Proceeds

- A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the loss payees, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.
- B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

5.9 Acceptance of Bonds and Insurance; Option to Replace

- A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 Partial Utilization, Acknowledgment of Property Insurer

- A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES

6.1 Supervision and Superintendence

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances. Superintendent shall communicate clearly in English.

6.2 Labor; Working Hours

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.3 Services, Materials, and Equipment

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.
- B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.4 Progress Schedule

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.

1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.
2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.5 *Substitutes and "Or-Equals"*

A. All substitutions and "or-equal" products shall be submitted only in the bidding phase. If not approved during bidding they will not be reviewed or accepted during construction.

B. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.

1. *"Or-Equal" Items:* If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:

a. in the exercise of reasonable judgment Engineer determines that:

- 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
- 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole; and
- 3) it has a proven record of performance and availability of responsive service.

b. Contractor certifies that, if approved and incorporated into the Work:

- 1) there will be no increase in cost to the Owner or increase in Contract Times; and

2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

2. Substitute Items:

- a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.
- b. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.
- c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances.
- d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
 - 1) shall certify that the proposed substitute item will:
 - a) perform adequately the functions and achieve the results called for by the general design,
 - b) be similar in substance to that specified, and
 - c) be suited to the same use as that specified;
 - 2) will state:
 - a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time,
 - b) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and
 - c) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;
 - 3) will identify:
 - a) all variations of the proposed substitute item from that specified, and

- b) available engineering, sales, maintenance, repair, and replacement services; and
 - 4) shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.
- C. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.
- D. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.
- E. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- F. *Engineer's Cost Reimbursement:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- G. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.6 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.
- B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by

Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

- C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:
1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity; nor
 2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.
- D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.
- E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.
- F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as a loss payee on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) for all losses and damages caused by, arising

out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.7 Patent Fees and Royalties

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

6.8 Permits

- A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.9 Laws and Regulations

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

6.10 Taxes

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

6.11 Use of Site and Other Areas

A. Limitation on Use of Site and Other Areas:

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.
2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.
3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all

court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

- B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.
- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.
- D. *Loading Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 Record Documents

- A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to Engineer for Owner.

6.13 Safety and Protection

- A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:
 - 1. all persons on the Site or who may be affected by the Work;
 - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.
- C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
- D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
- E. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- F. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 Safety Representative

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 Hazard Communication Programs

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

6.16 Emergencies

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor

believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 Shop Drawings and Samples

A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

1. Shop Drawings:

- a. Submit number of copies specified in the General Requirements.
- b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.

2. Samples:

- a. Submit number of Samples specified in the Specifications.
- b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.

B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. Submittal Procedures:

1. Before submitting each Shop Drawing or Sample, Contractor shall have:

- a. reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
- b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

- c. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
 - e. All job specific details and options shall be marked, clearly noted, and highlighted
2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.
 3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. Engineer's Review:

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Shop drawing review shall be a minimum of 14 days.
2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. Resubmittal Procedures:

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals

6.18 Continuing the Work

- A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 Contractor's General Warranty and Guarantee

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 - 1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 - 2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
 - 1. observations by Engineer;
 - 2. recommendation by Engineer or payment by Owner of any progress or final payment;
 - 3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 - 4. use or occupancy of the Work or any part thereof by Owner;
 - 5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;
 - 6. any inspection, test, or approval by others; or
 - 7. any correction of defective Work by Owner.

6.20 Indemnification

- A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and

- against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable .
- B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 Delegation of Professional Design Services

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.
- B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 – OTHER WORK AT THE SITE

7.1 Related Work at Site

- A. Owner may perform other work related to the Project at the Site with Owner's employees, or through other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:
 - 1. written notice thereof will be given to Contractor prior to starting any such other work; and
 - 2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.
- B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.
- C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of

Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

7.2 Coordination

- A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:
 - 1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;
 - 2. the specific matters to be covered by such authority and responsibility will be itemized; and
 - 3. the extent of such authority and responsibilities will be provided.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.3 Legal Relationships

- A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.
- B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's wrongful actions or inactions.
- C. Contractor shall be liable to Owner and any other contractor under direct contract to Owner for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's wrongful action or inactions.

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.1 Communications to Contractor

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

8.2 Replacement of Engineer

- A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.

8.3 Furnish Data

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

8.4 Pay When Due

- A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.5 Lands and Easements; Reports and Tests

- A. Owner's duties with respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

8.6 Insurance

- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.7 Change Orders

- A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.8 Inspections, Tests, and Approvals

- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.9 Limitations on Owner's Responsibilities

- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 Undisclosed Hazardous Environmental Condition

- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 Evidence of Financial Arrangements

- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents.

8.12 Compliance with Safety Program

- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed pursuant to Paragraph 6.13.D.

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

9.1 Owner's Representative

- A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract Documents.

9.2 Visits to Site

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.3 Authorized Variations in Work

- A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

9.4 Rejecting Defective Work

- A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.5 Shop Drawings, Change Orders and Payments

- A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.
- B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.
- C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.
- D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.6 Decisions on Requirements of Contract Documents and Acceptability of Work

- A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.
- B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believes that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.
- C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.
- D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.7 Limitations on Engineer's Authority and Responsibilities

- A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to

Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.

9.8 Compliance with Safety Program

- A. While at the Site, Engineer's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Engineer has been informed pursuant to Paragraph 6.13.D.

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.1 Authorized Changes in the Work

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).
- B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.2 Unauthorized Changes in the Work

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04,

except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.D.

10.3 Execution of Change Orders

- A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:
1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;
 2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and
 3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.4 Notification to Surety

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

10.5 Claims

- A. *Engineer's Decision Required:* All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.
- B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be

accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

- C. *Engineer's Action:* Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:
1. deny the Claim in whole or in part;
 2. approve the Claim; or
 3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.
- D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.
- E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.
- F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.1 Cost of the Work

- A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 11.01.B, and shall include only the following items:
1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise,

and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.
4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
 - c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
 - d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
 - e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
 - f. Losses and damages (and related expenses) caused by damage to the Work, not

compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, express and courier services, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.
2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A.

C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.

D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined

pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.2 Allowances

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. Cash Allowances:

1. Contractor agrees that:

- a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
- b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. Contingency Allowance:

1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.3 Unit Price Work

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.

C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:

1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
2. there is no corresponding adjustment with respect to any other item of Work; and
3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.1 Change of Contract Price

- A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:
 1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or
 2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or
 3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).
- C. *Contractor's Fee:* The Contractor's fee for overhead and profit shall be determined as follows:
 1. a mutually acceptable fixed fee; or
 2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five

- percent;
- c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 12.01.C.2.a and 12.01.C.2.b is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;
 - d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;
 - e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
 - f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.2 Change of Contract Times

- A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.3 Delays

- A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.
- B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

- C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.
- D. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.
- E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.1 Notice of Defects

- A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. Defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.2 Access to Work

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

13.3 Tests and Inspections

- A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.
- B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:
 - 1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;
 - 2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in Paragraph 13.04.C; and
 - 3. as otherwise specifically provided in the Contract Documents.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.
- E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation.
- F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

13.4 Uncovering Work

- A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.
- B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.
- C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation,

inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.

- D. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.5 Owner May Stop the Work

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.6 Correction or Removal of Defective Work

- A. Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).
- B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.7 Correction Period

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
1. repair such defective land or areas; or
 2. correct such defective Work; or

3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

13.8 Acceptance of Defective Work

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and for the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.9 Owner May Correct Defective Work

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer in

- accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct, or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.
- C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.1 Schedule of Values

- A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.2 Progress Payments

A. Applications for Payments:

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and

suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. Review of Applications:

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:
 - a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
 - d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. Payment Becomes Due:

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

D. Reduction in Payment:

1. Owner may refuse to make payment of the full amount recommended by Engineer because:
 - a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;
 - b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge

of such Liens;

- c. there are other items entitling Owner to a set-off against the amount recommended; or
 - d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.
2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor remedies the reasons for such action.
 3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1 and subject to interest as provided in the Agreement.

14.3 Contractor's Warranty of Title

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.4 Substantial Completion

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the tentative certificate to Owner, notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will, within said 14 days, execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion; (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of

responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.

- D. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the tentative list.

14.5 Partial Utilization

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:
1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 14.04.A through D for that part of the Work.
 2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
 3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
 4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.6 Final Inspection

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.7 Final Payment

A. Application for Payment:

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.
2. The final Application for Payment shall be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;
 - b. consent of the surety, if any, to final payment;
 - c. a list of all Claims against Owner that Contractor believes are unsettled; and
 - d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

B. Engineer's Review of Application and Acceptance:

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. Payment Becomes Due:

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

14.8 Final Completion Delayed

- A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.9 Waiver of Claims

- A. The making and acceptance of final payment will constitute:
 1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and
 2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.1 Owner May Suspend Work

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

15.2 Owner May Terminate for Cause

- A. The occurrence of any one or more of the following events will justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);
 2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;
 3. Contractor's repeated disregard of the authority of Engineer; or
 4. Contractor's violation in any substantial way of any provisions of the Contract Documents.
- B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:
1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);
 2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere; and
 3. complete the Work as Owner may deem expedient.
- C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

- D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.
- E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.
- F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B and 15.02.C.

15.3 Owner May Terminate For Convenience

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;
 - 3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and
 - 4. reasonable expenses directly attributable to termination.
- B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.4 Contractor May Stop Work or Terminate

- A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.

- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 – DISPUTE RESOLUTION

16.1 Methods and Procedures

- A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.
- B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.
- C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:
1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions; or
 2. agrees with the other party to submit the Claim to another dispute resolution process; or
 3. gives written notice to the other party of the intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 – MISCELLANEOUS

17.1 Giving Notice

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended; or
2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.2 Computation of Times

- A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.3 Cumulative Remedies

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.4 Survival of Obligations

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

17.5 Controlling Law

- A. This Contract is to be governed by the law of the state in which the Project is located.

17.6 Headings

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

END OF SECTION

SECTION 00800

SUPPLEMENTARY CONDITIONS

1. DEFINITIONS

Add the following:

The term(s) "**or equal**" or "**approved equal**," shall be interpreted to mean an item or material or equipment similar to that named and which is suited to the same use and capable of performing the same function and be of the same quality as that named. Such material or equipment shall be subject to approval by the Engineer.

The term **Acceptance**, shall be interpreted to mean that the OWNER of the work is satisfied that it is fully complete and in accordance with the Contract Documents.

The term **Affidavit**, shall be interpreted as the instrument which is to be signed by the Contractor and submitted to the OWNER through the Engineer, upon completion of that job, showing that all bills have been paid. It shall also mean such instrument that may be requested by the OWNER incident to partial payments.

The term **Approval** shall be interpreted as the item in question is accepted as satisfactory.

The term **Article**, shall be interpreted as the prime subdivision of a section of these or any other Specifications, the instructions to Bidders, the Special Conditions and the General Conditions.

The term "**Provided**," as used in the Specifications upon the Drawings, shall be understood to mean "provided complete in place," that is, "furnished and installed." Where "as shown," "as indicated," "as detailed," or words of similar importance are used, it shall be understood that the references to the Drawings and/or Specifications accompanying these documents are intended unless otherwise expressly stated.

The words "**furnish**," "**furnish and**," "**install**," and "**provide**" or words with similar meaning shall be interpreted unless otherwise specifically stated, to mean "furnish and install complete in place and ready for service."

2. AWARD OF CONTRACT

The award of the contract, if it is awarded, will be to the lowest responsible, responsive Bidder. No Notice of Award will be given until the OWNER has concluded such investigations as he deems necessary to establish the responsibility, qualifications and financial ability of the Bidders to do the Work in accordance with the Contract Documents to the satisfaction of the OWNER within the time prescribed. The OWNER reserves the right to reject the Bid of any Bidder who does not pass such investigation to the OWNER's satisfaction. In analyzing Bids, the OWNER may take into consideration alternates and unit prices, if requested by the Bid forms. If the Contract is awarded, the OWNER will issue the Notice of Award and give the successful Bidder a contract for execution within one hundred and twenty (120) days after the opening of Bids.

3. FORFEITURE OF BID SECURITY

Failure of the successful Bidder to execute and deliver the Agreement and deliver the required Bonds to the OWNER within 10 working days or 15 calendar days of receipt of the Agreement from the Owner, shall be just cause for the OWNER to annul the Notice of Award and declare the Bid and any security therefore forfeited.

4. QUALIFICATION OF SUB CONTRACTORS METERIALMEN AND SUPPLIERS

Within ten working days after bid opening, the CONTRACTOR will submit to the OWNER and the ENGINEER for acceptance a list of the names of sub contractors and such other persons and organizations (including those who are to furnish principal items of materials or equipment) proposed for those portions of the work as to which the identity of the subcontractors and other persons and organizations must be submitted as specified in the Contract Documents. Within thirty working days after receiving the list, the ENGINEER will notify the CONTRACTOR in writing if either the OWNER or the ENGINEER, after due investigation, has reasonable objection to any subcontractor, person or organization on such list. The failure of the OWNER or the ENGINEER to make objection to any subcontractor, person or organization on the list within thirty days of receipt shall constitute an acceptance of such subcontractor, person or organization. Acceptance of any such subcontractor, person or organization shall not constitute a waiver of any right of the OWNER or the ENGINEER to reject defective work, material or equipment or work material or equipment not in conformance with the requirements of the contract documents.

5. DELIVERY OF BONDS

Add to paragraph 2.1

Failure of the successful Bidder to execute the Agreement and deliver the required Bonds within ten (10) days of the Notice of Award shall be just cause for the Owner to annul the award and declare the Bid and any guarantee thereof forfeited.

6. COPIES OF DOCUMENTS

Add the following to paragraph 2.2

The Contractor will be furnished, free of charge, up to five (5) copies of the drawings and specifications in lieu of the ten (10) copies as stated.

7. CHANGE OF THE CONTRACT TIME

Add paragraph 12.4

Because this is a calendar day contract, normal rainfall, weather and climatic conditions, which may be reasonably expected, are not considered grounds for an extension of contract time.

8. PAYMENTS TO CONTRACTOR AND COMPLETION

Add the following to paragraph 14.13

The certificate of completion will not be issued nor the final payments made until ALL punch list items have been completed.

9. CONTRACTOR'S LIABILITY INSURANCE

Refer to General Condition 5.3

The Contractor will, at his own expense, purchase and maintain such insurance as will protect the Owner and the Contractor from claims under workmen's compensation laws, disability benefit laws or other similar employee laws; from claims for damages because of bodily injury, occupational sickness or disease, or death of his employees, or any person other than his employees, including claims insured by usual personal injury liability coverage; from claims for injury to or destruction of tangible property including loss of use resulting therefrom – any or all of which may arise out of or result from the Contractor's operations under the Contract Documents, whether such operations be by any Subcontractor or anyone directly or indirectly employed by any of them or for whose acts may be legally liable. This insurance shall be written for not less than \$1,000,000.00 combined single limit per occurrence (no aggregate limitation) or as required by law, whichever is greater, and shall include contractual liability insurance. Before starting the work, the Contractor will file with the Owner and Engineer certificates of such insurance, acceptable to the Owner; these certificates shall contain a provision that the coverage afforded under the policies will not be canceled or materially changed until at least 15 days after written notice is given to the Owner and Engineer. These policies shall be written to cover the Contractor and Owner jointly. The Certificate of Insurance form is included in Section 00650.

10. OWNERS INDEMNITY

Refer to General Conditions 6.30 through 6.32

- A. The Contractor shall obtain, maintain and furnish to the Owner during the life of this Contract, full Owner's Protective Liability Insurance that will protect him against all losses or claims which may arise from operations under the Contract Documents.
- B. To the fullest extent permitted by law, the CONTRACTOR shall indemnify, defend, and hold harmless the OWNER, the ENGINEER, and their officers, agents, and employees, against and from all claims and liability arising under or by reason of the Contract or any performance of the WORK, but not from the sole negligence or willful misconduct of the OWNER and/or the ENGINEER. Such indemnification by the CONTRACTOR shall include but not be limited to the following:
 - 1. Liability or claims resulting directly or indirectly from the negligence or carelessness of the CONTRACTOR or its agents in the performance of the WORK, or in guarding or maintaining the same, or from any improper materials, implements, or appliances used in its construction, or by or on account of any act or omission of the contractor or its agents;
 - 2. Liability or claims arising directly or indirectly from or based on the violation of any law, ordinance, regulation, order, or decree, whether by the CONTRACTOR or its agents;
 - 3. Liability or claims arising directly or indirectly from the use or manufacture by the CONTRACTOR, its agents, or the OWNER in the performance of this Contract of any copyrighted composition, secret process, patented or unpatented invention, article, or appliance, unless otherwise specifically stipulated in this Contract;
 - 4. Liability or claims arising directly or indirectly from the breach of any warranties, whether expressed or implied, made to the OWNER or any other parties by the CONTRACTOR or its agents;

5. Liabilities or claims arising directly or indirectly from the willful misconduct of the CONTRACTOR or its agents; and
6. Liabilities or claims arising directly or indirectly from any breach of the obligations assumed herein by the CONTRACTOR.
- C. The CONTRACTOR shall reimburse the OWNER, and the ENGINEER for all costs and expenses, (including but not limited to fees and charges of engineers, architects, attorneys, and other professionals and court costs) incurred by said OWNER, and the ENGINEER in enforcing the provisions of this Paragraph.
- D. The indemnification obligation under this Paragraph shall not be limited in any way by any limitation of the amount or type of damages, compensation, or benefits payable by or for the CONTRACTOR or any such subcontractor or other person or organization under worker's compensation acts, disability benefit acts, or other employees benefit acts.

11. PROPERTY INSURANCE

Refer to General Conditions 5.6

- A. The Contractor shall, at his own expense, obtain and maintain property insurance and furnish to the Owner during the life of this Contract the full insurable value of the project. This insurance shall include the interests of the Owner, the Contractor and Subcontractors in the work shall insure against the perils of Fire, Extended Coverage, Vandalism and Malicious Mischief.
- B. The Owner and Contractor waive all rights against each other for damages caused by fire or other perils to the extent covered by insurance provided under this Article, except such rights as they may have to the proceeds of such insurance. The Contractor shall require similar waivers by Subcontractors.

12. SALES TAX

Refer to General Conditions 6.15

The Contractor shall familiarize himself with the requirements and procedures as applicable of the State of Florida pertaining to the exemption from State Sales Tax as it may apply to the Owner.

13. INDEMNITY

Refer to General Conditions 6.30 – 6.32

The Bid Items for Payment and Performance Bond premium and consideration for indemnification to Owner and Engineer are included in the Schedule of Prices and must be completed by the Bidder in order to comply with Florida Statute 725.06.

14. OWNER'S RESPONSIBILITY

Refer to General Condition 8.5

Delete Paragraph 8.5 of the General Conditions in its entirety.

15. SUBSTANTIAL COMPLETION

Refer to General Conditions 14.8 and 14.9

- A. Amend the first three lines of Paragraph 14.8 of the General Conditions to read as follows: "When CONTRACTOR" considers the part of the Work described for Beneficial Occupancy in Section 00000 ready for its intended use CONTRACTOR shall in writing to OWNER and ENGINEER, certify that such Work is....."
- B. Amend Paragraph 14.9 of the General Conditions to read as follows: "Owner shall have the right to exclude CONTRACTOR from the substantially completed portion of the Work after the date of Substantial Completion, but OWNER shall allow CONTRACTOR reasonable access to complete or correct items on the tentative list."

16. PERMITS

The Contractor will be required to obtain all required permits, including a permit from the City of West Park Building and Zoning Department, prior to the start of construction.

17. LAWS AND REGULATIONS

Refer to General Conditions 6.14

The Contractor shall obey all applicable Federal, State and local laws including but not limited to the ones listed below.

The Contractor shall comply with Executive Order No. 11246, entitled "Equal Opportunity Employment," as amended by Executive Order No. 11275, and as supplemented in Department of Labor Regulations (No. 41 CFR, Chapter 60).

The Copeland "Anti-Kickback" Act (18 U.S.C. Section 874), as supplemented in U.S. Department of Labor Regulations (29 CFR, Chapter 60).

All applicable standards, orders or regulations issued pursuant to the Clean Air Act of 1970 (40 U.S.C. Section 1857 et seq.) as amended and the Federal Water Pollution Control Act (33 U.S.C. Section 1251 et seq.) as amended.

The Florida State Statute 446.101 Apprentice and Training Employment Regulations.

Florida Industrial Code No. 8C as amended and especially 8C-29 (CB-1958), Florida Department of Commerce, Bureau of Workmen's Compensation.

18. REVIEW OF APPLICATIONS FOR PROGRESS PAYMENTS

Refer to General Conditions 14.4

Owner shall, within sixty (60) days of presentation to him of the Application for Payment with Engineer's recommendation pay Contractor the amount recommended. This is in lieu of 10 days.

19. PARTIAL AND FINAL PAYMENT PROCEDURES

Refer to General Conditions 14.4 and 14.13

- A. If the work progresses according to this Contract, the Contractor will be paid each month, 90 percent of the value of the work completed during the preceding month and 90 percent of the value of the materials not already used, but which have been furnished by the Contractor under the Specifications and satisfactorily stored on the project site, provided that such materials have been delivered and inspected and that payment therefor has been satisfactorily certified by the Contractor to the Owner and provided further that the materials, in the judgment of the Owner's Engineer are such as probably will be incorporated in the work within the next 30 days. The Contractor shall substantiate the value of stored materials for which payment is requested by submitting copies of suppliers' invoices for the stored material. For the purpose of preparing a monthly estimate for partial payment, the Contractor will make an approximate estimate of the value of all work done and materials furnished as of the last day of each calendar month, and will deduct 10 percent thereof and all previous payments and charges, and the balance will be paid by the Owner to the Contractor on or about thirty days after the submittal to the Owner. The Owner's Engineer shall review, revise and correct, if necessary, and then approve the estimate for partial payment before it is submitted by the Owner's Engineer to the Owner. The 10 percent, which are deducted each month, are reserved by the Owner as a partial guarantee to it of the faithful execution of this Contract. As a consideration of such payment of 90 percent, the Owner shall have the right to enter upon and put into proper service any or all parts of the work which may be in condition for use; however, such use shall not be construed as the final acceptance and the commencement of the one year guarantee bond period for any or all parts of the work, unless final acceptance is made for the complete project at that time. No claim or charge is to be made by the Contractor for such use, nor is such use to be construed as an acceptance by the Owner of any part of the work so used.
- B. Upon receipt of written notice from the Contractor that the work has been completed in conformity with the Drawings and Specifications and any approved changes thereto, the Owner's Engineer shall promptly examine the work and, making such tests as he may deem proper and using all of the care and judgment normally exercised in the examination of completed work by a properly qualified and experienced professional engineer, shall satisfy himself that the Contractor's statement appears to be correct. He shall then inform the Owner in writing that he has examined the work and that it appears to conform to the Contract Drawings, Specifications and any approved Change Orders and that therefore he recommends acceptance and final payment to the Contractor. However, it is agreed by the Owner and the Contractor that such statement by the Owner's Engineer does not in any way relieve the Contractor from his responsibility to deliver a completed job in good and workmanlike condition, and does not render the Engineer or the Owner liable for any faulty work done or materials used by the Contractor.
- C. The Owner's Engineer will then make a final estimate of the value of all work done and will deduct therefrom all previous payments, which have been made. The Owner's Engineer will report such estimate to the Owner together with his recommendation as to the acceptance of the work or his findings as to any deficiencies therein. Such recommendation as to the acceptance of the work by the Owner's Engineer will be made to his best knowledge and behalf. After receipt and acceptance by the Owner of the properly executed Affidavit and the Release of Lien and within 60 days after approval of the Engineer's estimate and recommendation by the Owner, the amount of the estimate, less any charges or damages herein provided for, will be paid. Upon such final payment, the Owner shall be released by the Contractor from all liability whatever growing out of this Contract, except for the balance, if any, of such amount as may have been retained to

cover charges, claims or damages, as specified; and if the Owner is satisfied that no such charges, claims or damages exist or will arise, no such amount will be retained. All prior estimates are subject to correction in the final estimate.

- D. Each request for a partial payment shall be submitted on an Application for Payment Form shown on Page 00800-08-09 which shall be accompanied by an executed copy of the Certification of Contractor shown on Page 00800-12.
- E. Measurement and payment for work items for which direct payment is provided will be achieved as required by the Technical Specifications. When no direct payment for work or materials is required in General Conditions, the Special Conditions, the Proposal, the sections of the Technical Specifications or in other parts of the Contract Documents or shown, indicated or noted on the Drawings, compensation therefor shall be included in the Contract Unit or Lump Sum Prices for the several pay items under this Contract and shown and listed in the Proposal.
- F. When the work has been completed, the Contractor shall execute a Final Release of Lien and an Affidavit declaring that all bills have been paid in full.
- G. These final documents will be furnished to the Owner in a form similar to those that appear on Pages 00800-10 and 14.

END OF SECTION

APPLICATION FOR PAYMENT (SAMPLE) OR AIA G702

Date: _____

APPLICATION FOR PAYMENT NO. _____

To: _____ (OWNER) Project No.: _____
From: _____ (CONTRACTOR)
Contract for: _____

For work accomplished through the date of: _____, 200 ____.

SUMMARY OF CONTRACT AMOUNTS

- 1. Original Contract Price : \$ _____
- 2. Change Orders No. Through : \$ _____
- 3. Contract Price with all approved Change Orders : \$ _____
- 4. Work completed to date : \$ _____
- 5. Less (10%) Retainage : \$ _____
- 6. Amount due to date : \$ _____
- 7. Less previous payments (or applications) : \$ _____
- 8. AMOUNT DUE THIS APPLICATION: \$ _____

*Note: This application must be accompanied with the Certification of Contractor Form
And worksheet for completed items as shown on Page 00000- .*

Accompanying Documentation: _____

Payment of the above AMOUNT DUE THIS APPLICATION is recommended.

Dated: _____, 200 ____

By: _____
Project Manager

APPLICATION FOR PAYMENT NO.

CONTRACTOR'S SCHEDULE OF COMPLETED WORK ITEMS

SAMPLE (OR AIA G703)

Project: _____ Sheet _____ of _____

Owner's Contract No.: _____ Engineer's Project No.: _____

For work accomplished through the date of: _____ 20 .

Item No.	Description	ORIGINAL CONTRACT QUANTITIES				WORK COMPLETED	
		Quantity	Unit	Unit Price	Amount	Quantity	Amount
	Total (Original Contract)				\$ -		\$ -
	Change Order No. 1:				\$ -		\$ -
	Change Order No. 2:				\$ -		\$ -
	PROJECT TOTAL:				\$ -		\$ -

AFFIDAVIT

STATE OF FLORIDA)
 : ss
COUNTY OF BROWARD)

Before me, the undersigned authority to administer oaths and take acknowledgements, personally appeared _____, who, after being first duly sworn, upon oath deposes and says that all lienors contracting directly with, or directly employed by (him, them, it) and that all taxes imposed by Chapter 212, Florida Statutes (Sales and Use Tax Act) as amended, have been paid and discharged, and that all bills, wages, fees, claims and other charges incurred by _____ in connection with the construction of _____ have been paid in full.

SIGNED: _____

By: _____

WITNESSES:

SWORN AND SUBSCRIBED TO BEFORE ME THIS _____ day of _____, 20__ A.D.

Notary Public
State of Florida at Large
My Commission Expires:

END OF SECTION

AFFIDAVIT REGARDING EQUIPMENT STORAGE AND STAGING YARD

The undersigned agrees to secure prior to construction an off-site equipment storage and staging yard (lot) outside of the public right of way. The expense for this yard shall be included as part of bid item 4.06 Mobilization.

The undersigned further agrees to avoid overnight storage of equipment in the public right-of-way. Failure to comply with this requirement shall result in a penalty in the amount of \$250 per incident plus any costs incurred by the City. Furthermore, the City reserves the right to have towed away any equipment left in the right-of way overnight at the bidder's expense. The undersigned agrees to pay any additional cost incurred to retrieve towed and impounded equipment.

By: _____ Date _____
Signature of Bidder

Printed Name of Bidder and Title

Printed Name of the Firm

Address of the Firm

The foregoing instrument was acknowledged before me the ____ day of _____, 20 __, by

(Authorized Representative)

of _____, who is personally known to me or who
(Corporation, Partnership, etc.)

has produced _____ as identification and who did/did not take an oath.

(Signature of Notary)

Serial Number

(Print of Stamp Name of Notary)

(Expiration Date)

Notary Public – State of _____

END OF SECTION

CERTIFICATION OF CONTRACTOR

According to the best of my knowledge and belief, I certify that all items and amounts shown on Application for Payment No. _____ are correct, that all work has been performed and/or materials supplied in full accordance with the terms and conditions of this Contract, dated _____, 20____, between _____ (Owner) and _____ (Contractor).

I further certify that all just and lawful bills against the undersigned and his subcontractors and suppliers for labor, material and equipment employed in the performance of this Contract have been paid in full accordance with their terms and conditions; that all taxes imposed by Chapter 212, Florida Statutes (Sales and Use Tax Act), as amended, have been paid and discharged; and that there are no Vendor's, Mechanic's or other Liens or rights to liens or conditional sales contracts which should be satisfied or discharged before such payment is made.

Date: _____

Contractor: _____

STATE OF FLORIDA)
: ss
COUNTY OF BROWARD)

Personally appeared before me this _____ day of _____, 20____.

_____ known (or made known) to me as the _____ (Owner) (Partner) (Corporate Officer) - Give Title of _____ (Contractor(s), who subscribed and swore to the above instrument in my presence.

Notary Public
State of Florida at Large

My Commission Expires:

END OF SECTION

PARTIAL RELEASE OF LEIN

KNOW ALL MEN BY THESE PRESENTS, that _____ for and in consideration of the sum of _____ Dollars (\$ _____) paid to _____ by the _____, receipt of which is hereby acknowledged, do(es) hereby release and quitclaim to the City of West Park, the Owner, its successors or assigns, all liens, lien rights, claims or demands of any kind whatsoever which _____ now has (have) or have against the property, building, and/or for any incidental expense for the construction of:

thereon or in otherwise improving said property situated as above described.

IN WITNESS WHEREOF _____ have (has) hereunto set ____ hand and seal ____ this _____ day of _____, 20 __. A.D.

WITNESS:

_____ (Seal)

SWORN AND SUBSCRIBED TO BEFORE ME THIS ____ day of _____, 20 __ A.D.

Notary Public State of Florida at Large
My Commission Expires:

END OF SECTION

FINAL RELEASE OF LEIN

KNOW ALL MEN BY THESE PRESENTS, that _____
_____ for and in consideration of the sum of
_____ Dollars (\$ _____)
paid to _____ by the _____, receipt of which is
hereby acknowledged, do(es) hereby release and quitclaim to the City of West Park, the Owner, its
successors or assigns, all liens, lien rights, claims or demands of any kind whatsoever
which _____ now has (have) or have against the property, building, and/or for any
incidental expense for the construction of:

thereon or in otherwise improving said property situated as above described.

IN WITNESS WHEREOF _____ have (has) hereunto
set ___ hand and seal ___ this _____ day of _____, 20___. A.D.

WITNESS:

_____ (Seal)

SWORN AND SUBSCRIBED TO BEFORE ME THIS _____ day of _____, 20___. A.D.

Notary Public
State of Florida at Large
My Commission Expires:

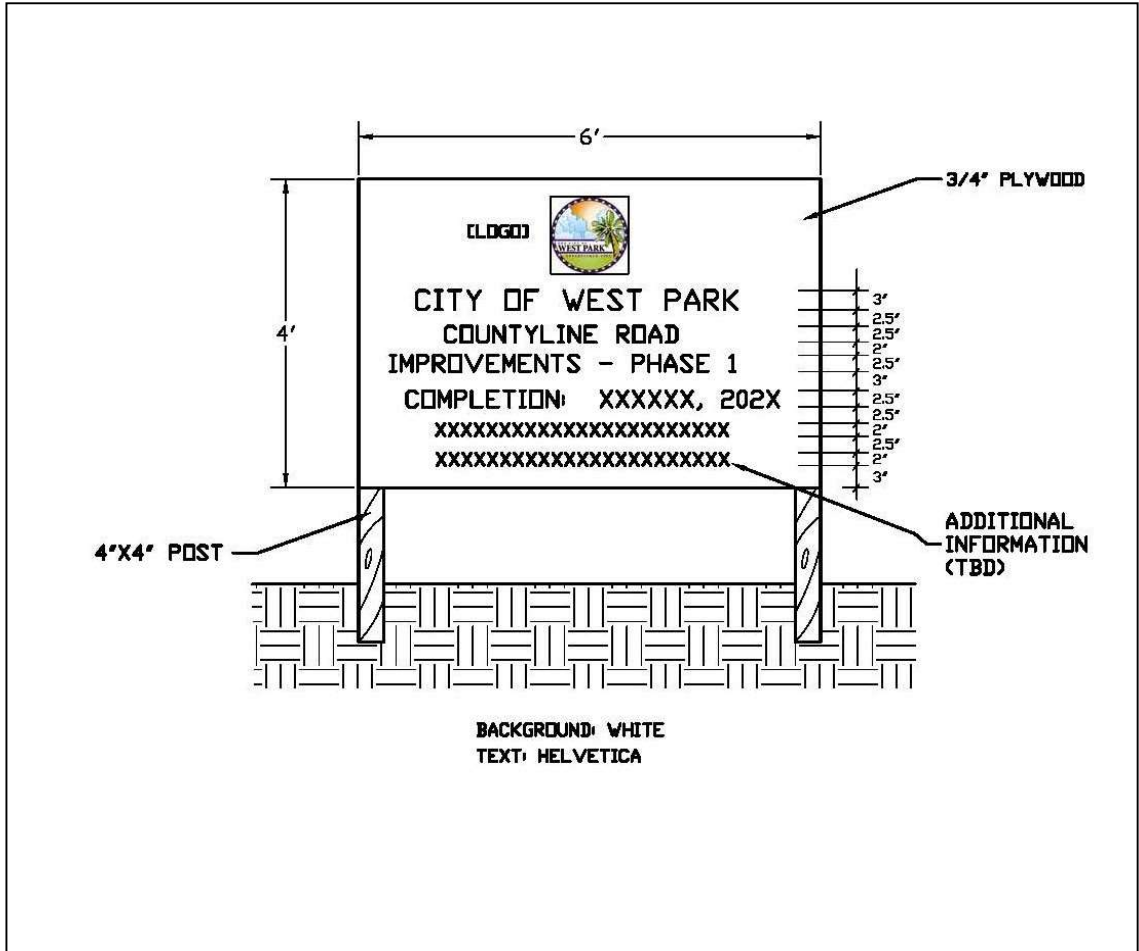
END OF SECTION

SECTION 00900

ADDENDUM

SECTION 00950

PROJECT SIGN



SECTION 01000

GENERAL REQUIREMENT

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

- A. The Contractor shall furnish all labor, superintendence, materials, fuel, water, tools, appliances, equipment, supplies, and other means of construction necessary or proper for performance and completion of all work included in this Contract. The Contractor shall perform and complete the work in the manner best calculated to promote rapid construction consistent with safety of life and property and to the satisfaction of the Owner and Engineer, and in strict accordance with the Contract Documents. The Contractor shall clean up the work and maintain it during and after construction, until accepted, and shall do all work and pay all costs incidental thereto. The Contractor shall repair or restore all structures and property that may be damaged or disturbed during performance of the work. The Contractor shall obtain any and all required permits, inspections, and pay any fees for the purpose of this project. All secondary or trade permits shall be the responsibility of the Contractor. The Contractor will adhere to all applicable federal, state, and local codes and ordinances for the construction of the project as well as the requirements and specifications indicated in the contract.
- B. The cost of incidental work described in these GENERAL REQUIREMENTS, for which there are no specific Contract Items, shall be considered as part of the general cost of doing the work and shall be included in the prices for the various Contract Items. No additional payment will be madetherefor.
- C. Omission of a specific item or component part of a system obviously necessary for the proper functioning of the system shall not relieve the Contractor of the responsibility of furnishing the item as part of the work at no additional cost to Owner.
- D. Where portions of the work traverse or cross federal, state, county or local highways, roads, streets, or waterways, and the agency in control of such property has established standard specifications governing items of work that differ from these specifications, the most stringent requirements shall apply.
- E. Public utility installations and structures shall be understood to include all poles, tracks, pipes, wires, conduits, house service connections, vaults, manholes and all other appurtenances and facilities pertaining thereto whether owned or controlled by the Owner, other governmental bodies or privately owned by individuals, firms or corporations, used to serve the public with transportation, traffic control, gas, electricity, telephone, sewerage, drainage, water or other public or private property which may be affected by the work shall be deemed included hereunder.
- F. The Contract Documents contain data relative to existing public utility installations and structures above and below the ground surface. These data are not guaranteed as to their completeness or accuracy and it is the responsibility of the Contractor to make his own investigations to inform himself fully of the character, condition and extent of all such installations and structures as may be encountered and as may affect the construction operations.
- G. The Contractor shall protect all public utility installations and structures from damage during the

work. The Contractor shall so arrange his operations as to avoid any damage to these facilities. All required protective devices and construction including but not limited to temporary pipe supports shall be provided by the Contractor at his expense. All existing public utilities damaged by the Contractor which are shown on the Plans or have been located in the field by the utility shall be repaired by the Contractor, at his expense, as directed by the Owner or Engineer. No separate payment shall be made for such protective devices or repairs to public utility installations or structures.

- H. The Contractor shall be solely and directly responsible to the Owner and operators of such properties for any damage, injury, expense, loss, inconvenience, delay, suits, actions or claims of any character brought because of any injuries or damage which may result from the construction operations under this Contract.
- I. Neither the Owner nor its officers or agents shall be responsible to the Contractor for damages as a result of the Contractor's failure to protect utilities encountered in the work.
- J. Public utility installations or structures owned or controlled by the Owner or another governmental body which are shown to be removed, relocated, replaced or rebuilt by the Contractor shall be considered as a part of the general cost of doing the work and shall be included in the prices bid for the various contract items. No separate payment shall be made therefore.
- K. Where public utility installations or structures owned or controlled by the Owner, another governmental body or public agency are encountered during the course of the work, and are not indicated on the Drawings or in the Specifications, and when, in the opinion of the Owner or Engineer, removal, relocation, replacement or rebuilding is necessary to complete the work under this Contract, such work shall be accomplished by the utility having jurisdiction, or such work may be ordered, in writing by the utility for the Contractor to accomplish. If such work is accomplished by the utility having jurisdiction, it will be carried out expeditiously and the Contractor shall give full cooperation to permit the utility to complete the removal, relocation, replacement or rebuilding as required. If such work is accomplished by the Contractor, it will be paid for as extra work as provided in the Agreement.
- L. In the event of interruption to domestic water, sewer, storm drain or other utility services as a result of accidental breakage due to construction operations, promptly notify the proper authority. Cooperate with said authority in restoration of service as promptly as possible and bear all costs of repair. In no case shall interruption of any water or utility service be allowed to exist outside working hours unless approval is granted prior to beginning construction.
- O. The Contractor shall, at all times in performance of the work, employ approved methods and exercise reasonable care and skill so as to avoid unnecessary delay, injury, damage or destruction of public utility installations and structures; and shall, at all times in the performance of the work, avoid unnecessary interference with, or interruption of, public utility services, and shall cooperate fully with the Owners thereof to that end.
- P. The maintenance, repair, removal, relocation or rebuilding of public utility installations and structures, when accomplished by the Contractor as herein provided, shall be done by methods approved by the owner of the utility.

1. Contractor shall notify the City of West Park Public Works Department 48 hours prior to the start of construction.
 2. Contractor shall be responsible for verifying all utility locations prior to commencement of construction.
 3. The Contractor shall notify the Engineer immediately, in writing, of any conflicts between the project work and any existing utility. The Engineer may request additional potholes at any time.
- B. Continuous operation of the Owner's existing system is of critical importance. Connections to existing services of utilities, or other work that requires the temporary shutdown of any existing operations or utilities, shall be planned in detail with appropriate scheduling of the work and coordinated with the Owner or Engineer.
- C. All materials and equipment (including emergency equipment) necessary to expedite the tie-in shall be on hand prior to the shutdown of existing services or utilities.
- D. At no time shall the Contractor undertake to close off any lines or open valves or take any other action that would affect the operation of the existing system, except as specifically required by the Drawings and Specifications and after approval is granted by the Owner. Request approval five (5) working days in advance of the time that interruption of the existing system is required.
- E. A detailed sequence of construction shall be submitted by the Contractor and approved by the Architect / Engineer before any work is started. The City of West Park reserves the right to make changes to the sequence as necessary to facilitate the work or to minimize any conflict with operations. The hours of work shall be 7:30 a.m. to 5:00 p.m., Monday through Friday, with exception of holidays. All work outside these normal work hours shall be pre-approved by the City of West Park and all cost for overtime by the City.

1.5 USE OF PREMISES

- A. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to areas permitted by law, ordinances, permits, or the requirements of the Contract documents and shall not unreasonably encumber the premises with construction equipment or other materials or equipment. No storage of materials will be allowed on the site. Excavation must be removed from the site as it is dug. Materials will be brought to the site when needed.
- B. Contractor shall maintain roadways open to two way traffic at all times where possible. Contractor shall backfill or steel plate, as directed by the Engineer, all trenches at the end of each workday so as to provide a surface passable by standard vehicular traffic.
- C. Contractor shall conduct his work in such a manner as to avoid damage to private or public property. Any damage to existing structures or work of any kind, including permanent reference markers or property corner markers or the interruption of utility service, shall be repaired or restored promptly at no additional expense to Owner.
- D. Contractor shall not enter upon private property for any purpose without first securing the permission of the property owner in writing and furnishing Engineer with a copy of said permission. This requirement will be strictly enforced, particularly with regard to such vacant properties that may be used for material storage.

- E. Contractor shall preserve and protect all existing vegetation such as trees, shrubs, and grass on or adjacent to the site that do not reasonably interfere with the construction, as determined by Engineer. Contractor shall be responsible for all unauthorized cutting or damaging of trees and shrubs, including damage due to careless operation of equipment, stockpiling of materials, or tracking of grass by equipment. Contractor shall be liable for, or shall be required to replace or restore at no additional cost to Owner, all vegetation that is destroyed or damaged.
- F. During the daily progress of the work, Contractor shall keep daily the premises free from accumulations of waste materials, rubbish, and other debris resulting from work. At the completion of the work, Contractor shall remove all waste materials, rubbish, and debris from and about the premises daily, as well as all tools, appliances, construction equipment and machinery, and surplus materials and shall leave the site clean and ready for occupancy by Owner. Contractor shall restore to their original condition those portions of the site not designated for alteration by the Contract Documents.
- G. Contractor shall not load or permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the work or adjacent property to stresses or pressures that will endanger it.

1.6 TEMPORARY CONSTRUCTION UTILITIES AND FACILITIES

- A. The Contractor shall provide and maintain sanitary facilities for his employees and his subcontractors' employees that will comply with the regulations of the local and state Departments of Health and as directed by the Engineer. The Owner will provide a place of connection for temporary water, if required, for testing at the site, all fees for water service will be paid for by the Contractor. The Contractor shall provide all temporary piping required to bring the water to the point of use and shall remove the piping when no longer needed.
- B. The Contractor shall be responsible for obtaining a source of electric power for construction. All temporary electric power installation shall meet the construction safety requirements of OSHA, state, and other governing agencies. Cost of electric power shall be borne by the Contractor.

1.7 SUBMITTALS DURING CONSTRUCTION

- A. Requirements in this section are in addition to any specific requirements for submittals specified in other sections of the Contract Documents. Submittals shall be addressed to:

Project Manager-City of West Park
1965 South State Road 7
West Park-FL 33023

- B. Prior to the start of construction, the Contractor shall submit a detailed plan for the sequencing of his construction and proposed tie-in to the existing force main for review and approval.

- C. The Contractor agrees that shop drawing submittals processed by the Engineer do not become Contract Documents and are not Change Orders; that the purpose of the shop drawing review is to establish a reporting procedure and is intended for the Contractor's convenience in organizing his work and to permit the Engineer to monitor the Contractor's progress and understanding of the design.

1.08 SHOP DRAWINGS REQUIREMENTS

- A. Shop drawings referred to herein shall include both shop and setting drawings, proposed laying schedules, and other submittals for both shop and field-fabricated items. Submittals shall include but not necessarily be limited to:
 - 1. Concrete Mix
 - 2. Asphalt Mix
 - 3. Soil Mix, Fabric
- B. The submittals shall include satisfactory identification of items, units, and assemblies in relation to the specification.
- C. Should the Contractor propose any item on his shop drawings, or incorporate an item into the work, and that item should subsequently prove to be defective or otherwise unsatisfactory (regardless of the Engineer's preliminary review), the Contractor shall, at his own expense, replace the item with another item that will perform satisfactorily.

1.09 RECORD DRAWINGS

- A. During the entire construction operation, the Contractor shall maintain records of all deviations from the Drawings and Specifications and shall prepare therefrom "record" drawings showing correctly and accurately all changes and deviations from the work made during construction to reflect the work as it was actually constructed. Each month, or as otherwise agreed, the Contractor shall submit to the Engineer a current listing and description of each change incorporated into the work since the preceding submittal. These drawings shall conform to recognized standards of drafting and shall be neat and legible. Four (4) sets of certified "as-builts" shall be submitted to the Owner.

1.10 PRECONSTRUCTION CONFERENCE

- A. Within five (5) working days following execution of the Contract but before work at the site starts, the Contractor shall meet with the City of West Park and its Engineer for discussion of scheduling requirements, procedures for handling shop drawings and other submittals, for processing applications for payment, and to establish a working understanding among the parties as to the work.

PART 2 PRODUCTS

2.1 OWNER-FURNISHED ITEMS

- A. There are no anticipated items to be furnished by the Owner for this project.
- B. If the Owner elects to furnish an item for this project, the Contractor's responsibility for material furnished by Owner shall begin at the point of its delivery to Contractor that is at the Owner's storage yard and not the project site. Materials already on the site shall become Contractor's responsibility on the day of the execution of the Agreement. Contractor shall examine all materials furnished by Owner at the time and place of delivery and shall call any defective material to the attention of Owner. Any material furnished by Owner and installed by Contractor without discovery of such defects will, if found defective prior to final acceptance of the work, be replaced with sound materials by Owner.
- C. Contractor, however, shall at his own expense furnish all supplies, labor, and facilities necessary to remove said defective material and install the sound material in a manner satisfactory to Engineer.
- D. All materials furnished by Contractor shall be delivered and distributed at the site by Contractor. Materials furnished by Owner shall be picked up by Contractor at Owner's storage yard, and then hauled to and distributed at the site.
- E. Payment for handling Owner-furnished material shall be included in the Bidder's applicable unit prices for installing the material.

PART 3 EXECUTION

- A. Not Used.

END OF SECTION

SECTION 01050

FINAL PAY ITEM DESCRIPTIONS

PAYMENT ITEMS (COUNTYLINE ROAD IMPROVEMENTS - PHASE 1)
GENERAL/ROADWAY/BIOSWALE

Item #	Item Description	Units	Basis of Payment and Detail Description
1	Clearing and Grubbing	AC	Includes the cost of the sawcutting, removal and disposal of all existing asphalt pavement, concrete bands/curb, miscellaneous concrete, rocks, vegetation/sod, tree roots, tree trimming, debris, pipes, and other facilities necessary to prepare the area for the proposed construction. Includes the cost for clearing and grubbing within harmonization areas and preparation for sod.
2	Maintenance of Traffic	LS	Includes the cost for all maintenance of traffic during construction and all M.O.T. permitting, temporary traffic control devices, temporary markings on paved and milled surfaces, warning devices, pedestrian access maintenance, and detours as required for the duration of the construction (incl. work outside normal business hours). All crosswalks, sidewalks, and driveway access shall be maintained and/or coordinated throughout the project duration at no additional cost. Also includes protection of excavated shoulder drop-off areas with suitable material. Includes variable message signage and all labor and materials to comply with Section 102 of the Specifications included herein.
3	Inlet Protection System	EA	Includes Labor and Materials for installation and maintenance of sediment traps as necessary to comply with the protection of existing inlets per the Storm Water Pollution Prevention Plan. Also includes removal and reinstallation during major storm events at no additional cost.
4	Tree Protection	LF	Includes Labor and Materials for installation and maintenance of temporary fencing or barricades for tree protection during the course of construction. Also includes removal at completion of project.
5	Performance and Payment Bond	LS	
6	Owner's Contingency (Do not Bid)	LS	Allowance and Owner's Contingency, is a contingency item to be utilized ONLY as authorized by the City. Payment from this item includes all Owner directed additional work as a consequence of unforeseen conditions.
7	Regular Excavation	CY	Includes the cost of all excavation, hauling, disposal, and associated earthwork needed to reconstruct the roadway and curb as shown on plans. Includes all work noted in Section 120 of the Specifications included herein.
8	Embankment	CY	Includes the cost of all embankment needed to construct the work as shown on plans. Includes all work noted in Section 120 of the Specifications included herein.
9	12" Stabilization Type B	SY	Includes all costs for stabilizing the roadbed per plans and specifications. Includes all labor, materials and related costs for density testing and to comply with Section 160 of the Specifications included herein.

10	Optional Base Course	SY	Includes all costs to furnish and install the proposed Optional Base Items. Also includes the cost for density testing by Contractor and to comply with Section 285 of the Specifications included herein.
11, 12	Type SP and FC Asphaltic Concrete	TN	Includes all work, labor, and materials necessary to install Type SP-12.5, and FC-9.5 Asphaltic Concrete for pavement in accordance with contract plans. No additional payment will be given for work during nighttime or weekend hours, primer, sand, multiple lift placements and mobilizations, tack coat, cleaning of existing pavement, cleanup of tack overspray or spill, removal of existing asphalt, and/or saw-cutting of existing pavement. This work will be considered incidental to this item. Includes all cost to comply with Section 334 of the Specifications included herein.
13	Concrete Curb and Gutter, Type F	LF	Includes all work, labor and materials to install proposed Concrete Curb and Gutter in accordance to the contract plans. Also, includes flume construction, grading, installation of curb pad including backfilling and compaction. Includes all cost to comply with Section 331 and 520 of the Specifications included herein.
14	Retro Reflective Pavement Markers	EA	Includes all work, labor and materials required to furnish and install proposed temporary and final Retro-Reflective Pavement Markers in accordance to the contract plans. Includes all cost necessary to comply with Section 706 of the Specifications included herein.
15,16	Traffic Stripes and Markings Items	Varies	Includes all work, labor and materials required to furnish and install temporary paint and final proposed Thermoplastic Traffic Stripes and Markings in accordance to the contract plans. Includes all cost necessary to comply with Section 711 of the Specifications included herein.
17	Bioswale Construction		Includes all costs to excavate and dispose material at swale and trench area per detail; furnish and install rock, filter fabric, engineered soil mix (trench) and top soil layer favorable to turf and ground cover growth over areas of the project which are to be sodded and planted; grade and spread as necessary to achieve final elevations. Also includes watering and all cost to comply with Section 570 of the Specifications included herein.
18	Performance Turf (St. Augustine Sod)	SY	Includes all work, labor and materials necessary to furnish and install proposed Performance Turf in accordance with the contract plans. Includes furnishing, handling and fine grading as necessary to achieve final elevations in accordance with plan details. Also includes watering and all cost to comply with Section 570 of the Specification included herein.
19	Plant Mix	EA	Includes all work, labor and materials required to furnish and install proposed Landscaping in accordance to the contract plans. Includes the cost of mulch layer, watering and fertilization. Includes all cost necessary to comply with Section 580 of the Specifications included herein.
20	Informational Sign	EA	Includes the cost to install signs furnished by City at locations in swale area as directed.
21	Project Sign	EA	Includes the cost to furnish and install sign per Section 0950 of the Project Manual. Also includes cost to remove sign at project completion.

N/A	Mobilization / Pollution Prevention	N/A	<p>Cost for all work and operation necessary for Mobilization and Demobilization of Equipment materials and personnel, Construction Staging, Field Engineering, Utility investigations, Construction Layout and Surveying, Work outside normal business hours (incl. nights and weekends), Public Outreach, Dust Control, Final Certified As-builts, Pre-construction Video and Documentation, Field Testing and Laboratory Work with Certified Reports, Agency Compliance, and all Work, Labor and Materials necessary to comply with the Storm Water Pollution Prevention Plan shown on the Contract Plans as well as Section 104 of the Specifications included herein shall be included in the overall project cost and no separate payment shall be made.</p>

SECTION 01700 (01 70 00)

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 SUMMARY:

- A. This Section includes administrative and procedural requirements for contract closeout including, but not limited to, the following:
 - 1. Inspection procedures.
 - 2. Project record document submittal.
 - 3. Submittal of warranties.
 - 4. Final cleaning.
 - 5. CONTRACTOR's Certification.
- B. Closeout requirements for specific construction activities are included in the appropriate Sections.
- C. Related Work Specified Elsewhere:
 - 1. Prerequisites to Substantial Completion and Final Acceptance: N/A

1.02 SUBSTANTIAL COMPLETION:

- A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following as applicable:
 - 1. Submit specific warranties, workmanship bonds, final certifications, and similar documents.
 - 2. Obtain and submit releases enabling the City unrestricted use of the Work and access to services and utilities. Include operating certificates, and similar releases.
 - 3. Submit record drawings, maintenance manuals, Project photographs, damage or settlement surveys, property surveys, and similar record information.
 - 4. Discontinue and remove temporary facilities from the site, along with mockups, construction tools, and similar elements.
 - 5. Complete final cleanup requirements, including touch up painting.
 - 6. Touch up and otherwise repair and restore marred, exposed finishes.
- B. Inspection Procedures: On receipt of a request for inspection, the City or its designee will either proceed with inspection or advise the CONTRACTOR of unfilled requirements. The City will prepare the Certificate of Substantial Completion following inspection or advise the CONTRACTOR of work that must be completed or corrected before the certificate will be issued.

1. The City will reschedule the inspection when in its opinion, the Work is substantially complete.

1.03 FINAL ACCEPTANCE:

- A. Preliminary Procedures: Submit certification by CONTRACTOR that Work has been completed in accordance with the Contract Documents to the knowledge of the CONTRACTOR. Before requesting final payment, complete the following as applicable:
 1. Submit the request for final inspection and provide with any required releases and supporting documentation. Include insurance certificates for products and completed operations where required.
 2. Submit a certified copy of the City 's final inspection list of items to be completed or corrected. The certified copy of the list shall state that each item has been completed.
 3. Submit consent of surety to final payment.
 4. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 5. Release of Liens (from the Prime, and all CONTRACTORS, Vendors and Suppliers).
- B. Reinspection Procedure: The City will re-inspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed.
 1. Upon completion of reinspection, the City will advise the CONTRACTOR of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
 2. If necessary, reinspection will be repeated.

1.04 RECORD DOCUMENT SUBMITTALS: (IF APPLICABLE)

- A. Maintain on site one set of the following record documents; record actual revisions to the work:
 1. Drawings/specifications, RFIs and addenda
 2. Change orders and other modifications to the contract
 3. Reviewed, approved and accepted shop drawings, product data, and samples
 4. Manufacturer's instruction for assembly, installation, and adjusting
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information related to changes of approved construction documents concurrent with construction progress.
- E. Specifications - legibly mark and record at each product section a description of the products

installed.

1. Manufacturer's name, product name and model number
 2. Changes made by addenda and modifications
- F. As-Built Drawings and shop drawings - legibly mark each item to record actual construction.
1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 2. Field changes of dimension and detail.
 3. Provide any additional details not on original contract drawings.
- G. As-built survey/Flood Certification Form:
1. Upon completion of site construction improvements, provide Architect and Owner with a complete and accurate field survey prepared, signed and sealed by a Florida registered surveyor.
- H. Submit documents, AutoCAD files, and PDF files on a CD or USB.

PART 2 - EXECUTION

2.01 FINAL CLEANING:

- A. General: The GENERAL CONDITIONS require general cleaning during construction.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each road surface to the condition expected in a normal program. All residual aggregate, sand or other road and drainage materials shall be removed to the satisfaction of the Town before final payment is approved.
1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion.
 - a. Remove debris and surface dust from limited-access spaces including trenches, equipment vaults, manholes, and similar spaces.
 - b. Clean the site of rubbish, litter, and other foreign substances. Rake grounds that are neither paved nor planted to a smooth, even-textured surface.
 - c. Remove temporary structures, tools, equipment, supplies, and surplus materials.
 - d. Remove temporary protection devices and facilities which were installed to protect previously completed Work.
 - e. Special Cleaning: cleaning for specific units of Work is specified in applicable Sections of Specifications.
- C. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.
- D. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from the site and dispose of lawfully.

E. Repairs:

1. Repair damaged protective coated surfaces.
2. Repair roads and other items damaged or deteriorated because of construction operations, including those which have been damaged, but are not located within the project limits.
3. Restore all ground areas affected by construction operations.

END OF SECTION

TECHNICAL SPECIFICATIONS

**SECTION 102
MAINTENANCE OF TRAFFIC**

102-1 Description.

Maintain traffic within the limits of the project for the duration of the construction period, including any temporary suspensions of the work. Construct and maintain detours. Provide facilities for access to residences, businesses, etc., along the project. Furnish, install and maintain traffic control and safety devices during construction. Furnish and install work zone pavement markings for maintenance of traffic (MOT) in construction areas. Provide any other special requirements for safe and expeditious movement of traffic specified in the Plans. MOT includes all facilities, devices and operations as required for safety and convenience of the public within the work zone.

Do not maintain traffic over those portions of the project where no work is to be accomplished or where construction operations will not affect existing roads. Do not obstruct or create a hazard to any traffic during the performance of the work, and repair any damage to existing pavement open to traffic.

Include the cost of any work that is necessary to meet the requirements of the Contract Documents under the MOT pay item, when there is not a pay item provided.

102-2 Materials.

Meet the following requirements:

*Bituminous Adhesive.....Section 970
Temporary Retroreflective Pavement Markers....Section 990
PaintSection 971
Removable TapeSection 990
Glass Spheres.....Section 971
Temporary Traffic Control Device Materials.....Section 990
Retroreflective and Non-Reflective Sheeting
For Temporary Traffic Control Devices.....Section 994*

102-2.1 Temporary Traffic Control Devices: *Use only the materials meeting the requirements of Section 990, Section 994, the FDOT Design Standards and the Manual on Uniform Traffic Control Devices (MUTCD).*

102-2.2 Detour: *Provide all materials for the construction and maintenance of all detours.*

102-2.3 Commercial Materials for Driveway Maintenance: *Provide materials of the type typically used for base, including recycled asphalt pavement material, and having stability and drainage properties that will provide a firm surface under wet conditions.*

102-3 Specific Requirements.

102-3.1 Beginning Date of Contractor's Responsibility: *Maintain traffic starting the day work begins on the project or on the first day Contract time is charged, whichever is earlier.*

102-3.2 Worksite Traffic Supervisor: *Provide a worksite traffic supervisor in accordance with Section 105. Provide the worksite traffic supervisor with all equipment and materials needed to set up, take down, maintain traffic control, and handle traffic-related situations.*

Ensure that the worksite traffic supervisor performs the following duties:

- 1. Performs on site direction of all traffic control on the project.*
- 2. Is on site during all set up and take down, and performs a drive through inspection immediately after set up.*
- 3. Is on site during all nighttime operations to ensure proper MOT.*
- 4. Immediately corrects all safety deficiencies and does not permit minor deficiencies that are not immediate safety hazards to remain uncorrected for more than 24 hours.*
- 5. Is available on a 24 hour per day basis and present within 45 minutes after notification of an emergency situation and is prepared to positively respond to repair the work zone traffic control or to provide alternate traffic arrangements.*
- 6. Conducts daily daytime and weekly nighttime inspections of projects with predominately daytime work activities, and daily nighttime and weekly daytime inspections of projects with predominantly nighttime work activities of all traffic control devices, traffic flow, pedestrian, bicyclist, and business accommodations.*

Advise the project personnel of the schedule of these inspections and give them the opportunity to join in the inspection as is deemed necessary. Include assurances in the inspection report that pedestrians are accommodated with a safe, accessible travel path around work sites separated from mainline traffic in compliance with the Americans with Disabilities Act (ADA) Standards for Transportation Facilities, that existing or detoured bicyclist paths are being maintained satisfactorily throughout the project limits, and that existing businesses in work areas are being provided with adequate entrances for vehicular and pedestrian traffic during business hours. Have the worksite traffic supervisor sign the report and certify that all of the above issues are being handled in accordance with the Contract Documents. When deficiencies are found, the worksite traffic supervisor is to note such deficiencies and include the proposed corrective actions, including the date corrected.

The Owner may disqualify and remove from the project a worksite traffic supervisor who fails to comply with the provisions of this Section. The Owner may temporarily suspend all activities, except traffic, erosion control and such other activities that are necessary for project maintenance and safety, for failure to comply with these provisions.

102-4 Alternative Traffic Control Plan.

The Contractor may propose an alternative traffic control plan (TCP) if a plan is presented in the Contract Documents. Have the Contractor's Engineer of Record sign and seal the alternative plan. Prepare the TCP in conformance with the requirements of the jurisdictional authority. Indicate in the plan a TCP for each phase of activities. Take responsibility for identifying and assessing any potential impacts to a utility that may be caused by the alternate TCP proposed by the Contractor, and notify the Owner in writing of any such potential impacts to utilities.

Engineer's approval of the alternate TCP does not relieve the Contractor of sole responsibility for all utility impacts, costs, delays or damages, whether direct or indirect, resulting from Contractor initiated changes in the design or construction activities from those in the original Contract Specifications, Design Plans (including TCPs) or other Contract Documents and which effect a change in utility work different from that shown in the Utility Plans, joint project agreements or utility relocation schedules.

The Owner reserves the right to reject any alternative TCP. Obtain the Engineer's written approval before beginning work using an alternate TCP. The Engineer's written approval is required for all modifications to the TCP. The Engineer will only allow changes to the TCP in an emergency without the proper documentation.

102-5 Traffic Control.

102-5.1 Standards: *FDOT Design Standards are the minimum standards for the use in the development of all TCPs. The MUTCD, Part VI is the minimum national standard for traffic control for highway construction, maintenance, and utility operations. Follow the basic principles and minimum standards contained in these documents for the design, application, installation, maintenance, and removal of all traffic control devices, warning devices and barriers which are necessary to protect the public and workers from hazards within the project limits.*

102-5.2 Maintenance of Roadway Surfaces: *Maintain all lanes that are being used for the MOT, including those on detours and temporary facilities, under all weather conditions. Keep the lanes reasonably free of dust, potholes and rutting. Provide the lanes with the drainage facilities necessary to maintain a smooth riding surface under all weather conditions.*

102-5.3 Number of Traffic Lanes: *Maintain one lane of traffic in each direction. Maintain two lanes of traffic in each direction at existing four (or more) lane cross roads, where necessary to avoid undue traffic congestion. Construct each lane used for MOT at least as wide as the traffic lanes existing in the area before commencement of construction. Do not allow traffic control and warning devices to encroach on lanes used for MOT. The Engineer may allow the Contractor to restrict traffic to one-way operation for short periods of time provided that the Contractor employs adequate means of traffic control and does not unreasonably delay traffic. When a construction activity requires restricting traffic to one-way operations, locate the flaggers within view of each other when possible. When visual contact between flaggers is not possible, equip them with 2-way radios, official, or pilot vehicles, or use traffic signals.*

102-5.4 Crossings and Intersections: *Provide and maintain adequate accommodations for intersecting and crossing traffic. Do not block or unduly restrict any road or street crossing the project unless approved by the Engineer. Before beginning any construction, provide the Engineer the names and phone numbers of persons that can be contacted when signal operation malfunctions.*

102-5.5 Access for Residences and Businesses: *Provide continuous access to all residences and all places of business.*

102-5.6 Protection of the Work from Injury by Traffic: *Where traffic would be injurious to a base, surface course, or structure constructed as a part of the work, maintain all traffic outside the limits of such areas until the potential for injury no longer exists.*

102-5.7 Flagger: *Provide trained flaggers in accordance with Section 105.*

102-5.8 Conflicting Pavement Markings: *Where the lane use or where normal vehicle or pedestrian paths are altered during construction, remove all pavement markings (paint, tape, thermoplastic, raised pavement markers, etc.) that will conflict with the adjusted vehicle or pedestrian paths. Use of paint to cover conflicting pavement markings is prohibited. Remove conflicting pavement markings using a method that will not damage the surface texture of the pavement and which will eliminate the previous marking pattern regardless of weather and light conditions.*

Remove all pavement markings that will be in conflict with “next phase of operation” vehicle pedestrian paths as described above, before opening to vehicle traffic or use by pedestrians. Cost for removing conflicting pavement markings (paint, tape, thermoplastic, raised pavement markers, etc.) to be included in Maintenance of Traffic, Lump Sum.

102-5.9 Vehicle and Equipment Visibility: *Equip all pickups and automobiles used on the project with a minimum of one Class 2 warning light that meets the Society of Automotive Engineers Recommended Practice SAE J595, dated November 1, 2008, or SAE J845, dated December 1, 2007, and incorporated herein by reference. Existing lights that meet SAE J845, dated March, 1992, or SAE J1318, dated April, 1986, may be used to their end of service life. The warning lights shall be a high intensity amber or white rotating, flashing, oscillating or strobe light. Lights shall be unobstructed by ancillary vehicle equipment such as ladders, racks or booms. If the light is obstructed, additional lights will be required. The lights shall be operating when a vehicle is in a work area where a potential hazard exists, when operating the vehicle at less than the average speed for the facility while performing work activities, making frequent stops or called for in the Plans or FDOT Design Standards. Equip all other vehicles and equipment with a minimum of 4 square feet of retroreflective sheeting or warning lights.*

102-5.10 No Waiver of Liability: *Conduct operations in such a manner that no undue hazard results due to the requirements of this Article. The procedures and policies described herein in no way acts as a waiver of any terms of the liability of the Contractor or his surety.*

102-6 Detours.

102-6.1 General: *Construct and maintain detour facilities wherever it becomes necessary to divert traffic from any existing roadway or bridge, or wherever construction operations block the flow of traffic.*

102-6.2 Construction: *Plan, construct, and maintain detours for the safe passage of traffic in all conditions of weather. Provide the detour with all facilities necessary to meet this requirement. Where pedestrian facilities are detoured, blocked or closed during the work, provide safe alternate accessible routes through or around the work zone meeting the requirements of the ADA Standards for Transportation Facilities.*

102-6.3 Construction Methods: *Select and use construction methods and materials that provide a stable and safe detour facility. Construct the detour facility to have sufficient durability to remain in good condition, supplemented by maintenance, for the entire period that the detour is required.*

102-6.4 Removal of Detours: *Remove detours when they are no longer needed and before the Contract is completed. Take ownership of all materials from the detour and dispose of them.*

102-6.5 Detours over Existing Roads and Streets: *When the Owner specifies that traffic be detoured over roads or streets outside the project area, do not maintain such roads or streets. However, maintain all signs and other devices placed for the purpose of the detour.*

102-7 Traffic Control Officer.

Provide uniformed law enforcement officers, including marked law enforcement vehicles, to assist in controlling and directing traffic in the work zone when the following types of work is necessary on projects:

- 1. Directing traffic/overriding the signal in a signalized intersection.*
- 2. When FDOT Design Standards, Index No. 619 is used on freeway facilities (Interstates, toll roads, and expressways) at nighttime for work within the travel lane.*
- 3. When Design Standards, Index No. 655 Traffic Pacing for overhead work is called for in the Plans or approved by the Engineer.*
- 4. When pulling conductor/cable above an open traffic lane on limited access facilities, when called for in the Plans or approved by the Engineer.*
- 5. When FDOT Design Standards, Index No. 625 Temporary Road Closure 5 Minutes or Less is used.*

102-8 Driveway Maintenance.

102-8.1 General: *Ensure that each residence and business has safe, stable, and reasonable access.*

102-8.2 Construction Methods: *Place, level, manipulate, compact, and maintain the material, to the extent appropriate for the intended use.*

As permanent driveway construction is accomplished at a particular location, the Contractor may salvage and reuse previously placed materials that are suitable for reuse on other driveways.

102-9 Temporary Traffic Control Devices.

102-9.1 Installation and Maintenance: *Install and maintain temporary traffic control devices as detailed in the Plans, Index 600 of the FDOT Design Standards and when applicable, in accordance with the approved vendor drawings. Erect the required temporary traffic control devices to prevent any hazardous conditions and in conjunction with any necessary traffic re-routing to protect the traveling public, workers, and to safeguard the work area. Use only those devices that are on the APL. Immediately remove or cover any devices that do not apply to existing conditions.*

All temporary traffic control devices must meet the requirements of National Cooperative Highway Research Program Report 350 (NCHRP 350) or the Manual for Assessing Safety Hardware 2009 (MASH) and current FHWA directives. Manufacturers seeking evaluation must furnish certified test reports showing that their product meets all test requirements set forth by NCHRP 350 or the MASH. Manufacturers seeking evaluation of Category I devices for inclusion on the APL shall include the manufacturer's self-certification letter. Manufacturer's seeking evaluation of Category II and Category III devices for inclusion on the APL shall include the FHWA WZ numbered acceptance letter with attachments and vendor drawings of the device in sufficient detail to enable the Engineer to distinguish between this and similar devices. For devices requiring field assembly or special site preparation, vendor drawings shall include all field assembly details and technical information necessary for proper application and installation and must be signed and sealed by a Professional Engineer registered in the State of Florida. Manufacturers seeking evaluation of Category IV devices for inclusion on the APL must comply with the requirements of Section 990 and include detailed vendor drawings of the device along with technical information necessary for proper application, field assembly and installation. Ensure that the APL number is permanently marked on the device at a readily visible location. Sheeting used on devices is exempt from this marking requirement.

Notify the Engineer of any scheduled operation which will affect traffic patterns or safety sufficiently in advance of commencing such operation to permit his review of the plan for the proposed installation of temporary traffic control devices.

Ensure an employee is assigned the responsibility of maintaining the position and condition of all temporary traffic control devices throughout the duration of the Contract. Keep the Engineer advised at all times of the identification and means of contacting this employee on a 24 hour basis.

Keep temporary traffic control devices in the correct position, properly directed, clearly visible and clean, at all times. Ensure that all traffic control devices meet acceptable standards as outlined in American Traffic Safety Services Association (ATSSA) "Quality Guidelines for Temporary Traffic Control Devices and Features". Immediately repair, replace or clean damaged, defaced or dirty devices.

102-9.2 Work Zone Signs: *Provide signs in accordance with the Plans and FDOT Design Standards. Meet the requirements of 700-1.2.4 and 990-8. Use only approved systems, which includes sign support posts or stands and attachment hardware (nuts, bolts, clamps, brackets, braces, etc.), meeting the vendor requirements specified on the APL drawings.*

Attach the sign to the sign support using hardware meeting the manufacturer's recommendations and as specified in the FDOT Design Standards.

Provide Federal Highway Administration's (FHWA) accepted sign substrate for use with accepted sign stands on the National Highway System (NHS) under the provisions of the NCHRP Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features."

102-9.3 Business Signs: *Provide and place signs in accordance with the Plans and FDOT Design Standards, Index No. 600 series. Furnish signs having retroreflective sheeting meeting the requirements of Section 990.*

102-9.4 High Intensity Flashing Lights: *Furnish Type B lights in accordance with the Plans and FDOT Design Standards.*

102-9.5 Warning/Channelizing Devices: *Furnish warning/channelizing devices in accordance with the Plans and FDOT Design Standards.*

102-9.5.1 Retroreflective Collars for Traffic Cones: *Use collars for traffic cones listed on the APL that meet the requirements of Section 990. Use cone collars at night designed to properly fit the taper of the cone when installed. Place the upper 6 inch collar a uniform 3-1/2 inches distance from the top of the cone and the lower 4 inch collar a uniform*

2 inches distance below the bottom of the upper 6 inch collar. Ensure that the collars are capable of being removed for temporary use or attached permanently to the cone in accordance with the manufacturer's recommendations. Provide a white sheeting having a smooth outer surface and that has the property of a retroreflector over its entire surface.

102-9.5.2 Barrier Wall (Temporary): *Furnish, install, maintain, remove and relocate a temporary barrier wall in accordance with the Plans. Ensure that temporary concrete barrier wall for use on roadway sections, complies with FDOT Design Standards, Index Nos. 412, 415 or 414 as specified in the Plans. Ensure that temporary concrete barrier wall for use on bridge and wall sections, complies with FDOT Design Standards, Index No 414 as specified in the Plans. Ensure that temporary water filled barrier wall used on roadway sections meets the NCHRP Report 350 criteria or the MASH and is listed on the APL. Barriers meeting the requirements of FDOT Design Standards, Index Nos. 412, 415 or temporary water filled barriers on the APL will not be accepted as an alternate to barriers meeting the requirements of FDOT Design Standards, Index No. 414.*

102-9.5.3 Glare Screen (Temporary): Use temporary glare screens listed on the APL that meet the requirements of Section 990. Furnish, install, maintain, remove and relocate glare screen systems in conjunction with temporary barrier wall at locations identified in the Plans. Ensure the anchorage of the glare screen to the barrier is capable of safely resisting an equivalent tensile load of 600 pounds per foot of glare screen, with a requirement to use a minimum of three fasteners per barrier section.

When glare screen is utilized on temporary barrier wall, barrier delineators will not be required.

102-9.6 Temporary Crash Cushion (Redirective/Gating): Furnish, install, maintain and subsequently remove temporary crash cushions in accordance with the details and notes shown in the Plans, the FDOT Design Standards, and requirements of the pre-approved alternatives listed on the APL. Maintain the crash cushions until their authorized removal. Repair all attachment scars to permanent structures and pavements after crash cushion removal. Make necessary repairs due to defective material, work, or Contractor operations at no cost to the Owner. Restore crash cushions damaged by the traveling public within 24 hours after notification as authorized by the Engineer.

102-9.7 Guardrail (Temporary): Furnish guardrail (temporary) in accordance with the Plans and FDOT Design Standards. Meet the requirements of Section 536.

102-9.8 Arrow Board: Furnish arrow boards that meet the requirements of Section 990 as required by the Plans and FDOT Design Standards to advise approaching traffic of lane closures or shoulder work. Type B arrow boards may be used on low to intermediate speed (0 mph to 50 mph) facilities or for maintenance or moving operations on any speed facility. Type C arrow boards shall be used for all other operations on high-speed (50 mph and greater) facilities and may be substituted for Type B arrow boards on any speed facility.

102-9.9 Portable Changeable Message Sign (PCMS): Furnish PCMSs or truck mounted changeable message signs that meet the requirements of Section 990 as required by the Plans and FDOT Design Standards to supplement other temporary traffic control devices used in work zones.

102-9.10 Portable Regulatory Signs (PRS): Furnish PRSs that meet the requirements of 990 as required by the Plans and FDOT Design Standards. Activate portable regulatory signs only during active work activities and deactivate when no work is being performed.

102-9.11 Radar Speed Display Unit (RSDU): Furnish RSDUs that meet the requirements of Section 990 as required by the Plans and FDOT Design Standards to inform motorists of the posted speed and their actual speed. Activate the radar speed display unit only during active work activities and deactivate when no work is being performed.

102-9.12 Temporary Signalization and Maintenance: Provide temporary signalization and maintenance at existing, temporary, and new intersections including but not limited to the following:

- (1) Installation of temporary poles and span wire assemblies as shown in the Plans,
 - (2) Temporary portable traffic signals as shown in the Plans,
 - (3) Adding or shifting signal heads,
 - (4) Trouble calls,
 - (5) Maintaining intersection and coordination timing and preemption devices,
- Restore any loss of operation within 12 hours after notification. Provide traffic signal equipment

that meets the requirements of the FDOT Design Standards and 603-2. The Engineer may approve used signal equipment if it is in acceptable condition. Replacement components for traffic signal cabinet assemblies will be provided by the maintaining agency.

102-9.13 Temporary Traffic Detection and Maintenance: Provide temporary traffic detection and maintenance at existing, temporary, and new signalized intersections. Provide temporary traffic detection equipment listed on the APL. Restore any loss of detection within 12 hours. Ensure 90% accuracy per signal phase, measured at the initial installation and after any lane shifts, by comparing sample data collected from the detection system with ground truth data collected by human observation. Collect the sample and ground truth data for a minimum of five minutes during a peak and five minutes during an off-peak period with a minimum three detections for each signal phase. Perform the test in the presence of the Engineer.

102-9.14 Truck Mounted Attenuators and Trailer Mounted Attenuators: Furnish, install and maintain only those attenuators that meet the requirements of NCHRP 350 or the MASH. Use truck mounted attenuators or trailer mounted attenuators, when called for in the FDOT Design Standards. Use attenuators listed on the APL. When attenuators are called for, use either a truck mounted attenuator or a trailer mounted attenuator system designed and installed in accordance with the manufacturers recommendations.

Equip the attenuator cartridge with lights and reflectors in compliance with applicable Florida motor vehicle laws, including turn signals, dual tail lights, and brake lights. Ensure that lights are visible in both the raised and lowered positions if the unit is capable of being raised. Ensure that the complete unit is painted DOT yellow (Fed. Std. 595 b, No. 13538). Stripe the rear facing of the cartridge in the operating position with the alternating 6 inch white and 6 inch safety orange 45 degree striping to form an inverted "V" at the center of the unit and slope down and toward the outside of the unit, in both directions from the center. In the raised position, place at least the same square footage of striping on the bottom of the cartridge as placed on the rear facing cartridge in the open position. Use Type III retro-reflecterized sheeting for striping. Attenuators will not be paid for separately. Include the cost of the truck with either a truck mounted attenuator or a trailer mounted attenuator in MOT Lump Sum. Payment includes all costs, including furnishing, maintaining and removal when no longer required, and all materials, labor, tools, equipment and incidentals required for attenuator maintenance.

102-9.15 Temporary Raised Rumble Strip Set: Furnish, install, maintain, remove, and reinstall temporary raised rumble strips per the manufacturer's recommendations and in accordance with FDOT Design Standards, Index No. 600. The temporary raised rumble strip may be either a removable polymer striping tape or a molded engineered polymer material.

102-9.16 Automated Flagger Assistance Devices (AFAD): Furnish, install, maintain, remove and relocate AFADs in accordance with the Plans and FDOT Design Standards. Position AFADs where they are clearly visible to oncoming traffic and out of the lane of traffic. The devices may be operated either by a single flagger at one end of the traffic control zone, from a central location, or by a separate flagger near each device's location. AFADs may be either a remotely controlled Stop/Slow AFAD mounted on either a trailer or a movable cart system, or a remotely controlled Red/Yellow Lens AFAD. AFADs will not be paid for separately. AFADs may be used as a supplement or an alternate to flaggers in accordance with Index 603. Include the cost for AFADs in MOT Lump Sum.

102-9.17 Temporary Lane Separator: *Furnish, install, maintain, remove and relocate temporary lane separator in accordance with the Plans and FDOT Design Standards, Index No 600. Anchor the portable temporary lane separator with a removable anchor bolt. Use epoxy on bridge decks where anchoring is not allowed. Remove the epoxy from the bridge deck by hydro-blasting or other method approved by the Engineer.*

102-10 Work Zone Pavement Marking.

102-10.1 Description: *Furnish and install work zone pavement markings for MOT in construction areas and in close conformity with the lines and details shown in the Plans and FDOT Design Standards.*

Centerlines, lane lines, edge lines, stop bars and turn arrows will be required in work zones prior to opening the road to traffic.

The most common types of work zone pavement markings are painted pavement markings and removable tape. Other types of work zone pavement markings may be identified in the Plans.

102.10.2 Painted Pavement Markings:

102-10.2.1 General: *Use painted pavement markings meeting the requirements of Section 710. Use standard waterborne paint unless otherwise identified in the Plans or approved by the Engineer.*

102-10.3 Removable Tape:

102-10.3.1 General: *Use removable tape listed on the APL and meeting the requirements of 990-4.*

102-10.3.2 Application: *Apply removable tape with a mechanical applicator to provide pavement lines that are neat, accurate and uniform. Equip the mechanical applicator with a film cut-off device and with measuring devices that automatically and accumulatively measure the length of each line placed within an accuracy tolerance of plus or minus 2%. Ensure removable tape adheres to the road surface. Removable tape may be placed by hand on short sections, 500 feet or less, if it is done in a neat accurate manner.*

102-10.3.3 Retroreflectivity: *Apply white and yellow traffic stripes and markings that will attain an initial retroreflectivity of not less than 300 mcd/lx·m² for white and contrast markings and not less than 250 mcd/lx·m² for yellow markings. Black portions of contrast tapes and black masking tapes must be non-reflective and have a reflectance of less than 5 mcd/lx·m². At the end of the six month service life, the retroreflectance of white and yellow removable tape shall not be less than 150 mcd/lx·m².*

102-10.3.4 Removability: *Provide removable tape capable of being removed from bituminous concrete and Portland cement concrete pavement intact or in substantially large strips, either manually or by a mechanical roll-up device, at temperatures above 40°F, without the use of heat, solvents, grinding or blasting.*

102-10.4 Temporary Retroreflective Pavement Markers (RPM's): *Use markers listed on the APL and meeting the requirements of 990-5. Apply all markers in accordance with the FDOT Design Standards, Index No. 600, prior to opening the road to traffic. Replace markers any time after installation when more than three consecutive markers fail or are missing, at no expense to the Owner, in a timely manner, as directed by the Engineer.*

102-11 Method of Measurement.

102-11.1 General: *Devices installed/used on the project on any calendar day or portion thereof, within the allowable Contract Time, including time extensions which may be*

granted, will be paid for at the Contract unit price for the applicable pay item, except those paid for as Lump Sum.

102-11.2 Traffic Control Officers: *The quantity to be paid for will be at the Contract unit price per hour (4 hour minimum) for the actual number of officers certified to be on the project site, including any law enforcement vehicles and all other direct and indirect costs. Payment will be made only for those traffic control officers specified in the Plans and authorized by the Engineer.*

102-11.3 Special Detours: *When a detour facility is specifically detailed in the Plans, or is otherwise described or detailed as a special item, and an item for separate payment is included in the proposal, the work of constructing, maintaining, and subsequently removing such detour facilities will be paid for separately. Otherwise, all traffic control devices, warning devices, barriers, signing, and pavement markings for each special detour will be included in the Lump Sum Maintenance of Traffic item.*

102-11.4 Commercial Material for Driveway Maintenance: *The quantity to be paid for will be the certified volume, in cubic yards, of all materials authorized by the Engineer, acceptably placed and maintained for driveway maintenance. The volume, which is authorized to be reused, and which is acceptably salvaged, placed, and maintained in other designated driveways will be included again for payment.*

102-11.5 Work Zone Signs: *The number of temporary post-mounted signs (temporary regulatory, warning and guide) certified as installed/used on the project will be paid for under Lump Sum MOT. Temporary portable signs (excluding mesh signs) and vehicular mounted signs will be included for payment under work zone signs, only if used in accordance with the FDOT Design Standards.*

102-11.6. Business Signs: *The number of business signs certified as installed/used on the project will be paid for under Lump Sum MOT.*

102-11.7 High Intensity Flashing Lights: *The number of high intensity flashing lights (Type B) certified as installed/used on the project will be paid for under Lump Sum MOT.*

102-11.8 Channelizing Devices: *The number of Type I, Type II, direction indicator barricade, Type III, vertical panel, drum and longitudinal channelizing devices certified as installed/used on the project meeting the requirements of the FDOT Design Standards, Index No. 600 and have been properly maintained will be paid for under Lump Sum MOT.*

102-11.9 Barrier Wall (Temporary): *The Contract unit price for barrier wall (temporary) will be full compensation for furnishing, installing, maintaining, and removing the barrier wall. When called for, the Contract unit price for barrier wall (temporary/relocate) will be full compensation for relocating the barrier. The certified quantity to be paid for will be determined by the number of sections times the nominal length of each section.*

102-11.10 Barrier Delineators: *The number of barrier delineators, installed on top of barrier wall, used on the project, meeting the requirements of the FDOT Design Standards and Section 705.*

102-11.11 Arrow Board: *Will be paid for under Lump Sum MOT.*

102-11.12 Portable Changeable Message Sign: *Will be paid for under Lump Sum MOT.*

102-11.13 Portable Regulatory Signs: *Will be paid for under Lump Sum MOT.*

102-11.14 Radar Speed Display Unit: *Will be paid for under Lump Sum MOT if applicable.*

102-11.15 Temporary Signalization and Maintenance: *For existing intersections, the*

quantity will be paid for under Lump Sum MOT.. No separate payment will be made for temporary signalization and maintenance at new intersections.

102-11.16 Temporary Traffic Detection and Maintenance: For existing intersections, the quantity to be paid for will be the number of signalized intersections per day beginning the day Contract Time begins and ending the day the permanent detection is operational and the final lane configuration is in place. For temporary and new intersections, the quantity to be paid for will be the number of signalized intersections per day beginning the day the temporary detection is functional and ending the day: the permanent detection is operational and the final lane configuration is in place for a new intersection; or, when the detection is removed for a temporary intersection.

102-11.17 Work Zone Pavement Markings: The quantities, furnished and installed, to be paid for will be the length of skip and solid pavement markings, and the area of pavement markings placed as follows(if applicable):

(a) The total transverse distance, in feet, of skip pavement marking authorized and acceptably applied. The length of actual applied line will depend on the skip ratio of the material used. Measurement will be the distance from the beginning of the first stripe to the end of the last stripe with proper deductions made for unpainted intervals as determined by plan dimensions or stations, subject to 9-1.3.

(b) The net length, in feet, of solid pavement marking authorized and acceptably applied.

(c) The number of directional arrows or pavement messages authorized and acceptably applied.

(d) The number of temporary RPM's authorized and acceptably applied.

102-11.18 Temporary Raised Rumble Strips: If applicable, the quantity to be paid for will be the number of calendar days, or portions thereof, that temporary raised rumble strips are certified as installed/used on the project within the Contract Time. The number of strips used must meet the requirements of the FDOT Design Standards, Index No. 600. No adjustment will be made to the "per day" measurement for the number of strips or sets used, or for the number of times the sets are relocated.

102-11.19 Temporary Lane Separator: If applicable, The quantity of temporary lane separator to be paid for will be plan quantity, in feet, including drainage gaps, completed and accepted.

102-12 Submittals.

102-12.1 Submittal Instructions: Prepare a certification of quantities, using the Owner's current approved form, for certified MOT payment items for each project in the Contract. Submit the certification of quantities to the Engineer. The Owner will not pay for any disputed items until the Engineer approves the certification of quantities.

102-12.2 Contractor's Certification of Quantities: Request payment by submitting a certification of quantities as directed by the Engineer, based on the amount of work done or completed. Ensure the certification consists of the following:

(a) Contract Number, Certification Number, Certification Date and the period that the certification represents.

(b) The basis for arriving at the amount of the progress certification, less payments previously made and less an amount previously retained or withheld. The basis will include a detail breakdown provided on the certification of items of payment in accordance with 102-13. After the initial setup of the MOT items and counts, the interval for recording the counts will be

made weekly on the certification sheet unless there is a change. This change will be documented on the day of occurrence. Some items may necessitate a daily interval of recording the counts.

102-13 Basis of Payment (Where applicable).

102-13.1 Maintenance of Traffic (General Work): *When an item of work is included in the proposal, price and payment will be full compensation for all work and costs specified under this Section except as may be specifically covered for payment under other items.*

102-13.2 Traffic Control Officers: *Price and payment will be full compensation for the services of the traffic control officers.*

102-13.3 Special Detours: *Price and payment will be full compensation for providing all detour facilities shown in the Plans and all costs incurred in carrying out all requirements of this Section for general MOT within the limits of the detour, as shown in the Plans.*

102-13.4 Commercial Materials for Driveway Maintenance: *Price and payment will be full compensation for all work and materials specified for this item, including specifically all required shaping and maintaining of driveways.*

102-13.5 Work Zone Signs: *Price and payment will be full compensation for all work and materials for furnishing signs, supports and necessary hardware, installation, relocating, maintaining and removing signs.*

102-13.6. Business Signs: *Price and payment will be full compensation for all materials and labor required for furnishing, installing, relocating, maintaining, and removing the signs as well as the cost of installing any logos provided by business owners.*

102-13.7 High Intensity Warning Lights: *Price and payment will be full compensation for furnishing, installing, operating, relocating, maintaining and removing high intensity flashing lights (Type B).*

102-13.8 Channelizing Devices: *Prices and payment will be full compensation for furnishing, installing, relocating, maintaining and removing the channelizing devices, including the costs associated with attached warning lights as required.*

102-13.9 Barrier Wall (Temporary): *Price and payment will be full compensation for furnishing, installing, maintaining, and removing the barrier. When called for, barrier wall (temporary) (relocate) will be full compensation for relocating the barrier.*

102-13.10 Barrier Delineators: *No separate payment will be made for barrier delineators installed on top of temporary barrier wall. The cost of furnishing, installing and maintaining the barrier delineators will be included in the cost of the temporary barrier wall.*

102-13.11 Glare Screen (Temporary): *NA*

102-13.12 Temporary Crash Cushion (Redirective/Gating): *Price and payment will be full compensation for furnishing, installing, maintaining and subsequently removing such crash cushions.*

102-13.13 Temporary Guardrail: *Price and payment will be full compensation for furnishing all materials required for a complete installation, including end anchorage assemblies and any end connections to other structures and for installing, maintaining and removing guardrail.*

102-13.14 Arrow Board: *Price and payment will be full compensation for furnishing, installing, operating, relocating, maintaining and removing arrow boards.*

102-13.15 Portable Changeable Message Sign: *Price and payment will be full*

compensation for furnishing, installing, operating, relocating, maintaining and removing portable changeable message signs.

102-13.16 Portable Regulatory Signs: *Price and payment will be full compensation for furnishing, installing, relocating, maintaining and removing a completely functioning system as described in these Specifications portable regulatory signs. Price and payment will be full compensation for furnishing, installing, operating, relocating, maintaining and removing portable regulatory signs. Payment will include all labor, materials, incidentals, repairs and any actions necessary to operate and maintain the unit at all times that work is being performed or traffic is being affected by construction and/or MOT operations.*

102-13.17 Radar Speed Display Unit: *Price and payment will be made only for a completely functioning system as described in these specifications. Payment will include all labor, hardware, accessories, signs, and incidental items necessary for a complete system. Payment will include any measurements needed to insure that the unit conforms to all specification requirements.*

Payment will include all labor, materials, incidentals, repairs and any actions necessary to operate and maintain the unit at all times that work is being performed or traffic is being affected by construction and/or MOT operations. Price and payment will be full compensation for furnishing, installing, operating, relocating, maintaining and removing radar speed display unit.

102-13.18 Temporary Signalization and Maintenance: *Price and payment will constitute full compensation for furnishing, installing, operating, maintaining and removing temporary traffic control signals including all equipment and components necessary to provide an operable traffic signal. Payment will be withheld for each day at each intersection where the temporary signalization is not operational within 12 hours after notification.*

102-13.19 Temporary Traffic Detection and Maintenance: *Price and payment will constitute full compensation for furnishing, installing, operating, maintaining and removing temporary traffic detection including all equipment and components necessary to provide an acceptable signalized intersection. Take ownership of all equipment and components. Payment will be withheld for each day at each intersection where the temporary detection is not operational within 12 hours after notification.*

102-13.20 Temporary Raised Rumble Strips: *Price and payment will be full compensation for all work and materials described in this Section, including all cleaning and preparing of surfaces, disposal of all debris, furnishing of all materials, application, curing, removal, reinstalling and protection of all items, protection of traffic, furnishing of all tools, machines and equipment, and all incidentals necessary to complete the work.*

102-13.21 Work Zone Pavement Markings: *Price and payment will be full compensation for all work specified including, all cleaning and preparing of surfaces, furnishing of all materials, application, curing and protection of all items, protection of traffic, furnishing of all tools, machines and equipment, and all incidentals necessary to complete the work. Final payment will be withheld until all deficiencies are corrected. Removable tape may be substituted for work zone paint at no additional cost to the Owner. Payment for temporary RPMs used to supplement line markings will be paid for under temporary retroreflective pavement markers. Install these markers as detailed in the FDOT Design Standards.*

102-13.22 Temporary Lane Separator: *Price and payment will be full compensation for all work specified in this Section.*

SECTION 104
PREVENTION, CONTROL, AND ABATEMENT OF
EROSION AND WATER POLLUTION

104-1 Description.

Provide erosion control measures on the project and in areas outside the right-of-way where work is accomplished in conjunction with the project, so as to prevent pollution of water, detrimental effects to public or private property adjacent to the project right-of-way and damage to work on the project. Construct and maintain temporary erosion control features or, where practical, construct and maintain permanent erosion control features as shown in the Plans or as may be directed by the Engineer.

104-2 General.

Coordinate the installation of temporary erosion control features with the construction of the permanent erosion control features to the extent necessary to ensure economical, effective, and continuous control of erosion and water pollution throughout the life of the Contract. Due to unanticipated conditions, the Engineer may direct the use of control features or methods other than those included in the original Contract.

104-3 Control of Contractor's Operations Which May Result in Water Pollution.

Prevent pollution of streams, canals, lakes, reservoirs, and other water impoundments with fuels, oils, bitumens, calcium chloride, or other harmful materials. Also, conduct and schedule operations to avoid or otherwise minimize pollution or siltation of such water impoundments, and to avoid interference with movement of migratory fish. Do not dump any residue from dust collectors or washers into any live stream.

Restrict construction operations in rivers, streams, lakes, tidal waters, reservoirs, canals, and other water impoundments to those areas where it is necessary to perform filling or excavation to accomplish the work shown in the Plans and to those areas which must be entered to construct temporary or permanent structures. As soon as conditions permit, promptly clear rivers, streams, and impoundments of all obstructions placed therein or caused by construction operations.

Do not frequently ford live streams with construction equipment. Wherever an appreciable number of stream crossings are necessary at any one location, use a temporary bridge or other structure.

Except as necessary for construction, do not deposit excavated material in rivers, streams, canals, or impoundments, or in a position close enough thereto, to be washed away by high water or runoff.

Where pumps are used to remove highly turbid waters from enclosed construction areas such as cofferdams or forms, treat the water by one or more of the following methods prior to discharge into State waters: pumping into grassed swales or appropriate vegetated areas or sediment basins, or confined by an appropriate enclosure such as turbidity barriers when other methods are not considered appropriate.

Do not disturb lands or waters outside the limits of construction as staked, except as authorized by the Engineer.

Obtain the Engineer's approval for the location of, and method of operation in, borrow pits, material pits, and disposal areas furnished for waste material from the project (other than commercially operated sources) such that erosion during and after completion of the work will not result in probability of detrimental siltation or water pollution.

104-4 Materials for Temporary Erosion Control.

The Engineer will not require testing of materials used in construction of temporary erosion control features other than as provided for geotextile fabric in 985-3 unless such material is to be incorporated into the completed project. When no testing is required, the Engineer will base acceptance on visual inspection.

The Contractor may use new or used materials for the construction of temporary silt fence, staked turbidity barriers, and floating turbidity barrier not to be incorporated into the completed project, subject to the approval of the Engineer.

104-5 Preconstruction Requirements.

At the Preconstruction Conference, provide to the Owner an Erosion Control Plan meeting the requirements or special conditions of all permits authorizing project construction. If no permits are required or the approved permits do not contain special conditions or specifically address erosion and water pollution, the project Erosion Control Plan will be governed by 7-1.1, 7-2.2, 7-8.1, 7-8.2, and Section 104.

When a DEP generic permit is issued, the Contractor's Erosion Control Plan shall be prepared to accompany the required Stormwater Pollution Prevention Plan (SWPPP). Ensure the Erosion Control Plan includes procedures to control off-site tracking of soil by vehicles and construction equipment and a procedure for cleanup and reporting of non-storm water discharges, such as contaminated groundwater or accidental spills. Do not begin any soil disturbing activities until Owner approval of the Contractor's Erosion Control Plan, including required signed certification statements.

Failure to sign any required documents or certification statements will be considered a default of the Contract. Any soil disturbing activities performed without the required signed documents or certification statements may be considered a violation of the DEP Generic Permit.

When the SWPPP is required, prepare the Erosion Control Plan in accordance with the planned sequence of operations and present in a format acceptable to the Owner. The Erosion Control Plan shall describe, but not be limited to, the following items or activities:

(1) For each phase of construction operations or activities, supply the following information:

- (a) Locations of all erosion control devices*
- (b) Types of all erosion control devices*
- (c) Estimated time erosion control devices will be in operation*
- (d) Monitoring schedules for maintenance of erosion control devices*
- (e) Methods of maintaining erosion control devices*
- (f) Containment or removal methods for pollutants or hazardous wastes*

(2) The name and telephone number of the person responsible for monitoring and maintaining the erosion control devices.

(3) Submit for approval the Erosion Control Plans meeting paragraphs 3a, 3b, or 3c below:

(a) Projects permitted by the South Florida Water Management District or require the following:

Obtain the Engineer's approval of the Erosion Control Plan. Do not begin construction activities until the Erosion Control Plan receives written approval from the Engineer.

104-6 Construction Requirements.

104-6.1 Limitation of Exposure of Erodible Earth:

The Engineer may limit the surface areas of unprotected erodible earth exposed by the construction operation and may direct the Contractor to provide erosion or pollution control measures to prevent contamination of any river, stream, lake, tidal waters, reservoir, canal, or other water impoundments or to prevent detrimental effects on property outside the project right-of-way or damage to the project. Limit

the area in which excavation and filling operations are being performed so that it does not exceed the capacity to keep the finish grading, turf, sod, and other such permanent erosion control measures current in accordance with the accepted schedule.

Do not allow the surface area of erodible earth that clearing and grubbing operations or excavation and filling operations expose to exceed 750,000 square feet without specific prior approval by the Engineer. This limitation applies separately to clearing and grubbing operations and excavation and filling operations.

The Engineer may increase or decrease the amount of surface area the Contractor may expose at any one time.

104-6.2 Incorporation of Erosion and Sediment Control Features:

Incorporate permanent erosion control features into the project at the earliest practical time. Use temporary erosion and sediment control features found in the State of Florida Erosion and Sediment Control Designer and Reviewer Manual (E&SC Manual) to correct conditions that develop during construction which were not foreseen at the time of design, to control erosion and sediment prior to the time it is practical to construct permanent control features, or to provide immediate temporary control of erosion and sediment that develops during normal construction operations, which are not associated with permanent erosion control features on the project. An electronic version of the E&SC Manual can be found at the following URL:

*[http://www.dot.state.fl.us/specificationsoffice/Implemented/URLinSpecs/Files/FLERosi
o nSedimentManual.pdf](http://www.dot.state.fl.us/specificationsoffice/Implemented/URLinSpecs/Files/FLERosi
o nSedimentManual.pdf)*

Install all sediment control devices in a timely manner to ensure the control of sediment and the protection of lakes, streams, gulf or ocean waters, or any wetlands associated therewith and to any adjacent property outside the right-of-way as required.

At sites where exposure to such sensitive areas is prevalent, complete the installation of any sediment control device prior to the commencement of any earthwork.

After installation of sediment control devices, repair portions of any devices damaged at no expense to the Owner. The Engineer may authorize temporary erosion and sediment control features when finished soil layer is specified in the Contract and the limited availability of that material from the grading operations will prevent scheduled progress of the work or damage the permanent erosion control features.

104-6.3 Scheduling of Successive Operations:

Schedule operations such that the area of unprotected erodible earth exposed at any one time is not larger than the minimum area necessary for efficient construction operations, and the

duration of exposure of uncompleted construction to the elements is as short as practicable. Schedule and perform clearing and grubbing so that grading operations can follow immediately thereafter. Schedule and perform grading operations so that permanent erosion control features can follow immediately thereafter if conditions on the project permit.

104-6.4 Details for Temporary Erosion and Sediment Control Features.

104-6.4.1 General: *Use temporary erosion, sediment and water pollution control features found in the E&SC Manual. These features consist of, but are not limited to, temporary turf, rolled erosion control products, sediment containment systems, runoff control structures, sediment barriers, inlet protection systems, silt fences, turbidity barriers, and chemical treatment. For design details for some of these items, refer to the FDOT Design Standards and E&SC Manual.*

104-6.4.2 Temporary Turf: *The Engineer may designate certain areas of turf or sod as temporary erosion control features. For areas not defined as sod, constructing temporary turf by seeding only is not an option for temporary erosion control under this Section.*

104-6.4.3 Runoff Control Structures: *Construct runoff control structures in accordance with the details shown in the Plans, the E&SC Manual, or as may be approved as suitable to adequately perform the intended function.*

104-6.4.4 Sediment Containment Systems: *Construct sediment containment systems in accordance with the details shown in the Plans, the E&SC Manual, or as may be approved as suitable to adequately perform the intended function. Clean out sediment containment systems as necessary in accordance with the Plans or as directed.*

104-6.4.5 Sediment Barriers: *Provide and install sediment barriers according to details shown in the Plans, as directed by the Engineer, or as shown in the E&SC Manual to protect against downstream accumulation of sediment. Sediment Barriers include, but are not limited to synthetic bales, silt fence, fiber logs and geosynthetic barriers. Reusable barriers that have had sediment deposits removed may be reinstalled on the project as approved by the Engineer.*

104-6.4.6 Silt Fence.

104-6.4.6.1 General: *Furnish, install, maintain, and remove silt fences, in accordance with the manufacturer's directions, these Specifications, the details as shown in the Plans, the FDOT Design Standards, and the E&SC Manual.*

104-6.4.6.2 Materials and Installation: *Use a geotextile fabric made from woven or nonwoven fabric, meeting the physical requirements of Section 985 according to those applications for erosion control.*

Choose the type and size of posts, wire mesh reinforcement (if required), and method of installation. Do not use products which have a separate layer of plastic mesh or netting. Provide a durable and effective silt fence that controls sediment comparable to the FDOT Design Standards and the E&SC Manual.

Erect silt fence at upland locations, across ditch lines and at temporary locations shown in the Plans or approved by the Engineer where continuous construction activities change the natural contour and drainage runoff. Do not attach silt fence to existing trees unless approved by the Engineer.

104-6.4.6.3 Inspection and Maintenance: *Inspect all silt fences immediately after each rainfall and at least daily during prolonged rainfall. Immediately correct any*

deficiencies. In addition, make a daily review of the location of silt fences in areas where construction activities have changed the natural contour and drainage runoff to ensure that the silt fences are properly located for effectiveness. Where deficiencies exist, install additional silt fences as directed by the Engineer.

Remove sediment deposits when the deposit reaches approximately 1/2 of the volume capacity of the silt fence or as directed by the Engineer. Dress any sediment deposits remaining in place after the silt fence is no longer required to conform to the finished grade, and prepare and seed them in accordance with Section 570.

104-6.4.7 Floating Turbidity Barriers and Staked Turbidity Barriers:

Install, maintain, and remove turbidity barriers to contain turbidity that may occur as the result of dredging, filling, or other construction activities which may cause turbidity to occur in the waters of the State. The Contractor may need to deploy turbidity barriers around isolated areas of concern such as seagrass beds, coral communities, etc. both within as well as outside the right-of-way limits. The Engineer will identify such areas. Place the barriers prior to the commencement of any work that could impact the area of concern. Install the barriers in accordance with the details shown in the Plans or as approved by the Engineer.

Ensure that the type barrier used and the deployment and maintenance of the barrier will minimize dispersion of turbid waters from the construction site. The Engineer may approve alternate methods or materials. Operate turbidity barriers in such a manner to avoid or minimize the degradation of the water quality of the surrounding waters and minimize damage to areas where floating barriers installed.

104-6.4.8 Inlet Protection System: Furnish and install inlet protection systems as shown in the Plans, FDOT Design Standards and the E&SC Manual.

104-6.4.9 Rolled Erosion Control Products (RECPs):

104-6.4.9.1 General: Install RECPs in locations where temporary protection from erosion is needed. Two situations occur that require artificial coverings. The two situations have differing material requirements, which are described below.

(1) Use RECPs composed of natural or synthetic fiber mats, plastic sheeting, or netting as protection against erosion, when directed by the Engineer, during temporary pauses in construction caused by inclement weather or other circumstances. Remove the material when construction resumes.

(2) Use RECPs as erosion control blankets, at locations shown in the Plans, to facilitate plant growth while permanent grassing is being established. For the purpose described, use non-toxic, biodegradable, natural or synthetic woven fiber mats. Install erosion control blankets capable of sustaining a maximum design velocity of 6.5 ft. /sec as determined from tests performed by Utah State University, Texas Transportation Institute or an independent testing laboratory approved by the Owner. Furnish to the Engineer, two certified copies of manufacturers test reports showing that the erosion control blankets meet the requirements of this Specification. Certification must be attested, by a person having legal authority to bind the manufacturing company. Also, furnish two 4 by 8 inch samples for product identification. The manufacturers test records shall be made available to the Owner upon request. Leave the material in place, as installed, to biodegrade.

104-6.4.10 Chemical Treatment: Provide chemical treatment in accordance with the E&SC Manual. Chemical treatment may be used to clarify turbid or sediment laden water that does not yet meet state water quality standards or as an amendment to other erosion prevention and sediment control products to aid in their performance. The contractor must

provide all of the required toxicity testing information in accordance with the E&SC Manual to the Engineer for review and acceptance prior to using any chemical treatment on the project site.

104-6.5 Removal of Temporary Erosion Control Features: *In general, remove or incorporate into the soil any temporary erosion control features existing at the time of construction of the permanent erosion control features in an area of the project in such a manner that no detrimental effect will result. The Engineer may direct that temporary features be left in place.*

104-7 Maintenance of Erosion and Sediment Control Features.

104-7.1 General: *Provide routine maintenance of permanent and temporary erosion and sediment control features, at no expense to the Owner, until the project is complete and accepted. If reconstruction of such erosion and sediment control features is necessary due to the Contractor's negligence or carelessness or, in the case of temporary erosion and sediment control features, failure by the Contractor to install permanent erosion control features as scheduled, the Contractor shall replace such erosion control features at no expense to the Owner.*

Inspect all erosion and sediment control features at least once every seven calendar days and within 24 hours of the end of a storm of 0.50 inches or greater. Maintain all erosion control features as required in the Stormwater Pollution Prevention Plan, Contractor's Erosion Control Plan and as specified in the State of Florida Department of Environmental Protection Generic Permit for Stormwater Discharge from Large and Small Construction Activities.

104-8 Protection during Suspension of Contract Time.

If it is necessary to suspend the construction operations for any appreciable length of time, shape the top of the earthwork in such a manner to permit runoff of rainwater, and construct earth berms along the top edges of embankments to intercept runoff water. Provide temporary slope drains to carry runoff from cuts and embankments that are in the vicinity of rivers, streams, canals, lakes, and impoundments. Locate slope drains at intervals of approximately 500 feet, and stabilize them by paving or by covering with waterproof materials. Should such preventive measures fail, immediately take such other action as necessary to effectively prevent erosion and siltation. The Engineer may direct the Contractor to perform, during such suspensions of operations, any other erosion and sediment control work deemed necessary.

104-9 Method of Measurement.

When separate items for temporary erosion control features are included in the Contract, the quantities to be paid for will be: (1) the area, in square yards, of rolled erosion control products; (2) the length, in feet, of runoff control structures, measured along the surface of the work constructed; (3) the number of sediment containment systems constructed and accepted; (4) the number of sediment containment system cleanouts accomplished and accepted; (5) the length, in feet, of sediment barriers; (6) the length, in feet, of floating turbidity barrier; (7) the length, in feet, of staked turbidity barrier; (8) the number of inlet protection systems; (9) the area, in square yards, of chemical treatment. (10) the number of floc logs or drums of product for chemical treatment.

Upon acceptance by the Engineer, the quantity of floating turbidity barriers, sediment

barriers, staked turbidity barriers, and inlet protection devices will be paid for regardless of whether materials are new, used, or relocated from a previous installation on the project.

104-10 Basis of Payment.

Include in overall project cost all work specified in this Section, including construction and routine maintenance of temporary erosion control features. Separate payment will not be made. Any additional costs resulting from compliance with the requirements of this Section, other than construction, routine maintenance, and removal of temporary erosion control features, will be included in the Contract unit prices for the item or items to which such costs are related.

SECTION 105
CONTRACTOR QUALITY CONTROL GENERAL REQUIREMENTS.

105-1 General.

105-1.1 Quality Control Documentation.

105-1.1.1 Submission of Materials Certification and Reporting Test Results:

Provide certifications prior to placement of materials. Report test results at completion of the test and meet the requirements of the applicable Specifications.

105-1.1.2 Worksheets: *Make available to the Owner, when requested, worksheets used for collecting test information. Ensure the worksheets at a minimum contain the following:*

- 1. Project Identification Number,*
- 2. Time and Date,*
- 3. Laboratory Identification and Name,*
- 4. Training Identification Numbers (TIN) and initials,*
- 5. Record details as specified within the test method.*

105-1.2 Inspections to Assure Compliance with Acceptance Criteria.

105-1.2.1 General: *The Owner is not obligated to make an inspection of materials at the source of supply, manufacture, or fabrication. Provide the Engineer with unrestricted entry at all times to such parts of the facilities that concern the manufacture, fabrication, or production of the ordered materials. Bear all costs incurred in determining whether the material meets the requirements of these Specifications.*

105-1.2.2 Quality Control Inspection: *Provide all necessary inspection to assure effective Quality Control of the operations related to materials acceptance. This includes but is not limited to sampling and testing, production, storage, delivery, construction and placement. Ensure that the equipment used in the production and testing of the materials provides accurate and precise measurements in accordance with the applicable Specifications. Maintain a record of all inspections, including but not limited to, date of inspection, results of inspection, and any subsequent corrective actions taken. Make available to the Owner the inspection records, when requested.*

105-1.2.3 Notification of Placing Order: *Order materials sufficiently in advance of their incorporation in the work to allow time for sampling, testing and inspection. Notify the Engineer, prior to placing orders for materials. Submit to the Engineer a fabrication schedule for all items requiring commercial inspection, before or at the preconstruction meeting. Notify the Engineer at least 30 days before beginning any production and include a production schedule.*

105-2 Quality Control Program.

105-2.1 General: *Certain operations require personnel with specific qualifications. Certain materials require production under an approved Quality Control (QC) Plan to ensure that these materials meet the requirements of the Contract Documents. Applicable materials include hot mix asphalt, Portland cement concrete (Structural), earthwork, cementitious materials, timber, steel and miscellaneous metals, galvanized metal products, prestressed and/or precast concrete products and drainage products. For all applicable materials included in the Contract, submit a QC Plan prepared in accordance with the requirements of this Section to the Engineer. Do not incorporate any of these materials into the project prior to the Engineer's approval of the QC Plan.*

Steel and Miscellaneous Metal products, including aluminum, are defined as the metal components of bridges, including pedestrian and moveable bridges, overhead and cantilevered sign supports, ladders and platforms, bearings, end wall grates, roadway gratings, drainage items, expansion joints, roadway decking, shear connectors, handrails, galvanized products,

fencing, guardrail, light poles, high mast light poles, standard mast arm assemblies and monotube assemblies, stay in-place forms, casing pipe, strain poles, fasteners, connectors and other hardware. When accreditation or certification is required, make supporting documents from the two previous inspections performed by the accrediting or certifying agency available to the Owner upon request.

105-2.2 Compliance with the Materials Manual.

Producers of Flexible Pipe shall meet the requirements of Section 6.1, Volume II of the FDOT's Materials Manual, which may be viewed at the following URL:

<http://www.dot.state.fl.us/specificationoffice/Implemented/URLinSpecs/Files/section61.pdf>.

Producers of Precast Concrete Pipe shall meet the requirements of Section 6.2, Volume II of the FDOT's Materials Manual, which may be viewed at the following URL:

<http://www.dot.state.fl.us/specificationoffice/Implemented/URLinSpecs/Files/section62.pdf>.

Producers of Precast Concrete Drainage Structures shall meet the requirements of Section 6.3, Volume II of the FDOT's Materials Manual, which may be viewed at the following URL:

<http://www.dot.state.fl.us/specificationoffice/Implemented/URLinSpecs/Files/section63.pdf>.

Producers of Precast/Prestressed Concrete Products shall meet the requirements of Sections 8.1 and 8.3 of the FDOT's Materials Manual, which may be viewed at the following URLs:

<http://www.dot.state.fl.us/specificationoffice/Implemented/URLinSpecs/Files/section81.pdf>.

<http://www.dot.state.fl.us/specificationoffice/Implemented/URLinSpecs/Files/section83.pdf>.

Producers of Precast Prestressed Concrete Products using Self Consolidating Concrete shall meet the requirements of Section 8.4, Volume II of the FDOT's Materials Manual, which may be viewed at the following URL:

<http://www.dot.state.fl.us/specificationoffice/Implemented/URLinSpecs/Files/section84.pdf>

Producers of Incidental Precast/Prestressed Concrete Products shall meet the requirements of Section 8.2, Volume II of the FDOT's Materials Manual, which may be viewed at the following URL:

<http://www.dot.state.fl.us/specificationoffice/Implemented/URLinSpecs/Files/section82.pdf>.

Producers of Portland Cement Concrete shall meet the requirements of Section 9.2, Volume II of the FDOT's Materials Manual, which may be viewed at the following

URL:

<http://www.dot.state.fl.us/specificationoffice/Implemented/URLinSpecs/Files/section92.pdf>.

Producers of Structural Steel and Miscellaneous Metal Components shall meet the requirements of Sections 11.1, 11.2, 11.3, 11.4 and 11.5 of the FDOT's Materials Manual, which may be viewed at the following URLs:

<http://www.dot.state.fl.us/specificationoffice/Implemented/URLinSpecs/Files/section111.pdf>

<http://www.dot.state.fl.us/specificationoffice/Implemented/URLinSpecs/Files/section112.pdf>

<http://www.dot.state.fl.us/specificationoffice/Implemented/URLinSpecs/files/section113.pdf>

<http://www.dot.state.fl.us/specificationoffice/Implemented/URLinSpecs/files/Section114.pdf>

<http://www.dot.state.fl.us/specificationoffice/Implemented/URLinSpecs/files/Section115.pdf>

Producers of Fiber Reinforced Polymer Composites shall meet the requirements of Section 12-1, Volume II of the FDOT's Materials Manual, which may be viewed at the following URL:

<http://www.dot.state.fl.us/specificationoffice/Implemented/URLinSpecs/files/section121.pdf>

105-2.3 Hot Mix Asphalt, Portland Cement Concrete (Structural), Earthwork, Cementitious Materials, Timber, Steel and Miscellaneous Metals, Galvanized Metal Products, Prestressed and/or Precast Concrete Products and Drainage Products Quality

Control Program: *Have an accepted Quality Control Program, developed in accordance with this Section, during the production of materials to be used on this project.*

105-2.4 Prestressed Concrete Quality Control Program: *Ensure that prestressed concrete plants are qualified.*

105-2.5 Steel and Miscellaneous Metals Quality Control Program: *Ensure that the fabricators of Steel and miscellaneous metal products are qualified. Obtaining qualification requires an accepted Quality Control Plan, developed in accordance with this Section. A current American Institute for Steel Construction (AISC) certification is a requirement for the Quality Control Acceptance Program of the steel and miscellaneous metal fabricators, provided that AISC certification program is available for the category of the fabrication products.*

105-2.6 Producers Quality Control Plan Submittal: *Depending on the type of products, the producers shall submit their proposed Quality Control Plans to the State Materials Office or to the District Materials Office, as described below:*

105-2.6.1 State Materials Office: *Producers of cementitious materials, steel and miscellaneous metals, galvanized metal products, and aggregates must submit their proposed Quality Control Plan to the State Materials Office for review and acceptance.*

105-2.6.2 District Materials Office: *Producers of hot mix asphalt, Portland cement concrete (Structural), earthwork, timber, prestressed and/or precast concrete products and drainage products must submit their proposed Quality Control Plan to the local District Materials Office for acceptance. Producers located outside the State must contact the State Materials Office for address information of the District Materials Office responsible for the review of the proposed Quality Control Program.*

105-2.7 Contractor's Quality Control Plan: *Have an approved Quality Control Plan meeting the requirements of this Section for the transportation, storage, placement, and other related construction operations required by the Contract Documents.*

105-3 Contractor Certification of Compliance.

Provide the Engineer with a notarized monthly certification of compliance with the requirements of this Section, to accompany each progress estimate, on a form provided by the Engineer. The Owner may not authorize payment of any progress estimate not accompanied by an executed certification document.

Final payment in accordance with 9-8 will not be made until a final notarized certification summarizing all QC exceptions has been submitted.

105-4 Guidelines for Development of the Quality Control Plan.

105-4.1 General: *Use the following guidelines for developing the QC Plan. Provide detailed policies, methods and procedures to ensure the specified quality of all applicable materials and related production and field operations. Include other items in addition to these guidelines as necessary.*

105-4.2 Personnel:

105-4.2.1 Qualifications: *Submit the Training Identification Numbers (TINs) or any other information which will be traceable to the certification agency's training location and dates for all technicians performing sampling, testing and inspection for both field and laboratory tests. Provide the names of the CTQP certifications and other pertinent certifications*

held and the expiration dates for each certification for each technician. Include employed and subcontracted technicians.

105-4.2.2 Level of Responsibility: *Identify the primary contact for the Owner. Identify roles and responsibilities of various personnel involved in the QC process.*

105-5. Raw Materials:

105-5.1 Source: *Identify the sources of raw materials. Provide locations and plant or mine numbers when applicable.*

105-5.1.1 Certification: *Describe methods of verifying compliance of certification with the specifications.*

105-5.1.2 Disposition of Failing Materials: *Describe the system for controlling non-conforming materials, including procedures for identification, isolation and disposition.*

105-5.2 Storage Facilities for Raw Materials: *Describe measures and methods, including bedding details, for preventing segregation, contamination and degradation.*

Describe methods of identifying individual materials. Where applicable, submit a site plan showing the locations of various materials.

105-5.3 Production Equipment: *Describe calibration frequencies, maintenance schedule and procedures for production equipment.*

105-5.4 Plant Requirements:

105-5.4.1 Plant Identification: *For those facilities producing materials listed in Article 105-3, provide the mailing address, physical address including county and X-Y (Latitude and Longitude) coordinates of the plant, telephone and fax numbers, E-mail address, primary contact at the plant, responsible person in charge, Owner information and Vendor Number and other information as required.*

105-5.4.2 Process Control System: *Describe the methods and measures established to ensure Contract compliance for the produced materials that are supplemental to the QC sampling and testing program described in the Contract Documents. These methods and measures will include, but are not limited to, inspection schedule, additional sampling and testing, maintenance schedule, etc.*

105-5.4.3 Loading and Shipping Control: *Describe the methods and measures for preventing segregation, contamination and degradation during loading and shipping operations. Describe the methods established for materials to be in compliance with the specifications at the point of use.*

105-5.5 Types of Products Generated: *Describe the products the plant is approved to produce under applicable guidelines.*

105-5.6 Other Requirements.

105-5.6.1 Copy of Certification: *Attach examples of certifications issued by the plant/Contractor for the products supplied.*

105-5.6.2 Statement of Compliance: *Include a statement of compliance with all quality requirements set forth in the Contract Documents.*

105-5.6.3 Information on Producers with Accepted Quality Control Programs: *Identify the Producers of materials listed in 105-2.1 for the project.*

105-5.6.4 Describing Documentation Procedure: *Identify location of document storage to enable review. Include QC charts, qualification/accreditation records, inspection reports, and other pertinent/supporting documents for an approved QC Plan.*

105-5.7 Final Manufactured Product - Plant Operations: *Describe inspection schedule and methods for identifying defects and non-compliance with the specifications. Describe corrective actions and methods to resolve them.*

105-5.7.1 Storage: *When storage of the produced materials is required and it is not defined in the Contract Documents, describe the methods and duration for storage. Include*

measures and methods for preventing segregation, contamination and degradation during storage.

105-5.7.2 Disposition of Failing Materials: *When not described in the specifications, describe the methods and measures for identifying and controlling the failing materials. Include preventive and corrective measures. Describe disposition of failing materials.*

105-5.8 Final Manufactured Product - Field Operations:

105-5.8.1 Transportation: *Describe the method of delivery from the point of production/storage to the point of placement.*

105-5.8.2 Storage: *When storage of the produced materials is required and it is not defined in the Contract Documents, describe the methods and duration for storage. Include measures and methods for preventing segregation, contamination and degradation during storage.*

105-5.8.3 Placement: *Describe the methods and identify the type of equipment used in incorporation of the materials into the project.*

105-5.8.4 Disposition of Failing Materials: *When not described in the specifications, describe the methods and measures for identifying and controlling the failing materials. Include preventive and corrective measures. Describe disposition of failing materials.*

105-5.9 Testing Laboratories: *Identify the laboratories performing testing. Ensure that the testing laboratories comply with the Laboratory Qualification Program requirements of this Section.*

105-5.9.1 Lab Qualification Program.

Testing Laboratories must have one of the following:

1. *Current AASHTO (AAP) accreditation.*
2. *Inspected on a regular basis per ASTM D 3740 for earthwork, ASTM D 3666 for asphalt and ASTM C 1077 for concrete for test methods used in the Acceptance Program, with all deficiencies corrected, and under the supervision of a Specialty Engineer.*
3. *Current Construction Materials Engineering Council (CMEC) program accreditation or other independent inspection program accreditation acceptable to the Engineer and equivalent to a. or b. above.*

Should any qualified laboratory falsify records, the laboratory qualification will be subject to revocation by the Engineer. Falsification of project-related documentation will be subject to further investigation and penalty under state and federal laws.

It is prohibited for any contract laboratory or staff to perform Contractor Quality Control testing and any other Acceptance Program testing on the same contract.

105-6 Quality Control Plan Submittal.

Submit the QC Plan to the Engineer for approval within 21 calendar days after the Contract Award. The Engineer will review the QC Plan and respond to the Contractor within 21 calendar days of receipt.

If at any time the Contractor is not in compliance with the approved QC Plan, or a part thereof, affected portions of the plan will be disapproved. Cease work in the affected operation(s) and submit a revision to the Engineer. If the QC Plan, or a part thereof, must be revised, submit the revision to the Engineer. The Engineer will review the revision and respond within seven calendar days of receipt. Continue to work on operations that are still in compliance with the approved sections of the QC Plan.

105-7 Personnel Qualifications.

105-7.1 General: *Provide qualified personnel for sampling, testing and inspection of materials and construction activities. Ensure that qualifications are maintained during the course of sampling, testing and inspection.*

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

105-7.2 QC Manager: *Designate a QC Manager who has full authority to act as the Contractor's agent to institute any and all actions necessary for the successful implementation of the QC Plan. The QC Manager must speak and understand English. The QC Manager must be on-site at the project on a daily basis or always available upon four hours' notice to administer the QC Plan. This includes administering, implementing, monitoring, and as necessary, adjusting the processes to ensure compliance with the Contract Documents. Ensure that the QC Manager is qualified as such through the Construction Training/Qualification Program.*

Under the direction of the QC Manager, and using standard forms provided by the Engineer, summarize the daily QC activities including testing and material sampling. Since erasures are strictly prohibited on all reports and forms, use blue or colored ink. Do not use black ink. If manual corrections to original data are necessary, strike through, correct, and date the entry, including the initials of the person making the correction.

105-7.3 Worksite Traffic Supervisor: *Provide a Worksite Traffic Supervisor who is responsible for initiating, installing, and maintaining all traffic control devices as described in Section 102 and in the Contract Documents. Use approved alternate Worksite Traffic Supervisors when necessary.*

105-7.4 Flagger: *Provide trained flaggers to direct traffic where one-way operation in a single lane is in effect and in other situations as required. The Worksite Traffic Supervisor or others will provide training for flaggers.*

105-7.5 Earthwork Quality Control Personnel:

105-7.5.1 Earthwork Level I: *Ensure the technician who samples soil and earthwork materials from the roadway project, takes earthwork moisture and density readings, and records those data in the Density Log Book holds a Construction Training and Qualification Program (CTQP) Earthwork Construction Inspection Level I qualification.*

105-7.5.2 Earthwork Level II: *Ensure the technician responsible for determining the disposition of soil and earthwork materials on the roadway, and for interpreting and meeting Contract Document requirements holds a CTQP Earthwork Construction Inspection Level II qualification.*

105-7.6 Asphalt Quality Control Personnel:

105-7.6.1 Plant Technicians: *For asphalt plant operations, provide a QC technician, qualified as a CTQP Asphalt Plant Level II technician, available at the asphalt plant at all times when producing mix. Perform all asphalt plant related testing with a CTQP Asphalt Plant Level I technician. As an exception, measurements of temperature may be performed by someone under the supervision of a CTQP Plant Level II technician.*

105-7.6.2 Paving Technicians: *For paving operations (with the exception of miscellaneous or temporary asphalt), keep a qualified CTQP Asphalt Paving Level II technician on the roadway at all times when placing asphalt mix, and perform all testing with a CTQP Asphalt Paving Level I technician. As an exception, measurements of cross-slope, temperature,*

and yield (spread rate) can be performed by someone under the supervision of a CTQP Paving Level II technician at the roadway.

105-7.6.3 Mix Designer: *Ensure all mix designs are developed by individuals who are CTQP qualified as an Asphalt Hot Mix Designer.*

105-7.6.4 Documentation: *Document all QC procedures, inspection, and all test results and make them available for review by the Engineer throughout the life of the Contract. Identify in the asphalt producer's Quality Control Plan the Quality Control Manager(s) and/or Asphalt Plant Level II technician(s) responsible for the decision to resume production after a quality control failure.*

105-8. Concrete QC Personnel:

105-8.1.1 Concrete Field Technician - Level I: *Ensure technicians performing plastic property testing on concrete for materials acceptance are qualified CTQP Concrete Field Technicians Level I. Plastic property testing will include but not be limited to slump, temperature, air content, water-to-cementitious materials ratio calculation, and making and curing concrete cylinders. Duties will include initial sampling and testing to confirm specification compliance prior to beginning concrete placements, ensuring timely placement of initial cure and providing for the transport of compressive strength samples to the designated laboratories.*

105-8.1.2 Concrete Field Inspector - Level II: *Ensure field inspectors responsible for the quality of concrete being placed on major bridge projects are qualified CTQP Concrete Field Inspectors Level II. A Level II Inspector must be present on the jobsite during all concrete placements. Prior to the placement of concrete, the inspector will inspect the element to be cast to ensure compliance with Contract Documents. A Level II Inspector's duties may include ensuring that concrete testing, inspection, and curing in the field are performed in accordance with the Contract Documents. The QC Inspector will inform the Verification Inspector of anticipated concrete placements and LOT sizes.*

105-8.1.3 Concrete Laboratory Technician – Level I: *Ensure technicians testing cylinders and recording concrete strength for material acceptance are qualified CTQP Concrete Laboratory Technicians Level I. Duties include final curing, compressive strength testing, and the recording/reporting of all test data.*

105-8.2 Supervisory Personnel – Post-Tensioned and Movable Bridge Structures:

105-8.2.1 General: *Provide supervisory personnel meeting the qualification requirements only for the post-tensioned and movable bridge types detailed in this Article. Submit qualifications to the Engineer at the pre-construction conference. Do not begin Construction until the qualifications of supervisory personnel have been approved by the Engineer.*

105-8.2.2 Proof of License or Certification: *Submit a copy of the Professional Engineer license current and in force issued by the state in which registration is held. The license must be for the field of engineering that the construction work involves such as Civil, Electrical or Mechanical. Under certain circumstances Florida registration may be required.*

Submit a copy of the license issued by the State of Florida for tradesmen that require a license indicating that the license is in force and is current. Submit a copy of the certification issued by the Instrumentation, Systems and Automation Society of America for each Certified Control Systems Technician.

105-8.2.3 Experience Record: *Submit the following information for supervisory personnel to substantiate their experience record. The supervisor (project engineer, superintendent/manager or foreman) seeking approval must provide a notarized certification statement attesting to the completeness and accuracy of the information submitted. Provide the following experience information for each individual seeking approval as a supervisor:*

Project owner's name and telephone number of an owner's representative, project identification number, state, city, county, highway number and feature intersected.

Provide a detailed description of each bridge construction experience, and the level of supervisory authority during that experience. Report the duration in weeks, as well as begin and end dates, for each experience period.

Provide the name, address and telephone number of an individual that can verify that the experience being reported is accurate. This individual should have been an immediate supervisor unless the supervisor cannot be contacted in which case another individual with direct knowledge of the experience is acceptable.

105-8.3 Pipe and Precast Concrete Products Manufacturing Facilities Quality

Control Personnel:

105-8.3.1 General: *Obtain personnel certifications from accredited training provider.*

105-8.3.2 Precast Concrete Drainage Structures, Precast Concrete Box Culvert, Precast Concrete Pipe, Incidental Precast Concrete, and Flexible Pipe Manufacturing Facilities Quality Control Personnel:

105-8.3.2.1 Level I Quality Control Inspectors: *Ensure that the Level I Inspectors have completed a minimum of a 12-hour, approved, Level I QC Inspector training course in the respective work area. As an exception to this, ensure Flexible Pipe Level I QC Inspectors have completed a minimum of an 8-hour, approved, Level I QC Flexible Pipe Inspector training course. For Incidental Precast Concrete, as an alternative to the completion of the 12-hour training course, the Owner will accept QC personnel meeting the requirements of 105-8.11.2.4.1 and CTQP Concrete Field Technician level I certification or Precast/Prestressed Concrete Institute (PCI) Quality Control Technician/Inspector Level II certification.*

105-8.3.2.2 Level II Quality Control Inspectors: *Ensure that Level II Inspectors have completed approved Level I QC Inspector training and a minimum of a 5-hour, approved Level II QC Inspector training course in the respective work areas. For Incidental Precast Concrete, as an alternative to the completion of the 5-hour training course, the Owner will accept CTQP Concrete Field Technician Level II or PCI Quality Control Level III certifications.*

105-8.3.2.3 Plant Quality Control Manager: *Ensure that QC Manager has completed approved Level II QC Inspector training and has a minimum of 2 years construction related experience in the specific work area.*

105-8.3.2.4 Additional Requirements for Quality Control Personnel of Precast Concrete Drainage, Precast Concrete Box Culvert, and Incidental Precast Concrete Manufacturing Facilities(if applicable):

105-8.3.2.4.1 Testing Personnel: *Ensure the personnel performing plastic property tests have ACI Concrete Field Testing Technician-Grade I certification. Ensure the personnel performing laboratory compressive strength testing have ACI Concrete Laboratory Testing Technician-Grade I certification or ACI Concrete Strength Testing Technician certification.*

105-8.3.2.4.2: Batch Plant Operator: *Ensure the concrete batch plant operator is qualified as a CTQP Concrete Batch Plant Operator. As an alternative to CTQP qualification, the Owner will accept the completion of a minimum of a 6-hour, approved, Batch Plant Operator training course.*

105-8.4 Structural Steel and Miscellaneous Metals Fabrication Facility Quality Control Personnel: *Ensure each fabrication facility has an onsite production manager, an onsite facility manager for QC, a plant engineer, and on site QC inspectors/technicians to provide complete QC inspections and testing.*

Ensure that the Facility Manager for QC and QC inspectors/technicians meet the certification requirements set forth in the latest version of AASHTO/NSBA Steel Bridge Collaboration S 4.1, Steel Bridge Fabrication QC/QA Guide Specification, including the years of experience required in Table 105-5 below. The Facility Manager for QC must meet the requirements of Table 105-5 for every Structural Steel Member Type produced by a plant with QC being managed by the Facility Manager for QC. The Facility Manager for QC will report directly to the plant manager or plant engineer and must not be the plant production manager nor report to or be the subordinate of the plant production manager. QC inspectors/technicians must be the employees of, and must report directly to the Facility Manager for QC.

TABLE 105-5 Experience Requirements for QC Inspectors/Technicians And Facility Manager for Quality Control		
Structural Steel Member Type	Minimum Years of Experience Required	
	QC Inspector/Technician	Facility Manager for QC
Rolled beam bridges	1 year	3 years
Welded plate girders (I sections, box sections, etc.)	2 years	4 years
Complex structures, such as trusses, arches, cable stayed bridges, and moveable bridges	3 years	5 years
Fracture critical (FC) members	3 years	5 years

**SECTION 120 (PART I)
EXCAVATION AND BACKFILL**

120-0 Description.

120-0.1 Work Included: *This Section covers the work necessary for the trench excavation and backfill, as well as any regular excavation and backfill required to complete the work as per the contract documents and specifications.*

120-0.2 Submittals: *Submittals shall be made for all products listed in accordance with the requirements specified.*

120-0.3 Settlement: *Any settlement noted adjacent to or in backfill, fill, or in structures built over the backfill or fill within the warranty period in accordance with the General Conditions will be considered to be caused by improper stabilization or compaction methods and shall be corrected at no cost to the Owner. Structure damaged by settlement shall be restored to their original condition by the Contractor at no cost to the Owner.*

120-0.4 General.

a. *See CONDITIONS OF THE CONTRACT and GENERAL REQUIREMENTS, Supplementary Conditions which contain information and requirements that apply to the work specified herein and are mandatory for this project.*

b. *Contractor shall provide Quality Control for this project as per the requirements of FDOT STANDARD SPECIFICATIONS SECTION 105.*

c. *A pre-construction video is required for this project prior to mobilization of equipment. Contractor is responsible for the quality of this video. Provide CD or flash drive capable of viewing on windows media player. Video shall extend at minimum 200 LF outside the limits of Construction. Cost of video to be included in overall project cost.*

120-0.1 Standard Specifications / Local Agency Specifications.

a. *If the term "Standard Specifications" is used, or if there is a reference to any section of the FDOT Standard Specification not included within this section, or if there is a reference to any section of the FDOT Standard Specification not included within this section; such reference shall mean the most current edition of Florida Department of Transportation Standard Specification for Road and Bridge Construction. The Standard Specifications shall be considered as part of this section of the Specifications; below are Listed references for the contractor's convenience; the contractor shall be responsible for obtaining and incorporation in the contract all of the Standard Specification's and the most current revisions that apply to this contract scope of work. The contractor shall document in his daily reports the required Standard Specifications that are used.*

b. *Any reference of the following "Jurisdictional Authority", "Agency", "Local Agency" in the ATTACHED; SECTION 120 EARTHWORK AND RELATED OPERATIONS FOR LOCAL AGENCIES, shall be considered to be the Owner (City of West Park) for this contract.*

c. *Any reference of the following "Engineer" in the ATTACHED; SECTION 120 EARTHWORK AND RELATED OPERATIONS FOR LOCAL AGENCIES, shall be considered to be the Construction Engineer for this contract.*

d. *ATTACHED; SECTION 120 EARTHWORK AND RELATED OPERATIONS FOR LOCAL AGENCIES*

SECTION 120 (PART II)

EARTHWORK AND RELATED OPERATIONS FOR LOCAL AGENCIES

120-1 Description.

120-1.1 General: *Perform Earthwork and Related Operations based on the type of work specified in the Contract and the Earthwork Categories as defined below. Meet the applicable requirements for materials, equipment and construction as specified.*

Earthwork and Related Operations consists of excavation for the construction of the roadway, excavation for structures and pipe, constructing backfill around structures and pipe, and constructing embankments as required for the roadway, ditches, and channel changes.

120-1.2 Earthwork Categories: *Performance of Earthwork Operations will fall into one of the following Earthwork Categories:*

120-1.2.1 Earthwork Category 1: *Includes the earthwork and related operations associated with the construction of sidewalks and bike paths along with any drainage structures associated with these facilities.*

120-1.2.2 Earthwork Category 2: *Includes the earthwork and related operations associated with the construction of turn lanes and other non-mainline traffic lanes, widening, roadway shoulders, concrete box culverts, retaining walls, and other drainage structures on the non-mainline pavement.*

120-1.2.3 Earthwork Category 3: *Includes the earthwork and related operations associated with the construction of new mainline pavement, along with concrete box culverts, retaining walls, and other drainage structures on the mainline pavement.*

120-2 Classes of Excavation.

120-2.1 Excavation of Unsuitable Material: *Excavation of unsuitable material consists of the removal of muck, clay, rock or any other material that is unsuitable in its original position and that is excavated below the finished grading template. For stabilized bases and sand bituminous road mixes, the finished grading template is the top of the finished base, shoulders and slopes. For all other bases and rigid pavement, the finished grading template is the finished shoulder and slope lines and bottom of completed base or rigid pavement.*

120-2.2 Lateral Ditch Excavation: *Lateral Ditch Excavation consists of all excavation of inlet and outlet ditches to structures and roadway, changes in channels of streams, and ditches parallel to the roadway right-of-way. Dress lateral ditches to the grade and cross-section shown in the plans.*

120-2.3 Channel Excavation: *Channel Excavation consists of the excavation and satisfactory disposal of all materials from the limits of the channel as shown in the plans.*

120-2.4 Excavation for Structures and Pipe: *Excavation for Structures consists of the excavation for bridge foundations, box culverts, pipe culverts, storm sewers and all other pipe lines, retaining walls, headwalls for pipe culverts and drains, catch basins, drop inlets, manholes, and similar structures.*

120-3 Excavation Requirements.

120-3.1 Excavation and Replacement of Unsuitable Materials: *Where rock, muck, clay, or other material within the limits of the roadway is unsuitable in its original position, excavate such material to the cross-sections shown in the plans or indicated by the Engineer, and backfill with suitable material. Shape backfill materials to the required cross-sections. Where the removal of*

plastic soils below the finished earthwork grade is required, meet a construction tolerance of ± 0.2 foot in depth and ± 6 inches (each side) in width.

120-3.2 Lateral Ditch Excavation: *Excavate inlet and outlet ditches to structures and roadway, changes in channels of streams and ditches parallel to the roadway. Dress lateral ditches to the grade and cross-section shown in the plans.*

120-3.3 Channel Excavation: *Excavate and dispose of all materials from the limits of the channel as shown in the plans. Excavate for bridge foundations, box culverts, pipe culverts, storm sewers and all other pipe lines, retaining walls, headwalls for pipe culverts and drains, catch basins, drop inlets, manholes, and similar structures.*

120-3.4 Excavation for Structures and Pipe.

120-3.4.1 Requirements for all Excavation: *Excavate foundation pits to permit the placing of the full widths and lengths of footings shown in the plans, with full horizontal beds. Do not round or undercut corners or edges of footings. Perform all excavation to foundation materials, satisfactory to the Engineer, regardless of the elevation shown on the plans. Perform all excavation in stream beds to a depth at least 4 feet below the permanent bed of the stream, unless a firm footing can be established on solid rock before such depth is reached, and excavate to such additional depth as may be necessary to eliminate any danger of undermining. Wherever rock bottom is secured, excavate in such manner as to allow the solid rock to be exposed and prepared in horizontal beds for receiving the masonry. Remove all loose and disintegrated rock or thin strata. Have the Engineer inspect and approve all foundation excavations prior to placing masonry.*

120-3.4.2 Earth Excavation:

120-3.4.2.1 Foundation Material other than the Rock: *When masonry is to rest on an excavated surface other than rock, take special care to avoid disturbing the bottom of the excavation, and do not remove the final foundation material to grade until just before placing the masonry. In case the foundation material is soft or mucky, the Engineer may require excavation to a greater depth and to backfill to grade with approved material.*

120-3.4.2.2 Foundation Piles: *Where foundation piles are used, complete the excavation of each pit before driving the piles. After the driving is completed, remove all loose and displaced material, leaving a smooth, solid, and level bed to receive the masonry.*

120-3.4.2.3 Removal of Obstructions: *Remove boulders, logs, or any unforeseen obstacles encountered in excavating.*

120-3.4.3 Rock Excavation: *Clean all rock and other hard foundation material, remove all loose material, and cut all rock to a firm surface. Either level, step vertically and horizontally, or serrate the rock, as may be directed by the Engineer. Clean out all seams, and fill them with concrete or mortar.*

120-3.4.4 Pipe Trench Excavation: *Excavate trenches for pipe culverts and storm sewers to the elevation of the bottom of the pipe and to a width sufficient to provide adequate working room. Remove soil not meeting the classification specified as suitable backfill material in 120-8.3.2.2 to a depth of 4 inches below the bottom of the pipe elevation. Remove rock, boulders or other hard lumpy or unyielding material to a depth of 12 inches below the bottom of the pipe elevation. Remove muck or other soft material to a depth necessary to establish a firm foundation. Where the soils permit, ensure that the trench sides are vertical up to at least the mid-point of the pipe.*

For pipe lines placed above the natural ground line, place and compact the embankment, prior to excavation of the trench, to an elevation at least 2 feet above the top of the pipe and to a width equal to four pipe diameters, and then excavate the trench to the required grade.

120-4 Disposal of Surplus and Unsuitable Material.

120-4.1 Ownership of Excavated Materials: *Dispose of surplus and excavated materials as shown in the plans or, if the plans do not indicate the method of disposal, take ownership of the materials and dispose of them outside the right-of-way.*

120-4.2 Disposal of Muck on Side Slopes: *As an exception to the provisions of 120-4.1, when approved by the Engineer, muck (A-8 material) may be placed on the slopes, or stored alongside the roadway, provided there is a clear distance of at least 6 feet between the roadway grading limits and the muck, and the muck is dressed to present a neat appearance. In addition, this material may also be disposed of by placing it on the slopes where, in the opinion of the Engineer, this will result in an aesthetically pleasing appearance and will have no detrimental effect on the adjacent developments. Where the Engineer permits the disposal of muck or other unsuitable material inside the right-of-way limits, do not place such material in a manner which will impede the inflow or outfall of any channel or of side ditches. The Engineer will determine the limits adjacent to channels within which such materials may be disposed.*

120-4.3 Disposal of Paving Materials: *Unless otherwise noted, take ownership of paving materials, such as paving brick, asphalt block, concrete slab, sidewalk, curb and gutter, etc., excavated in the removal of existing pavements, and dispose of them outside the right-of-way. If the materials are to remain the property of the Agency, place them in neat piles as directed. Existing limerock base that is removed may be incorporated in the stabilized portion of the subgrade. If the construction sequence will allow, incorporate all existing limerock base into the project as allowed by the Contract Documents.*

120-4.4 Disposal Areas: *Where the Contract Documents require disposal of excavated materials outside the right-of-way, and the disposal area is not indicated in the Contract Documents, furnish the disposal area without additional compensation.*

Provide areas for disposal of removed paving materials out of sight of the project and at least 300 feet from the nearest roadway right-of-way line of any road. If the materials are buried, disregard the 300 foot limitation.

120-5 Materials for Embankment.

120-5.1 General Requirements for Embankment Materials: *Construct embankments using suitable materials excavated from the roadway or delivered to the jobsite from authorized borrow pits.*

Construct the embankment using maximum particle sizes (in any dimension) as follows:

In top 12 inches: 3 1/2 inches (in any dimension).

12 to 24 inches: 6 inches (in any dimension).

In the depth below 24 inches: not to exceed 12 inches (in any dimension) or the compacted thickness of the layer being placed, whichever is less.

Spread all material so that the larger particles are separated from each other to minimize voids between them during compaction. Compact around these rocks in accordance with 120-7.2.

When and where approved by the Engineer, larger rocks (not to exceed 18 inches in any dimension) may be placed outside the one to two slope and at least 4 feet or more below the bottom of the base. Compact around these rocks to a firmness equal to that of the supporting soil. Where constructing embankments adjacent to bridge end bents or abutments, do not place rock larger than 3 1/2 inches in diameter within 3 feet of the location of any end-bent piling.

120-5.2 Use of Materials Excavated from the Roadway and Appurtenances: *Assume responsibility for determining the suitability of excavated material for use on the project in accordance with the applicable Contract Documents. Consider the sequence of work and*

maintenance of traffic phasing in the determination of the availability of this material.

120-5.3 Authorization for Use of Borrow: *Use borrow only when sufficient quantities of suitable material are not available from roadway and drainage excavation, to properly construct the embankment, subgrade, and shoulders, and to complete the backfilling of structures and pipe. Do not use borrow material until so ordered by the Engineer, and then only use material from approved borrow pits.*

120-5.3.1 Haul Routes for Borrow Pits: *Provide and maintain, at no expense to the Agency, all necessary roads for hauling the borrow material. Where borrow area haul roads or trails are used by others, do not cause such roads or trails to deteriorate in condition.*

Arrange for the use of all non-public haul routes crossing the property of any railroad. Incur any expense for the use of such haul routes. Establish haul routes which will direct construction vehicles away from developed areas when feasible, and keep noise from hauling operations to a minimum. Advise the Engineer in writing of all proposed haul routes.

120-5.3.2 Borrow Material for Shoulder Build-up: *When so indicated in the plans, furnish borrow material with a specific minimum bearing value, for building up of existing shoulders. Blend materials as necessary to achieve this specified minimum bearing value prior to placing the materials on the shoulders. Take samples of this borrow material at the pit or blended stockpile.*

120-5.4 Materials Used at Pipes, Culverts, etc.: *Construct embankments over and around pipes, culverts, and bridge foundations with selected materials.*

120-6 Embankment Construction.

120-6.1 General: *Construct embankments in sections of not less than 300 feet in length or for the full length of the embankment.*

120-6.2 Dry Fill Method.

120-6.2.1 General: *Construct embankments to meet compaction requirements in 120-7 and in accordance with the acceptance program requirements in 120-9. Restrict the compacted thickness of the last embankment lift to 6 inches maximum.*

As far as practicable, distribute traffic over the work during the construction of embankments so as to cover the maximum area of the surface of each layer.

Construct embankment in the dry whenever normal dewatering equipment and methods can accomplish the needed dewatering.

120-6.2.1.1 For A-3 and A-2-4 Materials with up to 15% fines: *Construct the embankment in successive layers with lifts up to a maximum compacted thickness of 12 inches. Ensure the percentage of fines passing the No. 200 US Standard sieve in the A-2-4 material does not exceed 15%.*

120-6.2.1.2 For A-1 Plastic materials (As designated in FDOT Design Standard Index 505) and A-2-4 Materials with greater than 15% fines: *Construct the embankment in successive layers with lifts up to a maximum compacted thickness of 6 inches.*

120-6.2.1.3 Equipment and Methods: *Provide normal dewatering equipment including, but not limited to, surface pumps, sump pumps and trenching/digging machinery. Provide normal dewatering methods including, but not limited to, constructing shallow surface drainage trenches/ditches, using sand blankets, sumps and siphons.*

When normal dewatering does not adequately remove the water, the Engineer may require the embankment material to be placed in the water or in low swampy ground in accordance with 120-7.2.4.

120-6.2.2 Placing in Unstable Areas: *Where depositing the material in water, or in low swampy ground that will not support the weight of hauling equipment, construct the embankment*

by dumping successive loads in a uniformly distributed layer of a thickness not greater than necessary to support the hauling equipment while placing subsequent layers. Once sufficient material has been placed so that the hauling equipment can be supported, construct the remaining portion of the embankment in layers in accordance with the applicable provisions of 120-7.2.4 and 120-7.2.6.

120-6.2.3 Placing on Steep Slopes: *When constructing an embankment on a hillside sloping more than 20 degrees from the horizontal, before starting the fill, deeply plow or cut into steps the surface of the original ground on which the embankment is to be placed.*

120-6.2.4 Placing Outside Standard Minimum Slope: *Where material that is unsuitable for normal embankment construction is to be used in the embankment outside the standard minimum slope (approximately one to two), place such material in layers of not more than 18 inches in thickness, measured loose. The Contractor may also place material which is suitable for normal embankment, outside such standard minimum slope, in 18 inch layers. Maintain a constant thickness for suitable material placed within and outside the standard minimum slope, unless placing in a separate operation.*

120-6.3 Hydraulic Method:

120-6.3.1 Method of Placing: *When the hydraulic method is used, as far as practicable, place all dredged material in its final position in the embankment by such method. Place and compact any dredged material that is re-handled, or moved and placed in its final position by any other method, as specified in 120-7.2. The Contractor may use baffles or any form of construction he may select, provided the slopes of the embankments are not steeper than indicated in the plans. Remove all timber used for temporary bulkheads or baffles from the embankment, and fill and thoroughly compact the holes thus formed. When placing fill on submerged land, construct dikes prior to beginning of dredging, and maintain the dikes throughout the dredging operation.*

120-6.3.2 Excess Material: *Do not use excess material placed outside the prescribed slopes, below the normal high-water level, to raise the fill. Remove only the portion of this material required for dressing the slopes.*

120-6.3.3 Protection of Openings in Embankment: *Leave openings in the embankments at the bridge sites. Remove any material which invades these openings or existing channels without additional compensation to provide the same depth of channel as existed before the construction of the embankment. Do not excavate or dredge any material within 200 feet of the toe of the proposed embankment.*

120-7 Compaction Requirements.

120-7.1 Moisture Content: *Compact the materials at a moisture content such that the specified density can be attained. If necessary to attain the specified density, add water to the material, or lower the moisture content by manipulating the material or allowing it to dry, as is appropriate.*

120-7.2 Compaction of Embankments.

120-7.2.1 Earthwork Category 1 and 2 Density Requirements: *Reduce the minimum required density from 100% to 95% of AASHTO T99 Method C for all earthwork items requiring densities.*

120-7.2.2 Earthwork Category 3 Density Requirements: *Except for embankments constructed by the hydraulic method as specified in 120-6.3, and for the material placed outside the standard minimum slope as specified in 120-6.2.4, and for other areas specifically excluded herein, compact each layer of the material used in the formation of embankments to a density of at least 100% of the maximum density as required by AASHTO T 99, Method C. Uniformly compact each layer using equipment that will achieve the required density, and as compaction operations progress, shape and manipulate each layer as necessary to ensure uniform density throughout the embankment.*

120-7.2.3 Compaction over Unstable Foundations: *Where the embankment material is deposited in water or on low swampy ground, and in a layer thicker than 12 inches (as provided in 120-6.2.2), compact the top 6 inches (compacted thickness) of such layer to the density as specified in 120-9.5.*

120-7.2.4 Compaction Where Plastic Material Has Been Removed: *Where unsuitable material is removed and the remaining surface is of the A-4, A-5, A-6, or A-7 Soil Groups, as determined by the Engineer, compact the surface of the excavated area by rolling with a sheepsfoot roller exerting a compression of at least 250 psi on the tamper feet, for the full width of the roadbed (subgrade and shoulders). Perform rolling before beginning any backfill, and continue until the roller feet do not penetrate the surface more than 1 inch. Do not perform such rolling where the remaining surface is below the normal water table and covered with water. Vary the procedure and equipment required for this operation at the discretion of the Engineer.*

120-7.2.5 Compaction of Material to Be Used in Base, Pavement, or Stabilized Areas: *Do not compact embankment material which will be incorporated into a pavement, base course, or stabilized subgrade, to be constructed as a part of the same Contract.*

120-7.2.6 Compaction of Grassed Shoulder Areas: *For the upper 6 inch layer of all shoulders which are to be grassed, since no specific density is required, compact only to the extent directed.*

120-7.2.7 Compaction of Grassed Embankment Areas: *For the outer layer of all embankments where plant growth will be established, do not compact. Leave this layer in a loose condition to a minimum depth of 6 inches for the subsequent seeding or planting operations.*

120-7.3 Compaction of Subgrade: *If the plans do not provide for stabilizing, compact the subgrade in both cuts and fills to the density specified in 120-9.5. For undisturbed soils, do not apply density requirements where constructing narrow widening strips or paved shoulders 5 feet or less in width.*

Where trenches for widening strips are not of sufficient width to permit the use of standard compaction equipment, perform compaction using vibratory rollers, trench rollers, or other type compaction equipment approved by the Engineer.

Maintain the required density until the base or pavement is placed on the subgrade.

120-8 Backfilling around Structures and Pipe.

120-8.1 Requirements for all Structures:

120-8.1.1 General: *Backfill around structures and pipe in the dry whenever normal dewatering equipment and methods can accomplish the needed dewatering.*

120-8.1.2 Equipment and Methods: *Provide normal dewatering equipment including, but not limited to, surface pumps, sump pumps, well points and header pipe and trenching/digging machinery. Provide normal dewatering methods including, but not limited to, constructing shallow surface drainage trenches/ditches, using sand blankets, perforated pipe drains, sumps and siphons.*

120-8.1.3 Backfill Materials: *Backfill to the original ground surface or subgrade surface of openings made for structures, with a sufficient allowance for settlement. The Engineer may require that the material used for this backfill be obtained from a source entirely apart from the structure.*

Do not allow heavy construction equipment to cross over culvert or storm sewer pipes until placing and compacting backfill material to the finished earthwork grade or to an elevation at least 4 feet above the crown of the pipe.

120-8.1.4 Use of A-7 Material: *In the backfilling of trenches, A-7 material may be used from a point 12 inches above the top of the pipe up to the elevation shown on the FDOT Design Standards as the elevation for undercutting of A-7 material.*

120-8.1.5 Time of Placing Backfill: *Do not place backfill against any masonry or concrete abutment, wingwall, or culvert until the Engineer has given permission to do so, and in no case until the masonry or concrete has been in place seven days or until the specified 28-day compressive strength occurs.*

120-8.1.6 Placement and Compaction: *Place the material in horizontal layers not exceeding 6 inches compacted thickness, in depth above water level, behind abutments, wingwalls and end bents or end rest piers, and around box culverts and all structures including pipe culverts. When the backfill material is deposited in water, compact per 120-8.2.5 and 120-8.3.4.*

The Contractor may elect to place material in thicker lifts of no more than 12 inches compacted thickness outside the soil envelope if he can demonstrate with a successful test section that density can be achieved. Notify the Engineer prior to beginning construction of a test section. Construct a test section of 500 feet in length. Perform five tests at random locations within the test section. All five tests must meet the density required by 120-7.2. Identify the test section with the compaction effort and soil classification in the Agency Logbook. In case of a change in compaction effort or soil classification, construct a new test section. When a test fails the requirements of 120-7.2, construct a new test section. The Contractor may elect to place material in 6 inches compacted thickness at any time.

120-8.2 Additional Requirements for Structures Other than Pipe:

120-8.2.1 Density: *Where the backfill material is deposited in water, obtain a 12 inch layer of comparatively dry material, thoroughly compacted by tamping, before verifying the layer and density requirements. Meet the requirements of the density Acceptance Criteria.*

120-8.2.2 Box Culverts: *For box culverts over which pavement is to be constructed, compact around the structure to an elevation not less than 12 inches above the top of the structure, using rapid-striking mechanical tampers.*

120-8.2.3 Other Limited Areas: *Compact in other limited areas using mechanical tampers or approved hand tampers, until the cover over the structure is at least 12 inches thick. When hand tampers are used, deposit the materials in layers not more than 4 inches thick using hand tampers suitable for this purpose with a face area of not more than 100 in². Take special precautions to prevent any wedging action against the masonry, and step or terrace the slope bounding the excavation for abutments and wingwalls if required by the Engineer.*

120-8.2.4 Culverts and Piers: *Backfill around culverts and piers on both sides simultaneously to approximately the same elevation.*

120-8.2.5 Compaction Under Wet Conditions: *Where wet conditions do not permit the use of mechanical tampers, compact using hand tampers. Use only A-3 material for the hand tamped portions of the backfill. When the backfill has reached an elevation and condition such as to make the use of the mechanical tampers practical, perform mechanical tamping in such manner and to such extent as to transfer the compaction force into the sections previously tamped by hand.*

120-8.3 Additional Requirements for Pipe 15 Inches Inside Diameter or Greater:

120-8.3.1 General: *Trenches for pipe may have up to four zones that must be backfilled.*

Lowest Zone: The lowest zone is backfilled for deep undercuts up to within 4 inches of the bottom of the pipe.

Bedding Zone: The zone above the Lowest Zone is the Bedding Zone. Usually it will be the

backfill which is the 4 inches of soil below the bottom of the pipe. When rock or other hard material has been removed to place the pipe, the Bedding Zone will be the 12 inches of soil below the bottom of the pipe.

Cover Zone: The next zone is backfill that is placed after the pipe has been laid and will be called the Cover Zone. This zone extends to 12 inches above the top of the pipe. The Cover Zone and the Bedding Zone are considered the Soil Envelope for the pipe.

Top Zone: The Top Zone extends from 12 inches above the top of the pipe to the base or final grade.

120-8.3.2 Material:

120-8.3.2.1 Lowest Zone: Backfill areas undercut below the Bedding Zone of a pipe with coarse sand, or other suitable granular material, obtained from the grading operations on the project, or a commercial material if no suitable material is available.

120-8.3.2.2 Soil Envelope: In both the Bedding Zone and the Cover Zone of the pipe, backfill with materials classified as A-1, A-2, or A-3. Material classified as A-4 may be used if the pipe is concrete pipe.

120-8.3.2.3 Top Zone: Backfill the area of the trench above the soil envelope of the pipe with materials allowed on FDOT Design Standard, Index No. 505.

120-8.3.3 Compaction:

120-8.3.3.1 Lowest Zone: Compact the soil in the Lowest Zone to approximately match the density of the soil in which the trench was cut.

120-8.3.3.2 Bedding Zone: If the trench was not undercut below the bottom of the pipe, loosen the soil in the bottom of the trench immediately below the approximate middle third of the outside diameter of the pipe.

If the trench was undercut, place the bedding material and leave it in a loose condition below the middle third of the outside diameter of the pipe. Compact the outer portions to meet the density requirements of the Acceptance Criteria. Place the material in lifts no greater than 6 inches (compacted thickness).

120-8.3.3.3 Cover Zone: Place the material in 6 inches layers (compacted thickness), evenly deposited on both sides of the pipe, and compact with mechanical tampers suitable for this purpose. Hand tamp material below the pipe haunch that cannot be reached by mechanical tampers. Meet the requirements of the density Acceptance Criteria.

120-8.3.3.4 Top Zone: Place the material in layers not to exceed 12 inches in compacted thickness. Meet the requirements of the density Acceptance Criteria.

120-8.3.4 Backfill Under Wet Conditions: Where wet conditions are such that dewatering by normal pumping methods would not be effective, the procedure outlined below may be used when specifically authorized by the Engineer in writing.

Granular material may be used below the elevation at which mechanical tampers would be effective, but only material classified as A-3. Place and compact the material using timbers or hand tampers until the backfill reaches an elevation such that its moisture content will permit the use of mechanical tampers. When the backfill has reached such elevation, use normally acceptable backfill material. Compact the material using mechanical tampers in such manner and to such extent as to transfer the compacting force into the material previously tamped by hand.

120-9 Acceptance Program.

120-9.1 Density over 105%: When a computed dry density results in a value greater than 105% of the applicable Proctor maximum dry density, perform a second density test within 5 feet. If the second density results in a value greater than 105%, investigate the compaction methods, examine

the applicable Maximum Density and material description. If necessary, test an additional sample for acceptance in accordance with AASHTO T 99, Method C.

120-9.2 Maximum Density Determination: Determine the maximum density and optimum moisture content by sampling and testing the material in accordance with the specified test method listed in 120-9.3.

120-9.3 Density Testing Requirements: Ensure compliance with the requirements of 120-9.5 by Nuclear Density testing in accordance with FDOT Florida Method FM 1-T 238. Determine the in-place moisture content for each density test. Use Florida Method FM 1-T 238, FM 5-507 (Determination of Moisture Content by Means of a Calcium Carbide Gas Pressure Moisture Tester), or ASTM D 4643 (Laboratory Determination of Moisture Content of Granular Soils by Use of a Microwave Oven) for moisture determination.

120-9.4 Soil Classification: Perform soil classification tests in accordance with AASHTO T-88. Classify soils in accordance with AASHTO M-145 in order to determine compliance with embankment utilization requirements.

120-9.5 Acceptance Criteria: Obtain a minimum density in accordance with 120-7.2 with the following exceptions:

- 1) Embankment constructed by the hydraulic method as specified in 120-6.3;
- 2) Material placed outside the standard minimum slope as specified in 120-6.2.4;
- 3) Other areas specifically excluded herein.

120-9.6 Frequency: Conduct sampling and testing at a minimum frequency listed in the table below.

Test Name	Frequency
Maximum Density	One per soil type
Density	1 per 500' RDWY (Alt Lift)
Soil Classification	One per Maximum Density

120-10 Maintenance and Protection of Work.

While construction is in progress, maintain adequate drainage for the roadbed at all times. Maintain a shoulder at least 3 feet wide adjacent to all pavement or base construction in order to provide support for the edges.

Maintain and protect all earthwork construction throughout the life of the Contract, and take all reasonable precautions to prevent loss of material from the roadway due to the action of wind or water. Repair any slides, washouts, settlement, subsidence, or other mishap which may occur prior to final acceptance of the work. Maintain all channels excavated as a part of the Contract work against natural shoaling or other encroachments to the lines, grades, and cross-sections shown in the plans, until final acceptance of the project.

120-11 Construction.

120-11.1 Construction Tolerances: Shape the surface of the earthwork to conform to the lines, grades, and cross-sections shown in the plans. In final shaping of the surface of earthwork, maintain a tolerance of 0.3 foot above or below the plan cross-section with the following exceptions:

1. Shape the surface of shoulders to within 0.1 foot of the plan cross-section.
2. Shape the earthwork to match adjacent pavement, curb, sidewalk, structures, etc.
3. Shape the bottom of ditches so that the ditch impounds no water.
4. When the work does not include construction of base or pavement, shape the entire roadbed (shoulder point to shoulder point) to within 0.1 foot above or below the plan cross-section.

Ensure that the shoulder lines do not vary horizontally more than 0.3 foot from the true lines

shown in the plans.

120-11.2 Operations Adjacent to Pavement: *Carefully dress areas adjacent to pavement areas to avoid damage to such pavement. Complete grassing of shoulder areas prior to placing the final wearing course. Do not manipulate any embankment material on a pavement surface.*

When shoulder dressing is underway adjacent to a pavement lane being used to maintain traffic, exercise extreme care to avoid interference with the safe movement of traffic.

120-12 Method of Measurement.

120-12.1 Excavation: *Excavation will be paid for by volume, in cubic yards, calculated by the method of average end areas, unless the Engineer determines that another method of calculation will provide a more accurate result. The material will be measured in its original position by field survey or by photogrammetric means as designated by the Engineer. Measurement for payment will include the excavation of unsuitable material, lateral ditch excavation, channel excavation, and excavation for structures and pipe. Payment will not be made for excavation or embankment beyond the limits shown in the plans or authorized by the Engineer.*

120-12.2 Embankment: *Measurement will be made on a loose volume basis, as measured in trucks or other hauling equipment at the point of dumping on the road. Payment will not be made for embankment beyond the limits shown in the plans or authorized by the Engineer.*

120-12.3 Swale Re-Grading: *Measurement will be made on the number of square yards graded to match the required cross slope for swale areas adjacent to asphalt pavement. Payment will not be made for swale grading beyond the limits shown in the plans or authorized by the Engineer.*

120-13 Basis of Payment.

120-13.1 General: *Prices and payments for the work items included in this Section will be full compensation for all work described herein, including excavating, dredging, hauling, placing, and compacting; dressing the surface of the earthwork; and maintaining and protecting the complete earthwork.*

120-13.2 Excavation: *The total quantity of all excavation specified under this Section will be paid for at the Contract unit price for Excavation. No payment will be made for the excavation of any materials which are used for purposes other than those shown in the plans or designated by the Engineer. No payment will be made for materials excavated outside the lines and grades given by the Engineer, unless specifically authorized by the Engineer.*

120-13.3 Embankment: *The total quantity of embankment specified in this Section will be paid for at the Contract unit price for embankment. No payment will be made for materials which are used for purposes other than those shown in the plans or designated by the Engineer. Includes the total quantity of re-grading specified for re-grading of existing swale. No payment will be made for materials placed outside the lines and grades given by the Engineer, unless specifically authorized by the Engineer.*

SECTION 125 EXCAVATION FOR STRUCTURES AND PIPE

125-1 Description.

Excavate for box culverts, pipes, retaining walls, headwalls for pipes and drains, catch basins, drop inlets, manholes, and similar structures. Construct and remove cofferdams, sheeting, bracing, etc.; pump or otherwise dewater foundations; remove and dispose of any existing structures or portions of structures not covered by other items in the Contract, including foundations, abutments, piers, wings, and all other materials, obstructions, etc., found necessary to clear the site for the proposed work; backfill, dispose of surplus material, and perform final cleaning, as may be necessary for the proper execution of the work. This Section does not include excavation for bases or pavements, curbs, curb and gutter, valley gutter, ditch pavement, or rubble gutter. Perform work in accordance with an approved Quality Control (QC) Plan meeting the requirements of 105-3.

125-1.1 Trench Excavation Safety System and Shoring, Special (Trench Excavation): *When performing trench excavation in excess of 5 feet in depth, comply with the Occupational Safety and Health Administration's (OSHA) trench safety standards, 29 CFR, 1926, Subpart P, and all subsequent revisions or updates adopted by the Department of Labor and Employment Security. Ensure that trench boxes are wide enough to accommodate compaction and density testing.*

Submission of bid and subsequent execution of the Contract will serve as certification that all trench excavation in excess of 5 feet in depth will be in compliance with Section 553.62, Florida Statutes.

Consider all available geotechnical information when designing the trench excavation safety system.

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

125-2 Classification.

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

125-3 Cofferdams.

125-3.1 Construction:

125-3.1.1 Methods: *Construct all foundations by open excavation, and shore, brace, or protect the foundation openings with cofferdams. Provide cofferdams or cribs for foundation construction below the bottom of the footings. Provide sufficient clearance in the cofferdam interiors to permit construction of forms and inspection of their exteriors, and for pumping equipment.*

125-3.1.2 Protection of Concrete: *Construct cofferdams to protect green concrete against damage from a sudden rising of the water and to prevent damage by erosion. Do not leave timber or bracing in cofferdams or cribs that extend into the substructure masonry except where permitted in writing by the Engineer.*

125-3.1.3 Placing in the Dry: *For placing footings in the dry, the Engineer may require cofferdam sheeting to be driven to an elevation 6 feet below the elevation of the bottom of the footings and require sufficient pumping equipment to dewater and maintain the cofferdam in a comparatively dry condition.*

125-3.1.4 Working Drawings: *For substructure work, submit drawings showing the proposed method of cofferdam construction and other details left to choice or not fully shown*

in the Plans. Obtain the Engineer's approval of the type and clearance of cofferdams, insofar as such details affect the character of the finished work. For other details of design that do not affect the character of the finished work, assume responsibility for the successful construction of the work. Retain a Professional Engineer, registered in the State of Florida, to prepare the above construction drawing, and keep a signed and sealed copy on hand at the site at all times.

125-3.2 Removal: *Unless otherwise provided, remove cofferdams or cribs, with all sheeting and bracing, after completion of the substructure without disturbing or marring the finished masonry.*

125-4 Excavation.

125-4.1 Requirements for all Excavation: *Perform all excavation to foundation materials, satisfactory to the Engineer, regardless of the elevation shown in the Plans. Remove rock, boulders or other hard lumpy or unyielding material to a depth of 12 inches below the bottom of pipes and box culverts elevations. Remove muck or other soft material to the depth indicated in the Plans or as directed by the Engineer.*

125-4.2 Earth Excavation:

125-4.2.1 Foundation Material other than the Rock: *When masonry is to rest on an excavated surface other than rock, take special care to avoid disturbing the bottom of the excavation, and do not remove the final foundation material to grade until just before placing the masonry. In case the foundation material is soft or mucky, the Engineer may require excavation to a greater depth and to backfill to grade with approved material.*

125-4.2.2 Foundation Piles: *Where foundation piles are used, complete the excavation of each pit before driving the piles. After the driving is completed, remove all loose and displaced material, leaving a smooth, solid, and level bed to receive the masonry.*

125-4.2.3 Removal of Obstructions: *Remove boulders, logs, or any unforeseen obstacles encountered in excavating. Compensation will be in accordance with the requirements of 4-3.*

125-4.3 Rock Excavation: *Clean all rock and other hard foundation material, remove all loose material, and cut all rock to a firm surface. Either level, step vertically and horizontally, or serrate the rock, as may be directed by the Engineer. Clean out all seams, and fill them with concrete or mortar.*

125-4.4 Pipe Trench Excavation: *Excavate trenches for pipes to the elevation of the bottom of the pipe and to a width sufficient to provide adequate working room. Remove soil not meeting the classification specified as suitable backfill material in 125-8.3.2.2, to a depth of 4 inches below the bottom of the pipe elevation. Where the soils permit, ensure that the trench sides are vertical up to at least the mid-point of the pipe.*

For pipe lines placed above the natural ground line, place and compact the embankment, prior to excavation of the trench, to an elevation at least 2 feet above the top of the pipe and to a width equal to four pipe diameters, and then excavate the trench to the required grade.

For pipe trenches utilizing trench boxes, ensure that the trench box used is of sufficient width to permit thorough tamping of bedding material under and around the pipes as specified in 125-8.1.6.

Do not disturb the installed pipe and its embedment when moving trench boxes. Move the trench box carefully to avoid excavated wall displacement or damage. As the trench box is moved, fill any voids left by the trench box and continuously place and compact the backfill material adjacent to and all along the side of the trench box walls to fill any voids created by the trench box.

125-5 Preservation of Channel.

125-5.1 General: *Unless shown in the Plans, do not excavate outside of caissons, cribs, cofferdams, or sheet piling, and do not disturb the natural stream bed adjacent to the structure. If excavating or dredging at the site of the structure before sinking caissons, cribs, or cofferdams, complete the foundation and backfill all such excavations to the original ground surface or other required elevation, with material satisfactory to the Engineer.*

125-5.2 Removal of Excavated Materials: *Do not allow materials that are deposited adjacent to the stream area to infiltrate the water areas. Leave the stream in its original condition.*

125-6 Disposal of Surplus.

Use suitable excavated materials for backfilling over or around the structure. Dispose of unsuitable materials. Meet the disposal requirements pertaining to water pollution contained in Section 104 and in 7-1.1.

125-7 Pumping.

Pump from the interior of any foundation enclosure in such manner as to preclude the possibility of any portion of the concrete materials being carried away. Do not pump while placing concrete, or for a period of at least 24 hours thereafter, unless using a suitable pump separated from the concrete work by a watertight wall.

125-8 Backfilling.

125-8.1 General Requirements for Structures and Pipe:

125-8.1.1 General: *Backfill in the dry whenever normal dewatering equipment and methods can accomplish the needed dewatering. A LOT is defined as one lift of backfill material placement, not to exceed 500 feet in length or a single run of pipe connecting two successive structures, whichever is less. Backfill for structures and pipe compacted in one operation will be considered as one LOT within the cover zone. Backfill around structures compacted separately from the pipe will be considered as separate LOTs. Backfill on each side of the pipe for the first lift will be considered a separate LOT. Backfill on opposite sides of the pipe for the remaining lifts will be considered separate LOTs, unless the same compactive effort is applied. Same compactive effort is defined as the same type of equipment (make and model) making the same number of passes on both sides of the pipe. For multiple phase backfill, a LOT shall not extend beyond the limits of the phase.*

When placing backfill within trench box each lift of backfill is considered a LOT. Placement of backfill within trench box limits will be considered a complete operation before trench box is moved for next backfill operation. When the trench box is moved for next backfill operation this will start new LOTs for each lift. Follow the density testing frequency in 125-9.3.1.

125-8.1.2 Equipment and Methods: *Provide normal dewatering equipment including, but not limited to, surface pumps, sump pumps, wellpoints and header pipe and trenching/digging machinery. Provide normal dewatering methods including, but not limited to constructing shallow surface drainage trenches/ditches, using sand blankets, perforated pipe drains, sumps and siphons.*

125-8.1.3 Backfill Materials: *Backfill to the original ground surface or subgrade surface of openings made for structures, with a sufficient allowance for settlement. The Engineer*

may require that the material used for this backfill be obtained from a source entirely apart from the structure. Use only material accepted by the Engineer.

Do not allow heavy construction equipment to cross over culvert or storm sewer pipes until placing and compacting backfill material to the finished earthwork grade or to an elevation at least 4 feet above the crown of the pipe.

125-8.1.4 Use of A-7 Material: In the backfilling of trenches, A-7 material may be used from a point 12 inches above the top of the pipe up to the elevation shown in the FDOT Design Standards as the elevation for undercutting of A-7 material.

125-8.1.5 Time of Placing Backfill: Do not place backfill against any masonry or concrete abutment, wingwall, or culvert until the Engineer has given permission to do so, and in no case until the masonry or concrete has been in place seven days or until the specified 28 day compressive strength occurs.

125-8.1.6 Placement and Compaction: Place the material in horizontal layers not exceeding 6 inches compacted thickness, in depth above water level, behind abutments, wingwalls and end bents or end rest piers, under the haunches of the pipes and around box culverts and all structures including pipe culverts. When the backfill material is deposited in water, compact as specified in 125-8.2.5 and 125-8.3.4.

The Contractor may elect to place material in thicker lifts of no more than 12 inches compacted thickness above the Soil Envelope if he can demonstrate with a successful test section that density can be achieved. Notify the Engineer prior to beginning construction of a test section. Construct a test section of the length of one LOT. Perform five QC tests at random locations within the test section. All five tests must meet the density required by 125-9.2 and be verified by the Owner. Identify the test section with the compaction effort and soil classification in the Logbook. In case of a change in compaction effort or soil classification, construct a new test section. When a QC test fails the requirements of 125-9.2 or when the QC tests cannot be verified, construct a new test section. The Contractor may elect to place material in 6 inches compacted thickness at any time.

125-8.2 Additional Requirements for Structures Other than Pipe:

125-8.2.1 Density: Where the backfill material is deposited in water, obtain a 12 inch layer of comparatively dry material, thoroughly compacted by tamping, before verifying the layer and density requirements. Meet the requirements of 125-9.2.

125-8.2.2 Box Culverts: For box culverts over which pavement is to be constructed, compact around the structure to an elevation not less than 12 inches above the top of the structure, using rapid-striking mechanical tampers.

125-8.2.3 Other Limited Areas: Compact in other limited areas using mechanical tampers or approved hand tampers, until the cover over the structure is at least 12 inches thick. When hand tampers are used, deposit the materials in layers not more than 4 inches thick using hand tampers suitable for this purpose with a face area of not more than 100 square inches. Take special precautions to prevent any wedging action against the masonry, and step or terrace the slope bounding the excavation for abutments and wingwalls if required by the Engineer.

125-8.2.4 Culverts and Piers: Backfill around culverts and piers on both sides simultaneously to approximately the same elevation.

125-8.2.5 Compaction Under Wet Conditions: Where wet conditions do not permit the use of mechanical tampers, compact using hand tampers. Use only A-3 material for the hand tamped portions of the backfill. When the backfill has reached an elevation and condition such as to make the use of the mechanical tampers practical, perform mechanical tamping in such manner and to such extent as to transfer the compaction force into the sections previously tamped by hand.

125-8.3 Additional Requirements for Pipe 15 Inches inside Diameter or Greater: 125-

8.3.1 General:

Trenches for pipe may have up to four zones that must be backfilled.

Lowest Zone: The lowest zone is backfilled for deep undercuts up to within 4 inches of the bottom of the pipe.

Bedding Zone: The zone above the lowest zone is the bedding zone. Usually it will be the backfill which is the 4 inches of soil below the bottom of the pipe. When rock or other hard material has been removed to place the pipe, the bedding zone will be the 12 inches of soil below the bottom of the pipe.

Cover Zone: The next zone is backfill that is placed after the pipe has been laid and will be called the cover zone. This zone extends to 12 inches above the top of the pipe. The cover zone and the bedding zone are considered the Soil Envelope for the pipe.

Top Zone: The top zone extends from 12 inches above the top of the pipe to the base or final grade.

125-8.3.2 Material:

125-8.3.2.1 Lowest Zone: *Backfill areas undercut below the bedding zone of a pipe with coarse sand, or other suitable granular material, obtained from the grading operations on the project, or a commercial material if no suitable material is available.*

125-8.3.2.2 Soil Envelope: *In both the bedding zone and the cover zone of the pipe, backfill with materials classified as A-1, A-2, or A-3. Material classified as A-4 may be used if the pipe is concrete pipe.*

125-8.3.2.3 Top Zone: *Backfill the area of the trench above the soil envelope of the pipe with materials allowed on FDOT Design Standards, Index No. 505.*

125-8.3.3 Compaction:

125-8.3.3.1 Lowest Zone: *Compact the soil in the lowest zone to approximately match the density of the soil in which the trench was cut.*

125-8.3.3.2 Bedding Zone: *If the trench was not undercut below the bottom of the pipe, loosen the soil in the bottom of the trench immediately below the approximate middle third of the outside diameter of the pipe.*

If the trench was undercut, place the bedding material and leave it in a loose condition below the middle third of the outside diameter of the pipe. Compact the outer portions to meet the density requirements of the acceptance criteria. Place the material in lifts no greater than 6 inches (compacted thickness).

125-8.3.3.3 Cover Zone: *Before placing the cover zone material, lay pipe according to Section 430. Excavate for pipe bells before laying pipe. Place the material in 6 inch layers (compacted thickness), evenly deposited on both sides of the pipe, and compact with mechanical tampers suitable for this purpose. Hand tamp material below the pipe haunch that cannot be reached by mechanical tampers. Meet the requirements of in 125-9.2.*

125-8.3.3.4 Top Zone: *Place the material in layers not to exceed 12 inches in compacted thickness. Meet the requirements of the density acceptance criteria.*

125-8.3.4 Backfill Under Wet Conditions: *Where wet conditions are such that dewatering by normal pumping methods would not be effective, the procedure outlined below may be used when specifically authorized by the Engineer in writing.*

The Owner will permit the use of granular material below the elevation at which mechanical tampers would be effective, but only material classified as A-3. Place and compact the material using timbers or hand tampers until the backfill reaches an elevation such that its moisture content will permit the use of mechanical tampers. When the backfill has reached such elevation, use normally acceptable backfill material. Compact the material using

mechanical tampers in such manner and to such extent as to transfer the compacting force into the material previously tamped by hand.

The Owner will permit the use of coarse aggregate below the elevation at which mechanical tampers would be effective. Use coarse aggregate as specified in Section 901 for Aggregate Size Number 89, 8, 78, 7, 68, 6, or 57. Place the coarse aggregate such that it will be stable and firm. Fully wrap the aggregate with a layer of Type D-4 filter fabric, as specified in Section 985. Do not place coarse aggregate within 4 feet of the ends of the trench or ditch. Use normally accepted backfill material at the ends.

125-9 Acceptance Program.

125-9.1 General Requirements: *Meet the requirements of 120-10, except replace the requirements of 120-10.1.6 with 125-9.1.1, 120-10.2 with 125-9.2, 120-10.3 with 125-9.3, and 120-10.4 with 125-10.*

125-9.1.1 Reduced Testing Frequency: *When no resolution testing is required for six consecutive LOTS, or if required, the QC test data was upheld, reduce the QC density testing to one test every two LOTS or one every four LOTS for trench box operations. Identify the substantiating tests in the Density Log Book and notify the Engineer in writing prior to starting reduced frequency of testing. Generate random numbers for selecting test locations for the LOTS under consideration. When QC test frequency is reduced to one every two LOTS, obtain the Engineer's approval to place more than one LOT over an untested LOT. Assure similar compaction efforts for the untested sections. If the Verification test fails, and QC test data is not upheld by Resolution testing the QC testing will revert to the original frequency.*

125-9.2 Acceptance Criteria:

125-9.2.1 Density: *Obtain a minimum QC density in any LOT of 100% of the Standard Proctor maximum density as determined by AASHTO T99, Method C, or the requirements of 125-8.3.3.1 when applicable. When the cover height below the bottom of base under asphalt pavement, below concrete pavement, or below unpaved ground, exceeds 15 inches, compact the pipe backfill in the cover zone to a density of at least 95% of the Standard Proctor maximum density as determined by AASHTO T99, Method C.*

For density requirements around drainage structures, obtain a minimum Quality Control (QC) density in any LOT of 100% of the Standard Proctor maximum density as determined by AASHTO T99 for a distance of one pipe diameter but not less than 3 feet from the outside face of the structure.

125-9.2.2 Exceptions to Structures and Pipe Density Requirements: *Compact the backfill to a firmness approximately equal to that of the soil next to the pipe trench in locations outside the plane described by a two (horizontal) to one (vertical) slope downward from the roadway shoulder line or the gutter line as applicable. Apply 125-9.2.1 when compacting side-drain pipe backfill under driveways serving a property that is not a single residential lot.*

125-9.3 Additional Requirements:

125-9.3.1 Frequency: *Conduct QC Standard Proctor maximum density sampling and testing at a minimum frequency of one test per soil type. The verification test will be at a minimum of one test per soil type:*

<i>Test Name</i>	<i>Quality Control</i>	<i>Verification</i>
<i>Standard Proctor Maximum Density</i>	<i>One per soil type</i>	<i>One per soil type</i>
<i>Density</i>	<i>One per LOT</i>	<i>One per four consecutive LOTs and for wet conditions, the first lift not affected by water</i>
<i>Soil Classification</i>	<i>One per Standard Proctor Maximum density</i>	<i>One per Standard Proctor Maximum density</i>

125-10 Verification Comparison Criteria and Resolution Procedures.

125-10.1 Standard Proctor Maximum Density Determination: *The Engineer will verify the QC results if the results compare within 4.5 PCF of the verification test result. Otherwise, the Engineer will take one additional sample of material from the soil type in question. The State Materials Office or an AASHTO accredited laboratory designated by the State Materials Office will perform resolution testing. The material will be sampled and tested in accordance with AASHTO T99, Method C.*

The Engineer will compare the resolution test result with the QC test results. If the resolution test result is within 4.5 PCF of the corresponding QC test results, the Engineer will use the QC test results for material acceptance purposes for each LOT with that soil type. If the resolution test result is not within 4.5 PCF of the Contractor's QC test, the verification test result will be used for material acceptance purposes.

125-10.2 Density Testing: *When a verification or independent verification density test fails the acceptance criteria, retest the site within a 5 feet radius and the following actions will be taken:*

- 1. If the QC retest meets the acceptance criteria and compares favorably with the verification or independent verification test, the Engineer will accept those LOTs.*
- 2. If the QC retest does not meet the acceptance criteria and compares favorably with the verification or independent verification test, rework and retest the LOT. The Engineer will re-verify those LOTs.*
- 3. If the QC retest and the verification or independent verification test do not compare favorably, complete a new equipment-comparison analysis as defined in 120-10.1.2. Once acceptable comparison is achieved, retest the LOTs. The Engineer will perform new verification testing. Acceptance testing will not begin on a new LOT until the Contractor has a gauge that meets the comparison requirements.*

125-10.3 Soil Classification: *Meet the requirements of 120-10.4.3.*

125-11 Site Restoration.

Wherever the existing site is disturbed solely for the purpose of constructing or removing box culverts, pipes, inlets, manholes, etc., completely replace and restore the site to the Engineer's satisfaction, without additional compensation.

125-12 Cleaning Up.

Upon completion of the work, leave the structure and all adjacent areas in a neat and presentable condition, clear up all temporary structures, rubbish and surplus materials and

leave the space under the structure unobstructed and in such shape that drift will not collect nor scour or be induced. Pile all material from existing structures that have been removed neatly on the bank, unless otherwise directed by the Engineer. Pull false work piling unless the Engineer permits it to be cut or broken off in which case it will be cut or broken off at least 2 feet below the ground line or stream bed.

125-13 Method of Measurement.

When direct payment for excavation for structures is provided in the proposal, and such payment is on a unit basis, such excavation will be measured in its original position by the cross-section method to determine the amount of material. The cubic yard volume of excavation used as a basis of payment will then be that material actually removed below the original ground line or stream bed, but not including that shown in the Plans to be paid for either as regular excavation, subsoil excavation, lateral ditch excavation or channel excavation, or which is included in the item for grading, and except that no payment will be made for material removed in excavating for footings or foundations outside of an area which is bounded by vertical planes 12 inches outside of the limits of the footing and parallel thereto. For pipe trenches the width used to be in the calculation shall be the diameter of the pipe, plus 24 inches.

125-14 Basis of Payment.

125-14.1 When No Direct Payment Provided: *When direct payment for excavation for structures is not provided for in the proposal, all work specified in this Section, other than as specified in 125-14.3 through 125-14.7, shall be included in the Contract price for the concrete or for other items covering the applicable structure.*

125-14.2 Direct Payment: *When direct payment for work under this Section is provided, the Contract price per cubic yard (measured as provided in 125-13), as shown in the proposal, shall be full compensation for all the work specified in this Section, except such work as is specifically stipulated to be paid for separately, in 125-14.3 through 125-14.7.*

125-14.3 Excavation Below Plan Grade: *When excavation of material below plan grade is called for in the Plans or authorized by the Engineer, and payment for Excavation for Structures is on a cubic yard basis, the material excavated below plan grade will be included in the measurement for this item.*

Payment for the material used for the backfill will be made as specified in

125-14.7.

125-14.4 Strengthening Foundations: *The work of strengthening the foundations (as provided in 125-4.2) shall be paid for as provided in 4-4, unless such work is covered by a bid item.*

125-14.5 Backfilling for Additional Support: *The work of providing additional support by backfilling with sand or other satisfactory material, where called for by the Engineer (as specified in 125-8), shall be paid for as provided in 4-4.*

125-14.6 Removal and Replacement of Existing Pavement: *For pavement, curb, etc., which is removed only in order to construct pipe culverts or storm sewers, as specified in 125-11, all costs of such removal and replacement shall be included in the costs of the pipe or other structure for which it is removed, unless otherwise provided for in the contract.*

125-14.7 Removal and Replacement of Material Unsuitable for Backfill: *When it cannot reasonably be anticipated from information contained in the Plans, that material excavated for the structure will be unsuitable for use as backfill, and such material proves to be unsuitable for this use, the work of disposing of such material away from the site will be paid for as Unforeseeable Work, and the work of bringing in substitute material for the backfill will be paid for as specified for the particular case shown below:*

(a) No additional payment will be made for backfill materials obtained from surplus material available from the normal excavation or grading operations.

(b) When the necessary material is not available from the normal excavation or grading operations, and the Contract includes an item for borrow excavation, backfill material authorized to be obtained from designated borrow areas will be included in the volume of borrow excavation to be paid for.

(c) When the necessary material is not available from the normal excavation or grading operations and no separate item for borrow excavation is included in the Contract, any backfill material obtained by increasing the volume of excavation within the roadway right of way will be measured and paid for as regular excavation subject to the provisions of 9-3.2.2.

(d) When authorization is given for obtaining the material from outside the right of way and from other than designated borrow areas, such excavation will be paid for as unforeseeable work.

(e) Where pipe bedding is provided, as specified in 125-8, by the use of select granular material, the quantity of such select material obtained either as commercial material or from material from the grading operations other than in the immediate vicinity of the pipe to be bedded, as authorized by the Engineer, will be paid for at the Contract price per cubic yard for select bedding material. No payment for this material will be made for material available from the excavation for the pipe culvert or from other material available from the grading operations at a location not sufficiently remote as to require loading on trucks.

125-14.8 Pay Items: *Payment for the work under this Section, when provided for directly.*

SECTION 160 STABILIZING

160-1 Description.

Stabilize designated portions of the roadbed to provide a firm and unyielding subgrade, having the required bearing value specified in the Plans. Perform work in accordance with an approved Quality Control (QC) Plan meeting the requirements of Section 105.

160-2 Materials.

160-2.1 Commercial Material: *Meet the requirements of Section 914.*

160-2.2 Local Material: *Meet the requirements of Section 914. Test material from each source, or if authorized by the Engineer, test blended materials. Submit test results to the Engineer at least 14 days prior to the stabilization operation.*

160-2.3 Existing Base: *When the material from an existing base is used as all, or a portion, of the stabilizing additives, no further testing is required unless directed by the Engineer.*

160-2.4 Granular Subbase: *If applicable, the Engineer may allow, at no additional cost to the Owner, the substitution of 6 inches of granular subbase meeting the requirements of 290-2 and 290-3, when 12 inches of stabilization requiring a limerock bearing ratio (LBR) value of 40 is specified.*

160-3 Construction Methods.

160-3.1 General: *Prior to the beginning of stabilizing operations, construct the area to be stabilized to an elevation such that, upon completion of stabilizing operations, the completed stabilized subgrade will conform to the lines, grades, and cross-section shown in the Plans. Prior to spreading any additive stabilizing material, bring the surface of the roadbed to a plane approximately parallel to the plane of the proposed finished surface.*

Construct mainline pavement lanes, turn lanes, ramps, parking lots, concrete box culverts and retaining wall systems meeting the requirements of 120-8.1, except replace “embankment” with “subgrade”.

Construct shoulder-only areas, sidewalk, and shared use path areas meeting the requirements of 120-8.1 except replace “embankment” with “subgrade” and meet the acceptance criteria of 160-4.2.

Isolated mixing operations will be considered as separate LOTS. Curb pads and shoulders compacted separately shall be considered separate LOTS. Isolated compaction operations will be considered as separate LOTS. For multiple phase construction, a LOT shall not extend beyond the limits of the phase.

160-3.2 Application of Stabilizing Material: *After substantially completing the roadbed grading operations, determine the type and quantity (if any) of stabilizing material necessary for compliance with the bearing value requirements. Before using any Fossil Fuel Combustion Products (FFCPs), provide documentation, at the preconstruction meeting or no later than 30 days prior to delivery of FFCP's to the project, signed and sealed by the Specialty Engineer that these materials meet the requirements of 403.7047 F.S. Notify the Engineer of the approximate quantity to be added before spreading. When additive stabilizing materials are required, spread the material uniformly over the area to be stabilized.*

160-3.2.1 Sampling and Testing of Local Material: *Randomly select locations for sampling using a random number generator approved by the Engineer in accordance with*

FM 1-T 267 and test at the minimum frequency listed in the table below before mixing. The Engineer will reject the material for failing QC test results. The Engineer will sample for Verification and Resolution testing at the minimum frequency listed in the table below. The Engineer will perform Verification tests at the minimum frequency listed in the table below.

Test Name	Quality Control	Verification	Resolution
Liquid Limit (LL), Plastic Index (PI), and Organic Content	One per two LOTs	One per eight LOTs	One per eight LOTs

160-3.2.1.1 Verification Comparison Criteria and Resolution

Procedures: If the QC and the Verification tests meet the requirements of Section 914 then the Engineer will accept the corresponding LOTs. Otherwise, the Engineer will submit the Resolution sample to the State Materials Office (SMO) or an AASHTO accredited laboratory designated by SMO to perform Resolution testing.

If the Resolution Test results meet the requirements of Section 914 then the Engineer will accept the LOTs in question. Otherwise remove the material and apply new material meeting the requirements of Section 914 and retest in accordance with 160-3.2.

160-3.3 Mixing: Perform mixing using rotary tillers, a plant or other equipment meeting the approval of the Engineer. The subgrade may be mixed in one course if the equipment and method of construction provides the uniformity, particle size limitation, compaction and other desired results of 160-4. Thoroughly mix the area to be stabilized throughout the entire depth and width of the stabilizing limits.

Perform the mixing operations, as specified, (either in place or in a plant) regardless of whether the existing soil, or any select soils placed within the limits of the stabilized sections, have the required bearing value without the addition of stabilizing materials.

160-3.4 Maximum Particle Size of Mixed Materials: At the completion of the mixing, ensure that the gradation of the material within the limits of the area being stabilized is such that 97% will pass a 3 1/2 inch sieve and that the material does not have a plasticity index greater than eight or liquid limit greater than 30. Remove any materials not meeting the plasticity requirements from the stabilized area. Break down or remove from the stabilized area materials, including clay lumps or lumps made of clay-size particles (any particle size 2 microns or less), not meeting the gradation requirements.

160-3.5 Bearing Value: Meet the bearing value requirements for the subgrade in accordance with 160-4.

160-3.6 Compaction: After completing the mixing operations and satisfying the requirements for bearing value, uniformity, and particle size. Compact the materials at a moisture content permitting the specified compaction in 160-4.2.3. If the moisture content of the material is improper for attaining the specified density, either add water or allow the material to dry until reaching the proper moisture content for the specified compaction.

160-3.7 Finish Grading: Shape the completed stabilized subgrade to conform to the finished lines, grades, and cross-section indicated in the Plans. Check the subgrade using elevation stakes or other means approved by the Engineer.

160-3.8 Requirements for Condition of Completed Subgrade: After completing the stabilizing and compacting operations, ensure that the subgrade is firm and substantially unyielding to the extent that it will support construction equipment and will have the bearing value required by the Plans.

Remove all soft and yielding material, and any other portions of the subgrade which will not compact readily, and replace it with suitable material so that the whole subgrade is brought to line and grade, with proper allowance for subsequent compaction.

160-3.9 Maintenance of Completed Subgrade: After completing the subgrade as specified above, maintain it free from ruts, depressions, and any damage resulting from the hauling or handling of materials, equipment, tools, etc. The Contractor is responsible for maintaining the required density until the subsequent base or pavement is in place including any repairs, replacement, etc., of curb and gutter, sidewalk, etc., which might become necessary in order to re-compact the subgrade in the event of underwash or other damage occurring to the previously compacted subgrade. Perform any such re-compaction at no expense to the Owner. Construct and maintain ditches and drains along the completed subgrade section.

160-4 Acceptance Program.

160-4.1 General Requirements: Meet the requirements of 120-10, except use 160-4.2 instead of 120-10.2, 160-4.3 instead of 120-10.3, and 160-4.4 instead of 120-10.4.

160-4.2 Acceptance Criteria:

160-4.2.1 Bearing Value Requirements:

160-4.2.1.1 General: Within the entire limits of the width and depth of the areas to be stabilized, obtain the required minimum bearing value for each LOT. For any area where the bearing value obtained is deficient from the value indicated in the Plans, in excess of the tolerances established herein, spread and mix additional stabilizing material in accordance with 160-3.3. Perform this reprocessing for the full width of the roadway being stabilized and longitudinally for a distance of 50 feet beyond the limits of the area in which the bearing value is Deficient. Determine the quantity of additional stabilizing material to be used in reprocessing.

160-4.2.1.2 Under-tolerances in Bearing Value Requirements: The under-tolerances are allowed for the following specified Bearing Values:

Specified Bearing Value	Under-tolerance
LBR 40	5.0
LBR 35	4.0
LBR 30 (and under)	2.5

The following unsoaked bearing value requirement is based on tests performed on samples obtained after completing mixing operations:

Specified Bearing Value	Unsoaked Bearing Value Required	Under-tolerance
LBR 40	LBR 43	0.0

160-4.2.2 Mixing Depth Requirements: Do not exceed individual plan depth thickness by more than 2 inches or exceed LOT-average depth thickness by more than 1 inch measured to the nearest 0.25 inch. No under-tolerance of mixing depth is allowed.

As an exception to the above mixing requirements, where the subgrade is of rock, the Engineer may waive the mixing operations (and the work of stabilizing), and the Owner will not pay for stabilization for such sections of the roadway.

160-4.2.3 Density Requirements:

160-4.2.3.1 General: Within the entire limits of the width and depth of the areas to be stabilized, other than as provided in 160-4.2.3.2, obtain a minimum density at any location of 98% of the Modified Proctor maximum density as determined by FM 1-T 180, Method D.

160-4.2.3.2 Exceptions to Density Requirements: *The Contractor need not obtain the minimum density specified in 160-4.2.3.1 if within the following limits:*

(a) *The width and depth of areas which are to be subsequently incorporated into a base course under the same contract.*

(b) *The upper 6 inches of areas to be grassed under the same contract. Compact these areas to a reasonably firm condition as directed by the Engineer.*

160-4.2.4 Frequency: *Conduct QC sampling and testing at a minimum frequency listed in the table below. The Engineer will perform Verification sampling and tests at a minimum frequency listed in the table below.*

<i>Test Name</i>	<i>Quality Control</i>	<i>Verification</i>	<i>Verification for Shoulder-Only, Shared Use Path and Sidewalk Construction</i>
<i>Modified Proctor Maximum Density</i>	<i>One per two consecutive LOTs</i>	<i>One per eight consecutive LOTs</i>	<i>One per four LOTs</i>
<i>Density</i>	<i>One per LOT</i>	<i>One per four LOTs</i>	<i>One per two LOTs</i>
<i>Stabilizing Mixing Depth</i>	<i>Three per 500 feet</i>	<i>Witness one per LOT</i>	<i>Witness one per LOT</i>
<i>LBR</i>	<i>One per two consecutive LOTs</i>	<i>One per eight consecutive LOTs</i>	<i>One per four LOTs</i>
<i>Gradation, LL/PI & Soil Classification (Local materials)</i>	<i>Not Required</i>	<i>One per eight consecutive LOTs</i>	<i>One per four LOTs</i>

160-4.3 Additional Requirements:

160-4.3.1 Quality Control Testing:

160-4.3.1.1 Bearing Values: *Test the stabilized subgrade sample collected in 160-4.3.1.3. Determine the LBR in accordance with FM 5-515 and 160-4.2.4.*

160-4.3.1.1.1 Unsoaked LBR: *If unsoaked LBR is desired, submit request for approval to the Engineer. Upon approval by the Engineer to consider the use of unsoaked LBR, randomly sample and test from three locations in the initial Lot for both soaked and unsoaked LBR in accordance with FM 5-515. Ensure all of the tests demonstrate the material achieves the LBR values in 160-4.2.1.2. Continue testing unsoaked LBR at the frequency shown in 160-4.2.4. Discontinue unsoaked LBR testing if any unsatisfactory QC LBR test result is obtained or resolution determines an unsatisfactory LBR.*

160-4.3.1.2 Mixing Depths: *Meet required plan mixing-depths by measuring from the proposed final grade line. Determine test locations, including stations and offsets. Notify the Engineer a minimum of 24 hours before checking mixing depths.*

160-4.3.1.3 Modified Proctor Maximum Density Requirement: *Collect enough material to split and create three separate samples. Determine test locations, including stations and offsets for the two LOTs under consideration. Retain the Verification and Resolution samples until the Engineer accepts the LOTs represented by the samples.*

160-4.3.2 Verification Tests:

160-4.3.2.1 Bearing Value & Soil Classification: *The Engineer will collect a sample at a location other than the location where the sample was collected in 160-4.3.1.3, and test the stabilized subgrade for determination of the LBR in accordance with FM 5-515. The Engineer will select test locations, including stations and offsets, using a Random Number generator, based on the LOTs under consideration.*

If local material is used for stabilizing, the Engineer will determine compliance with embankment utilization requirements and 160-3.4 by testing and classifying the stabilized subgrade in accordance with AASHTO T88 and AASHTO M 145 at the frequency shown in 160-4.2.4.

160-4.3.2.1.1 Unsoaked LBR: *The Engineer will sample and test the initial LOT for one soaked and one unsoaked LBR if consideration of the unsoaked LBR has been approved.*

160-4.3.2.2 Mixing Depth: *The Engineer will witness the Contractor's mixing depth checks to ensure compliance with 160-4.2.2. The Engineer will select test locations, including stations and offsets, using a Random Number generator.*

160-4.3.2.3 Modified Proctor Maximum Density: *The Engineer will randomly select one of the retained split samples and test in accordance with FM 1-T 180, Method D.*

160-4.4 Verification Comparison Criteria and Resolution Procedures:

160-4.4.1 Bearing Value & Soil Classification: *If the Verification test meets the requirements of 160-4.2.1 and embankment utilization requirements, the Engineer will accept the corresponding LOTs. Otherwise, the Engineer will collect an additional sample in the same LOT the Verification sample was obtained. SMO or an AASHTO accredited laboratory designated by SMO will perform Resolution testing on the additional sample. The material will be sampled and tested in accordance with FM 5-515. If local material is used for stabilization, the sample will be tested in accordance with AASHTO T-88, and AASHTO M-145.*

If the Resolution Testing results meet the requirements of 160-4.2.1 and embankment utilization requirements then the Engineer will accept the LOTs in question. Otherwise reprocess the corresponding LOTs in accordance with 160-3 and retest in accordance with 160-4.3.1.1.

160-4.4.2 Mixing Depth Thickness: *The Owner will witness the mixing depth checks.*

- 1. If the depth checks meet the requirements of 160-4.2.2 the Engineer will accept that 500-foot section.*
- 2. If the depth checks confirm shallow depth, re-mix the 500-foot section to an appropriate depth and re-measure in accordance with 160-4.3.1.2. The Engineer will repeat the witness process.*
- 3. If the depth checks confirm extra deep mixing, conduct an additional QC density test after compaction for the bottom 12 inches of the subgrade for that 500-foot section in addition to a QC density test for the top 12 inches. The additional density test must meet the requirements of 160-4.2.3.*

160-4.4.3 Modified Proctor Maximum Density Determination: *The Engineer will compare the Verification test results of 160-4.3.2.3 to the corresponding Quality Control test results. If the test result is within 4.5 lb/ft^3 of the QC test result, the LOTs will be verified. Otherwise, the Engineer will collect the Resolution split sample corresponding to the Verification sample tested. SMO or an AASHTO accredited laboratory designated by SMO will perform Resolution testing. The material will be sampled and tested in accordance with FM 1-T 180, Method D.*

The Engineer will compare the Resolution Test results with the QC test results. If the Resolution Test result is within 4.5 lb/ft^3 of the corresponding QC test result, the Engineer will use the QC test results for material acceptance purposes for each corresponding pair of LOTs. If the Resolution test result is not within 4.5 lb/ft^3 of the corresponding QC test, the Engineer will collect the remaining Verification split samples for testing. Verification Test results will be used for material acceptance purposes for the LOTs in question.

160-4.4.4 Density: *When a Verification or Independent Verification density test does not meet 160-4.2.3 (Acceptance Criteria), retest at a site within a 5 feet radius of the Verification test location and observe the following:*

- 1. If the QC retest meets the Acceptance Criteria and compares favorably with the Verification or Independent Verification test, the Engineer will accept the LOTS in question.*
- 2. If the QC retest does not meet the Acceptance Criteria and compares favorably with the Verification or Independent Verification test, rework and retest the material in that LOT. The Engineer will re-verify the LOTS in question.*
- 3. If the QC retest and the Verification or Independent Verification test do not compare favorably, complete a new equipment-comparison analysis as defined in 120-10.1.2. Once acceptable comparison is achieved, retest the LOTS. The Engineer will perform new verification testing. Acceptance testing will not begin on a new LOT until the Contractor has a gauge that meets the comparison requirements.*

160-5 Method of Measurement.

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

160-6 Basis of Payment.

Price and payment will constitute full compensation for all work and materials specified in this Section, including furnishing, spreading and mixing, compacting of all stabilizing material required and any reprocessing of stabilization areas necessary to attain the specified bearing value. The Owner will make full payment for any areas where the existing subgrade materials meet the design bearing value requirements without the addition of stabilizing additives, as well as areas where the Contractor may elect to place select high-bearing materials from other sources within the limits of the stabilizing.

If the item of borrow excavation is included in the Contract, any stabilizing materials obtained from designated borrow areas will be included in the pay quantity for borrow excavation.

SECTION 320
HOT MIX ASPHALT -
PLANT METHODS AND EQUIPMENT

320-1 General.

This Section specifies the basic equipment and operational requirements for hot mix asphalt (including warm mix asphalt) production facilities used in the construction of asphalt pavements and bases. Establish and maintain a quality control system that provides assurance that all materials and products submitted for acceptance meet Contract requirements.

320-2 Quality Control (QC) Requirements.

320-2.1 Minimum Producer QC Requirements: *Perform as a minimum the following activities:*

1. Stockpiles:
 - a. Assure materials are placed in the correct stockpile;*
 - b. Assure good stockpiling techniques;*
 - c. Inspect stockpiles for separation, contamination, segregation, and other similar items;*
 - d. Properly identify and label each stockpile.*
2. Incoming Aggregate:
 - a. Obtain gradations and bulk specific gravity (G_{sb}) values from aggregate supplier for reference;*
 - b. Determine the gradation of all component materials and routinely compare gradations and G_{sb} values to mix design.*
3. Cold Bins:
 - a. Calibrate the cold gate/feeder belt for each material;*
 - b. Determine cold gate/feeder belt settings;*
 - c. Observe operation of cold feeder for uniformity;*
 - d. Verify accuracy of all settings;*
 - e. Verify that the correct components are being used, and that all modifiers or additives or both are being incorporated into the mix.*
4. Batch Plants:
 - a. Determine percent used and weight to be pulled from each bin to assure compliance with the mix design;*
 - b. Check mixing time;*
 - c. Check operations of weigh bucket and scales.*
5. Drum Mixer Plants:
 - a. Determine aggregate moisture content;*
 - b. Calibrate the weigh bridge on the charging conveyor.*
6. Control Charts: *Maintain QC data and charts (updated daily) for all QC Sampling and Testing and make available upon demand. Provide the following charts:*
 - a. All components used to determine the composite pay factor (No. 8 sieve, No. 200 sieve, asphalt binder content, air voids, and density);*
 - b. Gradation of incoming aggregate;*
 - c. Gradation, asphalt binder content and maximum specific gravity (G_{mm}) of RAP;*

d. Any other test result or material characteristic (as determined by the Contractor) necessary for process control.

The above listed minimum activities are to be considered normal activities necessary to control the production of hot mix asphalt at an acceptable quality level. Depending on the type of process or materials, some of the activities listed may not be necessary and in other cases, additional activities may be required. The frequency of these activities will also vary with the process and the materials. When the process varies from the defined process average and variability targets, the frequency of these activities will be increased until the proper conditions have been restored.

320-2.2 Minimum Process Control Testing Requirements: Perform, as a minimum, the following activities at the testing frequencies provided in Table 320-1. QC tests used in the acceptance decision may be used to fulfill these requirements.

<i>Table 320-1</i>		
<i>Asphalt Plant - Materials Testing Frequencies</i>		
<i>Material</i>	<i>Property</i>	<i>Minimum Testing Frequency</i>
<i>Aggregate</i>	<i>Gradation</i>	<i>Once per 1,000 tons of incoming aggregate</i>
<i>Asphalt Mix</i>	<i>Asphalt Binder Content</i>	<i>If daily production > 100 tons, once per day; If daily production > 1,000 tons, twice per day. *</i>
<i>Asphalt Mix</i>	<i>Bulk Specific Gravity (G_{mb})</i>	<i>If daily production > 100 tons, once per day; If daily production > 1,000 tons, twice per day. *</i>
<i>Asphalt Mix</i>	<i>Gradation</i>	<i>If daily production > 100 tons, once per day; If daily production > 1,000 tons, twice per day. *</i>
<i>Asphalt Mix</i>	<i>Maximum Specific Gravity (G_{mm})</i>	<i>If daily production > 100 tons, once per day; If daily production > 1,000 tons, twice per day. *</i>
<i>Asphalt Mix</i>	<i>Temperature</i>	<i>Each of first 5 loads, then once every 5 loads thereafter, per day per mix design.</i>
<i>RAP</i>	<i>Asphalt Binder Content</i>	<i>Once per 1,000 tons RAP</i>
<i>RAP</i>	<i>Gradation</i>	<i>Once per 1,000 tons RAP</i>
<i>RAP</i>	<i>Maximum Specific Gravity (G_{mm})</i>	<i>Once per 5,000 tons RAP</i>

**If less than 100 tons of mix is produced on each of successive days of production, resulting in a cumulative quantity of greater than 100 tons, then perform the indicated test.*

320-2.3 Personnel Qualifications: Provide QC Technicians in accordance with Section 105.

320-2.4 Hot Mix Asphalt Testing Laboratory Requirements: The laboratory shall meet the following requirements:

1. *Area* - The effective working area of the laboratory shall be a minimum of 180 square feet, with a layout of which will facilitate multiple tests being run simultaneously by two technicians. This area does not include the space for desks, chairs and file cabinets. Any variations shall be approved by the Engineer.

2. *Lighting* - The lighting in the lab must be adequate to illuminate all areas of the work.

3. *Temperature Control* - Equip the lab with heating and air conditioning units that provide a satisfactory working environment.

4. *Ventilation* - Equip the lab with exhaust fans that will remove all hazardous fumes from within the laboratory in accordance with OSHA requirements.

5. *Equipment and Supplies* - Furnish the lab with the necessary sampling and testing equipment and supplies for performing contractor QC and Owner Verification Sampling and Testing. A detailed list of equipment and supplies required for each test is included in the appropriate FDOT, AASHTO, or ASTM Test Method. In the event testing equipment goes out of service during production, the Contractor may elect to use replacement equipment at another laboratory qualified, as described in Section 105, for up to 72 hours upon notification of the Engineer.

6. *Personal Computer* - Provide a personal computer capable of running a Microsoft Excel™ spreadsheet program, along with a printer.

7. *Communication* - Provide a telephone and fax machine (with a private line) for the use of the testing facility's QC personnel.

320-3 Requirements for All Plants.

320-3.1 General: Design, manufacture, coordinate, and operate the asphalt plant in a manner that will consistently produce a mixture within the required tolerances and temperatures specified.

320-3.2 Electronic Weigh Systems: Equip the asphalt plant with an electronic weigh system that: 1) has an automatic printout, 2) is certified every six months by an approved certified scale technician, and 3) meets monthly comparison checks with certified truck scales as specified in 320-3.2.4. Weigh all plant produced hot mix asphalt on the electronic weigh system, regardless of the method of measurement for payment.

Include, as a minimum, the following information on the printed delivery ticket:

- (a) Sequential load number
- (b) Project number
- (c) Date
- (d) Name and location of plant
- (e) Mix design number
- (f) Place for hand-recording mix temperature
- (g) Truck number
- (h) Gross, tare, and net tonnage per truck (as applicable)
- (i) Daily total tonnage of mix for the mix design

Print the delivery ticket with an original and at least one copy. Furnish the original to the Engineer at the plant and one copy to the Engineer at the paving site.

Utilize any one of the following three electronic weigh systems.

320-3.2.1 Electronic Weigh System on the Truck Scales: Provide an electronic weigh system on all truck scales, which is equipped with an automatic recordation system that is

approved by the Engineer. Use scales of the type that directly indicate the total weight of the loaded truck. Use scales meeting the requirements for accuracy, condition, etc., of the Bureau of Weights and Measures of the Florida Department of Agriculture, and re-certify such fact every six months, either by the Bureau of Weights and Measures or by a registered scale technician.

320-3.2.2 Electronic Weigh System on Hoppers Beneath a Surge or Storage

Bin: Provide an electronic weigh system on the hopper (hopper scales or load cells) beneath the surge or storage bin, which is equipped with an automatic recordation system approved by the Engineer.

320-3.2.3 Automatic Batch Plants with Printout: For batch plants, provide an approved automatic printer system which will print the individual or cumulative weights of aggregate and liquid asphalt delivered to the pugmill and the total net weight of the asphalt mix measured by hopper scales or load cell type scales. Use the automatic printer system only in conjunction with automatic batching and mixing control systems that have been approved by the Engineer.

320-3.2.4 Monthly Electronic Weigh System Comparison Checks: Check the accuracy of the electronic weighing system at the commencement of production and thereafter at least every 30 days during production by one of the following two methods and maintain a record of the weights in the Scale Check Worksheet.

320-3.2.4.1. Electronic Weigh System on Truck Scales:

(a) The Engineer will randomly select a loaded truck of asphalt mix, a loaded aggregate haul truck, or another vehicle type approved by the Engineer and record the truck number and gross weight from the Contractor's delivery ticket.

(b) Weigh the selected truck on a certified truck scale, which is not owned by the Contractor and record the gross weight for the comparison check. If another certified truck scale is not available, the Engineer may permit another set of certified truck scales owned by the Contractor to be used. The Engineer may elect to witness the scale check.

(c) The gross weight of the loaded truck as shown on the Contractor's delivery ticket will be compared to the gross weight of the loaded truck from the other certified truck scale. The maximum permissible deviation is 8 pounds per ton of load, based on the certified truck scale weight.

(d) If the distance from the asphalt plant to the nearest certified truck scale is enough for fuel consumption to affect the accuracy of the comparison checks, a fuel adjustment may be calculated by using the truck odometer readings for the distance measurement, and 6.1 miles per gallon for the fuel consumption rate, and 115 ounces per gallon for fuel weight.

(e) During production, when an additional certified truck scale is not available for comparison checks, the Engineer may permit the Contractor to weigh the truck on his certified scales used during production and then weigh it on another certified truck scale, as soon the other scale is available for the comparison checks.

In addition to the periodic checks as specified above, check the scales at any time the accuracy of the scales becomes questionable. When such inaccuracy does not appear to be sufficient to seriously affect the weighing operations, the Engineer will allow a period of two calendar days for the Contractor to conduct the required scale check. However, in the event the indicated inaccuracy is sufficient to seriously affect the mixture, the Engineer may require immediate shut-down until the accuracy of the scales has been checked and necessary

corrections have been made. Include the cost of all scale checks in the bid price for asphalt concrete, at no additional cost to the Owner.

320-3.2.4.2. Electronic Weigh System on Hoppers Beneath a Surge or Storage Bin and Automatic Batch Plants with Printout:

(a) The Engineer will randomly select a loaded truck of asphalt mix and record the truck number, and the net weight of the asphalt mix from the Contractor's delivery ticket.

(b) *Weigh the selected truck on a certified truck scale, which is not owned by the Contractor and record the gross weight for the comparison check. If another certified truck scale is not available, the Engineer may permit another set of certified truck scales owned by the Contractor to be used. The Engineer may elect to witness the scale check.*

(c) *Deliver the asphalt mix to the project, then weigh the selected empty truck on the same certified truck scales. Record the tare weight of the truck.*

(d) *Compare the net weight of the asphalt mix from the delivery ticket to the calculated net weight of the asphalt mix as determined by the certified truck scale weights. The maximum permissible deviation is 8 pounds per ton of load, based on the certified truck scale weight.*

(e) *Use the fuel adjustment as specified in 320-3.2.4.1(d), when the distance from the asphalt plant to the nearest certified truck scale is enough for fuel consumption to affect the accuracy of the comparison checks.*

(f) *During production, when an additional certified truck scale is not available for comparison checks, the Engineer may permit the Contractor to load a truck with aggregate from the pugmill, surge or storage bin, and follow the above procedures to conduct the comparison checks as soon as certified truck scale is available.*

If the check shows a greater difference than the tolerance specified above, then recheck on a second set of certified scales. If the check and recheck indicate that the printed weight is out of tolerance, have a certified scale technician check the electronic weigh system and certify the accuracy of the printer. While the system is out of tolerance and before its adjustment, the Engineer may allow the Contractor to continue production only if provisions are made to use a set of certified truck scales to determine the truck weights.

320-3.3 Asphalt Binder: Meet the following requirements:

320-3.3.1 Transportation: *Deliver the asphalt binder to the asphalt plant at a temperature not to exceed 370°F, and equip the transport tanks with sampling and temperature sensing devices meeting the requirements of 300-3.2.*

320-3.3.2 Storage: *Equip asphalt binder storage tanks to heat the liquid asphalt binder to the temperatures required for the various mixtures. Heat the material in such a manner that no flame comes in contact with the binder. Heat or insulate all pipe lines and fittings. Use a circulating system of adequate size to ensure proper and continuous circulation during the entire operating period. Locate a thermometer, reading from 200 to 400°F, either in the storage tank or in the asphalt binder feed line. Maintain the asphalt binder in storage within a range of 230 to 370°F in advance of mixing operations. Locate a sampling device on the discharge piping exiting the storage tank or at a location as approved by the Engineer.*

320-3.4 Aggregate: *Meet the following requirements:*

320-3.4.1 Stockpiles: *Place each aggregate component in an individual stockpile, and separate each from the adjacent stockpiles, either by space or by a system of bulkheads.*

Prevent the intermingling of different materials in stockpiles at all times. Identify each stockpile, including RAP, as shown on the mix design.

Form and maintain stockpiles in a manner that will prevent segregation. If a stockpile is determined to be segregated, discontinue the use of the material on the project until the appropriate actions have been taken to correct the problem.

320-3.4.2 Blending of Aggregates: *Stockpile all aggregates prior to blending or placing in the cold feed bins. If mineral filler or hydrated lime is required in the mix, feed or weigh it in separately from the other aggregates.*

320-3.4.2.1 Cold Feed Bin: *Provide a separate cold feed bin for each component of the fine and coarse aggregate required by the mix design. Equip the cold feed bins with accurate mechanical means for feeding the aggregate uniformly into the dryer in the proportions required for the finished mix to maintain uniform production and temperature. When using RAP as a component material, prevent any oversized RAP from being incorporated into the completed mixture by the use of: a grizzly or grid over the RAP bin; in-line roller or impact crusher; screen; or other suitable means. If oversized RAP material appears in the completed recycled mix, take the appropriate corrective action immediately. If the appropriate corrective actions are not immediately taken, stop plant operations.*

Use separate bin compartments in the cold aggregate feeder that are constructed to prevent any spilling or leakage of aggregate from one cold feed bin to another. Ensure that each cold feed bin compartment has the capacity and design to permit a uniform flow of aggregates. Mount all cold feed bin compartments over a feeder of uniform speed, which will deliver the specified proportions of the separate aggregates to the drier at all times. If necessary, equip the cold feed bins with vibrators to ensure a uniform flow of the aggregates at all times.

320-3.4.2.2 Gates and Feeder Belts: *Provide each cold feed bin compartment with a gate and feeder belt, both of which are adjustable to assure the aggregate is proportioned to meet the requirements of the mix design.*

320-3.4.3 Screening Unit: *Remove any oversized pieces of aggregate by the use of a scalping screen. Do not return this oversized material to the stockpile for reuse unless it has been crushed and reprocessed into sizes that will pass the scalping screen. Ensure that the quantity of aggregates being discharged onto the screens does not exceed the capacity of the screens to actually separate the aggregates into the required sizes.*

320-3.5 Dryer: *Provide a dryer of satisfactory design for heating and drying the aggregate. Use a dryer capable of heating the aggregate to within the specified temperature range for any mix, and equip the dryer with an electric pyrometer placed at the discharge chute to automatically register the temperature of the heated aggregates.*

320-3.6 Asphalt Binder Control Unit: *Provide a satisfactory means, either by weighing, metering, or volumetric measuring, to obtain the proper amount of asphalt binder material in the mix, within the tolerance specified for the mix design.*

320-3.7 Contractor's Responsibilities: *Acceptance of any automatic delivery ticket printout, electronic weight delivery ticket, other evidence of weight of the materials or approval of any particular type of material or production method will not constitute agreement by the Owner that such matters are in accordance with the Contract Documents and it shall be the Contractor's responsibility to ensure that the materials delivered to the project are in accordance with the Contract Documents.*

320-4 Additional Requirements for Batch Plants.

320-4.1 Heating and Drying: *Heat and dry the aggregate before screening. Control the temperature of the aggregate so the temperature of the completed mixture at the plant falls within the permissible range allowed by this Section.*

320-4.2 Gradation Unit: *Provide plant screens capable of separating the fine and coarse aggregates and of further separating the coarse aggregate into specific sizes. In addition, equip the gradation unit with a scalping screen to restrict the maximum size of the aggregates. In the event that the plant is equipped with cold feed bins that are capable of adequately controlling the gradation of the mixture, the use of plant screens is optional.*

320-4.3 Hot Bins: *Provide storage bins of sufficient capacity to supply the mixer when it is operating at full capacity. Provide hot bins with divided compartments to ensure separate and adequate storage of the appropriate fractions of the aggregate. Equip each compartment with an overflow chute of suitable size and location to prevent any backing up of material into other bins.*

320-4.4 Weigh Box or Hopper: *Equip the batch plant with a means for accurately weighing each bin size of aggregate and the mineral filler into the weigh box or hopper.*

320-4.5 Pugmills: *Utilize a pugmill capable of mixing the aggregate and the asphalt binder.*

320-5 Additional Requirements for Drum Mixer Plants.

320-5.1 Weight Measurements of Aggregate: *Equip the plant with a weigh-in-motion scale capable of measuring the quantity of aggregate (and RAP) entering the dryer.*

320-5.2 Synchronization of Aggregate Feed and Asphalt Binder Feed: *Couple the asphalt binder feed control with the total aggregate weight device, including the RAP feed, in such a manner as to automatically vary the asphalt binder feed rate as necessary to maintain the required proportions.*

320-5.3 Hot Storage or Surge Bins: *Equip the plant with either a surge bin or storage silo that is capable of storing an adequate amount of material to assure a uniform and consistent product.*

320-6 Preparation of the Mixture.

320-6.1 Mixing: *After the aggregate is dried and properly proportioned, mix the aggregate, along with any other components, with the asphalt binder to produce a thoroughly and uniformly coated mixture.*

320-6.2 Storage: *If necessary, store the asphalt mixture in a surge bin or hot storage silo for a maximum of 72 hours. For FC-5 mixtures, store the asphalt mixture in a surge bin or hot storage silo for a maximum of one hour.*

320-6.3 Mix Temperature: *Produce the mixture with a temperature within the master range as defined in Table 320-2.*

320-6.3.1 Test Requirements: *Determine the temperature of the completed mixture using a quick-reading thermometer through a hole in the side of the loaded truck immediately after loading. Contractor shall also provide a thermometer on-site for comparison purposes. Locate a 1/4 inch hole on both sides of the truck body within the middle third of the length of the body, and at a distance from 6 to 10 inches above the surface supporting the mixture. If a truck body already has a hole located in the general vicinity of the specified location, use this hole. At the Engineer's discretion, the Contractor may take the temperature of the load over the top of the truck in lieu of using the hole in the side of the truck.*

320-6.3.2 Test Frequency: *The normal frequency for taking asphalt mix temperatures will be for each day, for each design mix on the first five loads and one out of every*

five loads thereafter. Take the temperature of the asphalt mix at the plant and at the roadway before the mix is placed at the normal frequency. Record the temperature on the front of the respective delivery ticket. The Engineer shall review the plant and roadway temperature readings and may take additional temperature measurements at any time.

If any single load at the plant or at the roadway is within the master range shown in Table 320-2 but does not meet the criteria shown in Table 320-3 (for single measurements or the average of five consecutive measurements), the temperature of every load will be monitored until the temperature falls within the specified tolerance range in Table 320-3; at this time the normal frequency may be resumed. For warm mix asphalt, the Contractor may produce the first five loads of the production day and at other times when approved by the Engineer, at a hot mix asphalt temperature not to exceed **330°F** for purposes of heating the asphalt paver. For this situation, the upper tolerances of Tables 320-2 and 320-3 as applied to the warm mix asphalt mix design do not apply.

320-6.3.3 Rejection Criteria: Reject any load or portion of a load of asphalt mix at the plant or at the roadway with a temperature outside of its respective master range shown in Table 320-2. Notify the Engineer of the rejection immediately.

<i>Table 320-2</i>	
<i>Mix Temperature Master Range Tolerance</i>	
<i>Location</i>	<i>Acceptable Temperature Tolerance</i>
<i>Plant</i>	<i>Mixing Temperature ±30 F</i>
<i>Roadway</i>	<i>Compaction Temperature ±30F</i>

<i>Table 320-3</i>	
<i>Mix Temperature Tolerance From Verified Mix Design</i>	
<i>Any Single Measurement</i>	<i>±25°F</i>
<i>Average of Any Five Consecutive Measurements</i>	<i>±15°F</i>

320-7 Transportation of the Mixture.

Transport the mix in trucks of tight construction, which prevents the loss of material and the excessive loss of heat and previously cleaned of all foreign material. After cleaning, thinly coat the inside surface of the truck bodies with soapy water or an asphalt release agent as needed to prevent the mixture from adhering to the beds. Do not allow excess liquid to pond in the truck body. Do not use a release agent that will contaminate, degrade, or alter the characteristics of the asphalt mix or is hazardous or detrimental to the environment. Petroleum derivatives (such as diesel fuel), solvents, and any product that dissolves asphalt are prohibited. Provide each truck with a tarpaulin or other waterproof cover mounted in such a manner that it can cover the entire load when required. When in place, overlap the waterproof cover on all sides so that it can be tied down. Cover each load during cool and cloudy weather and at any time it appears rain is likely during transit with a tarpaulin or waterproof cover. Cover and tie down all loads of friction course mixtures.

**SECTION 330
HOT MIX ASPHALT -
GENERAL CONSTRUCTION REQUIREMENTS**

330-1 Description.

This Section specifies the basic equipment and construction requirements for hot mix asphalt (including warm mix asphalt) pavements and bases. Establish and maintain a quality control system that provides assurance that all materials, products and completed construction submitted for acceptance meet Contract requirements.

330-2 Quality Control (QC) Requirements.

330-2.1 Minimum QC Requirements: *In addition to the requirements set forth in Section 105, describe in the Quality Control Plan (QCP) how the following attributes will be monitored: pavement density, mix temperature, pavement smoothness, pavement cross-slope, mix spread rate, and pavement texture, including methods for monitoring pavement segregation and the corrective actions that will be taken to resolve any identified problems. Perform as a minimum, the following activities necessary to maintain process control and meet Specification requirements:*

1. Pavement Density: Monitor the pavement temperature with an infrared temperature device so that compaction is completed before the surface temperature of the pavement drops to the extent that effective compaction may not be achieved or the rollers begin to damage the pavement. Monitor the roadway density with either 6 inch diameter roadway cores, a nuclear density gauge, or other density measuring device, at a minimum frequency of once per 1,500 feet of pavement.

2. Mix Temperature: Determine the mix temperature at the roadway for the first five loads and one out of every five loads thereafter.

3. Mix Spread Rate: Monitor the mix spread rate at the beginning of each day's production, and as needed to control the operations, at a minimum of once per 5 truck loads placed. When determining the spread rate, use, at a minimum, an average of five truckloads of mix.

4. Pavement Texture: Monitor the pavement texture to minimize pavement segregation. Use density gauges, infrared temperature measurement devices, or roadway cores at the beginning of each day's production, and as necessary, both at truck exchanges and during normal paving operations.

5. Reporting: Ensure the accuracy of the Quality Control Roadway Reports on the approved form to reflect the actual surface area of the finished work and be in compliance with the requirements of the Contract Documents.

330-2.2 Personnel Qualifications: *Provide QC Technicians in accordance with Section 105.*

330-3 Limitations of Operations.

330-3.1 Weather Limitations: *Do not transport asphalt mix from the plant to the roadway unless all weather conditions are suitable for the paving operations.*

330-3.2 Limitations of Paving Operations:

330-3.2.1 General: *Place the mixture only when the surface upon which it is to be placed has been previously prepared, is intact, firm, dry, clean, and the tack or prime coat,*

with acceptable spread rate, is properly broken or cured. Do not place friction course until the adjacent shoulder area has been dressed and grassed.

330-3.2.2 Ambient Air Temperature: Place the mixture only when the air temperature in the shade and away from artificial heat meets requirements of Table 330-1. The minimum ambient temperature requirement may be reduced by 5°F when using warm mix technology, if mutually agreed to by both the Engineer and the Contractor.

Table 330-1	
Ambient Air Temperature Requirements for Paving	
Layer Thickness or Asphalt Binder Type	Minimum Temperature (°F)
≤ 1 inch	50
Any mixture > 1 inch containing a PG asphalt binder having a high temperature designation $\geq 76^{\circ}\text{C}$	45
Any mixture > 1 inch containing a PG asphalt binder having a high temperature designation $< 76^{\circ}\text{C}$	40
FC-5 ⁽¹⁾	65
⁽¹⁾ As an exception, place the mixture at temperatures no lower than 60°F, only when approved by the Engineer based on the Contractor's demonstrated ability to achieve a satisfactory surface texture and appearance of the finished surface. The minimum ambient temperature may be further reduced to 55°F when using warm mix technology, if agreed to by both the Engineer and the Contractor.	

330-3.2.3 Rain and Surface Conditions: Immediately cease transportation of asphalt mixtures from the plant when rain begins at the roadway. Do not place asphalt mixtures while rain is falling, or when there is water on the surface to be covered. Once the rain has stopped and standing water has been removed from the tacked surface to the satisfaction of the Engineer and the temperature of the mixture caught in transit still meets the requirements as specified in 320-6.3, the Contractor may then place the mixture caught in transit.

330-3.2.4 Wind: Do not place the mixture when the wind is blowing to such an extent that proper and adequate compaction cannot be maintained or when sand, dust, etc., are being deposited on the surface being paved to the extent that the bond between layers will be diminished.

330-4 Surface Preparation.

330-4.1 Cleaning: Prior to placing the mixture, clean the surface of the base or underlying pavement of all loose and deleterious material by the use of power brooms or blowers, supplemented by hand brooming where necessary.

330-4.1.1 Application over Asphalt Rubber Membrane Interlayer (ARMI): Where an asphalt mix is to be placed over a newly constructed ARMI, do not sweep or otherwise disturb the cover material prior to placing the asphalt mix, unless directed by the Engineer.

330-4.2 Tacking: Apply a tack coat on all existing pavement surfaces that are to be overlaid with an asphalt mix as specified in Section 300 and between successive layers of all asphalt mixes. Apply a tack coat on freshly primed bases only when so directed by the Engineer.

330-5 Paving Equipment.

330-5.1 General Requirements: Use equipment that is mechanically sound and capable of consistently meeting the requirements of these Specifications.

330-5.2 Asphalt Paver:

330-5.2.1 General: *Provide an asphalt paver that is self-propelled, can be steered, and is equipped with a receiving and distribution hopper and a mechanical screed. Use a mechanical screed capable of adjustment to regulate the depth of material spread and to produce the desired cross-section.*

330-5.2.2 Automatic Screed Control: *For all asphalt courses placed with an asphalt paver, equip the paver with automatic longitudinal screed controls of either the skid type, traveling stringline type, or non-contact averaging ski type with a minimum length of 25 feet. On the final layer of asphalt base, overbuild, and structural courses, and for friction courses, use the joint matcher in lieu of the skid, traveling stringline, or non-contact averaging ski on all passes after the initial pass. Equip the asphalt paver with electronic cross slope controls.*

330-5.2.3 Screed Width: *Provide an asphalt paver having a screed width greater than 8 feet when required to pave full width lanes. Do not use extendable screed strike-off devices that do not provide preliminary compaction of the mat in place of fixed screed extensions. Use a strike-off device only on irregular areas that would normally be done by hand and on shoulders 5 feet or less in width. When using the strike-off device on shoulders in lieu of an adjustable screed extension, demonstrate the ability to obtain an acceptable texture, density, and thickness.*

When using an extendable screed device to extend the screed's width on the full width lane or shoulder by 24 inches or greater, the Engineer will require an auger extension, paddle, or kicker device unless written documentation from the manufacturer is provided that these are not necessary.

330-5.3 Rollers:

330-5.3.1 Steel-Wheeled Rollers: *Provide compaction equipment capable of meeting the density requirements described in these Specifications. In the event that density testing is not required, and the standard rolling pattern is used, provide a tandem steel-wheeled roller weighing 5 to 15 tons for breakdown rolling. For finish rolling, use a separate roller with a weight of 5 to 15 tons. Variations from these requirements shall be approved by the Engineer.*

330-5.3.2 Traffic Rollers: *Provide compaction equipment capable of meeting the density requirements described in the Specifications. In the event that density testing is not required, and the standard rolling pattern is used, provide a self-propelled, pneumatic-tired traffic roller equipped with at least seven smooth-tread, low pressure tires, equipped with pads or scrapers on each tire. Maintain the tire pressure between 50 and 55 psi or as specified by the manufacturer. Use rollers with a minimum weight of 6 tons. Do not use wobble-wheeled rollers. Variations from these requirements shall be approved by the Engineer.*

330-5.3.3 Prevention of Adhesion: *Do not allow the mixture to adhere to the wheels of any rollers. Do not use fuel oil or other petroleum distillates to prevent adhesion. Do not use any method which results in water being sprinkled directly onto the mixture.*

330-5.4 Coring Equipment: *Furnish a suitable saw or drill for obtaining the required density cores.*

330-5.5 Hand Tools: *Provide the necessary hand tools such as rakes, shovels, and other similar tools, and a suitable means for keeping them clean. Do not use diesel fuel or other petroleum based solvents contained in an open container for cleaning purposes on the paver.*

330-6 Placing Mixture.

330-6.1 Requirements Applicable to All Pavement Types:

330-6.1.1 Alignment of Edges: *Place all asphalt mixtures by the stringline method to obtain an accurate, uniform alignment of the pavement edge. As an exception, pavement edges adjacent to curb and gutter or other true edges do not require a*

stringline. Control the unsupported pavement edge to ensure that it will not deviate more than plus or minus 1.5 inches from the stringline.

330-6.1.2 Paving Width: *If necessary due to the traffic requirements, place the mixture in strips in such a manner as to provide for the passage of traffic. As an option, where the road is closed to traffic, place the mixture to the full width with machines traveling in echelon.*

330-6.1.3 Mix Temperature: *Maintain the temperature of the mix at the time of paving within the master range as defined in 320-6.3. The minimum frequency for taking mix temperatures on the roadway will be as indicated in 320-6.3. Any load or portion of a load of asphalt mix on the roadway with a temperature outside of the master range shall be rejected for use on the project. Immediately notify the Engineer of the rejection.*

330-6.1.4 Speed of Paver: *Establish the forward speed of the asphalt paver based on the rate of delivery of the mix to the roadway but not faster than the optimum speed needed to adequately compact the pavement.*

330-6.1.5 Thickness and Spread Rate of Layers: *Construct each layer as defined in the following table:*

<i>Table 330-2</i>	
<i>Thickness and Target Spread Rate Requirements</i>	
<i>Mix Type</i>	<i>Specification Section and Article</i>
<i>Type SP</i>	<i>334-1</i>
<i>Type FC</i>	<i>337-8</i>
<i>Type B</i>	<i>234-8</i>
<i>ATPB</i>	<i>287-8</i>

330-6.1.5.1 Thickness Control: *Ensure the spread rate is within 5% of the target spread rate. When determining the spread rate, use, at a minimum, an average of five truckloads of mix. When the average spread rate is beyond plus or minus 5% of the target spread rate, monitor the thickness of the pavement layer closely and adjust the construction operations.*

If the Contractor fails to maintain an average spread rate within plus or minus 5% of the target spread rate for two consecutive days, the Engineer may elect to stop the construction operation at any time until the issue is resolved.

330-6.1.5.2 Maximum Spread Rate Tolerances: *When the average spread rate for the total structural or friction course pavement thickness measured in accordance with 330-6.1.5.1 exceeds the maximum spread rate tolerances shown in Table 330-3, address the unacceptable pavement in accordance with 330-9.5.*

<i>Table 330-3</i>		
<i>Maximum Spread Rate Tolerances</i>		
<i>Course</i>	<i>Design Thickness</i>	<i>Spread Rate Tolerance</i>
<i>Structural</i>	<i>≥ 2.5 inches</i>	<i>± 50 lbs per sy</i>
<i>Structural</i>	<i>< 2.5 inches</i>	<i>± 25 lbs per sy</i>
<i>Friction (dense)</i>	<i>-</i>	<i>± 25 lbs per sy</i>
<i>Friction (open)</i>	<i>-</i>	<i>± 15 lbs per sy</i>

As an exception, the Engineer may allow the Contractor to leave areas in place if it is determined by the Engineer that the deficiency is not a significant detriment to the pavement quality. A reduction to the pay item quantity will be made in accordance with 330-9.5.2.

330-6.1.6 Correcting Defects: *Before starting any rolling, check the surface; correct any irregularities; remove all drippings, sand accumulations from the screed, and fat spots from any source; and replace them with satisfactory material. Do not skin patch. When correcting a depression while the mixture is hot, scarify the surface and add fresh mixture.*

330-6.1.7 Hand Work: *In limited areas where the use of the paver is impossible or impracticable, the Contractor may place and finish the mixture by hand.*

330-7 Compacting Mixture.

330-7.1 General Requirements: *When density testing for acceptance is required, select equipment, sequence, and coverage (number of times the roller passes over a given area of pavement) of rolling to meet the specified density requirement. Regardless of the rolling procedure used, complete the final rolling before the surface temperature of the pavement drops to the extent that effective compaction may not be achieved or the rollers begin to damage the pavement.*

330-7.2 Standard Rolling Procedure: *When density testing for acceptance is not required, propose an alternative rolling pattern to be approved by the Engineer or use the following standard rolling procedure:*

1. Breakdown rolling: Provide two static coverages with a tandem steel-wheeled roller, following as close behind the paver as possible without pick-up, undue displacement, or blistering of the material.

2. Intermediate rolling: Provide five static coverages with a pneumatic-tired roller, following as close behind the breakdown rolling operation as the mix will permit.

3. Finish rolling: Provide one static coverage with a tandem steel-wheeled roller, after completing the breakdown rolling and intermediate rolling, but before the surface pavement temperature drops to the extent that effective compaction may not be achieved or the rollers begin to damage the pavement.

330-7.3 Rolling Procedures: *Utilize procedures that will uniformly compact the pavement layer to the desired density level, while meeting the appropriate smoothness requirements, without damaging the pavement surface, crushing aggregate or leaving excessive roller marks, roller heads, or ripples. While rolling is in progress, monitor the surface continuously, and adjust the compaction operations to comply with the surface requirements.*

330-7.4 Compaction of Areas Inaccessible to Rollers: *Use hand tamps or other satisfactory means to compact areas which are inaccessible to a roller, such as areas adjacent to curbs, gutters, bridges, manholes, etc.*

330-7.5 Correcting Defects: *Do not allow the compaction equipment to deposit contaminants onto the pavement surface. Remove and replace any areas damaged by such deposits as directed by the Engineer. Correct any depressions that develop before completing the rolling by loosening the mixture and adding new mixture to bring the depressions to a true surface. Should any depression remain after obtaining the final compaction, remove the full depth of the mixture, and replace it with sufficient new mixture to form a true and even surface. Correct all defects prior to laying the subsequent course.*

330-7.6 Use of Traffic Roller: *Use a traffic roller on the first overbuild course. Use a traffic roller or vibratory roller (unless restricted by the Contract Documents) on the first structural layer placed on an ARMI.*

330-7.7 Compaction at Bridge Structures: *Compact asphalt mixtures placed over bridge decks and approach slabs using static compaction only. Utilize the standard rolling procedure described in 330-7.2 or an alternative procedure approved by the Engineer.*

330-8 Joints.

330-8.1 General: *When laying fresh mixture against the exposed edges of joints, place it in close contact with the exposed edge to produce an even, well-compacted joint after rolling.*

330-8.2 Transverse Joints: *Place the mixture as continuously as possible to minimize transverse joints. When constructing permanent transverse joints, meet the surface requirements as defined in 330-9. Construct temporary transverse joints in such a manner to allow traffic to pass over it. When resuming the paving operation, construct a transverse joint by cutting back on the previously placed pavement at a location where the straightedge requirements are met. At the project limits, tie into the adjoining pavement layers as shown in the Plans.*

330-8.3 Longitudinal Joints: *Place each layer of pavement so that all longitudinal construction joints are offset 6 to 12 inches laterally between successive layers. Plan offsets in advance so that longitudinal joints of the friction course are not in wheel path areas. The longitudinal joints for friction course layers should be within 6 inches of the lane edge or at the center of the lane. The Engineer may waive this requirement where offsetting is not feasible due to the sequence of construction.*

330-8.4 Placing Asphalt Next to Concrete Pavement: *When placing asphalt next to concrete pavement, construct the joint as shown in the Plans.*

330-9 Surface Requirements.

330-9.1 General: *Construct a smooth pavement with good surface texture and the proper cross-slope.*

330-9.2 Texture of the Finished Surface of Paving Layers: *Produce a finished surface of uniform texture and compaction with no pulled, torn, raveled, crushed or loosened portions and free of segregation, bleeding, flushing, sand streaks, sand spots, or ripples. Address any pavement not meeting the requirements of this specification in accordance with 330-9.5. For dense graded structural and friction course mixtures, in areas not defined to be a density testing exception per 334-5.1.2, obtain for the Engineer six 6 inch diameter roadway cores at locations visually identified by the Engineer to be segregated. The Engineer will determine the density of each core in accordance with FM 1-T 166 and calculate the percent G_{mm} of the segregated area using the average G_{mb} of the roadway cores and the QC subplot G_{mm} for the questionable material. If the average percent G_{mm} is less than 90.0, address the segregated area in accordance with 330-9.5.*

Do not use asphalt concrete mixtures containing aggregates that cause a different color appearance in the final wearing surface unless the section is greater than or equal to one mile in length and across the full width of the pavement, including shoulders and turn lanes. Exceptions to these requirements will be permitted if approved by the Engineer.

330-9.3 Cross Slope: *Construct a pavement surface with cross slopes in compliance with the requirements of the Contract Documents. Furnish an electronic level with a length of 4 feet and an accuracy of 0.1 degree, approved by the Engineer for the control of cross slope. Make this electronic level available at the jobsite at all times during paving operations.*

330-9.3.1 QC Requirements: *Calibrate the electronic levels a minimum of once per day before paving operations begin, in accordance with manufacturer's instructions.*

Compare the QC level with the Verification level before paving operations begin, and at any time as directed by the Engineer. If the comparison between the QC and Verification levels is within the comparison tolerance of plus or minus 0.2%, the QC level is considered to compare favorably and can be used for measurement and acceptance of cross slopes. If the levels do not compare favorably, perform a second comparison using another calibrated electronic level (FDOT or Contractor) for resolution. If this resolution level compares favorably with the QC level, the QC level is considered to be verified. If the second level does not compare favorably with the QC level, discontinue the use of the QC electronic level and obtain another approved electronic level that meets the requirements of this specification. Regardless of the comparison analysis outcome, the Contractor assumes all risk associated with placing the pavement at the correct cross slope.

Measure the cross slope of the compacted pavement surface by placing the level at the center location of a lane and perpendicular to the roadway centerline. Record all measurements to the nearest 0.1% on the Cross Slope Measurement Data Form and submit to the Engineer for documentation.

1. Tangent Sections: Measure the cross slope at a minimum frequency of one measurement every 100 feet per lane. Calculate the absolute deviation of each cross slope measurement and then average the absolute deviations of ten consecutive cross slope measurements. (The absolute deviation is the positive value of a deviation) When the average absolute deviation cross slope is consistently within the acceptance tolerance as shown in Table 330-4 and upon the approval of the Engineer, the frequency of cross slope measurements can be reduced to one measurement every 200 feet during paving operations.

2. Superelevated Sections: Measure the cross slope every 100 feet per lane within the length of the full superelevation. Calculate the absolute deviation of each measurement and then average the absolute deviations of ten consecutive cross slope measurements. For the transition sections, measure the cross slope at control points identified in the Plans, or if not shown in the Plans, at a control point at the location of 0.0% cross slope and calculate the absolute deviation. For curves where the length of full superelevation is less than 250 feet, measure the cross slope at the beginning point, midpoint and ending point of the fully superelevated sections, calculate the absolute deviation, and average. When the number of measurements is less than ten and the length of full superelevation is greater than 250 feet, average the absolute deviation of all measurements.

If the average absolute deviation of the cross slope measurements falls outside the acceptance tolerance, as shown in Table 330-4, stop the paving operation and make adjustments until the problem is resolved to the satisfaction of the Engineer. If an individual cross slope deviation falls outside the acceptance tolerance as shown in Table 330-4, make corrections at no cost to the Owner in accordance with 330-9.5 to address the deficient area of the structural course. Complete all corrections before placement of the final pavement surface layer, unless stated otherwise in the Plans, or as determined by the Engineer. For pavement with multiple layers, the deficient areas for the structural course may be left in place, upon the approval of the Engineer.

The limits of deficient areas requiring correction may be verified and adjusted with more accurate measurement methods, including survey instruments, upon approval by the Engineer at no cost to the Owner.

Should the Contractor wish to have any corrections waived, submit a request to the Engineer for approval. The Engineer may waive the corrections at no reduction in payment if the deficiencies are sufficiently separated so as not to affect the overall traffic safety, surface drainage and ride quality characteristics of the pavement and the corrective action would unnecessarily mar the appearance of the finished pavement.

For intersections, tapers, crossovers, transitions at the beginning and end of the project, bridge approaches and similar areas, adjust the cross slope to match the actual site conditions, or as directed by the Engineer.

Table 330-4 Cross Slope Acceptance Tolerance		
Roadway Feature	Individual Absolute Deviation	Average Absolute Deviation
Tangent section (including turn	0.4%	0.2%
Superelevated lane curve	0.4%	0.2%
Shoulder	0.5%	0.5%

In the event that the distance between two edges of deficient areas is less than 100 feet, the correction work shall include the area between the deficient sections.

330-9.3.2 Verification: The Engineer will verify the Contractor's cross slope measurements by randomly taking a minimum of ten cross slope measurements per lane per mile in tangent sections, control points in transition sections, and a minimum of three cross slope measurements on fully superelevated sections over a day's production. The Engineer will measure the cross slope of the compacted pavement surface by placing the level at the center location of a lane and perpendicular to the roadway centerline. If the average absolute deviation or an individual cross slope deviation falls outside of the acceptance tolerance as shown in Table 330-4, immediately make a comparison check at the QC test locations to verify the QC measurements in the section. If the comparisons are beyond the acceptable comparison tolerance in accordance with 330-9.3.1, stop the paving operations until the issue is resolved to the satisfaction of the Engineer. Correct any cross slope not meeting the individual deviation acceptance tolerance in accordance with 330-9.5 at no cost to the Owner. The Engineer reserves the right to check the pavement cross slope at any time by taking cross slope measurements at any location.

330-9.4 Pavement Smoothness: Construct a smooth pavement meeting the requirements of this Specification.

330-9.4.1 General: Furnish a 15 foot manual and a 15 foot rolling straightedge meeting the requirements of FM 5-509. Obtain a smooth surface on all pavement courses placed, and then straightedge all layers as required by this Specification.

330-9.4.2 Test Method: Perform all straightedge testing in accordance with FM 5-509 in the outside wheel path of each lane. The Engineer may require additional testing at other locations within the lane.

330-9.4.3 Traffic Control: *Provide traffic control in accordance with Section 102 and the FDOT Design Standards Index Nos. 607 or 619 during all testing. When traffic control cannot be provided in accordance with Index Nos. 607 or 619, submit an alternative Traffic Control Plan as specified in 102-4. Include the cost of this traffic control in the Contract bid prices for the asphalt items.*

330-9.4.4 Process Control Testing: *Assume full responsibility for controlling all paving operations and processes such that the requirements of these Specifications are met at all times.*

330-9.4.5 QC Testing:

330-9.4.5.1 General: *Straightedge the final Type SP structural layer and friction course layer in accordance with 330-9.4.2, with the exception that if the method of acceptance is by laser profiler, then straightedging of the friction course layer is not required. Test all pavement lanes and ramps where the width is constant and document all deficiencies in excess of 3/16 inch on a form approved by the Engineer.*

330-9.4.5.2 Straightedge Exceptions: *Straightedge testing will not be required in the following areas: shoulders, intersections, tapers, crossovers, sidewalks, shared use paths, parking lots and similar areas, or in the following areas when they are less than 250 feet in length: turn lanes, acceleration/deceleration lanes and side streets. The limits of the intersection will be from stop bar to stop bar for both the mainline and side streets.*

As an exception, in the event the Engineer identifies a surface irregularity in the above areas that is determined to be objectionable, straightedge and address all deficiencies in excess of 3/8 inch in accordance with 330-9.5.

The Engineer may waive straightedge requirements for transverse joints at the beginning and end of the project, at the beginning and end of bridge structures, at manholes, and at utility structures if the deficiencies are caused by factors beyond the control of the Contractor, as determined by the Engineer. In addition, the Engineer may also waive the straightedging requirements on ramps and superelevated sections where the geometrical orientation of the pavement results in an inaccurate measurement with the rolling straightedge.

330-9.4.5.3 Intermediate Layers and Temporary Pavement: *When the design speed is 55 mph or greater and the intermediate Type SP layer or temporary pavement is to be opened to traffic, if the Engineer identifies a surface irregularity that is determined to be objectionable, straightedge and address all deficiencies in excess of 3/8 inch within 72 hours of placement in accordance with 330-9.5.*

330-9.4.5.4 Final Type SP Structural Layer: *Straightedge the final Type SP structural layer in accordance with 330-9.4.2, either behind the final roller of the paving train or as a separate operation. Notify the Engineer of the location and time of straightedge testing a minimum of 48 hours before beginning testing. The Engineer will verify the straightedge testing by observing the QC straight edging operations. Address all deficiencies in excess of 3/16 inch in accordance with 330-9.5.*

When the final structural course is to be opened to traffic and the design speed is 55 mph or greater, if any defect is 3/8 inch or greater, the Engineer may require deficiencies to be corrected within 72 hours after opening to traffic.

330-9.4.5.5 Friction Course Layer: *Where required per 330-9.4.5.1, straightedge the friction course layer in accordance with 330-9.4.2, either behind the final roller of the paving train or a separate operation upon completion of all paving operations. Notify the Engineer of the location and time of straightedge testing a minimum of 48 hours before as beginning testing. The Engineer will verify the straightedge testing by observing the QC*

straightedging operations. Address all deficiencies in excess of 3/16 inch in accordance with 330-9.5.

330-9.4.6 Acceptance:

330-9.4.6.1 Straightedge Acceptance: For areas of roadways where the design speed is less than 55 miles per hour, acceptance for pavement smoothness of the friction course will be based on verified QC measurements using the straightedge as required by 330-9.4.5. The Engineer will verify the straightedge testing by observing the QC straightedging operations.

330-9.5 Unacceptable Pavement:

330-9.5.1 Corrections: Address all areas of unacceptable pavement at no cost to the Owner. Retest all corrected areas and assure the requirements of these Specifications are met.

330-9.5.1.1 Structural Layers: Correct all deficiencies, as defined in these Specifications, in the Type SP structural layers by removing and replacing the full depth of the layer, extending a minimum of 50 feet on both sides (where possible) of the defective area for the full width of the paving lane.

As an option, for high straightedge deficiencies only, mill the pavement surface the full lane width to a depth and length that is adequate to remove the deficiency. This option only applies if the structural layer is not the final surface layer.

330-9.5.1.2 Friction Course: Correct deficiencies in the friction course or final surface layer by removing and replacing the full depth of the layer, extending a minimum of 50 feet on both sides (where possible) of the defective area for the full width of the paving lane. As an exception, the Engineer may allow the Contractor to leave these areas in place if it is determined by the Engineer that the deficiency is not a significant detriment to the pavement quality. A reduction to the pay item quantity will be made in accordance with 330-9.5.2.

330-9.5.2 Reduction in Pay Item Quantity: When the Engineer elects to waive corrections, the Owner will reduce the pay quantity for the pay item in question by the amount of material that the Contractor would have removed and replaced had the correction been made. When the pay quantity is in tons, the Owner will base the reduction on the volume of material that the Contractor would have removed (the length by the lane width by layer thickness) multiplied by the maximum specific gravity of the mix as determined through the following equation:

$$\text{Quantity (tons)} = L \times W \times t \times G_{mm} \times 0.0024$$

Where: L = Lane length (ft.)

W = Lane width (ft.)

t = Layer thickness (in.)

G_{mm} = Maximum specific gravity from verified mix design

For FC-5 open-graded friction course, the Owner will base the reduction on the area that the Contractor would have removed (the length by lane width) multiplied by a spread rate of 80 lb/yd² as determined through the following equation:

$$\text{Quantity (tons)} = L \times W \times 0.0044$$

Where: L = Lane length

(ft.) W = Lane width (ft.)

330-10 Protection of Finished Surface.

Keep sections of newly compacted asphalt concrete, which are to be covered by additional courses, clean until the successive course is laid.

Do not dump embankment or base material directly on the pavement. Dress shoulders before placing the friction course on adjacent pavement.

Equip blade graders operating adjacent to the pavement during shoulder construction with a 2 inch by 8 inch or larger board, or other attachment providing essentially the same results, attached to their blades in such manner that it extends below the blade edge in order to protect the pavement surface from damage by the grader blade.

To prevent rutting or other distortion, protect sections of newly finished dense-graded friction course and the last structural layer prior to the friction course from traffic until the surface temperature has cooled below 160°F.

**SECTION 334
SUPERPAVE ASPHALT CONCRETE**

334-1 Description.

334-1.1 General: Construct a Superpave Asphalt Concrete course using the type of mixture specified in the Contract, or when offered as alternates, as selected. Superpave mixes are identified as Type SP-9.5, Type SP-12.5 or Type SP-19.0.

Meet the requirements of Section 320 for plant and equipment. Meet the general construction requirements of Section 330, with the exception that the density requirements of 334-5.4 shall be met.

The Engineer will accept the work on a LOT to LOT basis in accordance with the applicable requirements of Sections 5, 6, and 9. The size of the LOT will be as specified in 334-5 for the asphalt mixture produced at the plant and as specified in 334-5.4 and 330-13 for the material placed on the roadway.

334-1.2 Traffic Levels: The requirements for Type SP Asphalt Concrete mixtures are based on the design traffic level of the project, expressed in 22,000 pound [80 kN] Equivalent Single Axle Loads (ESAL's). The seven traffic levels are as shown in Table 334-1.

Table 334-1 Superpave Traffic Levels	
Traffic Level	Traffic Level (1x10 ⁶ ESAL's)
1	≤ 0.3
2	0.3 to ≤ 1
3	1 to ≤ 3
4	3 to ≤ 10
5	10 to ≤ 30
6	30 to ≤ 100
7	> 100

The traffic level(s) for the project are as specified in the Contract. The Contractor may substitute a Type SP mix one traffic level higher than the traffic level specified in the Contract, at no cost to the Department. Where Type S Asphalt Concrete is specified in the Contract, if approved by the Engineer, the equivalent fine Type SP Asphalt Concrete mixture (Traffic Level 4) may be selected as an alternate at no additional cost to the Department. The equivalent mixes are as follows:

Type S-I Type SP-12.5
 Type S-II Type SP-19.0
 Type S-III Type SP-9.5

334-1.3 Layer Thicknesses: The Superpave mixes are categorized as either “coarse” or “fine”, depending on the overall gradation of the mixture. Coarse mixes are defined as having a gradation that passes below the restricted zone, defined in 334-2.3, when plotted on an FHWA 0.45 Power Gradation Chart. Fine mixes are defined as having a gradation that passes above the restricted zone.

334-1.3.1 Fine Mixes: The allowable structural layer thicknesses for fine Type SP Asphalt Concrete mixtures are as follows:

Type SP-9.5 3/4 inch - 1 1/4 inches [20 mm - 30 mm]
 Type SP-12.5 1 1/4 inches - 2 1/2 inches [30 mm - 60 mm]
 Type SP-19.0 2 inches - 2 3/4 inches [50 mm - 70 mm]

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

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

Type SP-12.5 - May not be used in the first layer of courses over 3 1/2 inches [90 mm] thick, nor in the first layer of courses over 2 3/4 inches [70 mm] thick on limited access facilities.

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

334-1.3.2 Coarse Mixes: The allowable structural layer thicknesses for coarse Type SP Asphalt Concrete mixtures are as follows:

Type SP-9.5 1 1/2 inches - 2 inches [40 mm - 50 mm]

Type SP-12.5 2 inches - 3 inches [50 mm - 80 mm]

Type SP-19.0 3 inches - 3 1/2 inches [80 mm - 90 mm]

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

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

334-1.3.3 Additional Requirements: The following requirements also apply to coarse and fine Type SP Asphalt Concrete mixtures:

1. A minimum 1 1/2 inch [40 mm] initial lift is required over an Asphalt Rubber Membrane Interlayer (ARMI).

2. When construction includes the paving of adjacent shoulders (≤ 5 feet [≤ 1.5 m] wide), the layer thickness for the upper pavement layer and shoulder shall be the same and paved in a single pass, unless shown differently in the plans.

3. All overbuild layers shall be fine Type SP Asphalt Concrete with the traffic level as stated in the Contract, up to a maximum of Traffic Level 4. Use a Traffic Level 4 mix for areas with higher traffic levels. Use the minimum and maximum layer thicknesses as specified in 334-1.3.1 unless shown differently in the plans.

4. On variable thickness overbuild layers, the minimum allowable thickness may be reduced by 3/8 inch [10 mm], and the maximum allowable thickness may be increased 3/8 inch [10 mm], unless shown differently in the plans.

334-2 Materials.

334-2.1 General Requirements: Meet the material requirements specified in Division III. Specific references are as follows:

Asphalt Cement Viscosity Grade AC-30, or Recycling Agent.....916-1 and 916-2

Asphalt Binder PG 64-22.....AASHTO MP-1

Mineral Filler917-1 and 917-2

Coarse Aggregate, Stone, Slag or Crushed Gravel Section 901

Fine Aggregate..... Section 902

334-2.2 Gradation Requirements: Combine the coarse and fine aggregate in proportions that will produce an asphalt mixture meeting all of the requirements defined in this Specification and conform to the gradation requirements at design as defined in Table 334-2. Aggregates from various sources may be combined.

Table 334-2 Aggregate Gradation Control Points (Gradation Design Ranges)						
Sieve Size	Superpave Mixture (Percent Passing)					
	SP-9.5		SP-12.5		SP-19.0	
	Min.	Max.	Min.	Max.	Min.	Max.
1 inch [25.0 mm]	-	-	-	-	100	-
3/4 inch [19.0 mm]	-	-	100	-	90	100
1/2 inch [12.5 mm]	100	-	90	100	-	90
3/8 inch [9.5 mm]	90	100	-	90	-	-
No. 4 [4.75 mm]	-	90	-	-	-	-
No. 8 [2.36 mm]	32	67	28	58	23	49
No. 200 [75 µm]	2	10	2	10	2	8

334-2.3 Restricted Zone: The gradation identified in 334-2.2 shall not pass through the restricted zones specified in Table 334-3. For Traffic Levels 5, 6 and 7 the design gradation shall pass below the restricted zone, when plotted on an FHWA 0.45 Power Gradation Chart. Unless otherwise noted in the plans, for Traffic Levels 1, 2, 3 and 4, the design gradation may pass either above or below the restricted zone, provided the lift thickness requirements specified in 334-1.3 are met.

334-2.4 Aggregate Consensus Properties: Meet the following consensus properties at design for the aggregate blend:

334-2.4.1 Coarse Aggregate Angularity: When tested in accordance with ASTM D 5821, meet the coarse aggregate angularity requirement defined in Table 334-4.

334-2.4.2 Fine Aggregate Angularity: When tested in accordance with AASHTO T-304, meet the fine aggregate angularity requirement defined in Table 334-5.

Table 334-3 Aggregate Gradation Restricted Zone (Design Only)						
Sieve Size within Restricted Zone	Boundaries of Restricted Zone Superpave Mixture (Percent Passing)					
	SP-9.5		SP-12.5		SP-19.0	
	Min.	Max.	Min.	Max.	Min.	Max.
No. 4 [4.75 mm]	-	-	-	-	-	-
No. 8 [2.36 mm]	47.2	47.2	39.1	39.1	34.6	34.6
No. 16 [1.18 mm]	31.6	37.6	25.6	31.6	22.3	28.3
No. 30 [600 µm]	23.5	27.5	19.1	23.1	16.7	20.7

Table 334-4 Coarse Aggregate Angularity Criteria (Minimum Percent Fractured Faces)				
Traffic Level	Depth of Top of Pavement Layer From Surface			
	≤4 inches [≤100 mm]		>4 inches [>100 mm]	
	1 or More Fractured Faces (%)	2 or More Fractured Faces (%)	1 or More Fractured Faces (%)	2 or More Fractured Faces (%)
1	55	-	-	-
2	65	-	-	-
3	75	-	50	-
4	85	80	60	-
5	95	90	80	75
6	100	100	95	90
7	100	100	100	100

Table 334-5 Fine Aggregate Angularity Criteria		
Traffic Level	Depth of Top of Pavement Layer From Surface	
	≤4 inches [≤100 mm]	>4 inches [>100 mm]
	Minimum Uncompacted Void Content (%)	Minimum Uncompacted Void Content (%)
1	-	-
2	40	-
3	40	40
4	45	40
5	45	40
6	45	45
7	45	45

334-2.4.3 Flat and Elongated Particles: When tested in accordance with ASTM D 4791, use a ratio of maximum to minimum dimensions of 5:1 and do not exceed 10% as the maximum amount of flat and elongated particles for the coarse aggregate blend for all projects with Traffic Levels 3 and higher. This criteria does not apply for projects with lower traffic levels.

334-2.4.4 Clay Content: When tested in accordance with AASHTO T 176, meet the sand equivalent value for fine aggregate blend defined in Table 334-6.

Table 334-6 Clay Content	
Traffic Level	Sand Equivalent Minimum (%)
1	40
2	40
3	40
4	45
5	45
6	50
7	50

334-2.5 Specific Requirements:

334-2.5.1 Condition of Aggregate: Provide clean aggregate that contains no deleterious substances. Do not use coarse or fine aggregate containing more than 0.5% of phosphate.

334-2.5.2 Fine Aggregate and Mineral Filler: In laboratory tests, and for the purpose of proportioning the paving mixture, all material passing the No. 8 [2.36 mm] sieve and retained on the No. 200 [75 µm] sieve will be considered as fine aggregate, and the material passing the No. 200 [75 µm] sieve will be considered as mineral filler.

334-2.5.3 Screenings: Do not use any screenings in the combination of aggregates which contain more than 15% of material passing the No. 200 [75 µm] sieve. When blending two screenings to produce the screening component of the aggregate, one of the screenings may contain up to 18% of material passing the No. 200 [75 µm] sieve, provided the combination of the two does not contain over 15% material passing the No. 200 [75 µm] sieve. Screenings may be washed to meet these requirements.

334-2.5.4 Use of Reclaimed Asphalt Pavement:

334-2.5.4.1 General Requirements: Reclaimed Asphalt Pavement (RAP) may be used as a component material of the asphalt mixture subject to the following:

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

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

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

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

3. For projects with Traffic Levels 5, 6 and 7, do not permit the amount of RAP material used in the mix to exceed 30% by weight of total aggregate. For projects with Traffic Levels 1, 2, 3 and 4, do not permit the amount of RAP material used in the mix to exceed 50% by weight of total aggregate. or grid over the RAP cold bin, in-line roller crusher, screen, or other suitable means to prevent oversized RAP material from showing up in the completed recycled mixture.

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

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

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

334-2.5.4.2 Special Requirements For RAP Milled From Projects:

When milling is required on the project and a Composition of Existing Pavement is included in the Contract Documents, and the use of the milled material as a component of the asphalt mixture is elected, use the following procedures for obtaining representative samples for the mix design:

1. Cut a minimum of ten 6 inch [150 mm] cores in area(s) approved by the Engineer. Fill the core holes prior to opening to traffic. Assume responsibility for accounting for the degradation that will occur during the milling operation.

2. Representative samples may also be obtained by milling the existing pavement to the full depth shown on the plans for pavement removal for a length of approximately 200 feet [60 m]. If required to maintain traffic, immediately replace the pavement removed with the mix specified in the Contract. This mix will be paid for at the Contract unit price.

3. Submit a written request to the Engineer for any variance from the above outlined methods of obtaining samples for mix designs.

334-2.5.4.3 Requirements For RAP Stockpiled From a Previous FDOT

Project: When the RAP to be used as a component in a mix design is stockpiled from a previous FDOT project and the Composition of Existing Pavement is known, design the mix and submit to the Engineer for approval.

334-2.5.4.4 Requirements For RAP With Unknown Characteristics: When the composition of stockpiled RAP to be used as a component in a mix design is not known, use the following procedures for design:

1. Submit a bag of RAP, composed of samples from a minimum of three separate locations in the stockpile(s) to the Engineer at least four weeks prior to the planned start of mix design. The Engineer will run viscosities on the RAP and furnish the information to the Contractor.
2. Run a minimum of six extraction gradation analyses and six determinations of bulk specific gravity of the RAP. Take samples at random locations around the stockpile(s).
3. Request the Engineer to make a visual inspection of the stockpile(s) of RAP. Based on visual inspection, the Engineer will determine the suitability of the stockpiled materials. Once the RAP stockpile has been approved, do not add additional material without prior approval of the Engineer.
4. Submit the data required above when submitting the proposed mix design to the Department for approval.

334-2.5.5 Recycling Agents: When RAP is approved for use as a component material, use a recycling agent meeting the requirements of 916-2 in the mix.

The Engineer will select the best formulation suited for the project and reserves the right to request reasonable changes throughout the construction duration.

334-3 Permissible Variation for the Coarse Aggregate.

Size and consistently grade or combine the aggregate or aggregates shipped to the job in such proportions that the resulting mixture meets the grading requirements of the mix design.

334-4 General Composition of Mixture.

334-4.1 General: Compose the asphalt mixture using a combination of aggregate (coarse, fine or mixtures thereof), mineral filler, if required, and asphalt binder material. Size, grade and combine the aggregate fractions to meet the grading and physical properties of the approved mix design. Aggregates from various sources may be combined.

334-4.2 Mix Design:

334-4.2.1 General: Design the Superpave asphalt mixture in accordance with AASHTO PP-28 or The Asphalt Institute's Superpave Mix Design Manual, to meet the requirements of this Specification. Short-term oven age the mixture for two hours at the compaction temperature at a thickness of 1 to 2 inches [25 to 50 mm]. Prior to the production of any Superpave asphalt mixture, submit the proposed mix design with supporting test data indicating compliance with all Superpave mix design criteria. Include representative samples of all component materials, including asphalt cement. Allow the Engineer a maximum of three weeks to either conditionally verify or reject the mix as designed. The Engineer will provide final verification of the mix design when the requirements of 334-4.4.2 have been met.

At the sole option of the Engineer, Type SP asphalt mixes may be used based on evidence of final verification and satisfactory performance in previous production for that particular mix.

334-4.2.2 Grading Requirements: Meet the gradation design ranges of Table 334-2.

334-4.2.3 Gyrotory Compaction: Compact the design mixture in accordance with AASHTO TP-4. Compact the mixture to the maximum number of gyrations and back calculate to the design number of gyrations. Use the number of gyrations as defined in Table 334-7.

Table 334-7 Superpave Design Gyrotory Compactive Effort			
Traffic Level	$N_{initial}$	N_{design}	$N_{maximum}$
1	7	68	104
2	7	76	117
3	7	86	134
4	7	86	134
5	8	96	152
6	8	96	152
7	8	96	152

334-4.2.4 Volumetric Criteria: Use an air void content of the mixture at design of 4.0% at the design number of gyrations (N_{design}). Meet the requirements of Table 334-8.

Table 334-8 Mixture Densification Criteria			
Traffic Level	% G_{mm}		
	$N_{initial}$	N_{design}	$N_{maximum}$
1	≤ 91.5	96.0	≤ 98.0
2	≤ 90.5	96.0	≤ 98.0
3	≤ 90.0	96.0	≤ 98.0
4	≤ 89.5	96.0	≤ 98.0
5	≤ 89.0	96.0	≤ 98.0
6	≤ 89.0	96.0	≤ 98.0
7	≤ 89.0	96.0	≤ 98.0

334-4.2.5 VMA Criteria: Meet the requirements of Table 334-9 for voids in the mineral aggregate (VMA) of the mixture at the design number of gyrations.

Table 334-9 VMA Criteria	
Type Mix	Minimum VMA (%)
SP-9.5	15.0
SP-12.5	14.0
SP-19.0	13.0

334-4.2.6 VFA Criteria: Meet the requirements of Table 334-10 for voids filled with asphalt (VFA) of the mixture at the design number of gyrations.

Table 334-10 VFA Criteria	
Traffic Level	Design VFA (%)
1	70 - 80
2	65 - 78
3	65 - 78
4	65 - 75
5	65 - 75
6	65 - 75
7	65 - 75

Note: For Type SP-9.5 mixtures at Traffic Levels 4-7, the maximum design VFA value is 76.

334-4.2.7 Dust Proportion: Use a dust to effective asphalt binder content by weight between 0.6 to 1.2 for fine mixes and 0.6 to 1.6 for coarse mixes.

334-4.2.8 Moisture Susceptibility: Provide a mixture (4 inch [100 mm] specimens) having a retained tensile strength ratio of at least 80% when compacted to $7 \pm 0.5\%$ air voids, and a minimum tensile strength (dry and unconditioned) of 120 psi [825 kPa]. Test the specimens in accordance with AASHTO T 283 with the following exceptions: saturate the specimens to a minimum saturation level of 90% and include one freeze-thaw cycle. If necessary, add an approved liquid anti-stripping agent in order to meet this criteria.

334-4.2.9 Water Permeability: Do not exceed a maximum coefficient of permeability (coarse mixes only) of the mixture of 125×10^{-5} cm/s when compacted to 6% air voids and tested in accordance with FM 5-565.

Trim the compacted specimen at both ends to the minimum thickness in 334-1.3 prior to testing.

334-4.2.10 Additional Information: In addition to the requirements listed above, provide the following information with each proposed mix design submitted for verification:

1. The specific project on which the mixture will be used.
2. The design traffic level and the maximum number of gyrations (N_{maximum}).
3. The source and description of the materials to be used.
4. The DOT source number and the DOT product code of the aggregate components furnished from a DOT approved source.
5. The gradation and approximate proportions of the raw materials as intended to be combined in the paving mixture. The gradation of the component materials shall be representative of the material at the time of use.
6. A single percentage of the combined mineral aggregate passing each specified sieve. Degradation of the aggregate due to processing (particularly -No. 200 [-75 μm]) should be accounted for and identified for the applicable sieves.
7. A single percentage of asphalt binder by weight of total mix intended to be incorporated in the completed mixture, shown to the nearest 0.1%.
8. A single temperature at which the mixture is intended to be discharged from the plant and compacted at the roadway.
9. Evidence that the completed mixture will conform to all specified physical requirements.
10. The name of the individual responsible for the Quality Control of the mixture during production.
11. The ignition oven calibration factor.

334-4.3 Revision of Mix Design: Submit all requests for revisions to verified mix designs, along with supporting documentation, to the Engineer. In order to expedite the revision process, the request for

revision or discussions on the possibility of a revision may be made verbally, but must be followed up by a written request. The verified mix design will remain in effect until a change is authorized by the Engineer. In no case may the effective date of the revision be established earlier than the date of the first communication between the Contractor and the Engineer regarding the revision.

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

334-4.4 Contractor's Quality Control:

334-4.4.1 Personnel: In accordance with the requirements of 330-2.2, Quality Control by the Contractor, provide the necessary quality control personnel. Employ a Quality Control Technician who is certified by the Department and possesses a valid certificate of qualification. When it becomes evident to the Department that the Quality Control Technician cannot perform as required by the position, the Department will revoke the certification and require replacement with another certified technician. Turn over a copy or summary of all Quality Control test data to the Department when the project is completed.

334-4.4.2 Initial Production Test Strip: For initial use of a Type SP mix design at a particular plant, limit full-scale production and placement of the mix to a test strip of 500 tons [450 metric tons] (for each mix) to demonstrate the capability of producing, placing, and compacting the mix as specified. Upon agreement between the Contractor and the Engineer, test strips of up to 1,000 tons [900 metric tons] may be used. Initial production requirements do not apply if the total quantity of mix to be placed is less than 2,200 tons [2,000 metric tons].

334-4.4.2.1 Calibration of the Superpave Gyratory Compactor: Calibrate the Superpave Gyratory Compactor in accordance with the manufacturer's recommendations prior to producing the Superpave mixture for the test strip. Check the height calibration, the speed of rotation, ram pressure and angle of gyration. (Following completion of the test strip, calibrate the height daily, the ram pressure and speed of rotation weekly, and the angle of gyration monthly.)

334-4.4.2.2 Plant Testing Requirements: During the initial production period, take a minimum of three separate sets of mixture samples which will be used for extraction gradation analysis and determination of volumetric properties. Provide a split sample of one of the samples for comparison testing with the Engineer.

334-4.4.2.3 Roadway Testing Requirements: Assume responsibility for cutting 3- 6 inch [150 mm] diameter roadway cores at locations determined by the Engineer for evaluation of permeability by the Department. The Department will have a maximum of three working days from the date the cores are obtained to complete the evaluation. (Permeability criteria applies only to coarse mixes when the average density for the test strip is less than 93.5% of G_{mm}).

For density determination, obtain 6 inch [150 mm] diameter roadway cores at random locations as directed by the Engineer within the test strip, at a frequency shown in Table 334-14.

334-4.4.2.4 Criteria for Passing Test Strip: Resume production when authorized by the Engineer based upon acceptable extraction gradation analysis as determined in accordance with 334-4.4.3, acceptable volumetric properties as determined in accordance with 334-4.4.4, acceptable density in accordance with 334-5.4.1, a coefficient of permeability of less than 125×10^{-5} cm/s as determined in accordance with FM 5-565 (permeability criteria applies only to coarse mixes when the average density for the test strip is less than 93.5% of G_{mm}), and a favorable comparison with the Engineer's test results (G_{mb} at N_{design} (within 1%) and G_{mm} (within 0.019) only). In the event that the test strip fails to meet any of the above mentioned criteria, remove and replace the material at no cost to the Department if so directed by the Engineer.

334-4.4.3 Extraction Gradation Analysis: The Engineer will sample the asphalt mixture at the plant in accordance with FM 1-T 168. The percent asphalt binder content of the mixture will be determined in accordance with FM 5-563 (ignition oven). The gradation of the extracted mixture will be determined in accordance with FM 1-T 030. Perform the extraction and gradation analysis in accordance

with FM 5-544 and 5-545, respectively, if the calibration factor for the mix exceeds 0.50%. All test results will be shown to the nearest 0.01. All calculations will be carried to the nearest 0.001 and rounded to the nearest 0.01, in accordance with the Department's rules of rounding.

Run an extraction gradation analysis on the mixture at a minimum frequency of once per production day when the daily production is less than 1,000 tons [900 metric tons]. If the daily production exceeds 1,000 tons [900 metric tons], perform the extraction gradation analysis of the mix a minimum of two times per production day.

During normal production, the Engineer will not require extraction gradation analysis on days when mix production is less than 100 tons [90 metric tons]. However, when mix production is less than 100 tons [90 metric tons] per day on successive days, run the test when the accumulative tonnage on such days exceeds 100 tons [90 metric tons].

The target gradation and asphalt content will be as shown on the mix design. Any changes in target will require a change in the mix design in accordance with 334-4.3.

If the percentage of asphalt binder deviates from the optimum asphalt binder content by more than 0.55%, or the percentage passing any sieve falls outside the limits in Table 334-11, immediately resample the mix and test to validate the previous test result, and if needed, make the necessary correction. If the results for two consecutive tests deviate from the optimum asphalt binder content by more than 0.55%, or exceed the limits in Table 334-11 for any sieve, notify the Engineer and take immediate steps to identify and correct the problem, then resample the mix. If the results from this test deviate from the optimum asphalt binder content by more than 0.55%, or exceed the limits in Table 334-11 for any sieve, stop the plant operation until the problem has been corrected.

Sieve Size	Percent Passing
1 inch [25.0 mm]	7.0
3/4 inch [19.0 mm]	7.0
1/2 inch [12.5 mm]	7.0
3/8 inch [9.5 mm]	7.0
No. 4 [4.75 mm]	7.0
No. 8 [2.36 mm]	5.5
No. 16 [1.18 mm]	5.0
No. 30 [600 μm]	4.5
No. 50 [300 μm]	4.5
No. 100 [150 μm]	3.0
No. 200 [75 μm]	2.0

Maintain control charts showing the results of the extraction gradation analysis (asphalt binder content and sieve analysis).

334-4.4.4 Volumetric Control: During production of the mix, monitor the volumetric properties of the Superpave mix with a Superpave Gyratory Compactor to determine the air voids, VMA, VFA, and dust-to-effective asphalt binder ratio (dust proportion) at N_{design} .

For coarse mixes, take appropriate corrective actions in order to maintain an air void content at N_{design} between 2.5 and 5.0% during production. When the air void content at N_{design} drops below 2.0 or exceeds 5.5% on any one test, or is less than 2.5% on two consecutive tests, stop plant operations until the appropriate corrective actions are made and the problem is resolved to the satisfaction of the Engineer.

For fine mixes, take appropriate corrective actions to maintain an air void content at N_{design} between 3.0 and 5.0% during production. When the air void content at N_{design} drops below 2.5 or exceeds 6.5% on any one test, or is less than 3.0% on two consecutive tests, stop plant operations until the appropriate corrective actions are made and the problem is resolved to the satisfaction of the Engineer.

Determine the volumetric properties of the mixture at a minimum frequency of once per production day when the daily production is less than 1,000 tons [900 metric tons]. If the daily production exceeds 1,000 tons [900 metric tons], monitor the volumetric properties two times per production day.

During normal production, volumetric properties of the mixture will not be required on days when mix production is less than 100 tons [90 metric tons]. However, when mix production is less than 100 tons [90 metric tons] per day on successive days, run the test when the accumulative tonnage on such days exceeds 100 tons [90 metric tons].

Testing required for volumetric property determination includes AASHTO TP-4, FM 1-T 209, FM 5-563 and FM 1-T 030.

In addition to the requirements of 330-2.2, maintain control charts showing the results of the volumetric testing (air voids, G_{mm} , G_{mb}).

334-4.4.5 Plant Calibration: At or before the start of mix production, perform an extraction gradation analysis of the mix to verify calibration of the plant. This extraction gradation analysis may also be used for the first test of the first day's production.

334-4.4.6 Viscosity of Asphalt Binder in Mixes Containing Reclaimed Asphalt Pavement: When RAP is a component material, the viscosity of the asphalt binder material in the asphalt mixture, determined by the Materials Office in accordance with FM 1-T 202, will be within the range of $6,000 \pm 2,000$ poises [400-1200 Pa·s]. This determination will be made on samples obtained by the Engineer on a random basis at a frequency of approximately one per 2,000 tons [1,800 metric tons] of mix.

If the viscosity is determined by the Engineer to be out of the specified tolerance, adjust the recycling agent formulation or blend of RAP used in the mixture to bring the viscosity within tolerance.

334-5 Acceptance of the Mixture.

334-5.1 General: The asphalt mixture will be accepted at the plant, with respect to gradation and asphalt binder content, on a LOT to LOT basis. The material will be tested for acceptance in accordance with the provisions of 330-2 and the following requirements. However, any load or loads of mixture which, in the opinion of the Engineer, are unacceptable for reasons of excessive segregation, aggregates improperly coated, or of excessively high or low temperature will be rejected for use in the work.

A standard size LOT at the asphalt plant will consist of 4,000 tons [3,600 metric tons] with four equal sublots of 1,000 tons [900 metric tons] each.

A partial LOT may occur due to the following:

- (1) the completion of a given mix type on a project.
- (2) an approved LOT termination by the Engineer due to a change in process, extended delay in production, or change in mix design.

If the partial LOT contains one or two sublots with their appropriate test results, then the previous full-size LOT will be redefined to include this partial LOT and the evaluation of the LOT will be based on either five or six subplot determinations. If the partial LOT contains three sublots with their appropriate test results, this partial LOT will be redefined to be a whole LOT and the evaluation of it will be based on three subplot determinations.

When the total quantity of any mix is less than 3,000 tons [2,700 metric tons], the partial LOT will be evaluated for the appropriate number of sublots from $n=1$ to $n=3$. When the total quantity of any mix type is less than 500 tons [450 metric tons], the Engineer will accept the mix on the basis of

visual inspection. The Engineer may run extraction and gradation analysis for verification purposes; however, the provisions for partial payment will not apply.

On multiple project contracts, the LOT(s) at the asphalt plant will carry over from project to project.

334-5.2 Acceptance Procedures: Control all operations in the handling, preparation, and mixing of the asphalt mix so that the percent bitumen and the percents passing the No. 8 [2.36 mm] and No. 200 [75 µm] sieves will meet the verified job mix formula within the tolerance shown in Table 334-12.

Table 334-12 Tolerances for Acceptance Tests	
Characteristic	Tolerance*
Asphalt Content (Extraction)	±0.55%
Asphalt Content (Printout)	±0.15%
Passing No. 8 [2.36 mm] Sieve	±5.50%
Passing No. 200 [75 µm] Sieve	±2.00%

*Tolerances for sample size of n=1. See Table 334-13 for other sample sizes n=2 through n=6.

Acceptance of the mixture will be on the basis of test results on consecutive random samples from each LOT. The Engineer will take one random sample from each subplot. The asphalt mixture will be sampled at the plant in accordance with FM 1-T 168. The percent asphalt binder content of the mixture will be determined in accordance with FM 5-563 (ignition oven). The percentages passing the No. 8 [2.36 mm] and No. 200 [75 µm] sieves will be determined in accordance with FM 1-T 030. The Engineer will perform the extraction and gradation analysis in accordance with FM 5-544 and 5-545, respectively, if the calibration factor for the mix exceeds 0.50%.

Calculations for the acceptance test results for bitumen content and gradation (percentages passing the No. 8 [2.36 mm] and No. 200 [75 µm] sieves) will be shown to the nearest 0.01. Calculations for arithmetic averages will be carried to the 0.001 and rounded to the nearest 0.01 in accordance with the Department's rules of rounding.

Payment will be made on the basis of Table 334-13 "Acceptance Schedule of Payment". The process will be considered out of control when the deviation of any individual test result from the mix design falls in the 80% pay factor for the "one test" column of Table 334-13. When this happens, the LOT will be automatically terminated and acceptance of the LOT determined in accordance with Table 334-13.

Table 334-13 Acceptance Schedule of Payment (Asphalt Plant Mix Characteristics)						
Average of Accumulated Deviations of the Acceptance Tests from the Mix Design						
Pay Factor	1-Test	2-Tests	3-Tests	4-Tests	5-Tests	6-Tests
Asphalt Binder Content (Extraction)						
1.00	0.00-0.55	0.00-0.43	0.00-0.38	0.00-0.35	0.00-0.33	0.00-0.31
0.95	0.56-0.65	0.44-0.50	0.39-0.44	0.36-0.40	0.34-0.37	0.32-0.36
0.90	0.66-0.75	0.51-0.57	0.45-0.50	0.41-0.45	0.38-0.42	0.36-0.39
0.80*	over 0.75	over 0.57	over 0.50	over 0.45	over 0.42	over 0.39
No. 8 [2.36 mm] Sieve **						
1.00	0.00-5.50	0.00-4.33	0.00-3.81	0.00-3.50	0.00-3.29	0.00-3.13
0.98	5.51-6.50	4.34-5.04	3.82-4.39	3.51-4.00	3.30-3.74	3.14-3.54
0.95	6.51-7.50	5.05-5.74	4.40-4.96	4.01-4.50	3.75-4.18	3.55-3.95
0.90	7.51-8.50	5.75-6.45	4.97-5.54	4.51-5.00	4.19-4.63	3.96-4.36
0.80*	over 8.50	over 6.45	over 5.54	over 5.00	over 4.63	over 4.36
No. 200 [75 µm] Sieve **						
1.00	0.00-2.00	0.00-1.71	0.00-1.58	0.00-1.50	0.00-1.45	0.00-1.41
0.95	2.01-2.40	1.72-1.99	1.59-1.81	1.51-1.70	1.46-1.63	1.42-1.57
0.90	2.41-2.80	2.00-2.27	1.82-2.04	1.71-1.90	1.64-1.80	1.58-1.73
0.80*	over 2.80	over 2.27	over 2.04	over 1.90	over 1.80	over 1.73
*If approved by the Engineer based on an engineering determination that the material is acceptable to remain in place, the indicated partial pay may be accepted. Otherwise, the Engineer will require removal and replacement at no cost. The Contractor may remove and replace at no cost to the Department at any time.						
**When there are two reduced payments for these items in one LOT of material, only the greatest reduction in payment will be applied. CAUTION: This rule applies only to these two gradation test results.						
Note: Deviations are absolute values with no plus or minus signs.						

When possible, the Engineer will complete all acceptance tests on the same day the sample was taken, and on no occasion will they be completed later than the following work day.

334-5.3 Automatic Batch Plant With Printout: Acceptance determinations for asphalt content and gradation for mixtures produced by automatic batch plants with printout will be based on extraction results as specified in 334-5.2.

334-5.4 Acceptance on the Roadway:

334-5.4.1 Density Control: The in-place density of each course of asphalt mix construction will be evaluated by the use of 6 inch [150 mm] diameter roadway cores. The required average density of a completed course will be based on the maximum specific gravity (G_{mm}) of the as-produced mix.

The Engineer will not perform density testing on patching courses, leveling courses, open-graded friction courses, or any course with a specified thickness less than 1 inch [25 mm] or a specified spread rate less than 105 lb/yd² [57 kg/m²]. In addition, density testing will not be performed on the following areas when they are less than 1,000 feet [300 m] in length: crossovers, intersections, turning lanes, acceleration lanes or deceleration lanes. Compact these courses (with the exception of open-graded friction courses) in accordance with the rolling procedure as approved by the Engineer.

334-5.4.1.1 LOTs: For the purpose of acceptance and determination of payment, each day's production will be divided into LOTs, and all LOTs are to be closed out at the end of the day. The standard size of a LOT will consist of 5,000 feet [1,500 m] of any pass made by the paving train regardless of the width of the pass. Changes in thickness, mix design, or underlying layer shall constitute

a separate LOT. Mix placed on the shoulder shall also be considered a separate LOT. Pavers traveling in echelon will be considered as two separate passes. When at the end of a day's production (production day) or the completion of a given course, layer, or mix, or at the completion of the project, a LOT size is determined to be less than 5,000 feet [1,500 m], it is considered a partial LOT. Partial LOTs are to be handled as follows:

If the length of the partial LOT is 2,000 feet [600 m] or less, then the previous full-size LOT will be redefined to include this partial LOT and the number of tests required for the combined LOT will be as shown in Table 334-14. If the partial LOT is 2,000 feet [600 m] or less, and a previous full-size LOT from the same day, mix, layer and project is not available, then the partial LOT will be evaluated separately and the number of tests required for the partial LOT will be as shown in Table 334-14. If the partial LOT is greater than 2,000 feet [600 m] long, it will be evaluated separately, with the number of tests required as shown in Table 334-14.

LOT Size (feet) [(m)]	Number of Tests
Less than 3,000 [900]	3
3,001 - 4,000 [901 - 1,200]	4
4,001 - 5,000 [1,201 - 1,500]	5
5,001 - 6,000 [1,501 - 1,800]	6
6,001 - 7,000 [1,801 - 2,100]	7
Greater than 7,000 [2,100]	2 LOTs

334-5.4.1.2 Target Maximum Specific Gravity: The target maximum specific gravity of the mix will be based on the average daily value as determined by the Contractor's Quality Control testing described in 334-4.4.4. Obtain two separate samples for maximum specific gravity determination on a daily basis. If only one maximum specific gravity test value is available, this value shall be used as the target maximum specific gravity. If a maximum specific gravity value is not determined for a day's production, the previous day's value will be used. Obtain, under the Engineer's supervision, split samples of the asphalt mixture used for the maximum specific gravity test for verification purposes. The minimum size of the split sample will be 4,000 g. The split samples will become the property of the Department. In the event of an obvious sampling or testing error, the Engineer may allow the Contractor to retest a portion of the split sample. The Engineer will run verification tests on the split samples in order to determine the acceptability of the Contractor's test results. If the verification test result differs from the Quality Control test result by more than 0.019 for two consecutive tests, the target G_{mm} value will be established by the Department's result until the cause of the discrepancy is identified and resolved to the satisfaction of the Engineer.

334-5.4.1.3 Quality Control of In-Place Compaction: Develop and implement a method to control the compaction of the pavement and ensure its compliance with the minimum specified density requirements. Include density determinations by the use of a nuclear density gauge at a frequency of one test per 1,000 feet [300 m] of compacted pavement in the quality control method. Other density measuring devices may be used in lieu of the nuclear density gauge, provided that it is demonstrated to the satisfaction of the Engineer that the device can accurately measure the relative level of density in the pavement on a consistent basis.

334-5.4.1.4 Acceptance: The completed pavement will be accepted with respect to density on a LOT basis. For each LOT, 6 inch [150 mm] diameter roadway cores will be obtained at random locations within the LOT, at the frequency shown in Table 334-14. Obtain the roadway cores at the random locations as directed by the Engineer, at the end of each day's production prior to opening the roadway to traffic. The locations of the cores will be determined in the longitudinal direction by the use of

statistically derived stratified random number tables furnished by the Department. The locations of the cores transversely will be uniformly spaced across the width of the pavement, with no cores located closer than 1 foot [0.3 m] of any unsupported edge. These will also be used for partial LOTs. Assume responsibility for maintenance of traffic, coring, patching the core holes, and trimming the cores to the proper thickness prior to density testing.

The density of the cores will be determined in accordance with FM 1-T 166, and will be averaged for each LOT. To receive full payment for density, the average density of a LOT shall be a minimum of 93.5% of G_{mm} for coarse mixes, and 92% of G_{mm} for fine mixes. Partial payment will be made for those LOTs that have an average density less than 93.5% of G_{mm} based on Table 334-15 (for coarse mixes), and less than 92% of G_{mm} based on Table 334-16 (for fine mixes).

Once the average density of a LOT has been determined, do not provide additional compaction to raise the average.

Table 334-15 Payment Schedule For Density (For Coarse Mixes)	
Percent of Maximum Specific Gravity	Percent of Payment
94.5 and above	105*
93.5 to less than 94.5	100
93.0 to less than 93.5	95
Less than 93.0	**

*The maximum payment for all LOTs with one or more individual density values less than 92.5% or greater than 96.5% shall be 100%. The maximum payment for all shoulders shall be 100%.

** In the event that the density of a LOT is less than 93.0% of G_{mm} , the Department will assess the pavement's permeability in accordance with FM 5-565. If the coefficient of permeability is less than or equal to 125×10^{-5} cm/s, the pavement will be accepted at 90% pay. If the coefficient of permeability is greater than 125×10^{-5} cm/s, the Engineer may require removal and replacement at no cost, or may accept the pavement at 90% pay. The Contractor may remove and replace at no cost to the Department at any time.

Table 334-16 Payment Schedule For Density (For Fine Mixes)	
Percent of Maximum Specific Gravity	Percent of Payment
92.0 and above	100
91.0 to less than 92.0	95
90.0 to less than 91.0	90
Less than 90.0 *	75

*If approved by the Engineer based on an engineering determination that the material is acceptable to remain in place, the Contractor may accept the indicated partial pay. Otherwise the Department will require removal and replacement at no cost. The Contractor may remove and replace at no cost to the Department at any time.

334-5.4.1.5 Additional Density Requirements:

1) If two consecutive LOTs are less than 93.5% of G_{mm} (for coarse mixes only), stop paving operations until appropriate corrective actions are made. Obtain the Engineer's approval prior to resuming production of the mix. Limit production to 1,000 tons [900 metric tons] until passing density values are obtained.

2) On shoulders with a width of 5 feet [1.5 m] or less, the Engineer will not require density. Compact the pavement in accordance with the rolling procedure (equipment and pattern) approved by the Engineer. Stop the production of the mix if the rolling procedure deviates from the approved procedure.

3) The maximum width of the mainline (non-shoulder) pavement to be placed (for coarse mixes only) during one pass of the paving train is 13 feet [4.1 m]. As an exception,

widths greater than 13 feet [4.1 m] will be permitted if the Contractor can demonstrate the ability to obtain density uniformly across the full width of the pavement.

334-5.4.2 Surface Tolerance: The asphalt mixture will be accepted on the roadway with respect to surface tolerance in accordance with the applicable requirements of 330-13.

334-5.5 Additional Tests: The Department reserves the right to run any test at any time for informational purposes and for determining the effectiveness of the Contractor's quality control.

334-5.5.1 Verification of Densification and Volumetric Properties: The Engineer will verify the densification properties of the mix during production with the Superpave Gyratory Compactor and will determine volumetric properties of the mix (air voids, VMA, VFA, and dust-to-effective asphalt binder ratio).

For coarse mixes, take appropriate corrective actions to maintain an air void content at N_{design} between 2.5 and 5.0% during production. When the air void content at N_{design} drops below 2.0 or exceeds 5.5% on any one test, or is less than 2.5% on two consecutive tests, stop plant operations until the appropriate corrective actions are made and the problem is resolved.

For fine mixes, take appropriate corrective actions in order to maintain an air void content at N_{design} between 3.0 and 5.0% during production. When the air void content at N_{design} drops below 2.5 or exceeds 6.5% on any one test, or is less than 3.0% on two consecutive tests, stop plant operations until the appropriate corrective actions are made and the problem is resolved.

When plant operations are stopped for coarse or fine mixes that have failing volumetric properties, obtain the Engineer's approval prior to resuming production of the mix. Limit production to 500 tons [450 metric tons] until passing volumetric properties are obtained.

334-5.5.2 Disposition of In-Place Material: Any material that is represented by the failing test results (less than 2.0% air voids at N_{design} for coarse mixes and less than 2.5% air voids at N_{design} for fine mixes) will be evaluated by the Engineer to determine if removal and replacement is necessary. Remove and replace any material, if required, at no cost to the Department.

334-6 Method of Measurement.

For the work specified under this Section (including the pertinent provisions of Sections 320 and 330), the quantity to be paid for will be the weight of the mixture, in tons [metric tons].

The bid price for the asphalt mix will include the cost of the liquid asphalt or the asphalt recycling agent. There will be no separate payment or unit price adjustment for the asphalt binder material in the asphalt mix. For the calculation of unit price adjustments of bituminous material specified in 9-2.1.1, the average asphalt content of Superpave mixes to be used in these calculations shall be set at 6.5%. The weight will be determined as provided in 320-2 (including the provisions for the automatic recordation system).

334-7 Basis of Payment:

Price and payment will be full compensation for all the work specified under this Section (including the applicable requirements of Sections 320 and 330).

Payment shall be made under:

- | | |
|--------------------|--|
| Item No. 334- 1 - | Superpave Asphaltic Concrete - per ton. |
| Item No. 2334- 1 - | Superpave Asphaltic Concrete - per metric ton. |

**SECTION 346
PORTLAND CEMENT CONCRETE**

346-1 Description.

Use concrete composed of a mixture of portland cement, aggregate, water, and, where specified, admixtures, pozzolan and ground granulated blast furnace slag. Deliver the portland cement concrete to the site of placement in a freshly mixed, unhardened state.

Obtain concrete from a plant that is currently on the list of Producers with Accepted Quality Control Programs. Producers seeking inclusion on the list shall meet the requirements of 105-3. If the concrete production facility's Quality Control Plan is suspended, the Contractor is solely responsible to obtain the services of another concrete production facility with an accepted Quality Control Plan or await the re-acceptance of the affected concrete production facility's Quality Control Plan prior to the placement of any further concrete on the project. There will be no changes in the contract time or completion dates. Bear all delay costs and other costs associated with the concrete production facility's Quality Control Plan acceptance or re-acceptance.

346-2 Materials.

346-2.1 General: *Meet the following requirements:*

- Coarse Aggregate..... Section 901*
- Fine Aggregate*..... Section 902*
- Portland Cement..... Section 921*
- Water..... Section 923*
- Admixtures**..... Section 924*
- Pozzolans and Slag Section 929*

**Use only silica sand except as provided in 902-5.2.3.*

***Use products listed on the Owner's Approved Product List (APL).*

Do not use materials containing hard lumps, crusts or frozen matter, or that is contaminated with dissimilar material in excess of that specified in the above listed Sections.

346-2.2 Types of Cement: *Unless a specific type of cement is designated elsewhere, use Type I, Type IP, Type IS, Type II, Type II (MH) or Type III cement in all classes of concrete. Use Type II (MH) for all mass concrete elements.*

Use only the types of cements designated for each environmental condition in structural concrete. A mix design for a more aggressive environment may be substituted for a lower aggressive environmental condition.

TABLE 1			
BRIDGE SUPERSTRUCTURES			
Component	Slightly Aggressive Environment	Moderately Aggressive Environment	Extremely Aggressive Environment
<i>Precast Superstructure and Prestressed Elements</i>	<i>Type I or Type III</i>	<i>Type I, Type II, Type III, Type IP, or Type IS</i>	<i>Type II (MH)</i>
<i>Cast In Place</i>	<i>Type I</i>	<i>Type I, Type II, Type IP, or Type IS</i>	<i>Type II (MH)</i>
BRIDGE SUBSTRUCTURE, DRAINAGE STRUCTURES AND OTHER STRUCTURES			

TABLE 1			
BRIDGE SUPERSTRUCTURES			
Component	Slightly Aggressive Environment	Moderately Aggressive	Extremely Aggressive
All Elements	Type I or Type III	Type I, Type II, Type IP, or Type IS	Environment Type II (MH)

346-2.3 Pozzolans and Slag: *Fly ash or slag materials are required in all classes of concrete. Use fly ash or slag materials as a cement replacement, on an equal weight replacement basis with the following limitations:*

(1) Mass Concrete:

a. Fly Ash - Ensure that the quantity of cement replaced with fly ash is 18% to 50% by weight, except where the core temperature is expected to rise above 165°F. In that case, ensure that the percentage of fly ash is 35% to 50% by weight.

b. Slag - Ensure that the quantity of cement replaced with slag is 50% to 70% by weight. Ensure that slag is 50% to 55% of total cementitious content by weight when used in combination with silica fume, ultrafine fly ash and/or metakaolin.

c. Fly Ash and Slag - Ensure that there is at least 20% fly ash by weight and 40% portland cement by weight for mixes containing portland cement, fly ash and slag.

(2) Drilled Shaft:

a. Fly Ash - Ensure that the quantity of cement replaced with fly ash is 33% to 37% by weight.

b. Slag - Ensure that the quantity of cement replaced with slag is 58% to 62% by weight.

c. Fly Ash and Slag (Ternary Blend) - Ensure that there is 10% to 20% fly ash, 50% to 60% slag by weight, and 30% portland cement by weight for mixes containing portland cement, fly ash and slag.

(3) Precast Concrete – Ensure that the precast concrete has a maximum of 25% fly ash or a maximum of 70% slag. In extremely aggressive environments, ensure that the precast concrete has a minimum of 18% fly ash or a minimum of 50% slag.

For fly ash and slag (ternary blend), ensure that there is 10% to 20% fly ash, 50% to 60% slag by weight, and 40% portland cement by weight for mixes containing portland cement, fly ash and slag.

(4) For all other concrete uses not covered in (1), (2) and (3) above,

a. Fly Ash - Ensure that the quantity of cement replaced with fly ash is 18% to 30% by weight.

b. Slag - Ensure that the quantity of cement replaced with slag is 25% to 70% for slightly and moderately aggressive environments and 50% to 70% by weight when used in extremely aggressive environments. Ensure that slag is 50% to 55% of total cementitious content by weight when used in combination with silica fume, ultra fine fly ash and/or metakaolin.

c. Fly Ash and Slag (Ternary Blend) - Ensure that there is 10% to 20% fly ash, 50% to 60% slag by weight, and 40% portland cement by weight for mixes containing portland cement, fly ash and slag.

(5) Blended Cements:

a. *Type IS - Ensure that the quantity of slag in Type IS is less than or equal to 70% by weight.*

b. *Type IP - Ensure that the quantity of the pozzolan in Type IP is less than or equal to 40% by weight.*

(6) *Highly Reactive Pozzolans: Highly reactive pozzolans are considered to be silica fume, metakaolin and ultrafine fly ash. When silica fume, metakaolin or ultrafine fly ash is used, it must be used in combination with fly ash or slag and cured in accordance with the manufacturer's recommendations and approved by the Engineer.*

a. *Silica Fume - Ensure that the quantity of cement replaced with silica fume is 3% to 9% by weight of the total cementitious material.*

b. *Metakaolin - Ensure that the quantity of cement replaced with metakaolin is 8% to 12% by weight of the total cementitious material.*

c. *Ultrafine Fly Ash - Ensure that the quantity of cement replaced with ultrafine fly ash is 8% to 12% by weight of the total cementitious material.*

346-2.4 Coarse Aggregate Gradation: *Produce all concrete using Size No. 57, 67 or 78 coarse aggregate. With the Engineer's approval, Size No. 8 or Size No. 89 may be used either alone or blended with Size No. 57, 67 or 78 coarse aggregate. The Engineer will consider requests for approval of other gradations individually. Submit sufficient statistical data to establish production quality and uniformity of the subject aggregates, and establish the quality and uniformity of the resultant concrete. Furnish aggregate gradations sized larger than nominal maximum size of 1.5 inch as two components.*

For Class I and Class II, excluding Class II (Bridge Deck), the coarse and fine aggregate gradation requirements set forth in Sections 901 and 902 are not applicable and the aggregates may be blended; however, the aggregate sources must be approved by the Owner. Do not blend the aggregate if the size is smaller than Size No. 78.

346-2.5 Admixtures: *Use admixtures in accordance with the requirements of this subarticle. Chemical admixtures not covered in this subarticle may be approved by the Owner. Submit statistical evidence supporting successful laboratory and field trial mixes which demonstrate improved concrete quality or handling characteristics.*

Use admixtures in accordance with the manufacturer's recommended dosage rate. Dosage rates outside of this range may be used with written recommendation from the admixture producer's technical representative. Do not use admixtures or additives containing calcium chloride (either in the raw materials or introduced during the manufacturing process) in reinforced concrete.

346-2.5.1 Water-Reducer/Water-Reducer Retardant Admixtures: *When a water-reducing admixture is used, meet the requirements of a Type A. When a water-reducing and retarding admixture is used, meet the requirements of a Type D.*

346-2.5.2 Air Entrainment Admixtures: *Use an air entraining admixture in all concrete mixes except counterweight concrete. For precast concrete products, the use of air entraining admixture is optional for Class I and Class II concrete.*

346-2.5.3 High Range Water-Reducing Admixtures:

346-2.5.3.1 General: *When a high range water-reducing admixture is used, meet the requirements of a Type F or Type I. When a high range water-reducing and retarding admixture is used, meet the requirements of a Type G or Type II. When silica fume or metakaolin is incorporated into a concrete mix design, use a high range water-reducing admixture Type I, II, F or G.*

346-2.5.3.2 Flowing Concrete Admixtures for Precast/Prestressed

Concrete: Use a Type I, II, F or G admixture for producing flowing concrete. If Type F or G admixture is used, verify the distribution of aggregates in accordance with ASTM C 1610 except allow for minimal vibration for consolidating the concrete. The maximum allowable difference between the static segregation is less than or equal to 15 percent. Add the flowing concrete admixtures at the concrete production facility.

346-2.5.4 Corrosion Inhibitor Admixture: Use only with concrete containing Type II cement, or Type II (MH) cement, and a water-reducing retardant admixture, Type D, or High Range Water-Reducer retarder admixture, Type G, to normalize the setting time of concrete. Ensure that all admixtures are compatible with the corrosion inhibitor admixture.

346-2.5.5 Accelerating Admixture for Precast Drainage and Incidental Concrete Products: The use of non-chloride admixtures Type C or Type E is allowed in the manufacturing of precast concrete products.

346-3 Classification, Strength, Slump and Air Content.

346-3.1 General: The separate classifications of concrete covered by this Section are designated as Class I, Class II, Class III, Class IV, Class V and Class VI. Strength and slump are specified in Table 2. The air content range for all classes of concrete is 1.0 to 6.0%, except for Class IV (Drilled Shaft) which is 0.0 to 6.0%.

Substitution of a higher class concrete in lieu of a lower class concrete may be allowed when the substituted concrete mixes are included as part of the Contractor's Quality Control Plan, or for precast concrete, the Precast Concrete Producer's Quality Control Plan. The substituted higher class concrete must meet or exceed the requirements of the lower class concrete and both classes must contain the same types of mix ingredients. When the compressive strength acceptance data is less than the minimum compressive strength of the higher design mix, notify the Engineer. Acceptance is based on the requirements in Table 2 for the lower class concrete.

TABLE 2		
Class of Concrete	Specified Minimum Strength (28-day) (psi)	Target Slump Value (inches) (c)
STRUCTURAL CONCRETE		
I (a)	3,000	3 (b)
I (Pavement)	3,000	2
II (a)	3,400	3 (b)
II (Bridge Deck)	4,500	3 (b)
III (e)	5,000	3 (b)
III (Seal)	3,000	8
IV (d)(f)	5,500	3 (b)
IV (Drilled Shaft)	4,000	8.5
V (Special) (d)(f)	6,000	3 (b)
V (d)(f)	6,500	3 (b)
VI (d)(f)	8,500	3 (b)

(a) For precast three-sided culverts, box culverts, endwalls, inlets, manholes and junction boxes, the target slump value and air content will not apply. The

maximum allowable slump is 6 inches, except as noted in (b). The Contractor is permitted to use concrete meeting the requirements of ASTM C 478 4,000 psi in lieu of Class I or Class II concrete for precast endwalls, inlets, manholes and junction boxes.

(b) The Engineer may allow a higher target slump when a Type F, G, I or II admixture is used, except when flowing concrete is used. The maximum target slump shall be 7 inches.

(c) For a reduction in the target slump for slip-form operations, submit a revision to the mix design to the Engineer.

(d) When the use of silica fume, ultrafine fly ash, or metakaolin is required as a pozzolan in Class IV, Class V, Class V (Special) or Class VI concrete, ensure that the concrete meets or exceeds a resistivity of 29 KOhm-cm at 28 days, when tested in accordance with FM 5-578. Submit three 4 x 8 inch cylindrical test specimens to the Engineer for resistivity testing before mix design approval. Take the resistivity test specimens from the concrete of the laboratory trial batch or from the field trial batch of at least 3 cubic yards. Verify the mix proportioning of the design mix and take representative samples of trial batch concrete for the required plastic and hardened property tests. Cure the field trial batch specimens similar to the standard laboratory curing methods. Submit the resistivity test specimens at least 7 calendar days prior to the scheduled 28 day test. The average resistivity of the three cylinders, eight readings per cylinder, is an indicator of the permeability of the concrete mix.

(e) When precast three-sided culverts, box culverts, endwalls, inlets, manholes or junction boxes require a Class III concrete, the minimum cementitious materials is 470 pounds per cubic yard. Do not apply the air content range and the maximum target slump shall be 6 inches, except as allowed in (b).

(f) Highly reactive pozzolans may be used outside the lower specified ranges to enhance strength and workability. Testing in accordance with FM 5-578 is not required.

346-3.2 Drilled Shaft Concrete: Notify the Engineer at least 48 hours before placing drilled shaft concrete. Obtain slump loss test results demonstrating that the drilled shaft concrete maintains a slump of at least 5 inches throughout the concrete elapsed time before drilled shaft concrete operations begin.

Obtain slump loss test results from an approved laboratory or from a field demonstration. Slump loss test results for drilled shafts requiring 30 cubic yards of concrete or less and a maximum elapsed time of five hours or less may be done in a laboratory. Obtain all other slump loss test results in the field. Technicians performing the slump test must be ACI Field Grade I qualified.

Ambient temperature conditions for placement of drilled shaft concrete for summer condition is 85° or higher, and below 85° for normal condition. Perform the slump loss test in one of the above ambient temperature conditions.

The concrete elapsed time is defined in Section 455. Obtain the Engineer's approval for use of slump loss test results including elapsed time before concrete placement begins.

Test each load of concrete for slump to ensure the slump is within the limits of 346. Initially cure acceptance cylinders for 48 hours before transporting to the laboratory.

If the elapsed time during placement exceeds the slump loss test data, provide an engineering analysis performed by a Professional Engineer, registered in the State of Florida, and knowledgeable in the area of foundations, to determine if the shaft is structurally sound and there

are no voids in the drilled shaft concrete. At the direction of the Engineer, excavate the drilled shaft for inspection. Obtain approval from the Engineer before placing any additional shafts.

346-3.3 Mass Concrete: *When mass concrete is designated in the Contract Documents, provide an analysis of the anticipated thermal developments in the mass concrete elements for all expected project temperature ranges using the selected mix design, casting procedures, and materials.*

Use a Specialty Engineer competent in the design and temperature control of concrete in mass elements. The Specialty Engineer shall follow the procedure outlined in Section 207 of the ACI Manual of Concrete Practice to formulate, implement, administer and monitor a temperature control plan, making adjustments as necessary to ensure compliance with the Contract Documents. The Specialty Engineer shall select the concrete design mix proportions that will generate the lowest maximum temperatures possible to ensure that a 35°F differential temperature between the concrete core and the exterior surface is not exceeded. The mass concrete maximum allowable temperature is 180°F. If either the differential temperature or the maximum allowable temperature is exceeded, the Specialty Engineer shall be available for immediate consultation.

Describe the measures and procedures intended for use to maintain a temperature differential of 35°F or less between the interior core center and exterior surface(s) of the designated mass concrete elements during curing. Submit both the mass concrete mix design and the proposed mass concrete plan to monitor and control the temperature differential to the Engineer for acceptance. Provide temperature monitoring devices to record temperature development between the interior core center and exterior surface(s) of the elements in accordance with the accepted mass concrete plan.

The Specialty Engineer, or a person designated by the Specialty Engineer, must personally inspect and approve the installation of monitoring devices and verify that the process for recording temperature readings is effective for the first placement of each size and type mass component. Submit to the Engineer for approval the qualification of all technicians employed to inspect or monitor mass concrete placements. Designate an employee(s) approved by the Specialty Engineer, as qualified to inspect monitoring device installation, to record temperature readings, to be in contact at all times with the Specialty Engineer if adjustments must be made as a result of the temperature differential or the maximum allowable temperature being exceeded, and to immediately implement adjustments to temperature control measures as directed by the Specialty Engineer. Read the monitoring devices and record the readings at intervals no greater than 6 hours. The readings will begin when the mass concrete placement is complete and continue until the maximum temperature differential and the temperature is reached and a decreasing temperature differential is confirmed as defined in the temperature control plan. Do not remove the temperature control mechanisms until the core temperature is within 50°F of the ambient temperature. Furnish a copy of all temperature readings to the Engineer. Provide determined temperature differentials, the summary sheet from the data logger, which includes the maximum temperature, the maximum temperature differential and a final report within three calendar days of completion of monitoring of each element.

Request approval of reduced monitoring of same least dimensioned mass concrete elements containing the same mix design, concrete placement temperatures (within plus 3°F), and insulation thermal resistance value. The Specialty Engineer may monitor and record the temperature for the first element only. Each subsequent element must be started within one hour of the first placement and be completed within one hour of the completion of the first element.

Each mass concrete element must be instrumented with monitoring devices in case of failure in meeting the one hour time limit.

Changes or adjustments made to the monitored element must be made to all elements. Failure to follow this will require an Engineering Analysis Report (EAR) for the elements not monitored even if the element that was monitored had a temperature differential well below the maximum allowed. The reduced monitoring option will not be allowed by the Engineer if the Contractor fails to comply with these requirements.

If the 35°F differential or the 180°F maximum allowable temperature has been exceeded, take immediate action as directed by the Specialty Engineer to retard further growth of the temperature differential. Describe methods of preventing thermal shock in the temperature control plan. Use a Specialty Engineer to revise the previously accepted plan to ensure compliance on future placements. Do not place any mass concrete until the Engineer has accepted the mass concrete plan(s). When mass concrete temperature differentials or maximum allowable temperature has been exceeded, provide all analyses and test results deemed necessary by the Engineer for determining the structural integrity and durability of the mass concrete element, to the satisfaction of the Engineer. The Owner will make no compensation, either monetary or time, for the analyses or tests or any impacts upon the project.

346-3.4 Flowing Concrete for Precast/Prestressed Concrete: Produce
flowing concrete mix with target slump of 9 inches.

Subsequent to the laboratory trial batch, perform a field demonstration of the proposed mix design by production and placement of at least three batches, 3 cubic yard minimum size each, of concrete containing flowing concrete HRWR admixture. Take representative samples from each batch and perform slump, air content, density (unit weight), and temperature tests on these samples. Cast specimens from each sample for compressive strength tests. Record the ambient air temperature during the test. Ensure that the concrete properties are within the required specification limits. The plants that are producing concrete with batch sizes of less than 3 cubic yards are required to produce and place at least a total amount of 9 cubic yards and perform the aforementioned tests on at least three randomly selected batches.

Determine the workability of the demonstration concrete batches by performing the slump tests on the samples taken at 15 minute intervals from each batch. Continue sampling and testing until the slump measures 6 inches or less. From the plot of slump versus time, determine the time for each batch when the slump is at 7.5 inches. The shortest time period determined from three consecutive batches, at 7.5 inches slump, is considered the cutoff time of the proposed concrete mix. For production concrete, ensure that the time between the batching and depositing of each load of concrete is less than the cutoff time of the mix and also does not exceed the allowable time limit specified in this Section.

Ensure that the demonstration concrete is mixed, delivered, placed, consolidated and cured in accordance with the proposed method and sequence. Produce the flowing concrete batches at slumps between 7.5 inches to 10.5 inches.

Perform inspection of the demonstration concrete during batching, delivery, placement and post placement. During placement, ensure that the concrete batches meet all plastic property requirements of the specifications and maintain their cohesive nature without excessive bleeding, segregation, or abnormal retardation.

Dispose of concrete produced for demonstration purposes at no expense to the Owner. Subject to the Engineer's approval, the Contractor may incorporate this concrete

into non-reinforced concrete items and may be included for payment, provided it meets Contract requirements for slump, entrained air, and strength.

After removal of the forms, perform the post-placement inspection of the in-place concrete. Observe for any signs of honeycombs, cracks, aggregate segregation or any other surface defects and ensure that the hardened concrete is free from these deficiencies. The Engineer may require saw cutting of the mock-up products to verify the uniform distribution of the aggregates within the saw cut surfaces and around the reinforcing steel and prestressing strands. The Engineer will require saw cutting of the demonstration mock-up products for plants that are demonstrating the use of the flowing concrete for the first time. Obtain core samples from different locations of mock-up products to inspect the aggregate distribution in each sample and compare it with the aggregate distribution of other core samples. Perform surface resistivity tests on the core samples or test cylinders at 28 days.

Submit the results of the laboratory trial batch tests and field demonstration of verified test data and inspection reports to the Engineer, along with certification stating that the results of the laboratory trial batch tests and field demonstration tests indicate that the proposed concrete mix design meets the requirements of the specifications. For the proposed mix design, state the anticipated maximum time limit between the batching and when the concrete of each batch is deposited during the production.

Upon the review and verification of the laboratory trial batch, field demonstration test data, inspection reports and contractor's certification statement, the Owner will approve the proposed mix design.

The Owner may approve proposed flowing concrete mixes, centrally mixed at the placement site, without the production of demonstration batches, provided that the proposed mix meets the following two criteria:

(1) A previously approved flowing concrete mix of the same class has demonstrated satisfactory performance under the proposed job placing conditions with a minimum of fifteen consecutive Owner acceptance tests, which met all plastic and hardened concrete test requirements.

(2) The cementitious materials and chemical admixtures, including the flowing concrete HRWR admixture, used in the proposed mix are the same materials from the same source used in the previously approved mix, (1) above.

Do not produce or place concrete until the design mixes have been approved.

346-4 Composition of Concrete.

346-4.1 Master Proportion Table: Proportion the materials used to produce the various classes of concrete in accordance with Table 3:

<i>TABLE 3</i>		
<i>Class of Concrete</i>	<i>Minimum Total Cementitious Materials Content pounds per cubic yard</i>	<i>Maximum Water to Cementitious Materials Ratio pounds per pounds*</i>
<i>I</i>	<i>470</i>	<i>0.53</i>
<i>I (Pavement)</i>	<i>470</i>	<i>0.50</i>
<i>II</i>	<i>470</i>	<i>0.53</i>
<i>II (Bridge Deck)</i>	<i>611</i>	<i>0.44</i>

<i>TABLE 3</i>		
<i>Class of Concrete</i>	<i>Minimum Total Cementitious Materials Content pounds per cubic yard</i>	<i>Maximum Water to Cementitious Materials Ratio pounds per pounds*</i>
<i>III</i>	<i>611</i>	<i>0.44</i>
<i>III (Seal)</i>	<i>611</i>	<i>0.53</i>
<i>IV</i>	<i>658</i>	<i>0.41**</i>
<i>IV (Drilled Shaft)</i>	<i>658</i>	<i>0.41</i>
<i>V (Special)</i>	<i>752</i>	<i>0.37**</i>
<i>V</i>	<i>752</i>	<i>0.37**</i>
<i>VI</i>	<i>752</i>	<i>0.37**</i>

**The calculation of the water to cementitious materials ratio (w/cm) is based on the total cementitious material including cement and any supplemental cementitious materials that are used in the mix.*

***When the use of silica fume or metakaolin is required, the maximum water to cementitious material ratio will be 0.35. When the use of ultrafine fly ash is required, the maximum water to cementitious material ratio will be 0.30.*

346-4.2 Chloride Content Limits for Concrete Construction:

346-4.2.1 General: *Use the following maximum chloride content limits for the concrete application and/or exposure environment shown:*

<i>TABLE 4</i>		
<i>Application/Exposure Environment</i>		<i>Maximum Allowable Chloride Content, pounds per cubic</i>
<i>Non Reinforced Concrete</i>		<i>No Test needed</i>
<i>Reinforced Concrete</i>	<i>Slightly Aggressive Environment</i>	<i>0.70</i>
	<i>Moderately or Extremely Aggressive Environment</i>	<i>0.40</i>
<i>Prestressed Concrete</i>		<i>0.40</i>

346-4.2.2 Control Level for Corrective Action: *If chloride test results exceed the limits of Table 4, suspend concrete placement immediately for every mix design represented by the failing test results, until corrective measures are made. Perform an engineering analysis to demonstrate that the material meets the intended service life of the structure on all concrete produced from the mix design failing chloride test results to the previous passing test results. Supply this information within 30 business days of the failing test results from a Professional Engineer registered in the State of Florida, and knowledgeable in the areas of corrosion and corrosion control.*

346-5 Sampling and Testing Methods.

Perform concrete sampling and testing in accordance with the following methods:

<i>TABLE 5</i>	
<i>Description</i>	<i>Method</i>
<i>Slump of Hydraulic Cement Concrete</i>	<i>ASTM C 143</i>

<i>TABLE 5</i>	
<i>Description</i>	<i>Method</i>
<i>Air Content of Freshly Mixed Concrete by the Pressure Method*</i>	<i>ASTM C 231</i>
<i>Air Content of Freshly Mixed Concrete by the Volumetric Method*</i>	<i>ASTM C 173</i>
<i>Making and Curing Test Specimens in the Field**</i>	<i>ASTM C 31</i>
<i>Compressive Strength of Cylindrical Concrete Specimens***</i>	<i>ASTM C 39</i>
<i>Obtaining and Testing Drilled Core and Sawed Beams of Concrete</i>	<i>ASTM C 42</i>
<i>Initial Sampling of Concrete from Revolving Drum Truck Mixers or Agitators</i>	<i>FM 5-501</i>
<i>Low Levels of Chloride in Concrete and Raw Materials</i>	<i>FM 5-516</i>
<i>Density (Unit Weight), Yield and Air Content (Gravimetric) of Concrete</i>	<i>ASTM C 138</i>
<i>Temperature of Freshly Mixed Portland Cement Concrete</i>	<i>ASTM C 1064</i>
<i>Sampling Freshly Mixed Concrete****</i>	<i>ASTM C 172</i>
<i>Static Segregation of Self Consolidating Concrete using Column Techniques</i>	<i>ASTM C 1610</i>
<i>Slump Flow of Self Consolidating Concrete</i>	<i>ASTM C 1611</i>
<i>Passing Ability of Self Consolidating Concrete by J-Ring</i>	<i>ASTM C 1621</i>
<i>Concrete Resistivity as an Electrical Indicator of its Permeability</i>	<i>FM 5-578</i>
<p><i>*The Owner will use the same type of meter for Verification testing as used for QC testing. When using pressure type meters, use an aggregate correction factor determined by the concrete producer for each mix design to be tested. Record and certify test results for correction factors for each type of aggregate at the concrete production facility.</i></p> <p><i>** Provide curing facilities that have the capacity to store all QC, Verification, "hold" and Independent Verification cylinders simultaneously for the initial curing.</i></p> <p><i>***The Verification technician will use the same size cylinders as the Quality Control technician.</i></p> <p><i>**** Take the test sample from the middle portion of the batch in lieu of collecting and compositing samples from two or more portions, as described in ASTM C172.</i></p>	

346-6 Control of Quality.

346-6.1 General: *Develop a Quality Control Plan (QCP) as specified in Section 105. Meet the requirements of the approved QCP and Contract Documents. Ensure the QCP includes the necessary requirements to control the quality of the concrete.*

Perform QC activities to ensure materials, methods, techniques, personnel, procedures and processes utilized during production meet the specified requirements. For precast/prestressed operations, ensure that the QC testing is performed by the party responsible for QC inspections on all phases of work. Ensure all materials and workmanship incorporated into the project meet the requirements of the Contract Documents.

Ensure the QCP includes any anticipated requirements for adjusting and controlling the concrete at the placement site. Include the testing procedures that will be implemented to control the quality of the concrete and ensure that concrete placed is within the tolerance range. Also, include provisions for the addition of water to concrete delivered to the placement site at designated level areas, to ensure the allowable amount of water stated on the

concrete delivery ticket is correct and the maximum water to cementitious materials ratio on the approved design mix is not exceeded. Ensure the anticipated ranges of jobsite water additions are described and the proposed methods of measuring water for concrete adjustments are included.

Failure to meet the requirements of this Specification or the QCP will automatically void the concrete portion of the QCP. To obtain QCP re-approval, implement corrective actions as approved by the Engineer. The Engineer may allow the Contractor to continue any ongoing concrete placement but the Engineer will not accept concrete for any new placement until the QCP re-approval is given by the Engineer.

346-6.2 Concrete Design Mix: Provide concrete that has been produced in accordance with a Owner's Engineer approved design mix, in a uniform mass free from balls and lumps.

For slump target values in excess of 6 inches or self consolidating concrete, utilize a grate over the conveyance equipment to capture any lumps or balls that may be present in the mix. The grate must cover the entire opening of the conveyance equipment and have an opening that is a maximum of 2 1/2 inches in any one direction. Remove the lumps or balls from the grate and discard them. Discharge the concrete in a manner satisfactory to the Engineer. Perform demonstration batches to ensure complete and thorough placements in complex elements, when requested by the Engineer.

Do not place concretes of different compositions such that the plastic concretes may combine, except where the plans require concrete both with and without silica fume, ultrafine fly ash, metakaolin or calcium nitrite in a continuous placement. Produce these concretes using separate design mixes. For example, designate the mix with calcium nitrite as the original mix and the mix without calcium nitrite as the redesigned mix. Ensure that both mixes contain the same cement, fly ash or slag, coarse and fine aggregates and compatible admixtures. Submit both mixes for approval as separate mix designs, both meeting all requirements of this Section. Ensure that the redesigned mix exhibits plastic and hardened qualities which are additionally approved by the Engineer as suitable for placement with the original mix. The Engineer will approve the redesigned mix for commingling with the original mix and for a specific project application only. Alternately, place a construction joint at the location of the change in concretes.

346-6.3 Delivery Certification: Ensure that an electronic delivery ticket is furnished with each batch of concrete before unloading at the placement site. The delivery ticket may be proprietary software or in the form of an electronic spreadsheet, but shall be printed. Ensure that the materials and quantities incorporated into the batch of concrete are printed on the delivery ticket. Include the following information on the Delivery Ticket:

- (1) Arrival time at jobsite,
- (2) Time that concrete mix has been completely discharged,
- (3) Number of revolutions upon arrival at the jobsite,
- (4) Total gallons of water added at the jobsite,
- (5) Additional mixing revolutions when water is added,
- (6) Total number of revolutions.

Items 3 through 6 do not apply to non-agitating concrete transporting vehicles.

Ensure the batcher responsible for production of the batch of concrete signs the delivery ticket, certifying the batch of concrete was produced in accordance with the Contract Documents.

Sign the delivery ticket certifying that the design mix maximum specified water to cementitious materials ratio was not exceeded due to any jobsite adjustments to the batch of

concrete, and that the batch of concrete was delivered and placed in accordance with the Contract Documents.

346-6.4 Plastic Property Tolerances: Do not place concrete with a slump more than plus or minus 1.5 inches from the target slump value specified in Table 2.

Reject concrete with slump or air content that does not fall within the specified tolerances and immediately notify the concrete production facility that an adjustment of the concrete mixture is required. If a load does not fall within the tolerances, test each subsequent load and the first adjusted load. If failing concrete is not rejected or adjustments are not implemented, the Engineer may reject the concrete and terminate further production until the corrections are implemented.

Do not allow concrete to remain in a transporting vehicle to reduce slump. Water may be added only upon arrival of the concrete to the jobsite and not thereafter.

346-7 Mixing and Delivering Concrete.

346-7.1 General Requirements: Operate all concrete mixers at speeds and volumes per the manufacturer's design or recommendation as stipulated on the mixer rating plate.

346-7.2 Transit Truck Mixing: When water is added at the jobsite, mix the concrete 30 additional drum mixing revolutions. Do not add water after the total number of drum mixing revolutions exceeds 130, do not make additional mix adjustments. Discharge all concrete from truck mixers before total drum revolutions exceed 300. Seek approval from the Engineer prior to using a central mixer and depositing the batch into a truck mixer.

346-7.2.1 Transit Time: Ensure compliance with Table 6 between the initial introduction of water into the mix and completely discharging all of the concrete from the truck. Reject concrete exceeding the maximum transit time. For critical placements, the Engineer may authorize the placement of the concrete.

TABLE 6	
Maximum Allowable Time	
Non-Agitator Trucks	Agitator Trucks
45 minutes	60 minutes
75 minutes*	90 minutes*

*When a water-reducing and retarding admixture (Type D, Type G or Type II) is used.

346-7.2.2 Placement Time: All the concrete in a load must be in its final placement position a maximum of 15 minutes after the transit time has expired unless a time extension is approved in advance by the Engineer.

346-7.3 On-site Batching and Mixing: Include provisions in the QCP for the mixing at the site. Use a mixer of sufficient capacity to prevent delays that may be detrimental to the quality of the work. Ensure that the accuracy of batching equipment is in accordance with requirements of this Section.

346-7.4 Concreting in Cold Weather: Do not mix or place concrete when the air temperature is below 45°F. Protect the fresh concrete from freezing in accordance with Section 400. The requirements of concreting in cold weather are not applicable to precast concrete mixing and placement operations occurring in a temperature controlled environment.

346-7.5 Concreting in Hot Weather: *Hot weather concreting is defined as the production, placing and curing of concrete when the concrete temperature at placing exceeds 85°F but is less than 100°F.*

Unless the specified hot weather concreting measures are in effect, reject concrete exceeding 85°F at the time of placement. Regardless of special measures taken, reject concrete exceeding 100°F. Predict the concrete temperatures at placement time and implement hot weather measures to avoid production shutdown.

346-7.6 Adding Water to Concrete at the Placement Site: *If the slump, as delivered, is outside the tolerance range, reject the load. If the slump is within the tolerance range, that load may be adjusted by adding water provided the addition of water does not exceed the water to cementitious materials ratio as defined by the mix design. After adding water, perform a slump test to confirm the concrete is within the slump tolerance range. If an adjustment is made at the concrete production facility, perform a slump test on the next load to ensure the concrete is within the slump tolerance range. Do not place concrete represented by slump test results outside of the tolerance range. Include water missing from the water storage tanks upon arrival at the project site in the jobsite water added.*

346-7.7 Sample Location: *Obtain acceptance samples from the point of final placement. Describe in the QCP the method to sample the plastic concrete at the point of final placement. Where concrete buckets are used to discharge concrete directly to the point of final placement or into the hopper of a tremie pipe, samples will be obtained from the discharge of the bucket. When the concrete is discharged directly from the mixer into the bucket and the bucket is discharged within 20 minutes, samples may be obtained from the discharge of the mixer.*

Where conveyor belts, troughs, pumps, or chutes are used to transport concrete directly to the point of final placement or into the hopper of a tremie pipe, samples will be obtained from the discharge end of the entire conveyor belt, trough, pump, or chute system.

Where concrete is placed in a drilled shaft or other element using a tremie pipe and a concrete pump, samples will be obtained from the discharge of the pump line at the location of the tremie hopper.

For all other placement methods, prior to each placement, obtain Owner approval for sampling at the discharge of the mixer in lieu of sampling at the point of final placement. Describe the sampling correlation procedure in the QCP. Once the comparative sampling correlation is approved by the Engineer, apply this correlation to the plastic properties tolerances for samples obtained from the discharge of mixer.

Where a concrete pump is used to deposit concrete directly into a drilled shaft which is a wet excavation without the use of a tremie, or other applications as approved by the Engineer, ensure the discharge end of the pump line remains immersed in the concrete at all times after starting concrete placement.

346-8 Plastic Concrete Sampling and Testing.

QC tests include air content, temperature, slump, and preparing compressive strength cylinders for testing at later dates. In addition, calculate the water to cementitious materials ratio in accordance with FM 5-501 for compliance to the approved mix design.

Ensure that each truck has a rating plate and a valid mixer identification card issued by the Owner. Ensure that the revolution counter on the mixer is working properly, and calibration of the water dispenser has been performed within the last twelve months. Reject any concrete batches that are delivered in trucks that do not have mixer identification cards.

Remove

the mixer identification card when a truck mixer is discovered to be in noncompliance and the mixer deficiencies cannot be repaired immediately. When the mixer identification card is removed for noncompliance, make note of the deficiency or deficiencies found, and forward the card to the District Materials and Research Engineer who has Producer QC Plan acceptance authority.

Perform plastic concrete tests on the initial delivery of each concrete design mix each day. Ensure QC technicians meeting the requirements of Section 105 are present and performing tests throughout the placement operation. Ensure one technician is present and performing tests throughout the placement operation at each placement site. If a project has multiple concrete placements at the same time, identify the number of technicians in the Quality Control Plan to ensure minimum sampling and testing frequencies are met. Ensure that the equipment used for delivery, placement and finishing meets the requirements of this Specification. When a truck designated for QC testing arrives at the discharge site, a subsequent truck may also discharge once a representative sample has been collected from the QC truck and while awaiting the results of QC testing. Reject non-complying loads at the jobsite. Ensure that corrections are made on subsequent loads. Immediately cease concrete discharge of all trucks if the QC truck has failing test. Perform plastic properties tests on all trucks prior to the first corrected truck and the corrected truck. When more than one truck is discharging into a pump simultaneously, only the truck designated for QC testing may discharge into the pump to obtain a representative sample of concrete from the QC truck only.

Furnish sufficient concrete of each design mix as required by the Engineer for verification testing. When the Engineer's verification test results do not compare with the QC plastic properties test results, within the limits defined by the Independent Assurance (IA) checklist comparison criteria, located in Materials Manual Chapter 5, disposition of the concrete will be at the option of the Contractor.

On concrete placements consisting of only one load of concrete, perform initial sampling and testing in accordance with this Section. The acceptance sample and plastic properties tests may be taken from the initial portion of the load.

If any of the QC plastic properties tests fail, reject the remainder of that load, and any other loads that have begun discharging, terminate the LOT and notify the Engineer. Make cylinders representing that LOT from the same sample of concrete.

Following termination of a LOT, obtain samples from a new load, and perform plastic properties tests until such time as the water to cementitious materials ratio, air content, temperature and slump comply with the Specification requirements. Initiate a new LOT once the testing indicates compliance with Specification requirements.

Suspend production when any five loads in two days of production of the same design mix are outside the specified tolerances. Make the necessary revisions to concrete operations and increase the frequency of QC testing in the QCP to bring the concrete within allowable tolerances. Obtain the Engineer's approval of the revisions before resuming production. After production resumes, obtain the Engineer's approval before returning to the normal frequency of QC testing.

If concrete placement stops for more than 90 minutes, perform initial plastic properties testing on the next batch and continue the LOT. Cylinders cast for that LOT will represent the entire LOT.

When the Owner performs Independent Verification, the Contractor may perform the same tests on the concrete at the same time. The Owner will compare results based on the Independent Assurance Checklist tolerances.

When the Owner's Independent Verification test results do not meet the requirements of this Section, the Engineer may require the Contractor to revise the QCP.

346-9 Acceptance Sampling and Testing.

346-9.1 General: Perform plastic properties tests in accordance with 346-8 and cast a set of three QC cylinders, for all structural concrete incorporated into the project. Take these acceptance samples randomly as determined by a random number generator. The Owner will independently perform verification plastic properties tests and cast a set of verification cylinders. The verification cylinders will be the same size cylinder selected by the Contractor, from a separate sample from the same load of concrete as the Contractor's QC sample.

For each set of QC cylinders verified by the Owner, cast one additional cylinder from the same sample, and identify it as the QC "hold" cylinder. The Owner will also cast one additional "hold" cylinder from each Verification sample. All cylinders will be clearly identified as outlined in the Sample/Lot Numbering System instructions located on the State Materials Office website. Deliver the QC samples, including the QC "hold" cylinder to the final curing facility in accordance with ASTM C 31. At this same time, the Owner will deliver the Verification samples, including the Verification "hold" cylinder, to their final curing facility.

Test the QC laboratory cured samples for compressive strength at the age of 28 days, or any other specified age, in a laboratory meeting and maintaining at all times the qualification requirements listed in Section 105.

The QC testing laboratory will input the compressive strength test results into the Owner's sample tracking database within 24 hours. When the QC testing laboratory cannot input the compressive strength test results into the owner's sample tracking database within 24 hours, the QC testing laboratory will notify the Verification testing laboratory within 24 hours of testing the cylinder and provide the Verification testing laboratory the compressive strength test results. Ensure the compressive strength results are input into the Owner's sample tracking database within 72 hours of determining the compressive strength of the cylinders. The Owner will compare the Verification sample results with the corresponding QC sample results. In the event that one set of compressive strength data for a set of cylinders falls outside the range of the other set of cylinders, use the lower Range of Average Compressive Strength to determine the comparison criteria. Based on this comparison, the Owner will determine if the Comparison Criteria as shown in Table 7 has been met. When the difference between QC and Verification is less than or equal to the Comparison Criteria, the QC data is verified. When the difference between QC and Verification data exceeds the Comparison Criteria, the data is not verified and the Engineer will initiate the resolution procedure.

<i>Table 7</i>	
<i>Range of Average Compressive Strength</i>	<i>Comparison Criteria</i>
<i>Less than 3500 psi</i>	<i>420 psi</i>
<i>3,501 – 4,500 psi</i>	<i>590 psi</i>

4,501 – 6,500 psi	910 psi
6,501 – 8,500 psi	1,275 psi
Greater than 8,500 psi	1,360 psi

346-9.2 Sampling Frequency:

As a minimum, sample and test concrete of each design mix for water to cementitious materials ratio, air content, temperature, slump and compressive strength once per LOT as defined by Table 8. When a mix design is used for a different application, the LOT is defined by the application. When more than one concrete production facility is used for the same mix design, describe the method of sampling, testing and LOT numbering in the QC Plan. The Engineer will randomly verify one of every four consecutive LOTs of each design mix based on a random number generator. The Owner's Engineer may perform Independent Verification testing to verify compliance with specification requirements. All QC activities, calculations, and inspections will be randomly confirmed by the Owner.

TABLE 8	
Class Concrete*	LOT Size
I	one day's production
I (Pavement)	2,000 square yards, or one day's production, whichever is less
II, II (Bridge Deck), III, IV, V (Special), V, VI	50 cubic yards, or one day's production, whichever is less
IV (Drilled Shaft)	50 cubic yards, or two hours between the end of one placement and the start of the next placement, whichever is less
III (Seal)	Each Seal placement
*For any class of concrete used for roadway barrier wall, the lot size is defined as 100 cubic yards, or one day's production, whichever is less.	

346-9.2.1 Reduced Frequency for Acceptance Tests: The LOT size may represent 100 cubic yards when produced at the same mix design at the same concrete production facility for the same prime contractor and subcontractor on a given Contract. Submit test results indicating the average compressive strength is greater than two standard deviations above the specified minimum strength for that class of concrete. Base calculations on a minimum of ten consecutive strength test results for a Class IV or higher; or a minimum of five consecutive strength results for a Class III or lower.

The average of the consecutive compressive strength test results, based on the class of concrete, can be established using historical data from a previous Owner project. The tests from the previous Owner project must be within the last 60 calendar days or may also be established by a succession of samples on the current project. Only one sample can be taken from each LOT. Test data must be from a laboratory meeting the requirements of Section 105. Obtain Owner approval before beginning reduced frequency LOT's. If at any time a strength test is not verified or the average strength of the previous ten or five consecutive samples based on the class of concrete from the same mix

design and the same production facility is less than the specified minimum plus two standard deviations, return to the maximum production quantity represented by the LOT as defined in Table 8. Notify the Engineer that the maximum production rate is reinstated. In order to reinstate reduced frequency, submit a new set of strength test results.

346-9.3 Strength Test Definition: *The strength test of a LOT is defined as the average of the compressive strengths tests of three cylinders cast from the same sample of concrete from the LOT.*

346-9.4 Acceptance of Concrete:

Ensure that the hardened concrete strength test results are obtained in accordance with 346-9.3. Do not discard a cylinder strength test result based on low strength (strength below the specified minimum strength as per the provisions of this Section).

When one of the three QC cylinders from a LOT is lost, missing, damaged or destroyed, determination of compressive strength will be made by averaging the remaining two cylinders. If more than one QC cylinder from a LOT is lost, missing, damaged or destroyed, the Contractor will core the structure at no additional expense to the Owner to determine the compressive strength. Acceptance of LOT may be based on verification data at the discretion of the Engineer. Obtain the approval of the Engineer to core, and of the core location prior to coring.

For each QC cylinder that is lost, missing, damaged or destroyed, payment for that LOT will be reduced by \$750.00 per 1,000 psi of the specified design strength [Example: loss of two Class IV (Drill Shaft) QC cylinders that has no verification data will require the element to be cored and a pay reduction will be assessed (4,000 psi / 1,000 psi) x \$750 x 2 = \$6,000]. This reduction will be in addition to any pay adjustment for low strength. When QC compressive strength test results are not verified, the resolution procedure will be used to accept or reject the concrete. Maintain the “hold” cylinders until the verification of the compressive strength test results.

When QC test results are verified, the Engineer will accept the concrete based on QC test results. The Engineer will accept at full pay only LOTs of concrete represented by plastic property results which meet the requirements of the approved mix design and strength test results which equal or exceed the respective specified minimum strength.

346-9.5 Resolution Procedure: *The Owner may initiate an IA review of sampling and testing methods. The resolution procedure may consist of, but need not be limited to, a review of sampling and testing of fresh concrete, calculation of water to cementitious materials ratio, handling of cylinders, curing procedures and compressive strength testing. Compare the Verification sample results with the verification hold cylinders results. Comparison results must not be greater than 14%. Compare the QC sample results with the QC hold cylinders results. Comparison results must not be greater than the comparison requirements in Table 7. Core samples of the hardened concrete may be required.*

The Engineer will determine through the resolution procedure whether the QC strength test results or the verification strength test are deemed to be the most accurate, LOTS will then be considered to be verified. When the Engineer cannot determine which strength test results are the most accurate, the concrete represented by the four consecutive LOTs will be evaluated based on the QC data. The Engineer will inform the QC and the Verification lab within three calendar days of the acceptance compressive strength test to transport their “hold” cylinders to the resolution lab. The QC and Verification laboratories will transport their own hold cylinder to the resolution testing laboratory within 72 hours after the Engineer notifies the

Contractor that a resolution is required. In addition, the Engineer will ensure that the QC and verification “hold” cylinders are tested within seven calendar days of the acceptance strength tests.

The resolution investigation will determine the strength test results for each of the four or less LOTs. When the QC strength test results are deemed to be the most accurate, the QC strength test results will represent the four or less consecutive LOTs and the Owner will pay for the resolution testing and investigation. When the verification strength test results are deemed to be the most accurate, the Owner will assess a \$1,000 pay reduction for the cost of the Resolution Investigation.

The results of the resolution procedure will be forwarded to the Contractor within five working days after completion of the investigation. If the Owner finds deficiencies based on the Contractor’s QCP, the Engineer may suspend that part of the QCP. When the QC plan is suspended, submit corrective actions for approval to the Engineer. The Engineer may take up to five working days to review corrective actions to the QCP. The Engineer will not allow changes to contract time or completion dates. Incur all delay costs and other costs associated with QC plan suspension and re-approval.

***346-9.6 Small Quantities of Concrete:** When a project has a total plan quantity of less than 50 cubic yards, that concrete will be accepted based on the satisfactory compressive strength of the QC cylinders. Provide certification to the Engineer that the concrete was batched and placed in accordance with the Contract Documents. Submit a quality control plan for the concrete placement operation in accordance with Section 105. In addition, the Engineer may conduct Independent Verification (IV) testing as identified in 346-9. Evaluate the concrete in accordance with 346-10 at the discretion of the Engineer.*

346-10 Investigation of Low Strength Concrete for Structural Adequacy.

***346-10.1 General:** When a concrete acceptance strength test result falls more than 500 psi below the specified minimum strength and the Owner determines that an investigation is necessary, make an investigation into the structural adequacy of the LOT of concrete represented by that acceptance strength test result at no additional expense to the Owner. The Engineer may also require the Contractor to perform additional strength testing as necessary to determine structural adequacy of the concrete.*

Furnish either a structural analysis performed by the Specialty Engineer to establish strength adequacy or drilled core samples as specified in 346-10.3 to determine the in-place strength of the LOT of concrete in question at no additional expense to the Owner. Obtain the Engineer’s approval before taking any core samples. When the concrete is deemed to have low strength, obtain and test the cores and report the data to the Engineer within 14 calendar days of the 28 day compressive strength tests. Core strength test results obtained from the structure will be accepted by both the Contractor and the Owner as the in-place strength of the LOT of concrete in question. The core strength test results will be final and used in lieu of the cylinder strength test results for determination of structural adequacy and any pay adjustment. The Owner’s Engineer will calculate the strength value to be the average of the compressive strengths of the three individual cores. This will be accepted as the actual measured value.

***346-10.2 Determination of Structural Adequacy:** If core strength test results are less than 500 psi below the specified minimum strength, consider the concrete represented by the cores structurally adequate. If the core strength test results are more than 500 psi below the specified minimum strength, the Owner’s Engineer will consider the concrete represented by the cores structurally questionable. Submit a structural analysis performed by the Specialty Engineer.*

If the results of the structural analysis indicate adequate strength to serve its intended purpose with adequate durability, and is approved by the Owner, the Contractor may leave the concrete in place subject to the requirements of 346-11, otherwise, remove and replace the LOT of concrete in question at no additional expense to the Owner.

346-10.3 Coring for Determination of Structural Adequacy: *Notify the Engineer 48 hours prior to taking core samples. The Engineer will select the size and location of the drilled cores so that the structure is not impaired and does not sustain permanent damage after repairing the core holes. Sample three undamaged cores taken from the same approximate location where the questionable concrete is represented by the low strength concrete test cylinders. Repair core holes after samples are taken.*

346-10.4 Core Conditioning and Testing: *Test the cores in accordance with ASTM C 42. Test the cores after obtaining the samples within seven calendar days.*

346-11 Pay Adjustments for Low Strength Concrete.

346-11.1 General: *Any LOT of concrete failing to meet the specified minimum strength as defined in 346-3, 346-9, 346-10 and satisfactorily meeting all other requirements of the Contract Documents, including structural adequacy, the Engineer will individually reduce the price of each low strength LOT in accordance with this Section.*

346-11.2 Basis for Pay Adjustments: *When an acceptance strength test result falls more than 500 psi below the specified minimum strength, core samples may be obtained in accordance with ASTM C 42 from the respective LOT of concrete represented by the low acceptance strength test result for determining pay adjustments. A price adjustment will be applied to the certified invoice price the Contractor paid for the concrete or the precast product.*

Do not core hardened concrete for determining pay adjustments when the 28 day acceptance cylinder strength test results are less than 500 psi below the specified minimum strength.

The results of strength tests of the drilled cores, subject to 346-11.5 and 346-11.6, will be used as the acceptance results and will be used in lieu of the cylinder strength test results for determining pay adjustments.

In precast operations, excluding prestressed, ensure that the producer submits acceptable core sample test results to the Engineer. The producer may elect to use the products in accordance with 346-11. Otherwise, replace the concrete in question at no additional cost to the Owner. For prestressed concrete, core sample testing is not allowed for pay adjustment. The results of the cylinder strength tests will be used to determine material acceptance and pay adjustment.

346-11.3 Coring for Determination of Pay Adjustments: *Obtain the cores in accordance with 346-10.3.*

346-11.4 Core Conditioning and Testing: *Test the cores in accordance with 346-10.4.*

346-11.5 Core Strength Representing Equivalent 28 Day Strength: *For cores tested no later than 42 calendar days after the concrete was cast, the Engineer will accept the core strengths obtained as representing the equivalent 28 day strength of the LOT of concrete in question. The Engineer will calculate the strength value to be the average of the compressive strengths of the three individual cores. The Engineer will accept this strength at its actual measured value.*

346-11.6 Core Strength Adjustments: *For cores tested later than 42 calendar days after the concrete was cast, the Engineer will establish the equivalency between 28 day strength and*

strength at ages after 42 calendar days. The Engineer will relate the strength at the actual test age to 28 day strength for the design mix represented by the cores using the following relationship:

346-11.6.1 Portland Cement Concrete without Pozzolan or Slag:

Equivalent 28 Day Strength, $f_c(28) = 1/F$ (Average Core Strength) x 100 where:

$$F = 4.4 + 39.1 (\ln x) - 3.1 (\ln x)^2 \text{ (Type I Cement)}$$

$$F = -17.8 + 46.3 (\ln x) - 3.3 (\ln x)^2 \text{ (Type II Cement)}$$

$$F = 48.5 + 19.4 (\ln x) - 1.4 (\ln x)^2 \text{ (Type III Cement)}$$

x = number of days since the concrete was placed

ln = natural log

346-11.6.2 Pozzolanic-Cement Concrete:

Equivalent 28 day compressive strength = $f_c(28)$, where:

$$f_c(28) = 0.490 f_c(t) e^{\left\{ \frac{\ln 8.31}{t} \right\}^{0.276}} \text{ (Type I Cement)}$$

$$f_c(28) = 0.730 f_c(t) e^{\left\{ \frac{\ln 2.89}{t} \right\}^{0.514}} \text{ (Type II Cement)}$$

$$f_c(28) = 0.483 f_c(t) e^{\left\{ \frac{\ln 5.38}{t} \right\}^{0.191}} \text{ (Type III Cement)}$$

$f_c(t)$ = Average Core Strength at time t (psi)

t = time compressive strength was measured (days)

346-11.6.3 Slag-Cement Concrete:

Equivalent 28 day compressive strength = $f_c(28)$, where:

$$f_c(28) = 0.794 f_c(t) e^{\left\{ \frac{\ln 7.06}{t} \right\}^{1.06}} \text{ (Type I Cement)}$$

$$f_c(28) = 0.730 f_c(t) e^{\left\{ \frac{\ln 6.02}{t} \right\}^{0.747}} \text{ (Type II Cement)}$$

$$f_c(28) = 0.826 f_c(t) e^{\left\{ \frac{\ln 2.36}{t} \right\}^{0.672}} \text{ (Type III Cement)}$$

$f_c(t)$ = Average Core Strength at time t (psi)

t = time compressive strength was measured (days)

346-11.7 Calculating Pay Adjustments: The Engineer will determine payment reductions for low strength concrete accepted by the Owner and represented by either

cylinder or core strength test results below the specified minimum strength, in accordance with the following:

Reduction in Pay is equal to the reduction in percentage of concrete cylinder strength (specified minimum strength minus actual strength divided by specified minimum strength).

For the elements that payments are based on the per foot basis, the Engineer will adjust the price reduction from cubic yards basis to per foot basis, determine the total linear feet of the elements that are affected by low strength concrete samples and apply the adjusted price reduction accordingly.

346-12 Pay Reduction for Plastic Properties

A rejected load in accordance with 346-6.4 is defined as the entire quantity of concrete contained within a single ready mix truck or other single delivery vehicle regardless of what percentage of the load was placed. If concrete fails a plastic properties test and is thereby a rejected load but its placement continues after completion of a plastic properties test having a failing result, payment for the concrete will be reduced.

The pay reduction for cast-in-place concrete will be twice the certified invoice price per cubic yard of the quantity of concrete in the rejected load.

The pay reduction for placing a rejected load of concrete into a precast product will be applied to that percentage of the precast product that is composed of the concrete in the rejected load. The percentage will be converted to a reduction factor which is a numerical value greater than zero but not greater than one. The precast product payment reduction will be twice the Contractor's billed price from the Producer for the precast product multiplied by the reduction factor.

If the Engineer authorizes placement of the concrete, even though plastic properties require rejection, there will be no pay reduction based on plastic properties failures; however, any other pay reductions will apply.

SECTION 520
CONCRETE GUTTER, CURB ELEMENTS,
AND TRAFFIC SEPARATOR

520-1 Description.

Construct Portland cement concrete curb. Curb will include concrete curb and gutter, concrete traffic separator, valley gutter, special concrete gutter, curb for sidewalk curb ramps and driveways, and any other types of concrete curb not specified in other Sections.

520-2 Materials.

520-2.1 Concrete: *Use concrete meeting the requirements of Section 347.*

520-2.2 Reinforcement: *For all steel reinforcement required by the Plans, meet the requirements of Section 415.*

520-2.3 Joint Materials: *Meet the requirements of Section 932.*

520-3 Forms.

520-3.1 Form Materials: *Construct forms for this work of either wood or metal. Provide forms that are straight, free from warp or bends, and of sufficient strength, when staked, to resist the pressure of the concrete without deviation from line and grade. For all items constructed on a radius, use flexible forms.*

520-3.2 Depth of Forms: *Ensure that forms have a depth equal to the plan dimensions for the depth of concrete being deposited against them.*

520-3.3 Machine Placement: *The Contractor may place these items by machine methods with the approval of the Engineer provided that the Contractor consistently produces an acceptable finished product, true to line, grade, and cross section.*

520-4 Excavation.

Excavate to the required depth, and compact the foundation material upon which these items are to be placed as specified in 120-9.

520-5 Placing Concrete.

Place the concrete in the forms, and tamp and spade it to prevent honeycombing, and until the top of the structure can be floated smooth and the edges rounded to the radius shown in the Plans.

520-6 Joints.

520-6.1 Contraction Joints: *Except for machine placed items, the Contractor may form joints by using dummy joints (either formed or sawed) or by using sheet metal templates. If using sheet metal templates, ensure that they are of the dimensions, and are set to the lines, shown in the Plans. Hold templates firmly while placing the concrete. Leave templates in place until the concrete has set sufficiently to hold its shape, but remove them while the forms are still in place.*

Saw contraction joints, for machine placed items, unless the Engineer approves an alternate method. Saw the joints as soon as the concrete has hardened to the degree that excessive raveling will not occur and before uncontrolled shrinkage cracking begins. Space contraction joints at intervals of 10 feet except where closure requires a lesser interval, but do not allow any section to be less than 4 feet in length.

520-6.2 Expansion Joints: *Construct expansion joints at all inlets, at all radius points, and at other locations indicated in the Plans. Locate them at intervals of 500 feet between other expansion joints or ends of a run. Ensure that the joint is 1/2 inch in width.*

520-7 Finishing.

520-7.1 Repair of Minor Defects: *Remove the forms within 24 hours after placing the concrete, and then fill minor defects with mortar composed of one part Portland cement and two parts fine aggregate. The Engineer will not allow plastering on the face of the curb. Remove and replace any rejected curb, curb and gutter, or valley gutter without additional compensation.*

520-7.2 Final Finish: *Finish all exposed surfaces while the concrete is still green. In general, the Engineer will only require a brush finish. For any surface areas, however, which are too rough or where other surface defects make additional finishing necessary, the Engineer may require the Contractor to rub the curb to a smooth surface with a soft brick or wood block, using water liberally. Also, if necessary to provide a suitable surface, the Engineer may require the Contractor to rub further, using thin grout or mortar.*

520-7.3 Imprinted Concrete: *Install imprinted concrete as shown in the Plans.*

520-8 Curing.

520-8.1 General: *Continuously cure the concrete for a period of at least 72 hours. Commence curing after completely finishing and as soon as the concrete has hardened sufficiently to permit application of the curing material without marring the surface. Immediately replace any curing material removed or damaged during the 72 hour period.*

After removing the forms, cure the surfaces exposed by placing a berm of moist earth against them or by any of the methods described below, for the remainder of the 72 hour curing period.

520-8.2 Wet Burlap Method: *Place burlap, as specified in 925-1, over the entire exposed surface of the concrete, with sufficient extension beyond each side to ensure complete coverage. Overlap adjacent strips a minimum of 6 inches. Hold the burlap securely in place such that it will be in continuous contact with the concrete at all times, and do not allow any earth between the burlap surfaces at laps or between the burlap and the concrete. Saturate the burlap with water before placing it, and keep it thoroughly wet throughout the curing period.*

520-8.3 Membrane Curing Compound Method: *Apply clear membrane curing compound or white pigmented curing compound, as specified in 925-2, by a hand sprayer meeting the requirements of 350-3.10, in a single coat continuous film at a uniform coverage of at least one gallon per 200 square feet. Immediately recoat any cracks, checks, or other defects appearing in the coating. Thoroughly agitate the curing compound in the drum prior to application, and during application as necessary to prevent settlement of the pigment.*

520-8.4 Polyethylene Sheeting Method: *Place polyethylene sheeting, as specified in 925-3, over the entire exposed surface of the concrete, with sufficient extension beyond each side to ensure complete coverage. Overlap adjacent strips a minimum of 6 inches. Hold the sheeting securely in place and in continuous contact with the concrete at all times.*

520-9 Backfilling and Compaction.

After the concrete has set sufficiently, but not later than three days after pouring, refill the spaces in front and back of the curb to the required elevation with suitable material. Place and thoroughly compact the material in layers not thicker than 6 inches.

520-10 Surface Requirements.

Test the gutter section of curb and gutter with a 10 foot straightedge laid parallel to the centerline of the roadway and while the concrete is still plastic. Perform straightedging along the edge of the gutter adjacent to the pavement or along other lines on the gutter cross-section, as directed by the Engineer. Immediately correct irregularities in excess of 1/4 inch.

520-11 Method of Measurement.

For curb or curb and gutter, the quantity to be paid will be plan quantity, in feet, measured along the face of the completed and accepted curb or curb and gutter. Curb for sidewalk curb ramps or driveways will be paid at the contract unit price for the adjacent curb type.

For valley gutter or shoulder gutter, the quantity to be paid will be plan quantity, in feet, measured along the gutter line of the completed and accepted valley gutter or shoulder gutter.

For concrete traffic separator of constant width, the quantity to be paid will be plan quantity, in feet, measured along the center of its width, completed and accepted, including the length of the nose.

For concrete traffic separator of varying width, the quantity to be paid will be plan quantity, in square yards, completed and accepted.

520-12 Basis of Payment.

520-12.1 Concrete Gutter, Curb Elements, and Traffic Separator: *Price and payment will be full compensation for all work specified in this Section, including removal of existing curb (repair and replacement/relocation operations), reinforcement steel, joint materials and asphalt or 4" limerock curb pad.*

SECTION 570
PERFORMANCE TURF

570-1 Description.

Establish a growing, healthy turf over all areas designated in the Plans. Use sod in areas designated in the Plans to be sodded. Maintain turf areas until final acceptance of all contract work.

570-2 Materials.

Meet the following requirements:

<i>Turf Materials</i>	<i>Section 981</i>
<i>Fertilizer</i>	<i>Section 982</i>
<i>Water.....</i>	<i>Section 983</i>

570-3 Construction Methods.

570-3.1 General: *Incorporate turf installation into the project at the earliest practical time. Shape the areas to be planted to the plan typical sections and lines and grade shown in the Contract Documents.*

Except in areas where the Contract Documents requires specific types of grass to match adjoining private property, any species of grass designated in Section 981 may be used. Use the methods and materials necessary to establish and maintain the initial grassing until acceptance of the Contract work. All of the permanent grassing material shall be in place prior to final acceptance.

Complete all grassing on shoulder areas prior to the placement of the friction course on adjacent pavement unless otherwise directed by the Owner.

570-3.2 Seeding: *At the Contractor's option, wildflower seed may be included in the turf seeding operation or performed separately from the turf seeding.*

Use of compost meeting the requirements of Section 987 as mulch is acceptable unless otherwise specified.

570-3.3 Sod: *Place the sod on the prepared surface, with edges in close contact. Do not use sod which has been cut for more than 48 hours.*

Place the sod to the edge of all landscape areas as shown in the Plans and as shown in the FDOT Design Standards.

Place rolled sod parallel with the roadway and cut any exposed netting even with the sod edge. Monitor placed sod for growth of pest plants and noxious weeds. If pest plants and/or noxious weeds manifest themselves within 30 days of placement of the sod during the months April through October, within 60 days of placement of the sod during the months of November through March treat affected areas by means acceptable to the Owner at no expense to the Owner. If pest plants and/or noxious weeds manifest themselves after the time frames described above from date of placement of sod, the Engineer, at his sole option, will determine if treatment is required and whether or not the Contractor will be compensated for such treatment. If compensation is provided, payment will be made as unforeseeable work. Remove and replace any sod as directed by the Engineer.

570-3.4 Watering: *Water all turf areas as necessary to produce a healthy and vigorous stand of turf. Ensure that water used for turf irrigation meets the requirements of Section 983.*

570-3.5 Fertilizing: *Fertilize as necessary based on soil testing performed in accordance with Section 162. Refer to Section 982 for fertilizer rates.*

For bid purposes, base estimated quantities on an initial application of 265 lbs/acre and one subsequent application of 135 lbs/acre of 16-0-8.

570-4 Turf Establishment.

Perform all work necessary, including watering and fertilizing, to sustain an established turf until final acceptance, at no additional expense to the Owner. Provide the filling, leveling, and repairing of any washed or eroded areas, as may be necessary.

Established turf is defined as follows:

- 1. An established root system (leaf blades break before seedlings or sod can be pulled from the soil by hand).*
- 2. No bare spots larger than one square foot.*
- 3. No continuous streaks running perpendicular to the face of the slope.*
- 4. No bare areas comprising more than 1% of any given 1,000 square foot area.*
- 5. No deformation of the turf areas caused by mowing or other Contractor equipment.*
- 6. No exposed sod netting.*
- 7. No pests or noxious weeds. Monitor turf areas and remove all competing vegetation, pest plants, and noxious weeds (as listed by the Florida Exotic Pest Plant Council, Category I "List of Invasive Species", Current Edition, <http://www.fleppc.org>). Remove such vegetation regularly by manual, mechanical, or chemical control means, as necessary. When selecting herbicides, pay particular attention to ensure use of chemicals that will not harm desired turf or wildflower species.*

If at the time that all other work on the project is completed, but all turf areas have not met the requirements for established turf set forth in 570-4, continuously maintain all turf areas until the requirements for established turf set forth in 570-4 have been met.

During the entire establishment period and until turf is established in accordance with this specification, continue inspection and maintenance of erosion and sedimentation control items in accordance with Section 104. Take responsibility for the proper removal and disposal of all erosion and sedimentation control items after turf has been established.

Notify the Engineer, with a minimum of seven calendar days advance notice, to conduct inspections of the turf at approximate 90-day intervals during the establishment period to determine establishment. Results of such inspections will be made available to the Contractor within seven calendar days of the date of inspection. Determination of an established turf will be based on the entire project and not in sections.

Upon the determination by the Engineer that the requirements of 570-4 have been met and an established turf has been achieved and all erosion and sedimentation control items have been removed, the Engineer will release the Contractor from any further responsibility provided for in this Specification.

The Contractor's establishment obligations of this specification will not apply to deficiencies due to the following factors, if found by the Engineer to be beyond the control of the Contractor, his subcontractors, vendors or suppliers:

- a. Determination that the deficiency was due to the failure of other features of the Contract.*
- b. Determination that the deficiency was the responsibility of a third party performing work not included in the Contract or its actions.*

570-5 Responsible Party.

For the purposes of this Specification, the Contractor shall be the responsible party throughout construction and establishment periods.

Upon final acceptance of the Contract, the Contractor's responsibility for maintenance of all the work or facilities within the project limits of the Contract will terminate; with the sole exception that the facilities damaged due to lack of established turf and the obligations set forth in this Specification for performance turf shall continue thereafter to be responsibility of the Contractor as otherwise provided in this Section.

570-6 Method of Measurement.

The quantities to be paid for will be plan quantity in square yards based on the area shown in the Plans, completed and accepted.

570-7 Basis of Payment.

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

SECTION 580 LANDSCAPE INSTALLATION

580-1 Description.

Plant trees and shrubs of the species, size, and quality indicated in the plans.

The Engineer reserves the right to adjust the number and location of any of the designated types and species to be used at any of the locations shown, in order to provide for any unanticipated effects which might become apparent after the substantial completion of other phases of the project, or for other causes.

580-2 Materials.

580-2.1 Plants:

580-2.1.1 Authority for Nomenclature; Species, etc.: For the designated authority in the identification of all plant material, refer to two publications of L.H. Bailey: "Hortus III" and "Manual of Cultivated Plants," and ensure that all specimens are true to type, name, etc., as described therein. For the standard nomenclature, refer to the publication of the American Joint Committee on Horticultural Nomenclature, "Standardized Plant Names."

580-2.1.2 Grade Standards and Conformity with Type and Species: Only use nursery grown plant material except where specified as Collected Material. Use nursery grown plant material that complies with all required inspection, grading standards, and plant regulations in accordance with the latest edition of the Florida Department of Agriculture's "Grades and Standards for Nursery Plants".

Except where a lesser grade might be specifically specified in the plans, ensure that the minimum grade for all trees and shrubs is Florida No. 1. Ensure that all plants are the proper size and grade at the time of delivery to the site, throughout the project construction period and during the plant establishment period.

Ensure that plant materials are true to type and species and that any plant materials not specifically covered in Florida Department of Agriculture's "Grades and Standards for Nursery Plants" conform in type and species with the standards and designations in general acceptance by Florida nurseries.

Ensure that plant materials are shipped with tags stating the botanical and common name of the plant.

580-2.1.3 Inspection and Transporting: Move nursery stock in accordance with all Federal and State regulations therefor, and accompany each shipment with the required inspection certificates for filing with the Engineer.

580-2.2 Water: Meet the requirements of Section 983.

580-3 Specific Requirements for the Various Plant Designations.

580-3.1 Balled-and-Burlapped Plants (B&B), and Wired Balled-and-Burlapped (WB & B):

580-3.1.1 General: Properly protect the root ball of these plants until planting them. The Engineer may reject any plant which shows evidence of having been mishandled.

Set the B&B and WB&B plants then remove the top 2/3 of all wire, rope, and binding surrounding the plant. Remove the burlap from the top 4 inches [100 mm] of the root ball. Do not disturb the root ball in any way. Bare root material is not allowed for substitution.

At least 90 days before digging out B & B and WB & B plants, root-prune those 1½ inches [38 mm] or greater in diameter and certify such fact on accompanying invoices.

580-3.1.2 Provisions for Wiring: For plants grown in soil of a loose texture, which does not readily adhere to the root system (and especially in the case of large plants or trees), the Engineer may require WB & B plants. For WB & B plants, before removing the plant from the excavated hole, place sound hog wire around the burlapped ball, and loop and tension it until the tightened wire netting

substantially packages the burlapped ball such as to prevent disturbing of the loose soil around the roots during handling.

580-3.2 Container-Grown Plants (CG): The Engineer will not accept any CG plants with roots which have become pot-bound or for which the top system is too large for the size of the container. Fully cut and open all containers in a manner that will not damage the root system. Do not remove CG plants from the container until immediately before planting to prevent damage to the root system.

580-3.3 Collected Plants (Trees and Shrubs) (C): Use C plants which have a root ball according to "Florida Grades and Standards for Nursery Plants". Do not plant any C plant before the Engineer's inspection and acceptance at the planting site.

580-3.4 Collected Plants (Herbaceous) (HC): The root mass and vegetative portions of collected herbaceous plants shall be as large as the specified container-grown equivalent. Do not plant any collected plant before inspection and acceptance by the Engineer.

580-3.5 Specimen Plants (Special Grade): When Specimen (or Special Grade) plants are required, label them as such on the plant list, and tag the plant to be furnished.

580-3.6 Palms: Wrap the roots of all plants of the palm species before transporting, except if they are CG plants and ensure that they have an adequate root ball structure and mass for healthy transplantation as defined in "Florida Grades and Standards for Nursery Plants".

The Engineer will not require burlapping if the palm is carefully dug from marl or heavy soil that adheres to the roots and retains its shape without crumbling. During transporting and after arrival, carefully protect root balls of palms from wind and exposure to the sun. Muck grown palms are not allowed. After delivery to the job site, if not planting the palm within 24 hours, cover the root ball with a moist material. Plant all palms within 48 hours of delivery to the site.

Move sabal and coconut palms in accordance with the "Florida Grades and Standards for Nursery Plants."

580-3.7 Substitution of Container-Grown (CG) Plants: With the Engineer's approval, the Contractor may substitute CG plants for any other root classification types, if he has met all other requirements of the Contract Documents.

580-4 Planting Requirements.

580-4.1 Layout: Prior to any excavation or planting, mark all planting beds and individual locations of palms, trees, large shrubs and proposed art and architectural structures, as shown in the plans, on the ground with a common bright orange colored spray paint, or with other approved methods, within the project limits. Obtain the Engineer's approval and make necessary utility clearance requests.

580-4.2 Excavation of Plant Holes: Excavate plant holes after an area around the plant three times the size of the root ball has been tilled to a depth of the root ball. Ensure that the plant hole is made in the center of the tilled area only to the depth of the plant root ball.

Where excess material has been excavated from the plant hole, use the excavated material to backfill to proper level.

580-4.3 Setting of Plants: Center plants in the hole. Lower the plant into the hole so that it rests on a prepared hole bottom such that the roots are level with, or slightly above, the level of their previous growth and so oriented such as to present the best appearance.

Backfill with native soil, unless otherwise specified on the plans. Firmly rod and water-in the backfill so that no air pockets remain. Apply a sufficient quantity of water immediately upon planting to thoroughly moisten all of the backfilled earth. Keep plants in a moistened condition for the duration of the planting period.

When so directed, form a water ring 6 inches [150 mm] in width to make a water collecting basin with an inside diameter equal to the diameter of the excavated hole. Maintain the water ring in an acceptable condition.

580-4.4 Special Bed Preparation: Where multiple or mass plantings are to be made in extended bedding areas, and the plans specify Special Bed Preparation, prepare the planting beds as follows:

Remove all vegetation from within the area of the planting bed and excavate the surface soil to a depth of 6 inches [150 mm]. Backfill the excavated area with peat, sand, finish soil layer material or other material to the elevation of the original surface. Till the entire area to provide a loose, friable mixture to a depth of at least 8 inches [200 mm]. Level the bed only slightly above the adjacent ground level. Then mulch the entire bedding area, in accordance with 580-8.

580-5 Staking and Guying.

580-5.1 General: When specified in the plans, or as directed by the Engineer, stake plants in accordance with the following.

Use wide plastic, rubber or other flexible strapping materials to support the tree to stakes or ground anchors that will give as the tree moves in any direction up to 30 degrees. Do not use rope or wire through a hose. Use guy chords, hose or any other thin bracing or anchorage material which has a minimum 12 inches [300 mm] length of high visibility flagging tape secured to guys, midway between the tree and stakes for safety.

Stake trees larger than 1 inch [25 mm] diameter and smaller than 2 inches [50 mm] diameter with a 2 by 2 inch [50 by 50 mm] stake, set at least 2 feet [0.6 m] in the ground and extending to the crown of the plant. Firmly fasten the plant to the stake with flexible strapping materials as noted above.

580-5.2 Trees of 2 to 3 1/2 inches [50 to 90 mm] Caliper: Stake all trees, other than palm trees, larger than 2 inches [50 mm] caliper and smaller than 3 1/2 inches [90 mm] caliper with two 2 by 4 inch [50 by 100 mm] stakes, 8 feet [2.4 m] long, set 2 feet [0.6 m] in the ground. Place the tree midway between the stakes and hold it firmly in place by flexible strapping materials as noted above.

580-5.3 Large Trees: Guy all trees, other than palm trees, larger than 3 1/2 inches [90 mm] caliper, from at least three points, with flexible strapping materials as noted above.

Anchor flexible strapping to 2 by 4 by 24 inch [50 by 100 by 600 mm] stakes, driven into the ground such that the top of the stake is at least 3 inches [75 mm] below the finished ground.

580-5.4 Special Requirements for Palm Trees: Brace palms which are to be staked with three 2 by 4 inch [50 by 100 mm] wood braces, toe-nailed to cleats which are securely banded at two points to the palm, at a point one third the height of the trunk. Pad the trunk with five layers of burlap under the cleats. Place braces approximately 120 degrees apart and secure them underground by 2 by 4 by 12 inch [50 by 100 by 300 mm] stake pads.

580-6 Tree Protection and Root Barriers.

Install tree barricades when called for in the Contract Documents or by the Engineer to protect existing trees from damage during project construction. Place barricades at the drip line of the tree foliage or as far from the base of the tree trunk as possible. Barricades shall be able to withstand bumps by heavy equipment and trucks. Maintain barricades in good condition.

When called for in the Contract Documents, install root barriers or fabrics in accordance with the details shown.

580-7 Pruning.

Prune all broken or damaged roots and limbs in accordance with established arboriculture practices. When pruning is completed ensure that all remaining wood is alive. Do not reduce the size or quality of the plant below the minimum specified.

580-8 Mulching.

Uniformly apply mulch material, consisting of wood chips (no Cypress Mulch is allowed), pine straw, compost, or other suitable material approved by the Engineer, to a minimum loose thickness of 2 inches over the entire area of the backfilled hole or bed within two days after the planting.

Compost used for mulch shall meet the requirements of Section 987. Maintain the mulch continuously in place until the time of final inspection.

580-9 Disposal of Surplus Materials and Debris.

Dispose of surplus excavated material from plant holes by scattering or otherwise as might be directed so that it is not readily visible or conspicuous to the passing motorist or pedestrian. Remove all debris and other objectionable material from the site and clean up the entire area and leave it in neat condition.

580-10 Contractor's Responsibility for Condition of the Plantings.

Ensure that the plants are kept watered, that the staking and guying is kept adjusted as necessary, that all planting areas and beds are kept free of weeds and undesirable plant growth and that the plants are maintained so that they are healthy, vigorous, and undamaged at the time of acceptance.

580-11 Plant Establishment Period and Contractor's Warranty.

Assume responsibility for the proper maintenance, survival and condition of all landscape items for a period of one year after the final acceptance of all work under the Contract in accordance with 5-11. Provide a Warranty/Maintenance Bond to the Department in the amount of the total sums bid for all landscape items as evidence of warranty during this plant establishment period. The costs of the bond will not be paid separately, but will be included in the costs of other bid items.

In addition to satisfying the provisions of Section 287.0935, Florida Statutes, the bonding company is required to have a A.M. Best rating of "A" or better. If the bonding company drops below the "A" rating during the one year Warranty/Maintenance Bond period, provide a new Warranty/Maintenance Bond for the balance of the one year period from a bonding company with an "A" or better rating. In such event, all costs of the premium for the new Warranty/Maintenance Bond shall be at the Contractor's expense.

Take responsibility to apply water as necessary during this period and include the cost in the various landscape items. No separate measurement or payment will be made for water during the plant establishment period.

The Engineer will conduct interim inspections of all landscape items 90 days, 180 days and 270 days into the plant establishment period, as well as at the end of the plant establishment period. As part of the warranty to the Department, and at no cost to the Department, immediately replace all landscape items found not to meet minimum specifications as shown in 580-2.1.2 after each inspection.

At the end of the one year warranty period, the Engineer will release the Contractor from further warranty work and responsibility, provided all landscape items are established and all previous warranty and remedial work, if any, has been completed.

580-12 Method of Measurement.

The quantities to be paid for will be the items shown in the plans, completed and accepted.

580-13 Basis of Payment.

Prices and payments will be full compensation for all work specified in this Section, including furnishing and planting the designated plant types, the furnishing and placing of the plant backfill, fertilizer and mulch, (except where such are shown to be paid for under a separate item), the application of water, the maintenance, care, etc., and all costs of any required replacing of plantings or restoring of damaged areas.

SECTION 700 ROADWAY SIGNING

700-1 General Requirements.

700-1.1 Description: *Furnish and erect roadway signs at the locations shown in the Plans and in accordance with the Broward County details shown in the Plans.*

The Owner designates ground traffic signs as signs erected on the shoulders, slopes, or medians, but not extending over the traveled roadway, and may further classify these signs as single post or multi-column.

Meet the requirements of Section 603.

700-1.2 Materials:

700-1.2.1 General: *Meet the materials requirements shown in the Specifications and FDOT Design Standards and any other requirements identified in the Plans.*

700-1.2.2 Concrete: *Use concrete meeting the requirements of Section 346.*

700-1.2.3 Static Sign Assembly Requirements: *All sign panels shall be aluminum unless otherwise shown in the Plans. Sheets and plates for sign panels shall meet the requirements of ASTM B209, Aluminum Association Alloy 6061-T6, 5154-H38 or 5052-H38. Sign panels for single column ground mounted signs shall utilize aluminum plate with a minimum thickness of 0.08 inches. All other sign panels shall utilize aluminum plate with a minimum thickness of 0.125 inches. All panels shall have rounded corners.*

700-1.2.4 Retroreflective Sign Sheeting: *Use signs that meet the material and process requirements of Section 994.*

Use Type XI sheeting for all regulatory, warning and overhead signs. The R1-1, R1-2, R5-1 and R5-1a signs must use a sheeting system that includes a colorless film overlay. Type XI sheeting shall also be used for all limited access advance exit and exit guide signs.

Use Type IV yellow-green fluorescent sheeting for school S1-1, S3-1, S4-3, S4-5 and supplemental panels used with S1-1 signs. Do not mix signs having fluorescent yellow-green sheeting with signs having yellow retroreflective sheeting.

Roll-up signs shall meet the requirements of Type VI sheeting. Use Type IV sheeting for all other signs.

700-1.3 Storage, Handling and Labeling: *If signs are stored prior to installation, store them in accordance with the manufacturer's recommendations. Properly package signs to protect them during storage, shipment and handling to prevent damage to the sign face and panel.*

In addition to the information required in Section 994, all permanent roadway signs must be labeled on the back bottom edge with the date of installation. Make the labels unobtrusive, but legible enough to be easily read by an observer on the ground when the sign is in its final position. Apply the label in a manner that is at least as durable as the sign face.

700-1.4 Acceptance of Signs:

700-1.4.1 Sign Inspection: *Provide certification that the sign assembly meets the material and installation requirements of the Contract. The Engineer will inspect the signs upon delivery to the storage or project site and again at the final construction inspection. Repair and replace signs deemed unacceptable by the Engineer at no expense to the Owner.*

700-1.4.2 Imperfections and Repairs: *Repair or replace signs containing imperfections or damage regardless of the kind, type, or cause of the imperfections or damage.*

For sign panels exceeding 30 square feet, the Contractor may make one patch, if necessary, to each sign panel to exceed two square inches. Make repairs according to the manufacturer's recommendations and to the satisfaction of the Engineer. Ensure that completed repairs provide a level of quality necessary to maintain the service life of the sign and are satisfactory in appearance to the Engineer.

700-2 Static Signs.

700-2.1 Ground Mounted Signs: *Ground mounted signs consist of both single column and multi-column static signs.*

700-2.1.1 Materials: *Use "Square Tube Sign Post" materials meeting the general provisions of the Broward County Public Works Department – Traffic Engineering Division.*

700-2.1.2 Fabrication of Panel Messages: *Fabricate standard sign panel messages in accordance with details included in the Standard Highway Signs (SHS) manual published by the U.S. Department of Transportation. Submit shop drawings to the Engineer for approval.*

700-2.1.3 Foundation: *Construct foundations in accordance with the applicable standards from the Broward County Public Works Department – Traffic Engineering Division.*

700-2.1.4 Breakaway Support Mechanisms for Ground Traffic Signs:

700-2.1.4.1 Frangible Supports: *Provide support posts for all frangible sign assemblies consisting of "Square Tube" in accordance with the requirements of the Broward County Public Works Department – Traffic Engineering Division.*

700-2.1.4.2 Slip Bases: *All slip bases must be fabricated in accordance with the requirements of the Broward County Public Works Department – Traffic Engineering Division.*

700-2.1.5 Installation: *Verify the length of the column supports in the field prior to fabrication to permit the appropriate sign mounting height. Fabricate the supports and wind beams in accordance with the applicable standards from the Broward County Public Works Department – Traffic Engineering Division. Columns must be plumb and panels must be level with the proper orientation.*

700-2.2.5 Shop Drawings: *Submit shop drawings to the Owner for approval. Prior to the submittal of the shop drawings, determine the actual in- place dimensions for all sign structures on the basis of existing field conditions and include these on the shop drawings.*

700-2.3 Method of Measurement: *For single post and multi post sign assemblies, an assembly consists of all the signs mounted on a single structure. The Contract unit price per assembly for ground mounted signs (single post and multi-post), furnished and installed, will include furnishing the sign panels, support structure, foundation, hardware, and labor necessary for a complete and accepted installation.*

Relocation of signs will consist of removing the existing sign assembly and installing the sign on a new foundation at the location shown in the Plans. When the Plans call for existing ground-mounted signs to be relocated or removed, after removing the sign panel from the assembly, remove supports and footings. Restore the area of the sign removal or relocation to the condition of the adjacent area.

700-2.4 Basis of Payment: *Price and payment will be full compensation for all work specified in this Section.*

SECTION 706
RAISED RETROREFLECTIVE PAVEMENT
MARKERS AND BITUMINOUS ADHESIVE

706-1 Description.

Place raised retroreflective pavement markers (RPMs) and adhesive, which upon installation produces a positive guidance system to supplement other reflective pavement markings.

706-2 Materials.

Use only Class B markers unless otherwise shown in the Plans. Meet the requirements of Section 970.

706-2.1 Product Acceptance on the Project. *Use only reflective pavement markers and bituminous adhesive that are listed on the FDOT's Approved Product List (APL).*

Provide to the Engineer a manufacturer's certification conforming to the requirements of Section 6, which confirms that each product meets the requirements of this Section.

706-3 Equipment.

Use equipment having either thermostatically controlled double boiler type units utilizing heat transfer oil or thermostatically controlled electric heating pots to install hot applied bituminous adhesive. Do not use direct flame melting units with flexible adhesives; however, this type of unit may be used with standard adhesive in accordance with manufacturer's recommendations. Use a melter/applicator unit suited for both melting and pumping the adhesive through heated applicator hoses.

Heat the adhesive to between 375°F and 425°F and apply directly to the bonding surface from the melter/applicator by either pumping or pouring. Maintain the application temperature between 375°F and 425°F. The adhesive may be reheated. However, do not exceed the manufacturer's recommendations for pot life at application temperatures.

706-4 Application.

Apply RPMs to the bonding surface using bituminous adhesives only. The Engineer will conduct field testing in accordance with FM 5-566. Correct RPMs not applied in accordance with these requirements at no cost to the Owner.

Prior to application of adhesive, clean the portion of the bonding surface of any material which would adversely affect the adhesive.

Apply the adhesive to the bonding surface (not the marker) so that 100% of the bonding area of the marker will be covered, in accordance with adhesive manufacturer's recommendations. Apply sufficient adhesive to ensure, that when the marker is pressed downward into the adhesive, adhesive will be forced out around the entire perimeter of the marker.

Immediately remove excess adhesive from the bonding surface and exposed surfaces of the RPMs. Soft rags moistened with mineral spirits meeting Federal Specifications TT-T-291 or kerosene may be used to remove adhesive from exposed faces of the RPMs. Do not use any other solvent. If any adhesive, pavement marking materials or other foreign matter adheres to the reflective face of the marker, replace the marker at no cost to the Owner.

Install RPMs with the reflective face of the RPM perpendicular to a line parallel to the roadway centerline.

Ensure that all final RPMs are in place prior to opening the road to traffic. If more than 2% of the RPMs fail in adhesion or alignment within the first 45 days under traffic, replace all failed markers at no expense to the Owner. If more than 5% of the markers fail in adhesion and or alignment during the initial 45 day period, the Engineer will extend the replacement period an additional 45 days from the date that all replacement markers have been installed. If, at the end of the additional 45 day period, more than 2% of all markers (initial installation and 45 day replacements combined) fail in adhesion or alignment, replace all failed markers at no expense to the Owner.

706-5 Contractor's Responsibility for Notification.

Notify the Engineer prior to the placement of RPMs. At the time of notification, indicate the manufacturer and the LOT numbers of RPMs and bituminous adhesive that are intended for use. Verify that the approved LOT numbers appear on the material packages. Furnish a test report to the Engineer certifying that the materials meet all requirements specified.

706-6 Method of Measurement.

The quantities to be paid for will be the number of RPMs, furnished and installed, completed and accepted.

706-7 Basis of Payment.

706-7.1 General: *Price and payment will be full compensation for all work specified in this Section.*

706-7.2 Unit Payment: *Price and payment for retroreflective pavement markers will be for number of RPMs furnished and installed, completed and accepted.*

**SECTION 710
PAINTED PAVEMENT MARKINGS**

710-1 Description.

Apply Painted Traffic Stripes and Markings, in accordance with the Contract Documents.

710-2 Materials.

Use only materials listed on the FDOT's Approved Product List (APL) meeting the following requirements:

*Raised Retroreflective Pavement Markers and Bituminous Adhesive
.....Section 970*

*Standard Waterborne Fast Dry Traffic Paint
..... 971-1 and 971-3*

Fast Dry Solvent Paint 971-1 and 971-4

Glass Spheres 971-1 and 971-2

The Engineer will take random samples of all material in accordance with the Owner's Sampling, Testing and Reporting Guide schedule.

710-3 Equipment.

Use equipment that will produce continuous uniform dimensions of pavement markings of varying widths and meet the following requirements:

(a) Capable of traveling at a uniform, predetermined rate of speed, both uphill and downhill, in order to produce a uniform application of paint and capable of following straight lines and making normal curves in a true arc.

(b) Capable of applying glass spheres to the surface of the completed stripe by an automatic sphere dispenser attached to the striping machine such that the glass spheres are dispensed closely behind the installed line. Use a glass spheres dispenser equipped with an automatic cut-off control that is synchronized with the cut-off of the traffic paint and applies the glass spheres in a manner such that the spheres appear uniform on the entire pavement markings surface with, 50 to 60% embedment.

(c) Capable of spraying the paint to the required thickness and width without thinning of the paint. Equip the paint tank with nozzles equipped with cut-off valves, which will apply broken or skip lines automatically.

710-4 Application:

710-4.1 General: *Remove existing pavement markings, such that scars or traces of removed markings will not conflict with new pavement markings, by a method approved by the Engineer. Payment for marking removal will be in accordance with 102-5.8.*

Before applying traffic stripes and markings, remove any material by a method approved by the Engineer that would adversely affect the bond of the traffic stripes.

Apply traffic stripes and markings only to dry surfaces, and when the ambient air and surface temperature is at least 40°F and rising. Do not apply traffic stripes and markings when winds are sufficient to cause spray dust.

Apply traffic stripes and markings, having well defined edges, over existing pavement markings such that not more than 2 inches on either end and not more than 1 inch on either side is visible. When stencils are used to apply symbols and messages, the areas covered by the stencil reinforcing will not be required to be painted.

Mix the paint thoroughly prior to pouring into the painting machine. Apply paint to the pavement by spray or other means approved by the Engineer.

Conduct field testing in accordance with FM 5-541. Remove and replace traffic stripes and markings not meeting the requirements of this Section at no additional cost to the Owner.

Apply all pavement markings prior to opening the road to traffic.

710-4.1.1 Final Surface: *Painted pavement markings (final surface) will include two applications of standard painted pavement markings and one application of retroreflective pavement markers applied to the final surface. Wait at least 14 days after the first application to apply the second application of painted pavement markings (final surface). Second application must be applied prior to final acceptance of the project.*

Apply all retroreflective pavement markers per the requirements of Section 706.

710-4.2 Thickness: *Apply paint to attain a minimum wet film thickness in accordance with the manufacturer's recommendations.*

710-4.3 Retroreflectivity: *Apply white and yellow standard pavement markings that will attain an initial retroreflectance of not less than 300 mcd/lx·m² and not less than 250 mcd/lx·m², respectively. Measure, record and certify and submit to the Engineer, the retroreflectivity of white and yellow pavement markings in accordance with FM 5- 541.*

The Owner reserves the right to test the markings within 3 days of receipt of the Contractor's certification. Failure to afford the Owner opportunity to test the markings will result in non-payment. The test readings should be representative of the Contractor's striping performance. If the retroreflectivity values measure below values shown above, reapply the striping at no additional cost to the Owner.

For standard pavement markings, ensure that the minimum retroreflectance of white and yellow pavement markings are not less than 150 mcd/lx m². If the retroreflectivity values fall below the 150 mcd/lx m² value within six months of initial application, the striping will be reapplied at the Contractor's expense.

710-4.4 Color: *Use paint material that meets the requirements of 971-1.*

710-4.5 Glass Spheres: *Apply glass spheres on all pavement markings immediately and uniformly following the paint application. The rate of application shall be based on the manufacturer's recommendation.*

710-5 Tolerances in Dimensions and in Alignment.

Establish tack points at appropriate intervals for use in aligning stripes, and set a stringline from such points to achieve accuracy.

710-5.1 Dimensions:

710-5.1.1 Longitudinal Lines: *Apply painted skip line segments with no more than plus or minus 12 inches variance, so that over-tolerance and under-tolerance lengths between skip line and the gap will approximately balance. Apply longitudinal lines at least 2 inches from construction joints of Portland cement concrete pavement.*

710-5.1.2 Transverse Markings, Gore Markings, Arrows, and Messages: *Apply paint in multiple passes when the marking cannot be completed in one pass, with an overall line width allowable tolerance of plus or minus 1 inch.*

710-5.1.3 Contrast Lines: *Use black paint to provide contrast on concrete or light asphalt pavement, when specified by the Engineer. Apply black paint in 10 foot segments following each longitudinal skip line.*

710-5.2 Alignment: *Apply painted stripes that will not deviate more than 1 inch from the stringline on tangents and curves one degree or less. Apply painted stripes that will not deviate more than 2 inches from the stringline on curves greater than one degree. Apply painted edge*

stripes uniformly, not less than 2 inches or more than 4 inches from the edge of pavement, without noticeable breaks or deviations in alignment or width.

Remove and replace at no additional cost to the Owner, traffic stripes that deviate more than the above stated requirements.

710-5.3 Correction Rates: *Make corrections of variations in width at a maximum rate of 10 feet for each 0.5 inches of correction. Make corrections of variations in alignment at a maximum rate of 25 feet for each 1 inch of correction, to return to the stringline.*

710-6 Contractor's Responsibility for Notification.

Notify the Engineer prior to the placement of the materials. Furnish the Engineer with the manufacturer's name and batch numbers of the materials and glass spheres to be used. Ensure that the approved batch numbers appear on the materials and glass spheres packages.

710-7 Protection of Newly Painted Pavement Markings.

Do not allow traffic onto or permit vehicles to cross newly applied pavement markings until they are sufficiently dry. Remove and replace any portion of the pavement markings damaged by passing traffic or from any other cause, at no additional cost to the Owner.

710-8 Corrections for Deficiencies to Applied Painted Pavement Markings.

Reapply a 1.0 mile section centered on any deficiency, at no additional cost to the Owner.

710-9 Submittals.

710-9.1 Submittal Instructions: *Prepare a certification of quantities, using the Owner's current approved form, for each project in the Contract. Submit the certification of quantities and daily worksheets to the Engineer. The Owner will not pay for any disputed items until the Engineer approves the certification of quantities.*

710-10 Method of Measurement.

The quantities to be paid for under this Section will be as follows:

(a) The length, in net miles, of 6 inch solid traffic stripe, authorized and acceptably applied.

(b) The total traversed distance in gross miles of 10-30 or 3-9 skip line. The actual applied line is 25% of the traverse distance for a 1:3 ratio. This equates to 1,320 feet of marking per mile of single line.

(c) The net length, in feet, of each of all other types of lines and stripes, authorized and acceptably applied.

(d) The number of pavement messages, symbols and directional arrows, authorized and acceptably applied.

(e) Lump Sum, as specified in 710-4.1.1 when the item for painted pavement markings (final surface) is included in the proposal.

The net length, in feet of dotted and skip stripes other than 10-30 and 3-9 will be measured as the distance from the beginning of the first painted stripe to the end of the last painted stripe with proper deductions made for unpainted intervals as determined by plan dimensions or stations, subject to 9-1.3. Unpainted intervals will not be included in pay quantity.

The gross-mile measurement of 10-30 and 3-9 skip traffic stripes will be taken as the distance from the beginning of the first painted stripe to the end of the last painted stripe, and will include the unpainted intervals. It will not include any lengths of unpainted intervals which, by design or by other intent of the Owner, are greater than 30 feet. Final measurement will be determined by plan dimensions or stations, subject to 9-1.3.1.

710-11 Basis of Payment.

710-11.1 General: *Prices and payments will be full compensation for all work specified in this Section, including, all cleaning and preparing of surfaces, furnishing of all materials, application, curing and protection of all items, protection of traffic, furnishing of all tools, machines and equipment, and all incidentals necessary to complete the work. Final payment will be withheld until all deficiencies are corrected.*

710-11.2 Painted Pavement Markings: *When the item for painted pavement markings (final surface) is included in the proposal, prices and payments will be full compensation for two applications of all painted pavement markings applied to the final surface, and one application of retroreflective pavement markers applied to the final surface in accordance with Section 706.*

SECTION 711 THERMOPLASTIC TRAFFIC STRIPES AND MARKINGS

711-1 Description.

Apply new thermoplastic traffic stripes and markings, or refurbish existing thermoplastic traffic stripes and markings, in accordance with the Contract Documents.

711-2 Materials.

711-2.1 Thermoplastic: Use only thermoplastic materials listed on the FDOT's Approved Product List (APL). The Engineer will take random samples of all material in accordance with the Owner's Sampling, Testing and Reporting Guide schedule.

711-2.1.1 Initial or Recapped Stripes and Markings: Use materials meeting the requirements of 971-1 and 971-5.

711-2.1.2 Refurbishing Existing Stripes and Markings: Use materials meeting the requirements of 971-1 and 971-5.

711-2.1.3 Preformed Stripes and Markings: Use Materials meeting the requirements of 971-1 and 971-6.

711-2.2 Glass Spheres: Use only glass spheres listed on the APL, meeting the requirements of 971-1 and 971-2. The Engineer will take random samples of all glass spheres in accordance with ASTM D1214 and the Owner's Sampling, Testing and Reporting Guide schedule.

711-2.3 Sand: Use materials meeting the requirements of 971-5.4.

711-3 Equipment.

Use equipment capable of providing continuous uniform heating of striping materials to temperatures exceeding 390°F, mixing and agitation of the material reservoir to provide a homogeneous mixture without segregation. Use equipment that will maintain the striping material in a plastic state, in all mixing and conveying parts, including the line dispensing device until applied. Use equipment which can produce varying width traffic stripes and which meets the following requirements:

(a) capable of traveling at a uniform, predetermined rate of speed, both uphill and downhill, in order to produce a uniform application of striping material and capable of following straight lines and making normal curves in a true arc.

(b) is capable of applying glass spheres to the surface of the completed stripe by a double drop application for initial traffic striping and marking and a single drop application for recapping and refurbishing. The bead dispenser for the first bead drop shall be attached to the striping machine in such a manner that the beads are dispensed closely behind with the thermoplastic material. The second bead dispenser bead shall be attached to the striping machine in such a manner that the beads are dispensed immediately after the first bead drop application. Glass spheres dispensers shall be equipped with an automatic cut-off control that is synchronized with the cut-off of the thermoplastic material and applies the glass spheres in a manner such that the spheres appear uniform on the entire traffic stripes and markings surface with, 50 to 60% embedment.

(c) Equipped with a special kettle for uniformly heating and melting the striping material. The kettle must be equipped with an automatic temperature control device and material thermometer for positive temperature control and to prevent overheating or scorching

of the thermoplastic material.

(d) Meet the requirements of the National Fire Protection Association, state, and local authorities.

711-4 Application.

711-4.1 General: *Remove existing pavement markings such that scars or traces of removed markings will not conflict with new stripes and markings by a method approved by the Engineer. Cost for removing conflicting pavement markings during maintenance of traffic operations to be included in Maintenance of Traffic, Lump Sum.*

Before applying traffic stripes and markings, remove any material by a method approved by the Engineer that would adversely affect the bond of the traffic stripes. Before applying traffic stripes to any Portland cement concrete surface, apply a primer, sealer or surface preparation adhesive of the type recommended by the manufacturer. Offset longitudinal lines at least 2 inches from any longitudinal joints of Portland cement concrete pavement.

Apply traffic stripes or markings only to dry surfaces, and when the ambient air and surface temperature is at least 50°F and rising for asphalt surfaces and 60°F and rising for concrete surfaces.

Apply striping to the same tolerances in dimensions and in alignment specified in 710-5. When applying traffic stripes and markings over existing markings, ensure that no more than 2 inches on either end and not more than 1 inch on either side of the existing line is visible.

Apply thermoplastic material to the pavement either by spray, extrusion or other means approved by the Engineer.

Conduct field tests in accordance with FM 5-541. Take test readings representative of the striping performance. Remove and replace traffic stripes and markings not meeting the requirements of this Section at no additional cost to the Owner.

Apply all final pavement markings prior to opening the road to traffic.

711-4.1.1 Preformed Thermoplastic: *Apply markings only to dry surfaces and when ambient air temperature is at least 32°F. Prior to installation, follow the manufacturer's recommendations for pre-heating.*

711-4.2 Thickness:

711-4.2.1 Initial or Recapped Stripes and Markings: *Apply or recap traffic stripes or markings such that all lane lines, center lines, transverse markings and traffic stripes and markings within traffic wearing areas, will have a thickness of 0.10 to 0.15 inch when measured above the pavement surface.*

Also, all gore, island, and diagonal stripe markings, bike lane symbols and messages, wherever located, will have a thickness of 0.09 to 0.12 inch when measured above the pavement surface.

Measure, record and certify and submit to the Engineer, the thickness of white and yellow pavement markings in accordance with FM 5-541.

The Engineer will verify the thickness of the pavement markings in accordance with FM 5-541 within 30 days of receipt of the Contractor's certification.

711-4.2.2 Refurbishing Existing Traffic Stripes and Markings: *Apply a minimum of 0.06 inch of thermoplastic material. Ensure that the combination of the existing stripe and the overlay after application of glass spheres does not exceed the maximum*

thickness of 0.150 inch for all lines. Measure, record and certify and submit to the Engineer, the thickness of white and yellow pavement markings in accordance with FM 5-541.

The Engineer will verify the thickness of the pavement markings in accordance with FM 5-541 within 30 days of receipt of the Contractor's certification.

711-4.3 Retroreflectivity: *Apply white and yellow traffic stripes and markings that will attain an initial retroreflectivity of not less than 450 mcd/lx·m² and not less than 350 mcd/lx·m², respectively for all longitudinal lines. All transverse lines, messages and arrows will attain an initial retroreflectivity of not less than 300 mcd/lx·m² and 250 mcd/lx·m² for white and yellow respectively. All pedestrian crosswalks, bike lane symbols or messages in a proposed bike lane shall attain an initial retroreflectivity of not less than 275 mcd/lx·m².*

Measure, record and certify and submit to the Engineer, the retroreflectivity of white and yellow pavement markings in accordance with FM 5-541.

711-4.4 Glass Spheres:

711-4.4.1 Longitudinal Lines: *For initial traffic striping and marking, apply the first drop of Type 4 or larger glass spheres immediately followed by the second drop of Type 1 glass spheres. For refurbishing, apply a single drop of Type 3 glass spheres. Apply reflective glass spheres to all markings at the rates determined by the manufacturer's recommendations.*

711-4.4.2 Transverse Stripes and Markings: *Apply a single drop of Type 1 glass spheres. Apply reflective glass spheres to all markings at the rates determined by the manufacturer's recommendations.*

Apply a mixture consisting of 50% glass spheres and 50% sharp silica sand to all thermoplastic pedestrian crosswalk lines and bike lane symbols at the rates determined by the manufacturer's recommendations.

711-4.4.3 Preformed Markings: *These markings are factory supplied with glass spheres and skid resistant material. No additional glass spheres or skid resistant material should be applied during installation.*

711-5 Contractor's Responsibility for Notification.

Notify the Engineer prior to the placement of the thermoplastic materials. Furnish the Engineer with the manufacturer's name and batch numbers of the thermoplastic materials and glass spheres to be used. Ensure that the approved batch numbers appear on the thermoplastic materials and glass spheres packages.

711-6 Protection of Newly Applied Traffic Stripes and Markings.

Do not allow traffic onto or permit vehicles to cross newly applied pavement markings until they are sufficiently dry. Remove and replace any portion of the pavement markings damaged by passing traffic or from any other cause, at no additional cost to the Owner.

711-7 Observation Period.

Longitudinal pavement markings are subject to a 180 day observation period under normal traffic. The observation period shall begin with the satisfactory completion and acceptance of the work.

The longitudinal pavement markings shall show no signs of failure due to blistering, excessive cracking, chipping, discoloration, poor adhesion to the pavement, loss of reflectivity or vehicular damage. The retroreflectivity shall meet the initial requirements of 711-4.3. The Owner reserves the right to check the retro reflectivity any time prior to the end of the observation period.

Replace, at no additional expense to the Owner, any longitudinal pavement markings that do not perform satisfactorily under traffic during the 180 day observation period.

711-8 Corrections for Deficiencies.

Recapping applies to conditions where additional striping material is applied to new or refurbished traffic stripes or markings to correct a deficiency. Recap a 1.0 mile section centered on the deficiency with additional striping material or by complete removal and reapplication at no additional cost to the Owner.

If recapping will result in a thickness exceeding the maximum allowed, the traffic stripes or markings will be removed and reapplied.

711-9 Submittals.

711-9.1 Submittal Instructions: *Prepare a certification of quantities, using the Owner's current approved form, for each project in the Contract. Submit the certification of quantities and daily worksheets to the Engineer. The Owner will not pay for any disputed items until the Engineer approves the certification of quantities.*

711-10 Method of Measurement.

The quantities to be paid for under this Section will be as follows:

(a) The length, in net miles, of 6 inch solid traffic stripe, authorized and acceptably applied.

(b) The total traversed distance in gross miles of 10-30 or 3-9 skip line. The actual applied line is 25% of the traverse distance, for a 1:3 ratio. This equates to 1,320 feet of marking per mile of single line.

(c) The net length, in feet, of all other types of lines and stripes, authorized and acceptably applied.

(d) The area, in square feet, of removal of existing pavement markings, acceptably removed.

(e) The number of pavement messages, symbols and directional arrows, authorized and acceptably applied.

711-11 Basis of Payment.

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

SECTION 911
LIMEROCK MATERIAL FOR BASE AND STABILIZED BASE

911-1 General.

This Section governs materials to be used on construction of limerock base and limerock stabilized base.

911-2 Furnishing of Material.

Except as might be specifically shown otherwise, all limerock material and the sources thereof shall be furnished by the Contractor. Approval of mineral aggregate sources shall be in accordance with 6-2.3. Any limerock material occurring in State-furnished borrow areas shall not be used by the Contractor in constructing the base, unless permitted by the Plans or other Contract Documents.

911-3 Composition.

The minimum of carbonates of calcium and magnesium in the limerock material shall be 70%. The maximum percentage of water-sensitive clay mineral shall be 3%. Determination shall be at the option of the Engineer.

911-4 Liquid Limit and Plasticity Requirements.

911-4.1 Material for Limerock Base: *The liquid limit shall not exceed 35 and the material shall be non-plastic.*

911-4.2 Material Used in Limerock Stabilized Base: *The liquid limit shall not exceed 35 and the plastic index shall not exceed 10.*

911-5 Mechanical Requirements.

911-5.1 Deleterious Material: *Limerock material shall not contain cherty or other extremely hard pieces, or lumps, balls or pockets of sand or clay size material in sufficient quantity as to be detrimental to the proper bonding, finishing, or strength of the limerock base.*

911-5.2 Gradation and Size Requirements:

911-5.2.1 For Limerock Base: *At least 97% (by weight) of the material shall pass a 3-1/2 inch sieve and the material shall be graded uniformly down to dust. The fine material shall consist entirely of dust of fracture. All crushing or breaking-up which might be necessary in order to meet such size requirements shall be done before the material is placed on the road.*

911-5.2.2 For Limerock Stabilized Base: *For this use, the limerock material shall meet the requirements of 911-5.2.1 except that 97% shall pass the 1-1/2 inch sieve.*

911-6 Limerock Bearing Ratio Requirements.

Limerock material used in construction of limerock base shall have an average LBR value of not less than 100. The average LBR value of material produced at a particular source shall be determined in accordance with an approved quality control procedure.

SECTION 916
BITUMINOUS MATERIALS

916-1 Asphalt Cement.

The grades of asphalt cement shall conform to the requirements given in the following Table 1:

Table 1 ASPHALT CEMENT		
Test	Conditions	Viscosity Grade Minimum/Maximum Value
AC-5		
Viscosity -P	140°F [60°C]	500 ± 100 [50 ± 10 Pa·s]
Viscosity - cSt	275°F [135°C]	minimum 175 [0.000175m ² /s]
Penetration (0.1 mm)	77°F [25°C], 100 g, 5 seconds	minimum 140
Flash Point	COC	minimum 350°F [177°C]
Solubility	in Trichlorethylene	minimum 99.0%
Tests on Residue from Thin Film Oven Test:		
Viscosity Ratio	Visc. 140°F [60°C] after TFOT Visc. 140°F [60°C] before TFOT	maximum 4
Loss on Heating		maximum 1.0%
Ductility	77°F [25°C], 50 mm/minute	minimum 1,000 mm
AC-10		
Viscosity -P	140°F [60°C]	1,000 ± 200 [100 ± 20 Pa·s]
Viscosity -cSt	275°F [135°C]	minimum 250 [0.00025 m ² /s]
Penetration (0.1 mm)	77°F [25°C], 100 g, 5 seconds	minimum 80
Flash Point	COC	minimum 425°F [218°C]
Solubility	in Trichloroethylene	minimum 99.0%
Tests on Residue from Thin Film Oven Test:		
Viscosity Ratio	Visc. 140°F [60°C] after TFOT Visc. 140°F [60°C] before TFOT	maximum 4
Loss on Heating		maximum 0.5%
Ductility	77°F [25°C], 50 mm/minute	minimum 900 mm
AC-20		
Viscosity -P	140°F [60°C]	2,000 ± 400 [200 ± 40 Pa·s]
Viscosity -cSt	275°F [135°C]	minimum 300 [0.0003m ² /s]
Penetration (0.1 mm)	77°F [25°C], 100 g, 5 seconds	minimum 60
Flash Point	COC	minimum 450°F [230°C]
Solubility	in Trichlorethylene	minimum 99.0%
Test on Residue from Thin Film Oven Test:		
Viscosity Ratio	Visc. 140°F [60°C] after TFOT Visc. 140°F [60°C] before TFOT	maximum 4
Loss on Heating		maximum 0.5%
Ductility	77°F [25°C], 50 mm/minute	minimum 800 mm
AC-30		
Viscosity -P	140°F [60°C]	3000 ± 600 [300 ± 60 Pa·s]
Viscosity -cSt	275°F [135°C]	minimum 350 [0.000350 m ² /s]

Table 1 ASPHALT CEMENT		
Test	Conditions	Viscosity Grade Minimum/Maximum Value
Penetration (0.1 mm)	77°F [25°C], 100 g, 5 seconds	minimum 50
Flash Point	COC	minimum 450°F [230°C]
Solubility	in Trichlorethylene	minimum 99.0%
Tests on Residue from Thin Film Oven Test:		
Viscosity Ratio	Visc. 140°F [60°C] after TFOT	maximum 4
	Visc. 140°F [60°C] before TFOT	
Loss on Heating		maximum 0.5%
Ductility	77°F [25°C], 50 mm/minute	minimum 500 mm
Spot Test, when and as specified. (See note below.) Standard with Naphtha Solvent- Negative for all grades. Naphtha-Xylene Solvent- percent Xylene-Negative for all grades Heptane-Xylene Solvent- percent Xylene-Negative for all grades.		
Note: The use of the spot test is optional. When it is specified, the Engineer shall indicate whether the standard naphtha solvent, the naphtha-xylene solvent, or the heptane-xylene solvent will be used in determining compliance with this requirement, and also, in the case of xylene solvents, the percentage of xylene to be used.		

All hot bituminous mixtures (except recycled mixtures) must contain Viscosity Grade AC-30 as specified above.

For Viscosity Grade AC-30, silicone shall be added to the asphalt cement at the rate of 25 cm³ of silicone mixed to each 5,000 gallons [19 m³] of asphalt cement. If a dispersing fluid is used in conjunction with the silicone, the resultant mixture containing the full 25 cm³ shall be added, in accordance with the manufacturer's recommendation. The blending of silicone mixture with the asphalt cement shall be done by the producer prior to shipment.

Viscosity Grade AC-30 used in friction course mixes shall contain 0.5% heat-stable antistripping additive by weight of asphalt from an approved source. The antistripping additive shall be introduced and mixed into the asphalt cement at the asphalt terminal during loading or by the Contractor at the asphalt plant in a manner satisfactory to the Engineer.

Material failing to meet the viscosity requirements (140°F [60°C]) shown above will be paid for at reduced rates as shown in Table 2 below:

Table 2	
AC-5: Viscosity in poises at 140°F, [in Pa·s at 60°C]	Percentage of Original Payment
400 - 600 [40 - 60]	100%
375 - 399 or 601 - 625 [37 - 39 or 60 - 63]	90%
340 - 374 or 626 - 660 [34 - 36 or 64 - 66]	80%
Less than 340 [34] or greater than 660 [66]	*50%

AC-10: Viscosity in poises at 140°F, [in Pa·s at 60°C]	Percentage of Original Payment
800 - 1,200 [80 - 120]	100%
750 - 799 or 1,201 - 1,250 [75 - 79 or 120 - 125]	90%
680 - 749 or 1,251 - 1,320 [68 - 74 or 126 - 132]	80%
Less than 680 [68] or greater than 1,320 [132]	*50%

AC-20: Viscosity in poises at 140°F, [in Pa·s at 60°C]	Percentage of Original Payment
1,600 - 2,400 [160 - 240]	100%
1,500 - 1,599 and 2,401 - 2,500 [150 - 159 and 240 - 250]	90%
1,375 - 1,499 and 2,501 - 2,625 [138 - 149 and 251 - 263]	80%
Less than 1,375 [138] or greater than 2,625 [263]	*50%

AC-30: Viscosity in poises at 140°F, [in Pa·s at 60°C]	Percentage of Bid Price square yard or ton [square meter or metric ton]
2,400 - 3,600 [240 - 360]	100%
2,250 - 2,399 or 3,601 - 3,750 [225 - 239 or 360 - 375]	97%
2,075 - 2,249 or 3,751 - 3,925 [208 - 224 or 376 - 393]	94%
Less than 2,075 [208] or greater than 3,925 [393]	*86%

* May be removed and replaced at the discretion of the Engineer.

916-1.2 Sampling and Certification: The supplier shall furnish a certification indicating compliance with the above specifications, including silicone and antistrip when required, for all asphalt cements delivered to the project.

For each shipment delivered to the asphalt terminal, the asphalt supplier shall submit a certified test report to the Owner to include all properties specified for a particular grade of asphalt cement. The test results may be from a sample taken from the storage tank(s) after delivery or from a random sample taken from the barge or rail car(s).

All materials delivered to the project shall be identified by viscosity grade.

916-2 Recycling Agents.

916-2.1 Requirements: The asphalt recycling agent shall be an asphalt cement or an asphalt cement blended (as necessary) with a softening agent or flux oil, and shall meet the following requirements:

TABLE I

Absolute Viscosity, (V60) after TFOT (Thin Film Oven Test)	3:1 Ratio maximum
Smoke Point	260°F [125°C] minimum
Flash Point	400°F [205°C] minimum
Solubility.....	97.5% minimum

Emulsified recycling agent shall meet the following requirements:

TABLE II

Storage Stability- 24 hour	1.0% maximum
Sieve Test.....	0.1% maximum
Residue by Evaporation	65.0% minimum

Residue from the emulsified recycling agent shall meet the requirements in Table I.

Recycling Agents may also be standard grade asphalt cements meeting the requirements of Table 1 in 916-1.1.

Silicone shall be added to the recycling agent at a rate of 25 cm³ for each 5,000 gallons [19 m³] of recycling agent. For emulsified recycling agent the silicone shall be added to the residue at the stated rate prior to emulsification. If a dispersing fluid is used in conjunction with the silicone, the

resultant mixture containing the full 25 cm³ shall be added, in accordance with the manufacturer's recommendation. The blending of silicone mixture with the residue shall be done by the supplier prior to shipment.

The recycling agent, or emulsified asphalt recycling agent, shall contain 0.5% heat-stable antistrip additive by weight of asphalt from an approved source. The antistrip additive shall be introduced and mixed into the recycling agent, or emulsified recycling agent, at the terminal.

916-2.2 Sampling and Certification: The supplier shall furnish a certification indicating compliance with the above specification for all recycling agents or emulsified recycling agents delivered to the project.

For each shipment delivered to the asphalt terminal, the asphalt supplier shall submit a test report to the Owner to include all properties specified for a particular recycling agent or emulsified recycling agent. The test results may be from a sample taken from the storage tank(s) after delivery or from a random sample taken from the barge or rail car(s).

916-3 Cut-Back Asphalts.

916-3.1 Requirements: Rapid-curing, cut-back asphalt shall conform to the requirements of AASHTO M 81, except that the penetration range shall be from 60-120 instead of 80-120.

For Grade RC-3000, in addition to the requirements shown in Table 1 of AASHTO M 81 the following values shall be added to the requirements for Distillation Test:

Distillate, Percentage by Volume of Total Distillate to 680°F [360°C]	Grade RC-3000 Maximum
to 320°F [160°C]	0
to 374°F [190°C]	10
to 437°F [225°C]	40

All other requirements for the distillation test (and for other properties included in the table) shall be as shown in Table 1 of AASHTO M 81.

Medium-curing, cut-back asphalt shall conform to the requirements of AASTHO M 82.

916-3.2 Sampling and Certification: For each tank of cut-back asphalt delivered to or prepared at the asphalt terminal, the asphalt supplier shall submit a sample to the Owner for testing before use. A pretest number will then be assigned by the Owner which shall be furnished with all cut-back asphalt delivered to the project.

916-4 Emulsions.

916-4.1 Requirements: Anionic Emulsified Asphalt shall meet the requirements of AASHTO M 140 with the exception that the cement mix test will be waived when the asphalt is used in non-mix application, such as tack coats and primes. Cationic Emulsified Asphalt shall meet the requirements of AASHTO M 208. Additional emulsions permitted by specifications shall meet the following requirements:

HIGH FLOAT EMULSIONS

Test	Conditions	Asphalt Emulsion Grade AE-60
		Minimum/Maximum
Tests on Emulsion:		
Saybolt Furol Visc	122°F [50°C]	75/400 seconds
Settlement	5 days (a)	maximum 5%
Storage Stability	24 hour (b)	maximum 1%
Sieve Test		maximum 0.10%
Demulsibility	50 mL CaCl ₂ 0.10 N	minimum 75%
Residue by Distillation		minimum 65%
Oil Portion	500°F. Dist. [260°C. Dist.]	maximum 1% by volume
Tests on Residue:		
Penetration (0.1 mm)	77°F [25°C], 100 g, 5 seconds	minimum 40
Absolute Viscosity	140°F [60°C]	minimum 3,200 poise [320 Pa·s]
Ductility	77°F [25°C], 50 mm/minute	minimum 400 mm
Float Test	140°F [60°C]	minimum 1,200 seconds
Solubility	in Trichlorethylene	minimum 97.5%

Test	Conditions	Asphalt Emulsion Grade AE-90
		Minimum/Maximum
Tests on Emulsion:		
Saybolt Furol Visc	122°F [50°C]	75/400 seconds
Settlement	5 days (a)	maximum 5%
Storage Stability	24 hour (b)	maximum 1%
Sieve Test		maximum 0.10%
Demulsibility	50 mL CaCl ₂ 0.10 N	minimum 75%
Residue by Distillation		minimum 65%
Oil Portion	500°F. Dist. [260°C. Dist.]	maximum 2% by volume
Tests on Residue:		
Penetration (0.1 mm)	77°F [25°C], 100 g, 5 seconds	minimum 70
Absolute Viscosity	140°F [60°C]	minimum 1,600 poise [160 Pa·s]
Ductility	77°F [25°C], 50 mm/minute	minimum 400 mm
Float Test	140°F [60°C]	minimum 1,200 seconds
Solubility	in Trichlorethylene	minimum 97.5%

Test	Conditions	Asphalt Emulsion Grade AE-150
		Minimum/Maximum
Tests on Emulsion:		
Saybolt Furol Visc	122°F [50°C]	75/400 seconds
Settlement	5 days (a)	maximum 5%
Storage Stability	24 hour (b)	maximum 1%
Sieve Test		maximum 0.10%
Demulsibility	50 mL CaCl ₂ 0.10 N	minimum 75%
Residue by Distillation		minimum 65%
Oil Portion	500°F. Dist. [260°C. Dist.]	maximum 3% by volume
Tests on Residue:		
Penetration (0.1 mm)	77°F [25°C], 100 g, 5 seconds	minimum 125
Absolute Viscosity	140°F [60°C]	minimum 800 poise [80 Pa·s]
Ductility	77°F [25°C], 50 mm/minute	minimum 400 mm
Float Test	140°F [60°C]	minimum 1,200 seconds
Solubility	in Trichlorethylene	minimum 97.5%

Test	Conditions	Asphalt Emulsion Grade AE-200
		Minimum/Maximum
Tests on Emulsion:		
Saybolt Furol Visc	122°F [50°C]	minimum 45 seconds
Settlement	5 days (a)	maximum 5%
Storage Stability	24 hour (b)	maximum 1%
Sieve Test		maximum 0.10%
Demulsibility	50 mL CaCl ₂ 0.10 N	minimum 75%
Residue by Distillation		minimum 62%
Oil Portion	500°F. Dist. [260°C. Dist.]	maximum 8% by volume
Tests on Residue:		
Penetration (0.1 mm)	77°F [25°C], 100 g, 5 seconds	minimum 150
Absolute Viscosity	140°F [60°C]	minimum 400 poise [40 Pa·s]
Ductility	77°F [25°C], 50 mm/minute	
Float Test	140°F [60°C]	minimum 1,200 seconds
Solubility	in Trichlorethylene	minimum 97.5%

(a) The test requirement for settlement may be waived when the emulsified asphalt is used in less than five days.

(b) The 24-hour (one day) storage stability test may be used instead of the five day settlement test.

SPECIAL MS-EMULSION		
Test	Conditions	Minimum/Maximum
Tests on Emulsion:		
Saybolt Furol Visc	77°F [25°C]	minimum 45 seconds
Storage Stability	24 hour	maximum 1%
Sieve Test	50 mL CaCl ₂ 0.10 N	maximum 0.10%
Demulsibility		minimum 65%
Residue by Distillation		minimum 62%
Naphtha Content	500°F. Dist. [260°C. Dist.]	maximum 8% by volume
Tests on Residue:		
Penetration (0.1 mm)	77°F [25°C], 100 g, 5 seconds	minimum 50
Ductility	77°F [25°C], 50 mm/minute	minimum 400 mm
Absolute Viscosity	140°F [60°C]	minimum 800 poise [80 Pa·s]
Solubility	in Trichloroethylene	minimum 97.5%
Maximum application temperature shall be 170°F [75°C].		

EMULSIFIED ASPHALT GRADE CRS-2H		
Test	Conditions	Minimum/Maximum
Tests on Emulsion:		
Saybolt Furol Visc.	122°F [50°C]	100/400 seconds
Settlement	5 days (a)	maximum 5%
Storage Stability	24 hour (b)	maximum 1%
Demulsibility	35 mL 0.8% Sodium Dioctyl Sulfosuccinate (c)	minimum 40%
Particle Charge		positive
Sieve Test		maximum 0.1%
Residue		minimum 65%
Tests on Residue:		
Penetration (0.1 mm)	77°F [25°C], 100 g, 5 seconds	80/140
Ductility	77°F [25°C], 50 mm/minute	minimum 400 mm
Solubility	in Trichloroethylene	minimum 97.5%
(a) The test requirement for settlement may be waived when the emulsified asphalt is used in less than five days.		
(b) The 24-hour (one day) storage stability test may be used instead of the five day settlement test.		
(c) The demulsibility test shall be made within 30 days from date of shipment.		

ASPHALT EMULSION PRIME (AEP)		
Test	Conditions	Minimum/Maximum
Tests on Emulsion:		
Saybolt Furol Visc.	77°F [25°C]	20/150 seconds
Settlement	5 days (a)	maximum 5%
Storage Stability	24 hour (b)	maximum 1%
Sieve Test		maximum 0.1%
Residue		minimum 55%
Naphtha Content	500°F. Dist [260°C. Dist.]	maximum 12% by volume
Tests on Residue:		
Penetration (0.1 mm)	77°F [25°C], 100 g, 5 seconds	40/200
Ductility	77°F [25°C], 50 mm/minute	minimum 400 mm
Solubility	in Trichloroethylene	minimum 97.5%
(a) The test requirement for settlement may be waived when the emulsified asphalt is used in less than five days.		
(b) The 24-hour (one day) storage stability test may be used instead of the five day settlement test.		

ASPHALT EMULSION GRADE RS-1		
Test	Conditions	Minimum/Maximum
Tests on Emulsion:		
Saybolt Furol Visc	77°F [25°C]	20/100 seconds
Storage Stability	24 hour	maximum 1%
Demulsibility	35 mL 0.02N CaCl ₂ (a)	minimum 60%
Sieve Test		maximum 0.10%
Residue by Distillation		minimum 55%
Naphtha Portion	500°F. Dist [260°C. Dist.](b)	maximum 3% by volume
Tests on Residue From Distillation Test:		
Penetration (0.1 mm)	77°F [25°C], 100 g, 5 seconds	minimum 60
Viscosity	140°F [60°C]	minimum 1,600 poise [160 Pa·s]
Ductility	77°F [25°C], 50 mm/minute	minimum 400 mm
Solubility	in Trichloroethylene	minimum 97.5%
(a) The demulsibility test shall be made within 30 days from the date of shipment.		
(b) When RS-1 has been modified to include naphtha, the 24-hour storage stability test will be waived.		

EMULSION PRIME (RS TYPE)		
Test	Conditions	Minimum/Maximum
Tests on Emulsion:		
Saybolt Furol Visc.	77°F [25°C]	minimum 75 seconds
Storage Stability	24 hour	maximum 1.0%
Sieve Test		maximum 0.1%
Naphtha Content		5/15% by volume
Residue		minimum 55%
Tests on Residue:*		
Penetration (0.1 mm)	77°F [25°C], 100 g, 5 seconds	minimum 50
Viscosity	140°F [60°C]	minimum 800 poise [80 Pa·s]
Solubility	in Trichloroethylene	minimum 97.5%

* Residue by distillation shall be in accordance with AASHTO T 59 except that the maximum temperature shall be 329 ± 10°F [165 ± 5°C] and the sample shall be maintained at this temperature for 20 minutes.

EPR-1 PRIME		
Tests	Conditions	Minimum/Maximum
Tests on Emulsion:		
Saybolt Furol Visc.	77°F [25°C]	6/24 seconds
Sieve Test (a)		maximum 0.1%
Residue by Distillation (b)		minimum 15%
Particle Charge Test (c)		positive
Tests on Residue: (d)		
Flash Point	COC	minimum 410°F [210°C]
Viscosity	cSt-140°F [60°C]	350/600 [0.00035/0.00060 m ² /s]
Aniline Point		85°/110°F [29°/43°C]

(a) Distilled water shall be used in place of 2% sodium oleate solution.
(b) Residue by distillation shall be in accordance with AASHTO T 59 with the exception that a 50 g sample is heated to 300°F [149°C] until foaming ceases, then cooling immediately and calculating results.
(c) Caution: this material has a positive particle charge, and therefore should not be mixed with materials having a negative particle charge.
(d) Residue by distillation shall be in accordance with AASHTO T 59 except that the maximum temperature shall be 329 ± 10°F [165 ± 5°C] and the sample shall be maintained at this temperature for 20 minutes.

916-4.2 Sampling and Certification: For each tank of emulsified asphalt delivered to or prepared at the asphalt terminal, the asphalt supplier shall submit a sample to the Owner for testing before use. A pretest number will then be assigned by the Owner which shall be furnished with all emulsified asphalt delivered to the project.

For all emulsion prime (EPR-1) delivered directly to the project for use, the supplier shall furnish a certification indicating compliance with all the specification requirements for EPR-1 Prime. When the EPR-1 is shipped to the Contractor in concentrated form, the supplier shall furnish a certification indicating compliance with all the specification requirements for EPR-1 Prime for each batch of material when blended with the appropriate amount of water. The Contractor shall blend the concentrate EPR-1 with the appropriate amount of water indicated by the supplier prior to use as a prime coat, and for each distributor load of material delivered to the project, shall furnish a certification indicating compliance with the supplier's requirements for blending along with a copy of the supplier's certification for the concentrate. In the event that the diluted EPR-1 Prime is not used in a 12-hour period, the material shall be thoroughly mixed by circulation or other suitable means prior to its use.

SECTION 921 PORTLAND CEMENT AND BLENDED CEMENT

921-1 General.

Cement shall conform to the requirements of AASHTO M85 or AASHTO M240, as applicable, except as defined below or as specifically restricted in Section 346.

921-1.1 Type of Cement: *Cement may be Types I, II, II (MH), III, IV, V (AASHTO M85), or IP, IP (MS), IS (AASHTO M240). Different brands of cement, cement of the same brand from different facilities, or different types of cement shall be stored separately and shall not be mixed.*

921-1.2 Alkali Content: *Only Portland cement containing a maximum of 0.60% alkali, or less, calculated as Na_2O (% Na_2O plus 0.658% K_2O), may be used with no further testing. When tests performed in accordance with ASTM C33 XI.3 on coarse and fine aggregate indicate the aggregate to be non-reactive to alkalis, cements exceeding 0.60% alkali is allowed.*

921-1.3 Heat of Hydration: *The cement heat of hydration for Type II (MH) shall be 88 cal/g or less at 7 days when tested in accordance with ASTM C186. For Type II (MH) used in mass concrete, the cement heat of hydration shall be 80 cal/g or less at 7 days when tested in accordance with ASTM C186.*

921-2 Terminology.

The following definitions are applicable to the production and quality control of cement:

Source of Supply - indicates a cement supplier responsible for supplying the final product. Where the supplier has more than one manufacturing facility, the source of supply may be designated as the manufacturer/facility.

Approved Source - indicates a cement supplier, including but not limited to a plant, a terminal, or a transfer facility, that has been qualified by the State Materials Office. A list of Approved Cement Sources will be maintained by the State Materials Office.

Quality Control (QC) Plan Status - indicates quality control approval status, for each cement supplier and will be maintained by the State Materials Office in conjunction with the Approved Source List.

Purchaser - The term "purchaser" in the AASHTO Specifications shall be taken as the Owner or jurisdictional authority if applicable.

Approved Laboratory - indicates a laboratory acceptable to the State Materials Office which has been currently inspected by the Cement and Concrete Reference Laboratory (CCRL), is actively participating in their proficiency program and which has all deficiencies noted at the time of inspection corrected. The laboratory must also authorize CCRL to send copies of final inspection reports to the State Materials Office.

Mill Test Report - indicates a certification from the cement supplier identifying that the cement meets Section 921, the Type, the production period the sample represents and the chemical and physical analyses of the cement, and the silo numbers where the cement is stored. The mill test report must identify that there is limestone in the cement, if limestone is included. An acceptable mill test report is found in the appendix of AASHTO M85.

921-3 Packing, Handling and Storing.

Cement may be delivered in bags or in bulk. The storage building, bin or silo shall be weatherproof and shall be located convenient to the work. On small jobs, storage in the open may be permitted by the Engineer in which case raised platforms and adequate waterproof coverings shall be provided.

921-4 Rejection.

The entire contents of the sack or bulk container which contains cement that does not meet the requirements of this Specification or has been damaged, is partially set, lumpy or caked shall be rejected.

Bagged cement which varies more than 5% from the designated weight, or if the average weight of 50 sacks, taken at random, is less than the designated weight, the cement shall be rejected.

921-5 Quality Control Plan.

921-5.1 General: *The Quality Control Program of a cement supplier shall conform to Section 105.*

921-5.2 Acceptance of Portland Cement: *Portland cement from an approved source with a current QC Plan approval may be accepted on the basis of mill test reports meeting the requirements of the applicable AASHTO and FDOT Specifications and a delivery ticket printed on the producer's letterhead and traceable to the mill test report. Quality control testing shall be performed by an approved laboratory.*

921-5.3 Cement Ownership and Responsibility: *For purposes of QC Plan approval status, the cement supplier shall be responsible for cement quality until the cement is accepted by the concrete producer. Where the cement has been accepted by a concrete producer and is subsequently found deficient, the concrete plant QC Plan approval may be withdrawn with respect to further use of that cement and reinstated only when the deficiency is adequately resolved. Reinstatement is made by the State Materials Office.*

921-5.4 Quality Control Plan Approval Control: *The State Materials Office may withdraw QC Plan approval and may require cement shipments to be individually tested prior to incorporation. QC Plan approvals may be rescinded when the performance of cement is in question, including problems with concrete quality, inconsistent quality control data, or failure of quality control or verification test results. Discontinuance of approval may be based on testing at the point of use, testing by the manufacturer or proven poor performance of the cement in concrete.*

921-5.5 Sampling of Cement: *The verification samples may be taken at the manufacturer's plant, distribution facility or at the concrete production facility. Samples shall be obtained by one of the methods in FM 5-503. Samples shall be a minimum of 10 pounds in size. At the concrete production facility, cement samples shall be jointly obtained by the authorized Inspector and the concrete producer's representative.*

SECTION 970
MATERIALS FOR RAISED RETROREFLECTIVE PAVEMENT
MARKERS AND BITUMINOUS ADHESIVE

970-1 Raised Retro-Reflective Pavement Markers (RPM).

970-1.1 Composition: *The marker shall consist of materials conforming to ASTM D4280.*

970-1.2 Physical Requirements: *The physical size of the RPM shall conform to the requirements of ASTM D4280. Laboratory and field samples for RPMs and bituminous adhesives shall meet the requirements of ASTM D4280 and include the following requirements:*

The minimum area of each reflective face shall be 2.5 square inches. The minimum base size shall be 12 square inches.

970-1.2.1 Designation of Marker Type, Color and Classification: *The marker description shall be in order of type, color and reflective surface condition in accordance with ASTM D4280 and the following chart.*

<i>RPM Class</i>			
<i>Class</i>	<i>Description</i>	<i>Expected Normal Service</i>	<i>ASTM Surface Designation</i>
<i>A</i>	<i>Temporary marker</i>	<i>Up to six months</i>	<i>none</i>
<i>B</i>	<i>Permanent marker</i>	<i>Long life</i>	<i>H, hard abrasion resistant lens</i>

970-1.3 Performance Requirements: *The RPM shall meet the performance requirements specified in ASTM D4280, Section 6.2, for luminous intensity, flexural strength, compressive strength, resistance to cracking, and thermal cycling, as modified herein. Test method FM 5-566 will be used to evaluate marker performance.*

970-1.3.1 Class A Markers: *Meet the coefficient of luminous intensity requirements of ASTM D4280. Abrasion treatment is not required for Class A Markers.*

970-1.3.2 Class B (Abrasion Resistant) Markers: *Meet the coefficient of luminous intensity requirements of ASTM D4280 after abrasion. Each marker shall be marked as abrasion resistant by the manufacturer.*

970-1.3.3 In-service Minimum Reflective Intensity: *The Class B reflective pavement marker shall retain a minimum coefficient of luminous intensity for 18 months of not less than 30% of the values shown in Table 1 of ASTM D4280, and a minimum luminous intensity of 0.2 cd/fc at the end of two years.*

970-1.4 Application Properties: *Application properties shall meet the requirements of Section 706.*

970-1.5 Packaging and Labeling: *Shipment shall be made in containers which are acceptable to common carriers and packaged in such a manner as to ensure delivery is in perfect condition. Each package shall be clearly marked as to the name of the manufacturer, type, color, quantity enclosed and date of manufacture. Show the designation of the marker in accordance with ASTM D4280.*

970-2 Bituminous Adhesive for Pavement Markers.

970-2.1 General: *Bituminous adhesive as recommended by the marker manufacturer shall be used for bonding the markers to the pavement.*

970-2.2 Specific Requirements for Bituminous Adhesives: *The bituminous adhesive shall meet the properties of adhesives per ASTM D4280 Section A1, including filler-free and filler alone properties.*

970-2.3 Performance Requirements: *The performance of the adhesive shall be determined in accordance with the test methods listed in ASTM D4280.*

970-3 Product Acceptance on the Project.

Acceptance will be made in accordance with the requirements of Section 706.

SECTION 983
WATER FOR GRASSING

The water used in the grassing operations may be obtained from any approved source. The water shall be free of any substance which might be harmful to plant growth. Effluent water shall meet all Federal, State and local requirements.

Sod shall be watered daily for 30 days upon installation, every other day for 60 days, and twice weekly thereafter. Sod and sodding soil mixture shall be watered to provide moisture to a depth of 3 inches upon installation, and for 1 to 2 weeks thereafter.

Sod shall be watered to avoid wilting. The contractor shall water the sod every 6 to 8 hours until the roots penetrate the sodding soil mixture, applying a quarter inch of water each time. Thereafter, the contractor shall water to maintain soil moisture and avoid wilting as required.

SECTION 994
RETROREFLECTIVE AND NON-REFLECTIVE
SHEETING AND SIGN PANEL FABRICATION

994-1 Description.

994-1.1 General: *This Section specifies the requirements for retroreflective and non-reflective sheeting and sign panel materials and fabrication. This includes the sign sheeting materials such as transparent and opaque process inks for retroreflective sheeting materials, vinyl and transparent overlays.*

994-2 Retroreflective and Non-Reflective Sheeting Systems.

994-2.1 Materials: *Retroreflective sheeting material will be classified in accordance with and meet the requirements of ASTM D4956. Overlay materials include colored and colorless transparent overlays and vinyl.*

994-2.2 Approved Product List (APL): *All sheeting, process inks and overlay materials will be listed as a system on the jurisdictional authority's Approved Product List (APL). Sign sheeting systems will consist of base sheeting with ink and/or overlay materials. Products with an ASTM classification of Type XI or greater will not be accepted for qualification on the APL for fluorescent orange, fluorescent yellow and fluorescent yellow-green. Manufacturers seeking evaluation of their products need to submit product data sheets, performance test reports from an independent laboratory showing the sign sheeting system meets the requirements of this Section, and an APL application in accordance with Section 6. Information on the APL application must include the individual materials comprising the sign sheeting system and identify colors, ASTM base sheeting classification, adhesive backing class, availability of transparent and/or opaque backing and availability of liner types. Submit an infrared identification curve (2.5 to 15 μm) for each color of ink.*

994-2.3 Performance Requirements.

994-2.3.1 General: *Sheeting, process inks and overlay materials must be tested in accordance with, and meet all the performance requirements of ASTM D4956, including Supplemental Requirement S2, Rebound able Sheeting Requirements, except as amended in this Section.*

For performance requirements that are color dependent, each color included in the APL application must be tested and meet the requirements identified in ASTM D4956 or this Section as applicable. Purple sign sheeting materials must meet the color requirements as identified in the 23 CFR 665 Table 1 to Appendix to Part 655, Subpart F. All sign sheeting systems consisting of inks and/or overlays will be tested as a system consisting of white base sheeting and each color of ink and/or overlay.

Panels for testing sheeting must be prepared in accordance with 994-3 for testing. The in-service life for the sign sheeting system will equal the life of the reflective base sheeting of the system.

994-2.3.2 Retroreflective Intensity: *The retroreflectivity of sheeting and sheeting systems must meet the minimum initial requirements as stated for all observation and entrance angles as identified in ASTM D 4956. The 0.2 and 0.5 degree observation angles with an entrance angle of minus 4 degrees per ASTM D4956 will be used for in-service requirements.*

Rotational sensitivity shall be tested in accordance with AASHTO M268. Rotationally sensitive sheeting will be noted on the APL.

<i>Type VI Sheeting</i>	
<i>Minimum Coefficient of Retroreflection (cd/foot-candle·ft²)(cd/fc·ft²)</i>	
<i>Observation/Entrance Angle</i>	<i>Fluorescent Pink</i>
<i>(degree)</i>	
<i>0.2/-4</i>	<i>160</i>
<i>0.5/-4</i>	<i>100</i>
<i>0.2/30</i>	<i>100</i>
<i>0.5/30</i>	<i>40</i>

994-2.3.3 Colorless Overlay Films: *Colorless overlay film is allowed for the purpose of improving color retention. These films must be compatible with the sign sheeting system and not delaminate or discolor for the in-service life of the system.*

994-2.3.4 Color: *The fluorescent pink initial color shall meet the following x, y chromaticity coordinates:*

<i>Fluorescent Pink</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
<i>x</i>	<i>.450</i>	<i>.590</i>	<i>.644</i>	<i>.536</i>
<i>y</i>	<i>.270</i>	<i>.350</i>	<i>.290</i>	<i>.230</i>

Fluorescent pink sheeting shall have a minimum luminance factor of 25.

994-2.3.5 Outdoor Weathering: *Outdoor weathering exposure of sign sheeting systems will be in accordance with, and meet the requirements of ASTM D4956 for each system, color and classification. All testing will be conducted at an exposure location meeting the Tropical Summer Rain Climate Type (Miami, Florida or equivalent). Outdoor weathering is not required for Type VI fluorescent pink.*

994-2.3.6 Packaging and Labeling.

Packaging and labeling must meet the requirements of ASTM D4956.

994-2.3.7 Samples.

Field samples will be obtained in accordance with the approved Sampling, Testing and Reporting Guide Schedule and on a random basis at the discretion of the Engineer.

994-3 Sign Panels.

994.3.1 Materials: *For aluminum sheets and plates for sign panels, meet the requirements of ASTM B 209, Aluminum Association Alloy 6061-T6, 5154-H38 or 5052-H38 and those shown in the Plans.*

994-3.2 Preparation of Sign Blanks.

994-3.2.1 De-greasing and Etching for Aluminum Sign Blanks:

994-3.2.1.1 General: *Prior to the application of retroreflective sheeting, use any of the methods shown below to de-grease and etch the aluminum sign blanks.*

994-3.2.1.2 Hand Method: *Under this method, de-grease and etch the blanks in one operation, using steel wool (medium grade) with any of the following combinations of materials:*

- (1) An abrasive cleanser of a commercial grade kitchen scouring Powder.*
- (2) Acid and a suitable detergent solution.*
- (3) An alkaline solution.*

Thoroughly rinse the blanks with clean water following all hand de-greasing operations.

994-3.2.1.3 Power-Washer Method: *Under this method, de-grease the blanks with an inhibited alkaline cleanser, by spraying for 90 seconds with the solution between 135 and 249°F, the exact temperature to be as recommended by the manufacturer of the cleanser. After the spraying, rinse the blanks with clean water. Then etch the blanks by immersing them in a 6 to 8% solution of phosphoric acid at a temperature of 100 to 180°F for 60 seconds. After immersion, rinse the blanks in clean water.*

994-3.2.1.4 Immersion Method: *Under this method, de-grease the blanks by immersing them in a solution of inhibited alkaline cleanser at a temperature between 160 and 180°F for three to five minutes, and then rinsing with clean water. Then etch blanks by immersing them in a 6 to 8% solution of phosphoric acid at a temperature of 100°F for three minutes. After immersion, rinse the blanks in clean water.*

994-3.2.1.5 Vapor De-greasing Method: *Under this method, de-grease the blanks by totally immersing them in a saturated vapor of trichloroethylene. Remove trademark printing with lacquer thinner or a controlled alkaline cleaning system.*

994-3.2.1.6 Alkaline De-greasing Method: *De-grease the blanks by totally immersing them in a tank containing an alkaline solution, controlled and titrated in accordance with the solution manufacturer's directions. Adapt immersion time to the amount of soil present and the thickness of the metal. After immersion, thoroughly rinse the blanks with running water.*

994-3.2.1.7 Etching Method when De-greasing is Separate Operation: *If using either of the de-greasing methods described in this section, accomplish etching by one of the following alternate methods:*

(1) *Acid Etch: Etch well in a 6 to 8% phosphoric acid solution at 100°F, or in a proprietary acid etching solution. Rinse thoroughly with running cold water, which may be followed by a hot water rinse.*

(2) *Alkaline Etch: Etch aluminum surfaces in an alkaline etching material that is controlled by titration. Meet the time, temperature, and concentration requirements specified by the solution manufacturer. After completing etching is complete, rinse the panel thoroughly.*

994-3.2.1.8 Chromate Coating: *Before applying retroreflective sheeting to the aluminum, treat the aluminum sign surfaces with chromate conversion coating. Coating may consist of an organic or inorganic chromate material. Coatings shall be applied according to the manufacturer's instructions and shall conform to ASTM B449, Class 2.*

994-3.3 Drying: *Dry the panels using a forced-air drier. Use a device or clean canvas gloves, to handle the material between all cleaning and etching operations and the application of retroreflective sheeting. Do not allow the metal to come in contact with greases, oils or other contaminants prior to the application of retroreflective sheeting.*

994-3.4 Fabrication of Sign Blanks: *Fabricate all metal parts to ensure a proper fit of all sign components. Complete all fabrication, with the exception of cutting and punching of holes, prior to metal de-greasing and applying the retroreflective sheeting. Cut metal panels to size and shape and keep free of buckles, warp, dents, burrs, and defects resulting from fabrication. Use aluminum sheets with increments of 4 feet in width; except, for sign widths that are not multiples of 4 feet. A maximum of two panels may be cut to less than 4 feet, and no panel may be cut to less than one foot. Mount aluminum sheets vertically and provide backing strips a vertical joints to keep the abutting sheets in proper alignment.*

Ship all multi-panel signs to the project intact, completely assembled and ready to be installed. Fabricate signs taller than 10 feet as two separate signs with a horizontal splice, ready to be spliced and installed.

994-3.5 Fabrication of Retroreflective Sign Faces.

994-3.5.1 General: *Fabricate signs with sign sheeting systems listed on the APL meeting the requirements in Section 700, FDOT Design Standards and Plans.*

994-3.5.2 Application of Sheeting: *Apply retroreflective sheeting to the base panels with mechanical equipment in a manner specified for the manufacture of traffic control signs by the sheeting manufacturer. For sheeting that has been identified as rotationally sensitive, apply white sheeting for cut-out legends, symbols, borders and route marker attachments within the parent sign face at the optimum rotation angle according to the identification markings. Apply all background sheeting at a uniform rotational angle. The retroreflective sheeting for each sign will be from the same roll or lot number. Apply consecutively alternate successive width sections of either sheeting or panels to ensure that corresponding edges of sheeting lie adjacent on the finished sign. If the sign cannot be constructed from retroreflective sheeting from the same roll or lot number, the fabricator may color match from a different lot; the color between the rolls cannot exceed three ΔE 's using test method ASTM D 2244. The Engineer will not accept nonconformance that may result in non-uniform shading and an undesirable contrast between adjacent widths of applied sheeting or non-optimum retroreflectivity in the finished sign and installation.*

Sheeting is to be trimmed at 45 degree angle from the edge of each panel. Finish signs by sealing sheeting splices and sign edges according to sign manufacturer recommendations.

994-3.5.3 Direct and Reverse Screen Processing: *Screen message and borders on retroreflective sheeting in accordance with the recommendations of the ink or overlay manufacturer. Process messages either before or after applying the sheeting to the base panels.*

The transparent and opaque process inks furnished for direct and reverse screen processing shall be of a type and quality formulated for retroreflective sheeting materials as listed on the APL and applied in accordance with the manufacturer's instruction. Screen processing in accordance with the techniques and procedures recommended by the manufacturer must produce a uniform legend of continuous stroke width of either transparent or opaque ink, with sharply defined edges and without blemishes on the sign background that will affect the intended sign use.

994-3.5.4 Finished Sign Face: *Provide finished signs with properly aligned clean cut and sharp messages and borders. Fabricated signs must be free of wrinkles, bubbles, foreign matter, scratches, free of patches, or other visually identifiable defects. Ensure that finished background panels are essentially a plane surface.*

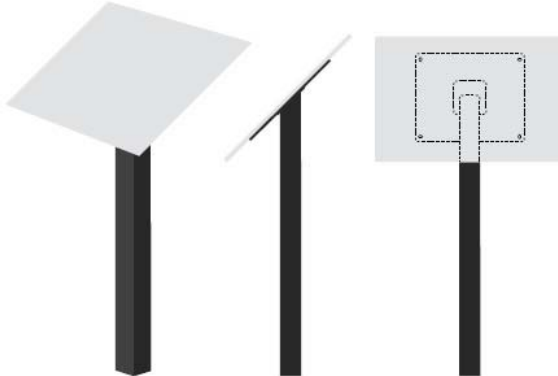
994-3.5.5 Packaging and Labeling: *For permanent roadway signs, label the back of all finished panels at the bottom edge with the date of fabrication, sign sheeting system manufacturer, Type, and the fabricator's initials. Make the labels unobtrusive, but legible enough to be easily read by an observer on the ground when the sign is in its final position. Apply the label in a manner that is at least as durable as the sign face.*

Properly package signs to protect them during storage, shipment and handling to prevent damage to the sign face and panel.

INFORMATIONAL SIGNAGE

SAMPLE INFORMATIONAL SIGN OPTION

FRAMELESS STYLE MOUNTS



SINGLE ANGLE MOUNT FRAMELESS PEDESTAL

Frameless pedestal for angle mounting self supporting panels (.5" thick high pressure laminate). Predrilled holes in the mount plate correspond with threaded holes on the backside of the .5" thick HPL panel. Mount plates 12"×12" and larger mechanically attach to the "6×6" plate welded to the 3"×3" post.

Mount Plate Size

6×6 _____

12×12 _____

12×18 _____

16×20 _____

16×20 with extended post length _____

INSTALLATION AND POST LENGTH OPTIONS

Direct bury installation (above):

Standard post length: 60".

Typical length below grade: 18"-24".

To be installed with post lengths/footings per your geographical area's recommendations.

**Pedestal/post to be provided by City of West Park for in-ground installation by Contractor.*