Table of Contents

Section	Description
DIVISION 1	
01010	Summary of Work
01015	City Furnished Equipment and Services
01025	Measurement and Payment
01040	Coordination
01080	Abbreviations and Definitions
01090	Reference Standards
01110	Environmental Protection Procedures
01200	Project Meetings
01300	Submittals
01310	Construction Progress Schedules
01400	Quality Assurance
01500	Temporary Facilities
01530	Protection of Existing Facilities
01550	Site Access and Storage
01560	Temporary Environmental Controls
01568	Erosion Control, Sedimentation and Containment of Construction Materials
01600	Control of Materials
01610	Delivery, Storage and Handling
01700	Contract Closeout
01710	Cleaning Up
01740	Warranties and Bonds
DIVISION 2 - SITE WORK	
02001	Mobilization
02141	Temporary Bypass Pumping
02230	Clearing and Grubbing
02260	Steel Sheet Piling
02314	Excavation, Backfill and Fill for Structural Facility and Utility System
02315	Trenching and Backfilling for Piping Systems
02741	Prime and Tack Coats
02742	Hot-Mix Asphalt Paving
02745	Pavement Removal and Replacement
02765	Pavement Markings and Traffic Signs
160	Stabilizing
285	Optional Base Course
327	Milling of Existing Asphalt Pavement
334	Superpave Asphalt Concrete
337	Asphalt Concrete Friction Courses

DIVISION 3 – CONCRETE

03375 Flowable Fill

DIVISION 4 - MASONRY – (NOT USED)

DIVISION 5 – METALS – (NOT USED)

DIVISION 6 - WOOD AND PLASTIC – (NOT USED)

DIVISION 7 - THERMAL AND MOISTURE PROTECTION – (NOT USED)

DIVISION 8 - DOORS AND WINDOWS – (NOT USED)

DIVISION 9 – FINISHES – (NOT USED)

DIVISION 10 - SPECIALTIES – (NOT USED)

DIVISION 11 – EQUIPMENT – (NOT USED)

DIVISION 12 – FURNISHING - (NOT USED)

DIVISION 13 - SPECIAL CONSTRUCTION - (NOT USED)

DIVISION 14 - CONVEYING SYSTEMS – (NOT USED)

DIVISION 15 – MECHANICAL

15010 Basic Mechanical Requirements
15060 Piping and Fittings
15065 Miscellaneous Materials
15100 Valves, General
15102 Tapping Sleeves
15115 Check Valves
15120 Gate Valves
15125 Plug Valves

DIVISION 16 – ELECTRICAL – (NOT USED)

DIVISION 17 – CONTROLS – NOT USED

END OF SECTION

SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.01 LOCATION OF WORK:

The locations of work for this Contract as follows:

- Within the right of way of **NE 105th Street**, from Biscayne Boulevard going east to the end of the road
- Within the right of way of **NE 107th Street**, from Biscayne Boulevard to East Dixie Highway
- Within the right of way of **East Dixie Highway**, from NE 107th Street to Biscayne Boulevard
- Within the right of way of **Biscayne Boulevard** from NE 105th Street to NE 107th Street.
- Within the right of way of **Biscayne Boulevard** from East Dixie Highway to approximately 25 linear foot north of NE 116 Street.
- Within the right of way **NE 116th Street** to NE 16 Avenue and NE 16 Avenue from NE 116th Street to NW 117th Street.
- Eleven (11) **private** lift stations.

1.02 SCOPE OF WORK:

A. Furnish all labor, materials, equipment and incidentals necessary to upsize an existing 8-inch forcemain to a 12-inch forcemain and make connections to existing lift stations as shown on the Drawings and specified herein.

B. The Work includes, but is not necessarily limited to, the following major items:

1. Furnishing and installing approximately 6550 LF of 12-inch ductile iron pipe including all installation components.
2. Furnishing and installing approximately 40 LF of 10-inch ductile iron pipe including all installation components.
3. Furnishing and installing approximately 5 LF of 8-inch ductile iron pipe including all installation components.
4. Furnishing and installing approximately 63 LF of 6-inch ductile iron pipe including all installation components.
5. Furnishing and installing approximately 138 LF of 4-inch ductile iron pipe including all installation components.
6. Tapping to an exisitng 12-inch forcemain and making 10 connections to existing lift stations.
7. Abandoning existing 8-inch forcemain.

8. Pavement restoration to impacted streets, curbs, driveways and sidewalks.
9. Installation of new sidewalks and detectable warnings.
10. Milling and resurfacing of streets.
11. Replacing pavement markings and reflective pavement markers.
12. Field adjustment of signage.
13. Restoring sodded areas,
14. Installing stamped concrete.
15. Maintenance of Traffic.

1.03 WORK SEQUENCE:

A. Duties of the existing private lift stations and existing 8-inch forcemain must be maintained via bypass pumping throughout the duration of the project. The Contractor will be responsible for the sequence of construction and continuous operation of the existing pump stations and forcemain throughout the project. The proposed sequence shall be in accordance with the schedule submitted by the Contractor and approved by the Owner.

1.04 CONTRACTOR'S USE OF PREMISES:

A. Contractor shall limit the use of the premises for the performance of the Work and storage of materials and equipment to minimize the impact on traffic, residents and tenants in the project areas.

B. Contractor shall assume full responsibility for security of all his and his subcontractors materials and equipment stored on the site.

C. If directed by the Owner and/or Authority Having Jurisdiction (AHJ), the Contractor shall move any stored items which interfere with operations of traffic.

D. Obtain and pay for use of additional storage or work areas if needed to perform the Work.

END OF SECTION

SECTION 01015

CITY FURNISHED EQUIPMENT AND SERVICES

PART 1 - GENERAL

1.01 MATERIALS SUPPLIED BY THE CITY

A. There will be NO owner furnished equipment for this project.

1.02 MATERIALS AND EQUIPMENT FURNISHED BY CONTRACTOR

A. The Contractor will supply all materials for the project.

B. All materials and equipment furnished by the Contractor for use in the work shall be new and of recent domestic manufacture and shall be the products of reliable manufacturers or suppliers who, unless otherwise specified, have been regularly engaged in the manufacture of such materials and equipment for at least five years. All components shall, wherever possible, be standard stock articles of well-known manufacturers. Where the Plans and Specifications designate the product of a particular manufacturer, the product specified has been found suitable for the intended use, but, unless otherwise provided, articles or products of similar characteristics may be offered for the approval of the City and Engineer. Complete descriptive data shall be furnished in quintuplicate regarding all articles furnished by the Contractor. The descriptive data shall consist of dimension drawings, catalog references, material lists and other information necessary to clearly identify and evaluate each article. When substitutions are permitted, the Contractor shall make all necessary changes in adjacent or connected structures and equipment at his expense.

C. Where contemplated changes, substitutions or appurtenant work require engineering design in the opinion of the Engineer, the Contractor shall have such design services performed at his expense. Said engineering design services shall be of an extent satisfactory to the Engineer whose word shall be final and shall be performed by a Registered Professional Engineer licensed to practice in the State of Florida.

END OF SECTION

Page Intentionally Left Blank

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 SCOPE

A. A contract will be awarded for the total of Items 1 through 32, inclusive. It is intended that all work required to complete this Project will be included in the various bid items described below.

1.02 PAYMENT ITEMS

A. The format for Payment Requests shall be as directed by the Owner. This shall include the level of breakdown and grouping of payment items.

B. Measurement: Measurement of work for payment will not be made under this contract. All labor, materials and work performed for construction of the facilities shall be included in the aggregate price entered in the Proposal for each bid item. C. Item No. 1, 3, 5,7, and 9 – Furnish Ductile Iron Pipe

Payment for furnishing and delivering to the project site 12-inch, 10-inch, 8-inch, 6-inch and 4-inch ductile iron pipe, valves, and fittings for force main of the nominal sizes specified in these bid items will be paid at the unit price bid, times the number of lineal feet installed and accepted by the Owner and Engineer, which payment shall be full compensation for backfill materials; pipe; pipe fittings, solid sleeves, and specials; pipe bedding; furnishing 12-inch, 10-inch, 8-inch, 6-inch and 4-inch check valves and plug valves; furnishing joint restraints, all valves, complete with riser pipe and valve box not included in other pay items; materials for placing mains out of service; temporary pavement materials; material for restoration of driveways and grassed areas; transportation and handling cost delivered ditch side; pressure testing valves above ground prior to installation; all material and equipment required to test the main, and all other appurtenant and miscellaneous items required for a complete and satisfactory installation.

D. Item No. 2, 4, 6, 8, and 10 – Install Ductile Iron Pipe

Payment for installing ductile iron pipe, valves and fittings for forcemains of the nominal sizes specified in these bid items will be paid for at the unit price bid times the number of feet installed. The number of feet installed shall be determined by the method specified in Item C above applied to the pipe of the particular bid item. The price per foot for installing pipe and fittings shall be full compensation for the completed pipeline, ready for service, and shall include, but not be limited to, excavation; saw-cutting the pavement where indicated, sheeting and shoring; to control trench width; dewatering the excavation; unloading the pipe, fittings and all other materials not specified in other bid items from delivery trucks at the job site (trench side) and placing them into position in the trench; cutting and installing nipples; making thrust resistant joints; furnishing joint materials, including vegetable soap lubricant; installing all valves, complete with riser pipe and valve box, not included in other pay items; placing and compacting backfill; for furnishing and maintaining temporary barricades and/or construction cones for local traffic; furnishing

additional suitable backfill material, if required; disposing of excess or unsuitable fill materials; making connection to the existing main where the connection is not specified as a part of another pay item; making thrust resistant joints; furnishing and installing tie rods and eye bolts and at all bends, tees, caps and plugs; making all connections within the lines themselves; furnishing all materials and equipment required to test the main; testing the main; performing all work required to place mains out of service; maintaining access to residences, businesses and protecting existing utilities along the route of the main; making temporary paving repairs; complying with any work hour restrictions; satisfying all requirements of the appended permits; moving and replacing, utilities, trees, grass, shrubs, mail boxes, sidewalk, sprinklers, shoulders, asphalt paths, curb, curb and gutter, and all other similar, appurtenant and miscellaneous items and work damaged by the construction, to original locations and to equal or better than original conditions, including final cleanup.

The quantity for payments shall be the horizontal projection of the center line of the permanently installed and accepted pipe (of the particular bid item), including the length of fittings along the run, measured to the nearest one -tenth of a foot from P.I. to P.I. of fittings and to the seat of the bell at the end of any particular run.

E. Item No. 11– Furnish and Install 12x12-inch Tapping sleeve and 12-inch Tapping Valve

Payment for making the connection to the existing 12-inch cast iron pipe force main at Sta. 132+72.43 including furnishing and installing 12x12-inch tapping sleeve, 12-inch tapping valve and 12-inch pipe and fittings, tapping valve box and cover, complete as shown on the Plans. The price bid shall be full compensation for the complete installation, ready for service, and shall include, but not be limited to, exploratory excavation; excavation; sheeting and shoring, connections with the existing mains; all applicable items and work from Item D; dewatering the excavation; placing and compacting backfill; furnishing additional suitable backfill material, if required; furnishing and installing the joint materials as required; pressure testing the tapping sleeve and tapping valve, before tapping; furnishing and installing riser pipe and valve box, including concrete collar or thrust restraints; placing and compacting backfills; constructing concrete anchors or thrust restraints;; making temporary and permanent paving repairs around the valve outside the main trench line, if required; and all other appurtenant and miscellaneous items and work.

F. Item No. 12– Making Connection to an existing 10-inch force main

Payment for making the connection to the existing 10-inch cast iron pipe force main at Sta. 66+07.83 including cutting the existing force main, furnishing and installing 90 degree 10-inch horizontal bend and 10-inch cap, complete as shown on the Plans. The price bid shall be full compensation for the complete installation, ready for service, and shall include, but not be limited to, exploratory excavation; excavation; sheeting and shoring, connections with the existing mains; all applicable items and work from Item D; dewatering the excavation; placing and compacting backfill; furnishing additional suitable backfill material, if required; furnishing and installing the joint materials as required; and all other appurtenant and miscellaneous items and work. Payments also include furnishing, installing, operating, maintaining and removing a temporary by-pass pumping system.

G. Item No. 13– Making Connection to an existing 8-inch force main

Payment for making the connection to the existing 8-inch cast iron pipe force main at Sta. 25+17.58 including cutting the existing force main, furnishing and installing 90 degree 8-inch horizontal bend and 8-inch cap, complete as shown on the Plans. The price bid shall be full compensation for the complete installation, ready for service, and shall include, but not be limited to, exploratory excavation; excavation; sheeting and shoring, connections with the existing mains; all applicable items and work from Item D; dewatering the excavation; placing and compacting backfill; furnishing additional suitable backfill material, if required; furnishing and installing the joint materials as required; and all other appurtenant and miscellaneous items and work. Payments also include furnishing, installing, operating, maintaining and removing a temporary by-pass pumping system.

H. Item No. 14– Making Connection to an existing 6-inch force main

Payment for making the connection to the existing 6-inch cast iron pipe force main at Sta. 81+78.87 and the existing 6-inch ductile iron pipe force main at Sta. 90+21.16 including cutting the existing force main, furnishing and installing 90 degree 6-inch horizontal bend and 6-inch cap, complete as shown on the Plans. The price bid shall be full compensation for the complete installation, ready for service, and shall include, but not be limited to, exploratory excavation; excavation; sheeting and shoring, connections with the existing mains; all applicable items and work from Item D; dewatering the excavation; placing and compacting backfill; furnishing additional suitable backfill material, if required; furnishing and installing the joint materials as required; and all other appurtenant and miscellaneous items and work. Payments also include furnishing, installing, operating, maintaining and removing a temporary by-pass pumping system.

I. Item No. 15– Making Connection to an existing 4-inch force main

Payment for making connections to the existing 4-inch force main at Sta. 19+68.78, Sta. 42+08.05, Sta. 49+95.42, Sta. 77+20.00, Sta. 84+05.98, Sta. 92+22.70 and Sta. 94+25.10 including cutting the existing force main, furnishing and installing 90 degree 4-inch horizontal bend and 4-inch cap, complete as shown on the Plans. The price bid shall be full compensation for the complete installation, ready for service, and shall include, but not be limited to, exploratory excavation; excavation; sheeting and shoring, connections with the existing mains; all applicable items and work from Item D; dewatering the excavation; placing and compacting backfill; furnishing additional suitable backfill material, if required; furnishing and installing the joint materials as required; and all other appurtenant and miscellaneous items and work. Payments also include furnishing, installing, operating, maintaining and removing a temporary by-pass pumping system.

J. Item No. 16– Furnish and Install Air Release Valve Assemblies

Payment for constructing Air Release Valve Assemblies (ARV's), at locations shown on the plans, or where directed by the Engineer in the field, complete as shown in the Standard Details, will be paid for at the unit price bid times, the number of assemblies installed and accepted. The price bid shall be full compensation for each complete installation, ready for

service, and shall include, but not be limited to, excavation; for complying with Trench Safety Act; all applicable items and work from Item D; furnishing and installing PVC pipe, including cutting and threading as required; tapping the ductile iron pipe; furnishing and installing corporation stop, coupling, angle valve and street elbow; furnishing and installing manhole, manhole frame and cover and riser pipe, including concrete support ring; placing and compacting backfill; furnishing additional backfill material, if required; temporary paving; permanent paving outside of the main trench line, if necessary; and all other appurtenant and miscellaneous items and work.

K. Item No. 17– FDOT- Compaction/ Stabilization of 12” Subgrade

Price and payment will constitute full compensation for all work and materials specified in Section 160 of the specifications, including furnishing, spreading and mixing of all stabilizing material required and any reprocessing of stabilization areas necessary to attain the specified bearing value. The Department 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.

L. Item No. 18– FDOT- Furnish and Place 6" Type B-12.5 Over 5 Granular Subbase (LBR 100) (Optional Base Group 9)

Price and payment will be full compensation for all work specified in Section 285 of the specifications, including tack coat between base layers, prime coat, cover material for prime coat, bituminous material used in bituminous plant mix, and cement used in soil-cement.

Where the Plans include a typical cross-section which requires the construction of an asphalt base only, price adjustments for bituminous material provided for in 9-2.1.2 will apply to that typical cross-section. For typical cross-sections which permit the use of asphalt or other materials for construction of an optional base, price adjustments for bituminous material provided for in 9-2.1.2 of Section 9 in the FDOT Specifications will not apply.

M. Item No. 19– FDOT- Superpave Structural Course

Price and payment will be full compensation for all work specified in Section 334 of the specifications.

N. Item No. 20– FDOT- Asphalt Concrete Friction Courses

Price and payment will be full compensation for all work specified in Section 337 of the specifications.

O. Item No. 21– FDOT- Milling of Existing Asphalt Pavement

Price and payment will be full compensation for all work specified in Section 327, including hauling off and stockpiling or otherwise disposing of the milled material.

P. Item No. 22– Compaction/ Stabilization of 12”Subgrade

Payment for compacting/stabilizing of subgrade will be made at the unit price per square yard, which price shall constitute full compensation for handling, cleaning, positioning and compacting of said bedding to a LBR meeting jurisdictional standards and in compliance with contract plans, test reports and specifications, importing fill material and disposal of excess waste or unsuitable material. Payment includes all work performed in furnishing and installing (including compaction of) subgrade in accordance with Florida Department of Transportation (FDOT) standards and requirements.

Q. Item No. 23– Furnish and place 8-inch Limerock Base Material

Payment for furnishing and placing of lime rock base material will be made at the unit price per square yard at the depth indicated on the plans, which price shall constitute full compensation for applying prime coat and furnishing all such material, in place, including all transportation, handling, cleaning, positioning and compacting of said bedding to applicable jurisdictional requirements and excavation and disposal of waste or unsuitable material (including those determined to be contaminated material by certified geotechnical findings).
Payment includes all work performed in furnishing and installing (including placement and compaction of) lime rock base material in accordance with Florida Department of Transportation (FDOT) standards and requirements.

R. Item No. 24– Furnish and place 1-inch Asphaltic Concrete Course

Payment for placement of asphalt concrete pavement and the thickness indicated will be made per ton for such placement as named and at the thickness indicated in the construction plans which price will constitute full compensation for applying a Florida Department of Transportation (FDOT) approved tack coat between placement lifts, applying a Florida Department of Transportation (FDOT) approved prime coat on the base course prior to placement asphalt courses / lifts and furnishing, placing and compacting all asphalt surface, complete in place to the cross section and thickness shown on the drawings; including restoration of traffic loop detectors, placement of necessary tonnage of temporary asphalt pavement, temporary pavement markings, milling and saw cutting of all pavement and all cleanup of the area disturbed by this construction as demarcated on construction drawings.
Payment includes all work performed in furnishing and installing (including placement and compaction of asphalt concrete in accordance with Miami-Dade Public Works Department

S. Item No. 25– Mill 1-inch Asphaltic Concrete Course

Payment shall constitute full compensation for milling the existing pavement and shall include removal of RPMs and existing thermoplastic and paint striping, curb milling, utility covers, manhole covers and valve adjustment.

T. Item No. 26– Installation of Stamped Concrete

Payment includes all work performed in furnishing and installing stamped concrete at the unit price per square foot.

U. Item No. 27– Restoring Sod Areas

Payment for furnishing and placing topsoil and sod will be made at the unit price per square yard of topsoil which price shall constitute full compensation for furnishing and placing the topsoil.

V. Item No. 28– Restoring Concrete Areas

Payment for furnishing and installing sidewalks, driveways and curbs will be made at the unit price per square yard, which price shall constitute full compensation for completing said work, including all earthwork, clearing compaction of subgrade, backfilling of sidewalk, driveway and curb, construction of the sidewalk, driveway and curb, furnishing and setting for expansion joint material, disposal of excess material, and all other appurtenant and miscellaneous items and work.

W. Item No. 29– Detectable warnings

Payment for furnishing and installing each detectable warning, complete as shown on the Plans.

X. Item No. 30– Replace Pavement Markings

Payment for furnishing and placing pavement markings will be made as a lump sum. It includes placing pavement markings as indicated on the plans, additional pavement marking affected during construction and the furnishing and installation of reflective pavement markers.

Y. Item No. 31 – Mobilization and Site Preparation

Payment for mobilization and site preparation as needed, for installation of the force main will be made at the contract aggregate sum entered in the proposal, which sum shall be full compensation for furnishing all labor, tools, construction, including but not limited to site preparation, protection of existing utilities during construction, adherence to Trench Safety Act, as shown on the drawings necessary for completion of the item. Since this item is bid as an aggregate sum, no special provisions for measurement will be necessary.

Z. Item No. 32– Maintenance of Traffic

Payment for maintenance of traffic will be made at the contract aggregate sum entered therefore in the proposal. This payment includes all items required to safely maintain traffic throughout a transportation work zone with minimal inconvenience to the public.

END OF SECTION

SECTION 01040

COORDINATION

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall allow the CITY and/or his agents to enter upon the work area for the purpose of inspecting the project. The CONTRACTOR shall cooperate with all aforesaid parties.

B. Each Contractor shall cooperate fully with the CITY, the ENGINEER, FDOT and all other authorities having jurisdiction, to effect proper coordination and progress to complete the project on schedule and in proper sequence. Insofar as possible, decisions of all kinds required from the ENGINEER shall be anticipated by the Contractor to provide ample time for inspection, or the preparation of instructions.

C. The CONTRACTOR shall assume full responsibility for the correlation of all parts of his work with that of other sub-contractors. The CONTRACTOR'S superintendent shall correlate all work with other sub-contractors in the laying out of work. The Contractor shall lay out his own work in accordance with the Drawings, Specifications, and instructions of latest issue.

PART 2 – PRODUCTS – NOT USED

PART 3 – EXECUTION – NOT USED

END OF SECTION

Page Intentionally Left Blank

SECTION 01080

ABBREVIATIONS AND DEFINITIONS

PART 1 - GENERAL

1.01 RELATED SECTIONS:

A. Front End Bid Documents

B. Section 01090: Reference Standards

1.02 ABBREVIATIONS:

A. Where any of the following abbreviations are used in the Contract Documents, they shall have the meaning set forth opposite each. Abbreviations for trade associations and standards organizations are listed in Section 01090 - Reference Standards.

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AFBMA	Anti-Friction Bearing Manufacturers Association
AGA	American Gas Association
AGMA	American Gear Manufacturers Association
AISC	American Institute of Steel Construction
AMCA	Air Moving and Conditioning Association
ANS	American National Standard
ANSI	American National Standards Institute
API	American Petroleum Institute
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers

ASTM	American Society for Testing and Materials
AWG	American or Brown and Sharpe Wire Gage
AWPA	American Wood-Preservers' Association
AWWA	American Water Works Association
CS	Commercial Standard
IBR	Institute of Boiler and Radiator Manufacturers
IEEE	Institute of Electrical and Electronics Engineers, Inc.
Fed. Spec.	Federal Specifications issued by the Federal Supply Service of the General Services Administration, Washington, D.C.
IPS	Iron Pipe Size
JIC	Joint Industry Conference Standards
NBS	National Bureau of Standards
NEC	National Electrical Code; latest edition
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NPT	National Pipe Thread
OS&Y	Outside screw and yoke
SMACNA	Sheet Metal and Air Conditioning Contractors National Association, Inc.
Stl. WG	U. S. Steel Wire, Washburn and Moen, American Steel and Wire or Roebling Gage
UL	Underwriters' Laboratories
USS Gage	United States Standard Gage
WOG	Water, Oil, Gas
WSP	Working steam pressure

125-lb. ANS	American National Standard for Cast-Iron
or	Pipe Flanges and Flanged Fittings,
250-lb. ANS	Designation B16.1-1975, for the appropriate class

1.03 DEFINITIONS:

A. Wherever the words defined in this section or pronouns used in their stead occur in the Contract Documents, they shall have the meanings herein given.

As Directed, as Required, Etc.

Wherever in the Contract Documents, or on the Drawings, the words "as directed," "as ordered," "as requested," "as required," "as permitted," or words of like import are used, it shall be understood that the direction, order, request, requirement, or permission of the Engineer is intended. Similarly, the words "approved," "acceptable," "suitable," "satisfactory," and words of like import shall mean approved by, acceptable to, suitable to, or satisfactory to the Engineer.

Provide

Wherever in the Contract Documents the word "provide" is used, it shall mean to furnish (or supply) and install.

Elevation

The figures given on the Drawings or in the other Contract Documents after the word "elevation" or abbreviation of it shall mean the distance in feet above the datum adopted by the Engineer.

Rock

The word "rock," wherever used as the name of an excavated material or material to be excavated, shall mean only boulders and pieces of concrete or masonry exceeding 1 cu. yd. in volume, or solid ledge rock which, in the opinion of the Engineer, requires, for its removal, drilling and blasting, wedging, sledging, barring, or breaking up with a power-operated tool. No soft or disintegrated rock which can be removed with a hand pick or power-operated excavator or shovel, no loose, shaken, or previously blasted rock or broken stone in rock fillings or elsewhere, and no rock exterior to the maximum limits of measurement allowed, which may fall into the excavation, will be measured or allowed as "rock."

Earth

The word "earth", wherever used as the name of an excavated material or material to be excavated, shall mean all kinds of material other than rock as above defined.

City or Owner

The word "City" or “Owner”, wherever used as the name, shall mean the City of North Miami including but not limited to City Government, Public Services Department and their Engineers and Staff.

Engineer

The word "Engineer", wherever used as the name, shall mean EAC Consulting, Inc. as the Engineer of Record or his/her designee.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01090

REFERENCE STANDARDS

PART 1 - GENERAL

1.01 QUALITY ASSURANCE:

A. Should specified reference standards conflict with the Contract Documents, bring to the attention of the Owner and Engineer.

1.02 SCHEDULE OF REFERENCES:

AA	Aluminum Association 818 Connecticut Avenue, N.W. Washington, DC 20006
AABC	Associated Air Balance Council 1000 Vermont Avenue, N.W. Washington, DC 20005
AASHTO	American Association of State Highway and Transportation Officials 444 North Capitol Street, N.W. Washington, DC 20001
ABMA	American Bearing Manufacturers Association 1101 Connecticut Avenue, N.W., Suite 700 Washington, DC 20036
ACI	American Concrete Institute Box 19150 Reford Station Detroit, MI 48219
ADC	Air Diffusion Council 230 North Michigan Avenue Chicago, IL 60601
AGA	American Gas Association
AGC	Associated General Contractors of America 1957 E Street, N.W. Washington, DC 20006

AI	Asphalt Institute Asphalt Institute Building College Park, MD 20740
AIA	American Institute of Architects 1735 New York Avenue, N.W. Washington, DC 20006
AISC	American Institute of Steel Construction Eighth Floor 400 North Michigan Avenue Chicago, IL 60611
AISI	American Iron and Steel Institute 1000 16th Street, N.W. Washington, DC 20036
AITC	American Institute of Timber Construction 333 W. Hampden Avenue Englewood, CO 80110
AMCA	Air Movement and Control Association 30 West University Drive Arlington Heights, IL 60004
ANSI	American National Standards Institute 1430 Broadway New York, NY 10018
APA	American Plywood Association Box 11700 Tacoma, WA 98411
API	American Petroleum Institute 1220 L. Street, N.W. Washington, DC 2005
ARI	Air-Conditioning and Refrigeration Institute 1501 Wilson Boulevard Arlington, VA 22209
ASCE	American Society of Civil Engineers 1801 Alexander Bell Drive Reston, VA 20191

ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers 1791 Tullie Circle, N.E. Atlanta, GA 30329
ASME	American Society of Mechanical Engineers 345 East 47th Street New York, NY 10017
ASPA	American Sod Producers Association 4415 West Harrison Street Hillside, IL 60162
ASTM	American Society for Testing and Materials 1916 Race Street Philadelphia, PA 19103
AWI	Architectural Woodwork Institute 2310 South Walter Reed Drive Arlington, VA 22206
AWPA	American Wood-Preservers' Association 7735 Old Georgetown Road Bethesda, MD 20014
AWS	American Welding Society 550 LeJeune Road, N.W. Miami, FL 33135
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235
BIA	Brick Institute of America 11490 Commerce Park Drive Reston, VA 22091
BOCA	BOCA International Headquarters Office 4051 West Flossmoor Road Country, Club Hills, IL 60478-5795
CDA	Copper Development Association 57th Floor, Chrysler Building 405 Lexington Avenue New York, NY 10174

CLFMI	Chain Link Fence Manufacturers Institute 1101 Connecticut Avenue, N.W. Washington, DC 20036
CRSI	Concrete Reinforcing Steel Institute 933 Plum Grove Road Schaumburg, IL 60195
DHI	Door and Hardware Institute 7711 Old Springhouse Road McLean, VA 22101
EJCDC	Engineers' Joint Contract Documents Committee American Consulting Engineers Council 1015 15th Street, N.W. Washington, DC 20005
EJMA	Expansion Joint Manufacturers Association 25 North Broadway Tarrytown, NY 10591
FGMA	Flat Glass Marketing Association 3310 Harrison White Lakes Professional Building Topeka, KS 66611
FM	Factory Mutual System 1151 Boston-Providence Turnpike P.O. Box 688 Norwood, MA 02062
FS	Federal Specification General Services Administration Specifications and Consumer Information Distribution Section (WRSIS) Washington Navy Yard, Building 197 Washington, DC 20407
GA	Gypsum Association 1603 Orrington Avenue Evanston, IL 60201
JIC	Joint Industrial Council c/o National Machine Tool Builders Association 79-1 Westpark Drive McLean, VA 22102

IBR	Institute of Boiler and Radiator Manufacturers a/k/a Hydronics Institute P.O. Box 218 35 Russo Place Berkeley Heights, NJ 07922
ICBO	International Conference of Building Officials 5360 S. Workman Mill Road Whittier, CA 90601
ICEA	Insulated Cable Engineers Association Box 1568 Carrollton, GA 30112
IEEE	Institute for Electrical and Electronics Engineers 3 Park Ave 17th Floor New York, NY 10016-5997
IMIAC	International Masonry Industry All-Weather Council International Masonry Institute 815 15th Street, N.W. Washington, DC 20005
MBMA	Metal Buildings Manufacturer's Association 1230 Keith Building Cleveland, OH 44115
MEC	Massachusetts Electric Code
MIL	Military Specifications Naval Publications and Forms Center 5801 Tabor Avenue Philadelphia, PA 19120
ML/SFA	Metal Lath/Steel Framing Association 221 North LaSalle Street Chicago, IL 60601
NAAMM	National Association of Architectural Metal Manufacturers 221 North LaSalle Street Chicago, IL 60601
NCMA	National Concrete Masonry Association P.O. Box 781 Hendron, VA 22070

NEBB	National Environmental Balancing Bureau 8224 Old Courthouse Road Vienna, VA 22180
NEC	National Electric Code
NECA	National Electrical Contractors Association 3 Belhesda Metro Center Suite 1100 Bethesda, MD 20814
NEMA	National Electrical Manufacturers' Association 1300 N 17th Street Suite 1847 Rosslyn VA 22209
NETA	InterNational Electrical Testing Association 106 Stone St. P.O. Box 687 Morrison, CO 80465
NFPA	National Fire Protection Association Battery March Park Quincy, MA 02269
NFPA	National Forest Products Association 1619 Massachusetts Avenue, N.W. Washington, DC 20036
NSWMA	National Solid Wastes Management Association 1730 Rhode Island Avenue, N.W. Washington, DC 20036
NTMA	National Woodwork Manufacturers Association 205 W. Touhy Avenue Park Ridge, IL 60068
PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 60077
PCI	Prestressed Concrete Institute 201 North Wells Street Chicago, IL 60606

PS	Product Standard U.S. Department of Commerce Washington, DC 20203
RIS	Redwood Inspection Service One Lombard Street San Francisco, CA 94111
RCSHSB	Red Cedar Shingle and Handsplit Shake Bureau 515 116th Avenue Bellevue, WA 98004
SDI	Steel Deck Institute P.O. Box 9506 Canton, OH 44711
SDI	Steel Door Institute 712 Lakewood Center North 14600 Detroit Avenue Cleveland, OH 44107
SIGMA	Sealed Insulating Glass Manufacturers Association 111 East Wacker Drive Chicago, Il 60601

END OF SECTION

Page Intentionally Left Blank

SECTION 01110

ENVIRONMENTAL PROTECTION PROCEDURES

PART 1 - GENERAL

1.01 SCOPE OF WORK:

A. The work covered by this Section consists of furnishing all labor materials and equipment and performing all work required for the prevention of environmental pollution in conformance with applicable laws and regulations, during and as the result of construction operations under this Contract. For the purpose of this Specification, environmental pollution is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environment for aesthetic and/or recreational purposes.

B. The control of environmental pollution requires consideration of air, water, and land, and involves management of noise and solid waste, as well as other pollutants.

C. Schedule and conduct all work in a manner that will minimize the erosion of soils in the area of the work. Provide erosion control measures such as diversion channels, sedimentation or filtration systems, berms, staked hay bales, seeding, mulching, or other special surface treatments as are required to prevent silting and muddying of streams, rivers, impoundments, lakes, etc. All erosion control measures shall be in place in an area prior to any construction activity in that area. Specific requirements for erosion and sedimentation controls are specified in Section 01568.

D. These Specifications are intended to ensure that construction is achieved with a minimum of disturbance to the existing ecological balance between a water resource and its surroundings. These are general guidelines. It is the Contractor's responsibility to determine the specific construction techniques to meet these guidelines.

E. All phases of sedimentation and erosion control shall comply with and be subject to the approval of the Florida Department of Environmental Protection and local Conservation Commission.

F. Schedule and conduct all work in a manner that will minimize the level of noise escaping the site, especially at night and on weekends.

1.02 APPLICABLE REGULATIONS:

A. Comply with all applicable Federal, State, and local laws and regulations concerning environmental pollution control and abatement.

1.03 NOTIFICATIONS:

A. The Engineer will notify the Contractor in writing of any non-compliance with the foregoing provisions or of any environmentally objectional acts and corrective action to be taken. State or local agencies responsible for verification of certain aspects of the environmental protection requirements shall notify the Contractor in writing, through the Engineer, of any non-compliance with State or local requirements. The Contractor shall, after receipt of such notice from the Engineer or from the regulatory agency through the Engineer, immediately take corrective action. Such notice, when delivered to the Contractor or his authorized representative at the site of the work, shall be deemed sufficient for the purpose. If the Contractor fails or refuses to comply promptly, the Owner may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs or damages by the Contractor unless it is later determined that the Contractor was in compliance.

1.04 IMPLEMENTATION:

A. Prior to commencement of the work, meet with the City, FDOT and Engineer to develop mutual understandings relative to compliance with this provision and administration of the environmental pollution control program.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 EROSION CONTROL:

A. Provide positive means of erosion control such as shallow ditches around construction to carry off surface water. Erosion control measures such as siltation basins, hay check dams, mulching, jute netting, and other equivalent techniques shall be used as appropriate and/or the equivalent per FDOT's erosion control measures. Offsite surface water shall be diverted around the site to a downstream channel ahead of siltation barriers. Flow of surface water into excavated areas shall be prevented. Ditches around construction area shall also be used to carry away water resulting from dewatering of excavated areas. At the completion of the work, ditches shall be backfilled and the ground surface restored to original condition.

3.02 PROTECTION OF STREAMS, WETLANDS, AND SURFACE WATER:

A. Care shall be taken to prevent or reduce to a minimum any damage to any stream, drainage ditch, storm drain of sewer from pollution by debris, sediment, or other material, or from the manipulation of equipment and/or materials in or near such streams. Water that has been used for washing or processing, or that contains oils or sediments that will reduce the quality of the water in the stream, shall not be directly returned to the stream.

Such water will be diverted through a settling basin or filter before being directed into the streams.

B. All preventative measures shall be taken to avoid spillage of petroleum products and other pollutants. In the event of any spillage, prompt remedial action shall be taken in accordance with a contingency action drawing or plan approved by the Florida Department of Environmental Protection. Contractor shall submit to copies of approved contingency drawings or plans to the Engineer.

C. Water being flushed from structures or pipelines after disinfection, with a Cl2 residue of 2 mg/l or greater, shall be treated with a dechlorination solution, in a method approved by the Engineer, prior to discharge.

3.03 PROTECTION OF LAND RESOURCES:

A. Land resources within the project boundaries and outside the limits of permanent work shall be restored to a condition, after completion of construction, that will appear to be natural and not detract from the appearance of the project. Confine all construction activities to areas shown on the Drawings.

B. Outside of areas requiring earthwork for the construction of the new facilities, the Contractor shall not deface, injure, or destroy trees or shrubs, nor remove or cut them without prior approval. No ropes, cables, or guys shall be fastened to or attached to any existing nearby trees for anchorage unless specifically authorized by the Engineer. Where such special emergency use is permitted, first wrap the trunk with a sufficient thickness of burlap or rags over which softwood cleats shall be tied before any rope, cable, or wire is placed. The Contractor shall in any event be responsible for any damage resulting from such use.

C. Where trees may possibly be defaced, bruised, injured, or otherwise damaged by the Contractor's equipment, dumping or other operations, protect such trees by placing boards, planks, or poles around them. Monuments and markers shall be protected similarly before beginning operations near them.

D. Any trees or other landscape feature scarred or damaged by the Contractor's equipment or operations shall be restored as nearly as possible to its original condition. The Engineer will decide what method of restoration shall be used and whether damaged trees shall be treated and healed or removed and disposed of.

All scars made on trees by equipment, construction operations, or by the removal of limbs larger than 1-in. in diameter shall be coated as soon as possible with an approved tree wound dressing. All trimming or pruning shall be performed in an approved manner by experienced workmen with saws or pruning shears. Tree trimming with axes will not be permitted.

Trees that are to remain, either within or outside established clearing limits, that are subsequently damaged by the Contractor and are beyond saving in the opinion of the Engineer, shall be immediately removed and replaced.

E. The locations of the Contractor's storage, and other construction building, required temporarily in the performance of the work, shall be cleared portions of the job site or areas to be cleared as shown on the Drawings and shall require written approval of the City and/or FDOT and shall not be within wetlands or floodplains. The preservation of the landscape shall be an imperative consideration in the selection of all sites and in the construction of buildings.

F. Remove all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess of waste materials, or any other vestiges of construction as directed by the Engineer. It is anticipated that excavation, filling, and plowing of roadways will be required to restore the area to near natural conditions which will permit the growth of vegetation thereon. The disturbed areas shall be prepared and seeded as described in Section 01568, or as approved by the Engineer.

G. All debris and excess material will be disposed of outside wetland or floodplain areas in an environmentally sound manner.

3.04 PROTECTION OF AIR QUALITY:

A. Burning. The use of burning at the project site for the disposal of refuse and debris will not be permitted.

B. Dust Control. The Contractor will be required to maintain all excavations, embankments, stockpiles, access roads, plant sites, waste areas, borrow areas, and all other work areas within or without the project boundaries free from dust which could cause the standards for air pollution to be exceeded, and which would cause a hazard or nuisance to others.

C. An approved method of stabilization consisting of sprinkling or other similar methods will be permitted to control dust. .

D. Sprinkling, to be approved, must be repeated at such intervals as to keep all parts of the disturbed area at least damp at all times, and the Contractor must have sufficient competent equipment on the job to accomplish this if sprinkling is used. Dust control shall be performed as the work proceeds and whenever a dust nuisance or hazard occurs, as determined by the Engineer.

3.05 MAINTENANCE OF POLLUTION CONTROL FACILITIES DURING CONSTRUCTION:

A. During the life of this Contract, maintain all facilities constructed for pollution control as long as the operations creating the particular pollutant are being carried out or until the

material concerned has become stabilized to the extent that pollution is no longer being created.

3.06 NOISE CONTROL:

A. The Contractor shall make every effort to minimize noises caused by his operations. Equipment shall be equipped with silencers or mufflers designed to operate with the least possible noise in compliance with State and Federal (OSHA) regulations.

END OF SECTION

Page Intentionally Left Blank

SECTION 01200

PROJECT MEETINGS

PART 1 - GENERAL

1.01 PRECONSTRUCTION CONFERENCE:

A. A preconstruction meeting will be held between the Contractor, the Engineer, and the Owner to review the Contractor's proposed methods of complying with the requirements of the Contract Documents.

B. Contractor will be notified of the time, date and place where the preconstruction conference will be held.

1.02 PROGRESS MEETINGS WITH ENGINEER:

A. In addition to other regular project meetings for other purposes (as indicated elsewhere in the Contract Documents), The Contractor will hold general progress meetings twice each month with times coordinated with preparation of payment requests unless otherwise noted by the Owner. Meeting dates shall be established by the Owner. Require every entity involved in the planning, coordination or performance of work to be properly represented at each meeting. Include (when applicable) consultants, separate contractors (if any), principal subcontractors, suppliers/ manufacturers/fabricators, governing authorities, insurers, special supervisory personnel and others with an interest or expertise in the progress of the work. Review each entity's present and future needs including interface requirements, time, sequence, deliveries, access, site utilization, temporary facilities and services, hours of work, hazards and risks, housekeeping, submittals, change orders, and documentation of information for payment requests. Discuss whether each element of current work is ahead of schedule. Determine how behind-time work will be expedited and secure commitments from the entities involved in doing so. Discuss whether schedule revisions are required to ensure that current work and subsequent work will be completed within the Contract Time. Review everything of significance which could affect the progress of the work.

B. Within seven days after each progress meeting date, the Owner will forward copies of the minutes-of-the-meeting, to the Contractor.

C. Immediately following each progress meeting where revisions to the Progress Schedule/Critical Path Schedule have been made or recognized (regardless of whether agreed to by each entity represented), revise the Schedule. Reissue revised Schedule within 10 days after meeting. At intervals matching the preparation of payment requests, revise and reissue the Schedule to show actual progress of the work in relation to the latest revision of the Schedule.

END OF SECTION

Page Intentionally Left Blank

SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.01 DESCRIPTION:

A. This Section specifies the general methods and requirements of submissions applicable to the following work-related submittals.

1. Shop Drawings.

2. Product Data.

3. Samples.

B. Detailed submittal requirements will be specified in the technical specifications section.

1.02 SHOP DRAWINGS, PRODUCT DATA, SAMPLES:

A. Shop Drawings:

1. Shop drawings, as specified in individual work Sections include, but are not necessarily limited to: custom-prepared data such as fabrication and erection/installation (working) drawings of concrete reinforcement, structural details and piping layout, scheduled information, setting diagrams, actual shopwork manufacturing instructions, custom templates, special wiring diagrams, coordination drawings, individual system or equipment inspection and test reports including performance curves and certifications as applicable to the work.

2. All shop drawings shall be submitted using the transmittal form with the contractor’s letterhead and shall itemize each shop drawing being submitted.

3. All shop drawings submitted by subcontractors for approval shall be sent directly to the Contractor for checking. The Contractor shall be responsible for their submission at the proper time so as to prevent delays in delivery of materials.

4. The Contractor shall check all sub-contractor's shop drawings regarding measurements, size of members, materials, and details to satisfy himself that they conform to the intent of the Drawings and Specifications. Shop drawings found to be inaccurate or otherwise in error shall be returned to the subcontractors for correction before submission thereof.

5. All details on shop drawings submitted for approval shall show clearly the relation of the various parts of the main members and lines of the structure, and where correct fabrication of the work depends upon field measurements, such measurements shall be made and noted on the drawings before being submitted for approval.

B. Product Data:

1. Product data as specified in individual Sections, include, but are not necessarily limited to, standard prepared data for manufactured products (sometimes referred to as catalog data), such as the manufacturer's product specification and printed installation instructions, availability of colors and patterns, manufacturer's printed statements of compliances including certificates of compliance and applicability, roughing-in diagrams and templates, catalog cuts, product photographs, standard wiring diagrams, printed performance curves and operational-range diagrams, production or quality control inspection and test reports and certifications and recommended spare-parts listing, and printed product warranties, as applicable to the Work.

C. Samples:

1. Samples specified in individual Sections, include, but are not necessarily limited to, physical examples of the work such as sections of manufactured or fabricated work, small cuts or containers of materials, complete units of repetitively-used products, color/texture/pattern swatches and range sets, specimens for coordination of visual effect, graphic symbols, and units of work to be used by the Engineer or Owner for independent inspection and testing, as applicable to the Work.

1.03 CONTRACTOR'S RESPONSIBILITIES:

A. The Contractor shall review shop drawings, product data and samples, including those by subcontractors, prior to submission to determine and verify the following:

1. Field measurements

2. Field construction criteria

3. Catalog numbers and similar data

4. Conformance with the Specifications

B. Each shop drawing, sample, and product data submitted by the Contractor shall have affixed to it the following Certification Statement including the Contractor's Company name and signed by the Contractor: "Certification Statement: by this submittal, I hereby represent that I have determined and verified all field measurements, field construction

criteria, materials, dimensions, catalog numbers and similar data, and I have checked and coordinated each item with other applicable approved shop drawings and all Contract requirements." Shop drawings and product data sheets 11-in. X 17-in. and smaller shall be bound together in an orderly fashion and bear the above Certification Statement on the cover sheet. The cover sheet shall fully describe the packaged data and include a listing of all items within the package. Provide to the Owner and Engineer a copy of each submittal transmittal form for shop drawings, product data and samples at the time of submittal of said drawings, product data and samples to the Engineer.

C. If a shop drawing shows any deviation from the requirements of the Contract Documents, the Contractor shall make specific mention of the deviations provide a description of the deviations in a letter attached to the submittal.

D. The review and approval of shop drawings, samples or product data by the Engineer shall not relieve the Contractor from his responsibility with regard to the fulfillment of the terms of the Contract. All risks of error and omission are assumed by the Contractor and the Owner and Engineer will not have responsibility therefor.

E. No portion of the work requiring a shop drawing, sample, or product data shall be started nor shall any materials be fabricated or installed prior to the approval or qualified approval of such item. Fabrication performed, materials purchased or on-site construction accomplished which does not conform to approved shop drawings and data shall be at the Contractor's risk. The Owner will not be liable for any expense or delay due to corrections or remedies required to accomplish conformity.

F. Project work, materials, fabrication, and installation shall conform with approved shop drawings, applicable samples, and product data.

1. Manufacturer’s printed installation instructions, a part of product data submitted to the Engineer will not be reviewed and are for informational purposes <u>only</u>.

1.04 SUBMISSION REQUIREMENTS:

A. Make submittals promptly in accordance with approved schedule, and in such sequence as to cause no delay in the Work or in the work of any other contractor.

B. All submittals shall be submitted sufficiently in advance of construction requirements to provide no less than fourteen working days, excluding Saturdays, Sundays and legal holidays for review from the time received at the Engineer’s reviewing office. For submittals of major equipment, that require more than fourteen days to review, due to its sheer complexity and amount of detail and also requiring review by more than one engineering discipline, a letter will be sent by the Project Manager or his/her designee to the Contractor informing him/her of the circumstances and the date it is expected the submittal will be returned to the Contractor.

C. Number of submittals required:

1. Shop Drawings: Unless otherwise stated in the respective Specifications Sections, submit six (6) copies.

2. Product Data: Unless otherwise stated in the respective Specifications submit six (6) copies.

3. Samples: Submit the number stated in the respective Specification Sections.

D. Submittals shall contain:

1. The date of submission and the dates of any previous submissions.

2. The Project title and number.

3. Contractor identification.

4. The names of:

a. Contractor

b. Supplier

c. Manufacturer

5. Identification of the product, with the specification section number, page and paragraph(s).

6. Field dimensions, clearly identified as such.

7. Relation to adjacent or critical features of the Work or materials.

8. Applicable standards, such as ASTM or Federal Specification numbers.

9. Identification of deviations from Contract Documents.

10. Identification of revisions on resubmittals.

11. An 8-in. X 3-in. blank space for Contractor and Engineer stamps.

E. Each shipment of drawings shall be accompanied by a transmittal form furnished by the Engineer providing a list of the drawing numbers and the names mentioned above.

F. Submittals shall be separated by specification section. Do not combine submittals for different specification sections under the same transmittal.

1.05 REVIEW OF SHOP DRAWINGS, PRODUCT DATA, WORKING DRAWINGS AND SAMPLES:

A. The Engineer's review is for general conformance with the design concept and contract drawings. Markings or comments shall not be construed as relieving the Contractor from compliance with the contract plans and specifications or from departures therefrom. The Contractor remains responsible for details and accuracy, for coordinating the work with all other associated work and trades, for selecting fabrication processes, for techniques of assembly, and for performing work in a safe manner.

B. The review of shop drawings, data, and samples will be general. They shall not be construed:

1. as permitting any departure from the Contract requirements;

2. as relieving the Contractor of responsibility for any errors, including details, dimensions, and materials;

3. as approving departures from details furnished by the Engineer, except as otherwise provided herein.

C. If the shop drawings, data or samples as submitted describe variations and show a departure from the Contract requirements which the Engineer finds to be in the interest of the Owner and to be so minor as not to involve a change in Contract Price or time for performance, the Engineer may return the reviewed drawings without noting an exception.

D. Two (maximum) copies of shop drawings or product data will be returned to the Contractor via First Class United States Postal Service. Samples will not be returned.

E. Submittals will be returned to the Contractor under one of the action codes indicated and defined on the transmittal form furnished by the Engineer.

F. Resubmittals will be handled in the same manner as first submittals. On resubmittals the Contractor shall direct specific attention, in writing, on the letter of transmittal and on resubmitted shop drawings by use of revision triangles or other similar methods, to revisions other than the corrections requested by the Engineer, on previous submissions. Any such revisions which are not clearly identified shall be made at the risk of the Contractor. The Contractor shall make corrections to any work done because of this type revision that is not in accordance to the Contract Documents as may be required by the Engineer.

G. Partial submittals may not be reviewed. The Engineer will be the only judge as to the completeness of a submittal. Submittals not complete will be returned to the Contractor, and will be considered "Rejected" until resubmitted. The Engineer may at his option

provide a list or mark the submittal directing the Contractor to the areas that are incomplete.

H. If the Contractor considers any correction indicated on the shop drawings to constitute a change to the Contract Documents, the Contractor shall give written notice thereof to the Engineer at least seven working days prior to release for manufacture.

I. When the shop drawings have been completed to the satisfaction of the Engineer, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the Engineer.

1.06 DISTRIBUTION:

A. Distribute reproductions of approved shop drawings and copies of approved product data and samples, where required, to the job site file and elsewhere as directed by the Engineer. Number of copies shall be as directed by the Engineer but shall not exceed 6.

1.07 GENERAL PROCEDURES FOR SUBMITTALS:

A. Coordination of Submittal Times: Prepare and transmit each submittal sufficiently in advance of performing the related work or other applicable activities, or within the time specified in the individual work sections, of the Specifications, so that the installation will not be delayed by processing times including disapproval resubmittal (if required), coordination with other submittals, inspection, testing (off-site and on-site), purchasing, fabrication, delivery and similar sequenced activities. No extension of time will be authorized because of the Contractor's failure to transmit submittals sufficiently in advance of the Work.

1.08 CERTIFICATION FORMS:

A. If specifically required in other Sections of these Specifications, the Contractor shall submit the applicable Certificate of Design for each item required, and in the form attached to this Section, completely filled in and signed and sealed by a registered professional engineer.

1.09 CERTIFICATES OF COMPLIANCE:

A. Certificates of Compliance as required in the specifications shall include and mean certificates, manufacturer’s certificates, certifications, certified copies, letters of certification and certificate of materials.

B. The Contractor shall be responsible for providing Certificates of Compliance as required in the technical specifications. Certificates are required for demonstrating proof of compliance with specification requirements and shall be executed in 6 copies unless otherwise specified. Each certificate shall be signed by an official authorized to certify on behalf of the manufacturing company and shall contain the name and address of the Supplier, the project name and location, and the quantity and date or dates of shipment or

delivery to which the certificates apply. Copies of laboratory test reports submitted with certificates shall contain the name and address of the testing laboratory and the date or dates of the tests to which the report applies. Certification shall not be construed as relieving the Supplier from furnishing satisfactory material, if after tests are performed on selected samples, the material is found not to meet the specific requirements.

CERTIFICATE OF DESIGN

The undersigned hereby certifies that he/she is a Professional Engineer registered in the state of _____ and that he/she has been employed by (Name of Contractor) _____ to design _____ in accordance with Specifications Section _____ for the (Name of Project) _____ The undersigned further certifies that he/she has performed similar designs previously and has performed the design of the _____; that said design is in conformance with all applicable local, state, and federal codes, rules, and regulations and professional practice standards; that his/her signature and Professional Engineer (P.E.) Stamp have been affixed to all calculations and drawings used in, and resulting from, the design; and that the use of that stamp signifies the responsibility of the undersigned for that design.

The undersigned hereby certifies that he/she has Professional Liability Insurance with limits of $1,000,000.00 and a Certificate of Insurance is attached.

The undersigned hereby agrees to make all original design drawings and calculations available to the Town/City of _____ or Owner's representative within seven (7) days following written request therefore by the Owner.

_____	_____
P.E. Name	Contractor's Name
_____	_____
Signature	Signature
_____	_____
Title	Title
_____	_____
Address	Address

CERTIFICATE OF UNIT RESPONSIBILITY
For Specification Section _____

_____
(Section title)

In accordance with Section 01300, paragraph 1.08 of the contract documents, the undersigned manufacturer accepts unit responsibility for all components of equipment furnished under specification Section _____. We hereby certify that these components are compatible and comprise a functional unit suitable for the specified and indicated performance and design requirements.

_____ _____
Notary Public Name of Corporation

_____ _____
Commission expiration date Address

Seal: By: _____
Duly Authorized Official

_____
Legal Title of Official

Date: _____

END OF SECTION

Page Intentionally Left Blank

SECTION 01310

CONSTRUCTION PROGRESS SCHEDULES

PART 1 - GENERAL

1.01 DESCRIPTION:

A. CONTRACTOR shall prepare and submit to the City for review within 30 days after Notice to Proceed, a construction progress schedule.

B. No work shall be done between 6:00 p.m. and 8:00 a.m. nor on weekends or legal holidays without written permission of OWNER. However, emergency work may be done without prior permission.

C. Night work may be established by CONTRACTOR as regular procedure with written permission of OWNER. Such permission, however, may be revoked at any time by OWNER if CONTRACTOR fails to maintain adequate equipment and supervision for proper prosecution and control of work at night.

1.02 FORM OF SCHEDULES:

A. Prepare schedules in form of a horizontal bar chart.

Provide separate horizontal bar for each trade or operation.

Horizontal Time Scale: Identify first work day of each week.

Scale and spacing to allow space for notations and future revisions.

B. Format of Listings: Chronological order of start of each item of work.

C. Identification of Listings: By major specification section numbers.

1.03 CONTENT OF SCHEDULES:

A. Construction Progress Schedule:

Show complete sequence of construction by activity.

Show dates for beginning and completion of each major element of construction and installation dates for major items of equipment. Elements shall include, but not be limited to, the following:

Shop drawing receipt from supplier/manufacturer submitted to City, review and return to supplier/manufacturer.

Material and equipment order, manufacturer, delivery, installation, and checkout.

Performance tests and supervisory services activity.

Piping installation.

Backfilling, sodding, paving and markings.

Miscellaneous concrete placement.

Connection to existing sewers.

Final cleanup.

Allowance for inclement weather.

Show projected percentage of completion for each item as of first day of each month.

1.04 SCHEDULE REVISIONS:

A. Every 30 days CONTRACTOR shall revise construction schedule to reflect changes in progress of work.

B. Indicate progress of each activity at date of submittal.

C. Show changes occurring since previous submittal of schedule.

Major changes in scope.

Activities modified since previous submittal.

Revised projections of progress and completion.

Other identifiable changes.

D. Provide a narrative report as needed to define:

Problem areas, anticipated delays, and impact on schedule.

Corrective action recommended and its effect.

1.05 SUBMITTAL REQUIREMENTS:

A. For initial submittal of construction schedule and subsequent revisions thereof, furnish six copies of schedule to ENGINEER.

END OF SECTION

Page Intentionally Left Blank

SECTION 01400

QUALITY ASSURANCE

PART 1 - GENERAL

1.01 DESCRIPTION:

A. This section covers Quality Assurance and Control requirements for this contract.

B. The Contractor is responsible for controlling the quality of work, including work of its subcontractors, and suppliers and for assuring the quality specified in the Technical Specifications is achieved.

C. Refer to the Article 6 - Contractor's Responsibilities, paragraphs 6.01, 6.02, and 6.03.

1.02 CONTRACTOR FURNISHED TESTING LABORATORY SERVICES:

A. An independent commercial testing laboratory acceptable to the Owner and Engineer shall perform all tests that require the services of a laboratory to determine compliance with the Contract Documents. The laboratory shall be staffed with experienced technicians, properly equipped, and fully qualified to perform the tests in accordance with the specified standards.

B. Preliminary Testing Services: The Contractor shall be responsible for all testing laboratory services in connection with concrete materials and mix designs, the design of asphalt mixtures, gradation tests for structural and embankment fills, backfill materials, and all other tests and engineering data required for the Engineer's review of materials and equipment proposed to be used in the Work. The Contractor shall obtain the Engineer's acceptance of the testing laboratory before having services performed, and shall pay all costs for services.

C. The Contractor shall not retain any testing laboratory against which the Owner or the Engineer have reasonable objection, and if at any time during the construction process the services become unacceptable to the Owner, or the Engineer, either the Owner or the Engineer may direct in writing that such services be terminated. The request must be supported with evidence of improper testing or unreasonable delay. If the Engineer determines that sufficient cause exists, the Contractor shall terminate the services and engage a different testing laboratory.

D. Transmittal of Test Reports: Written reports of testing and engineering data furnished by the Contractor for the Engineer's review of materials and equipment proposed to be used in the Work shall be submitted as specified for Shop Drawings.

E. The Contractor's testing laboratory shall furnish four copies of a written report of each test performed by laboratory personnel within three days after each test is completed.

Distribution shall be two copies of each test report to the Engineer's Representative, one copy to the Owner, and one copy for the Contractor.

1.04 QUALITY ASSURANCE:

A. Copies of applicable referenced standards are not included in the Contract Documents. Where copies of standards are needed by the Contractor for superintendence and quality control of the work, the Contractor shall obtain a copy or copies directly from the publication source and maintain at the jobsite, available to the Contractor's personnel, subcontractors, Owner and Engineer

B. Quality of Materials: Unless otherwise specified, all materials and equipment furnished for permanent installation in the Work shall conform to applicable standards and specifications and shall be new, unused, and free from defects and imperfections, when installed or otherwise incorporated in the Work. The Contractor shall not use material and equipment for any purpose other than that intended or specified unless the Engineer authorizes such use.

C. Where so specified, products or workmanship shall also conform to the additional performance requirements included within the Contract Documents to establish a higher or more stringent standard or quality than that required by the referenced standard.

1.06 MATERIALS AND EQUIPMENT:

A. The Contractor shall maintain control over procurement sources to ensure that materials and equipment conform to specified requirements in the Contract Documents.

B. The Contractor shall comply with manufacturer’s printed instructions regarding all facets of materials and/or equipment movement, storage, installation, testing, startup, and operation. Should circumstances occur where the contract documents are more stringent than the manufacturer’s printed instructions, the Contractor shall comply with the specifications. In cases where the manufacturer’s printed instructions are more stringent than the contract documents, the Contractor shall advise the Owner and Engineer of the disparity and conform to the manufacturer’s printed instructions. In either case, the Contractor is to apply the more stringent specification or recommendation, unless approved otherwise by the Engineer.

1.07 SHOP AND FIELD TESTING:

A. The Contractor is responsible for providing advance notice of and access for the shop and field testing specified in the technical specification sections.

B. The Contractor and its Subcontractor shall permit inspections, tests, and other services as required by the Contract Documents.

C. Contractor shall provide twenty one days written notice to the Engineer so that the Engineer may schedule and witness on site tests. The Engineer's witnessing of tests does not relieve the Contractor and/or Subcontractors of their obligation to comply with the requirements of the Contract Documents.

1.08 MANUFACTURER'S FIELD SERVICES:

A. When specified in the technical specifications sections, the Contractor shall arrange for and provide technical representation from manufacturer's of respective equipment, items or components. The manufacturer's representative shall be a factory trained service engineer/technician with the type and length of experience specified in the technical specifications.

1.09 CERTIFICATION FORMS AND CERTIFICATES:

A. The Contractor shall be responsible for submitting the certification forms and certificates in conformance with the requirements specified in Section 01300 - Submittals.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 QUALITY CONTROL:

A. Quality control is the responsibility of the Contractor, and the Contractor shall maintain control over construction and installation processes to assure compliance with specified requirements.

B. Certifications for personnel, procedures, and equipment associated with special processes (e.g., welding, cable splicing, instrument calibration, surveying) shall be maintained in the Contractor's field office, available for inspection by the Engineer. Copies shall be made available to the Engineer upon request.

C. Means and methods of construction and installation processes are the responsibility of the Contractor, and at no time is it the intent of the Engineer to supersede or void that responsibility.

END OF SECTION

SECTION 01500

TEMPORARY FACILITIES

PART 1 - GENERAL

1.01 SCOPE OF WORK:

A. The Contractor shall provide all temporary facilities for the proper completion of the work, as required and as specified.

1.02 SANITARY REGULATIONS:

A. The Contractor shall provide adequate sanitary facilities for the use of those employed on the Work. Such facilities shall be made available when the first employees arrive on the site of the Work, shall be properly secluded from public observation, and shall be constructed and maintained during the progress of the Work in suitable numbers and at such points and in such manner as may be required.

B. The Contractor shall maintain the sanitary facilities in a satisfactory and sanitary condition at all times and shall enforce their use. He shall rigorously prohibit the committing of nuisances on the site of the Work, on the lands of the Owner, or on adjacent property.

1.03 WATER SUPPLY:

A. The Contractor shall make arrangements and pay for all water necessary for completion of construction operations under this contract.

B. For all necessary operations at the site of the work (except as noted in the next paragraph below) the Owner, without charge therefor, shall provide reasonable quantities of water at the then existing pressure from a mutually convenient hydrant of the water distribution system. The Contractor shall furnish all necessary pipe or hose extensions to conduct the water to the points of use and shall exercise due care not to waste water. The Contractor shall not contaminate the water supply and shall comply with all applicable regulations and code requirements.

C. The Owner reserves the right to limit, suspend, or terminate the supplying of water as set forth above should it consider such action to be necessary on account of damage to the distribution system, the necessity of conserving water, or other emergency. In this event, the Contractor shall obtain water from some other approved source, at his own expense.

1.04 ELECTRICAL ENERGY:

A. The Contractor shall make all necessary applications and arrangements and pay all fees and charges for electrical energy for power and light necessary for the proper completion of the Work and during its entire progress. The Contractor shall provide and pay for all temporary wiring, switches, connections, and meters.

B. The Contractor shall pay charges and fees by power company for providing the electrical service and for power used at no additional cost to the Owner.

1. Perform all work in accordance with the power company's requirements and in manner approved by power company.

2. Notify power.

C. The Contractor shall provide sufficient electric lighting so that all work may be done in a workmanlike manner when there is not sufficient daylight.

1.05 PRECAUTIONS DURING ADVERSE WEATHER:

A. During adverse weather and against the possibility thereof, the Contractor shall take all necessary precautions so that the Work may be properly done and satisfactory in all respects.

END OF SECTION

SECTION 01530

PROTECTION OF EXISTING FACILITIES

PART 1 - GENERAL

1.01 WORK INCLUDED

A. The CONTRACTOR shall protect all existing utilities and improvements not designated for removal and shall restore damaged or temporarily relocated utilities and improvements to a condition equal to or better than they were prior to such damage or temporary relocation, all in accordance with requirements of the Contract Documents.

B. The CONTRACTOR shall verify the exact locations and depths of all utilities shown and the CONTRACTOR shall make exploratory excavations of all utilities that may interfere with the Work. All such exploratory excavations shall be performed as soon as practicable after award of Contract and, in any event, a sufficient time in advance of construction to avoid possible delays to the CONTRACTOR's Work. When such exploratory excavations show the utility location as shown to be in error, the CONTRACTOR shall so notify the ENGINEER.

C. The number of exploratory excavations required shall be that number which is sufficient to determine the alignment and grade of the utility.

1.02 RIGHTS-OF-WAY

A. The CONTRACTOR shall not do any Work that would affect any oil, gas, sewer, or water pipeline; any telephone, telegraph, or electric transmission line; any fence; or any other structure, nor shall the CONTRACTOR enter upon the rights-of-way involved until notified by the CITY and or Authority Having Jurisdiction. After authority has been obtained, the CONTRACTOR shall give said party due notice of its intention to begin Work, and shall give said party convenient access and every facility for removing, shoring, supporting, or otherwise protecting such pipeline, transmission line, ditch, fence, or structure, and for replacing same. When 2 or more contracts are being executed at one time on the same or adjacent land in such manner that Work on one contract may interfere with that on another, the CITY shall determine the sequence and order of the Work.

When the territory of one contract is the necessary or convenient means of access for the execution of another contract, such privilege of access or any other reasonable privilege may be granted by the CITY to the CONTRACTOR so desiring, to the extent, amount, in the manner, and at the times permitted. No such decision as to the method or time of conducting the Work or the use of territory shall be made the basis of any claim for delay or damage.

1.03 PROTECTION OF STREET OR ROADWAY MARKERS

A. The CONTRACTOR shall not destroy, remove, or otherwise disturb any existing survey markers or other existing street or roadway markers without proper authorization. No pavement breaking or excavation shall be started until all survey or other permanent marker points that will be disturbed by the construction operations have been properly referenced for easy and accurate restoration. It shall be the CONTRACTOR's

responsibility to notify the proper representatives of the CITY and AHJ of the time and location that Work will be done. Such notification shall be sufficiently in advance of construction so that there will be no delay due to waiting for survey points to be satisfactorily referenced for restoration. All survey markers or points disturbed by the CONTRACTOR without proper authorization by the ENGINEER, will be accurately restored by the CONTRACTOR's expense after all work has been completed.

1.04 RESTORATION OF PAVEMENT

A. General: All paved areas including damaged during construction shall be replaced with similar materials and of equal thickness to match the existing adjacent undisturbed areas, except where specific resurfacing requirements have been called for in the Contract Documents or in the requirements of the agency issuing the permit. All temporary and permanent pavement shall conform to the requirements of the affected pavement owner. All pavements which are subject to partial removal shall be neatly saw cut in straight lines.

B. Temporary Resurfacing: Wherever required by the public authorities having jurisdiction, the CONTRACTOR shall place temporary surfacing promptly after backfilling and shall maintain such surfacing for the period of time fixed by said authorities before proceeding with the final restoration of improvements.

C. Permanent Resurfacing: In order to obtain a satisfactory junction with adjacent surfaces, the CONTRACTOR shall saw cut back and trim the edge so as to provide a clean, sound, vertical joint before permanent replacement of an excavated or damaged portion of pavement. Damaged edges of pavement along excavations and elsewhere shall be trimmed back by saw cutting in straight lines. All pavement restoration and other facilities restoration shall be constructed to finish grades compatible with adjacent undisturbed pavement.

D. Restoration of Sidewalks or Private Driveways: Wherever sidewalks or private roads have been damaged during construction, the CONTRACTOR shall place suitable temporary sidewalks or roadways promptly after backfilling and shall maintain them in satisfactory condition for the period of time fixed by the authorities having jurisdiction over the affected portions before proceeding with the final restoration or, if no such period of times is so fixed, the CONTRACTOR shall maintain said temporary sidewalks or roadways until the final restoration thereof has been made.

1.05 EXISTING UTILITIES AND IMPROVEMENTS

A. General: The CONTRACTOR shall protect all underground utilities and other improvements which may be impaired during construction operations. It shall be the CONTRACTOR's responsibility to ascertain the actual location of all existing utilities and other improvements that will be encountered in its construction operations, and to see that such utilities or other improvements are adequately protected from damage due to such operations. The CONTRACTOR shall take all possible precautions for the protection of unforeseen utility lines to provide for uninterrupted service and to provide such special protection as may be necessary.

B. Utilities to be Moved: In case it shall be necessary to move the property of any public utility or franchise holder, such utility company or franchise holder will, upon request of

the CONTRACTOR, be notified by the CITY to move such property within a specified reasonable time. When utility lines that are to be removed are encountered within the area of operations, the CONTRACTOR shall notify the ENGINEER a sufficient time in advance for the necessary measures to be taken to prevent interruption of service.

C. Where the proper completion of the Work requires the temporary or permanent removal and/or relocation of an existing utility or other improvement which is shown, the CONTRACTOR shall remove and, without unnecessary delay, temporarily replace or relocate such utility or improvement in a manner satisfactory to the ENGINEER and the owner of the facility. In all cases of such temporary removal or relocation, restoration to former location shall be accomplished by the CONTRACTOR in a manner that will restore or replace the utility or improvement as nearly as possible to its former locations and to as good or better condition than found prior to removal.

D. CITY's and FDOT's Right of Access: The right is reserved to the CITY and FDOT and to the owners of public utilities and franchises to enter at any time upon any public street, alley, right-of-way, or easement for the purpose of making changes in their property made necessary by the Work of this Contract.

E. Underground Utilities Shown or Indicated: Existing utility lines that are shown or the locations of which are made known to the CONTRACTOR prior to excavation and that are to be retained, and all utility lines that are constructed during excavation operations shall be protected from damage during excavation and backfilling and, if damaged, shall be immediately repaired by the CONTRACTOR.

F. Underground Utilities Not Shown or Indicated: In the event that the CONTRACTOR damages any existing utility lines that are not shown or the locations of which are not made known to the CONTRACTOR prior to excavation, a written report thereof shall be made immediately to the City and ENGINEER.

G. All costs of locating, repairing damage not due to failure of the CONTRACTOR to exercise reasonable care, and removing or relocating such utility facilities not shown in the Contract Documents with reasonable accuracy, and for equipment on the project which was actually working on that portion of the Work which was interrupted or idled by removal or relocation of such utility facilities, and which was necessarily idled during such Work will be paid for as extra Work.. Compensation shall not include CONTRACTOR's costs for the coordination of his activities with the utility company affected. CONTRACTOR shall schedule his work in such a manner that he is not delayed by the utilities companies relocating or supporting their facilities. No compensation will be paid the CONTRACTOR for any loss of time or delay associated with CONTRACTOR scheduling.

H. Approval of Repairs: All repairs to a damaged improvement are subject to inspection and approval by an authorized representative of the improvement owner before being concealed by backfill or other Work.

I. Maintaining in Service: All power, telephone or other communication cable ducts, gas and water mains, irrigation lines, sewer lines, storm drain lines, poles, and overhead power and communication wires and cables encountered along the line of the Work shall remain continuously in service during all the operations under the Contract, unless other

arrangements satisfactory to the ENGINEER are made with the owner of said pipelines, duct, main, irrigation line, sewer, storm drain, pole, or wire or cable. The CONTRACTOR shall be responsible for and shall repair all damage due to its operations, and the provisions of this Section shall not be abated even in the event such damage occurs after backfilling or is not discovered until after completion of the backfilling.

1.06 TREES WITHIN STREET RIGHTS-OF-WAY AND PROJECT LIMITS

A. General: The CONTRACTOR shall exercise all necessary precautions so as not to damage or destroy any trees or shrubs, including those lying within street rights-of-way and project limits, and shall not trim or remove any trees unless such trees have been approved for trimming or removal by the jurisdictional agency or CITY. All existing trees and shrubs which are damaged during construction shall be trimmed or replaced by the CONTRACTOR or a certified tree company under permit from the jurisdictional agency or CITY and to the satisfaction of said agency and/or the CITY. Tree trimming and replacement shall be accomplished in accordance with the following paragraphs.

B. Trimming: Symmetry of the tree shall be preserved; no stubs or splits or torn branches left; clean cuts shall be made close to trunk or large branch. Spikes shall not be used for climbing live trees. All cuts over 1-1/2 inches in diameter shall be coated with an asphaltic emulsion material.

C. Replacement: The CONTRACTOR shall immediately notify the jurisdictional agency and/or the CITY if any tree is damaged by the CONTRACTOR's operations. If, in the opinion of said agency or the CITY, the damage is such that replacement is necessary, the CONTRACTOR shall replace the tree at its own expense. The tree shall be of a like size and variety as the tree damaged, or, if of a smaller size, the CONTRACTOR shall pay to the CITY of said tree compensatory payment acceptable to the tree owner, subject to the approval of the jurisdictional agency or CITY.

1.07 NOTIFICATION BY THE CONTRACTOR

A. Prior to any excavation in the vicinity of any existing underground facilities, including all water, sewer, storm drain, gas, or other pipelines; all buried electric power, communications, or television cables; all traffic signal and street lighting facilities; and all roadway and state highway rights-of-way the CONTRACTOR shall notify the respective authorities representing the owners or agencies responsible for such facilities not less than 3 days nor more than 7 days prior to excavation so that a representative of said owners or agencies can be present during such Work if they so desire.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

Page Intentionally Left Blank

SECTION 01550

SITE ACCESS AND STORAGE

PART 1 -- GENERAL

1.01 HIGHWAY LIMITATIONS

A. The CONTRACTOR shall make its own investigation of the condition of available public and private roads and of clearances, restrictions, bridge load limits, and other limitations affecting transportation and ingress and egress to the site of the Work. It shall be the CONTRACTOR's responsibility to construct and maintain any haul roads required for its construction operations.

1.02 TEMPORARY CROSSINGS

A. General: Wherever necessary or required for the convenience of the public or individual residents at street or highway crossings, private driveways, or elsewhere, the CONTRACTOR shall provide suitable temporary bridges over unfilled excavations, except in such cases as the CONTRACTOR shall secure the written consent of the individuals or authorities concerned to omit such temporary bridges, which written consent shall be delivered to the CITY prior to excavation. All such bridges shall be maintained in service until access is provided across the backfilled excavation. Temporary bridges for street and highway crossing shall conform to the requirements of the authority having jurisdiction in each case, and the CONTRACTOR shall adopt designs furnished by said authority for such bridges, or shall submit designs to said authority for approval, as may be required.

B. Street Use: Nothing herein shall be construed to entitle the CONTRACTOR to the exclusive use of any public street, alleyway, or parking area during the performance of the Work hereunder, and it shall so conduct its operations as not to interfere unnecessarily with the authorized work of utility companies or other agencies in such streets, alleys, ways, or parking areas. No street shall be closed to the public without first obtaining permission from the CITY and proper governmental authority. Where excavation is being performed in primary streets or highways, one lane in each direction shall be kept open to traffic at all times unless otherwise provided or shown. Toe boards shall be provided to retain excavated material if required by the ENGINEER or the agency having jurisdiction over the street or highway. Fire hydrants on or adjacent to the Work shall be kept accessible to fire-fighting equipment at all times. Temporary provisions shall be made by the CONTRACTOR to assure the use of sidewalks and the proper functioning of all gutters, sewer inlets, and other drainage facilities.

C. Traffic Control: For the protection of traffic in public or private streets and ways, the CONTRACTOR shall provide, place, and maintain all necessary barricades, traffic cones, warning signs, lights, and other safety devices in accordance with the requirements of the Manual of Uniform Traffic Control Devices. The CONTRACTOR shall take all necessary precautions for the protection of the Work and the safety of the public. All barricades and obstructions shall be illuminated at night, and all lights shall be kept burning from sunset

until sunrise if night work is allowed. The CONTRACTOR shall station such guards or flaggers and shall conform to such special safety regulations relating to traffic control as may be required by the public authorities within their respective jurisdictions. All signs, signals, and barricades shall conform to the requirements of the OSHA Safety and Health Standards for Construction.

D. Street Closure: If closure of any street is required during construction, a formal application for a street closure shall be made to the authority having jurisdiction at least 30 days prior to the required street closure in order to determine necessary sign and detour requirements.

1.03 CONTRACTOR'S SITE ACCESS

A. Unless otherwise required by the CITY, delivery and employee access will be via public right of way and/or CITY owned property and such access shall be kept unrestricted.

1.04 CONTRACTOR'S WORK AND STORAGE AREA

A. Storage areas shall be coordinated with the City. Responsibility for protection and safekeeping of equipment and materials at or near the sites will be solely that of the CONTRACTOR and no claim shall be made against the CITY by reasons of any act of an employee or trespasser. Should an occasion arise necessitating access to an area occupied by stored equipment and/or materials, the CONTRACTOR shall immediately move them. No equipment or materials shall be placed upon the CITY's property until it is acceptable to the CITY.

B. If the CONTRACTOR requires additional staging area , then the CONTRACTOR shall obtain such areas from off site sources. The CONTRACTOR shall pay for any off site area he requires.

C. Upon completion of the Contract, the CONTRACTOR shall remove from the storage areas all of their equipment, temporary fencing, surplus materials, rubbish, etc., and restore the areas back to existing conditions.

1.05 TRAFFIC CONTROL

A. The CONTRACTOR shall maintain traffic and protect the public from all damage to persons and property within the Contract Limits, in accordance with all applicable state, local, and city regulations. The CONTRACTOR shall conduct its operations so as to maintain and protect access, for vehicular and pedestrian traffic, to and from all properties and business establishments and joining or adjacent to those streets affected by its operations, and to subject the public to a minimum of delay and inconvenience. Suitable signs, barricades, railing, etc., shall be erected and the Work outlined by adequate lighting at night. Danger lights shall be provided as required. Watchmen and flagmen shall be provided as may be necessary for the protection of traffic.

B. All dirt or debris spilled from the CONTRACTOR's trucks on existing pavements shall be removed by the CONTRACTOR immediately.

1.06 SECURITY

A. The CONTRACTOR shall employ watchmen and security guards to protect the job site against vandalism, burglary, theft, trespassing, etc. The CONTRACTOR shall care for and protect against loss or damage of all material to be incorporated in the construction for the duration of the project and shall repair or replace damaged or lost materials and damage to structures. The CONTRACTOR shall be responsible for providing, maintaining and securing gates used for construction purposes for the duration of the project.

PART 2 -- PRODUCTS (Not Used)

PART 3 -- EXECUTION (Not Used)

END OF SECTION

Page Intentionally Left Blank

SECTION 01560

TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 - GENERAL

1.01 EXPLOSIVES AND BLASTING

A. The use of explosives on the Work will not be permitted.

1.02 DUST ABATEMENT

A. The CONTRACTOR shall furnish all labor, equipment, and means required and shall carry out effective measures wherever and as often as necessary to prevent its operation from producing dust in amounts damaging to property, cultivated vegetation, or domestic animals, or causing a nuisance to persons living in or occupying buildings in the vicinity. The CONTRACTOR shall be responsible for any damage resulting from any dust originating from its operations. The dust abatement measures shall be continued until the CONTRACTOR is relieved of further responsibility by the City and/or ENGINEER. No separate payment will be allowed for dust abatement measures and all costs thereof shall be included in the Aggregate Sum items in the Proposal.

1.03 RUBBISH CONTROL

A. During the progress of the Work, the CONTRACTOR shall keep the site of the Work and other areas used by it in a neat and clean condition, and free from any accumulation of rubbish. The CONTRACTOR shall dispose of all rubbish and waste materials of any nature occurring at the Work site, and shall establish regular intervals of collection and disposal of such materials and waste. The CONTRACTOR shall also keep its haul roads free from dirt, rubbish, and unnecessary obstructions resulting from its operations. Disposal of all rubbish and surplus materials shall be off the site of construction in accordance with local codes and ordinances governing locations and methods of disposal, and in conformance with all applicable safety laws, and to the particular requirements of the OSHA Safety and Health Standards for Construction.

1.04 SANITATION

A. Toilet Facilities: Fixed or portable chemical toilets shall be provided wherever needed for the use of employees. Toilets at construction job sites shall conform to the requirements of of the OSHA Standards for Construction.

B. Such facilities shall be made available when the first employees arrive on the Work, shall be properly secluded from public observation, and shall be constructed and maintained in suitable numbers and at such points and in such manner as may be required. At the close of each work day, the facilities shall be locked to prevent unauthorized access.

C. The CONTRACTOR shall maintain the sanitary facilities in a satisfactory and sanitary condition at all time and shall enforce their use. He shall rigorously prohibit the committing of nuisances on the site of the Work, on the lands of the CITY, or an adjacent property.

E. Sanitary and Other Organic Wastes: The CONTRACTOR shall establish a regular daily collection of all sanitary and organic wastes. All wastes and refuse from sanitary facilities provided by the CONTRACTOR or organic material wastes from any other source related to the CONTRACTOR's operations shall be disposed of away from the site in a manner satisfactory to the ENGINEER and in accordance with all laws and regulations pertaining thereto.

1.05 CHEMICALS

A. All chemicals used during project construction or furnished for project operation, whether defoliant, soil sterilant, herbicide, pesticide, disinfectant, polymer, paint, fuel, solvent or reactant of other classification, shall show approval of either the U.S. Environmental Protection Agency or the U.S. Department of Agriculture. The handling, storage, use and disposal of all such chemicals and disposal of residues shall be in strict accordance with all applicable rules and regulations of Federal, State and local jurisdictional agencies and the printed instructions of the manufacturer and all regulatory requirements. Copies of antidote literature shall be kept at the storage site and at the CONTRACTOR's job site office. A supply of antidotes shall be kept at the CONTRACTOR's office.

1.06 NOISE CONTROL

A. Noise resulting from the CONTRACTOR's work shall not exceed the noise levels and other requirements stated in local ordinances. The CONTRACTOR shall be responsible for curtailing noise resulting from his operation. He shall, upon written notification from the ENGINEER or the noise control officers, make any repairs, replacements, adjustments, additions and furnish mufflers when necessary to fulfill requirements.

1.07 EROSION ABATEMENT AND WATER POLLUTION

A. It is imperative that any CONTRACTOR dewatering operation not contaminate or disturb the environment of the properties adjacent to the work. The CONTRACTOR shall, therefore, schedule and control his operations to confine all runoff water from disturbed surfaces, water from dewatering operations that becomes contaminated with lime silt, muck and other deleterious matter, fuels, oils, bitumens, calcium chloride, chemicals and other polluting materials.

B. The CONTRACTOR shall construct temporary silting basin(s) of adequate size and provide all necessary temporary materials, operations and controls including, but not limited to, filters, coagulants, screens, and other means necessary to attain the required discharge water quality.

C. The CONTRACTOR shall be responsible for providing, operating and maintaining materials and equipment used for conveying the clear water to the point of discharge. All pollution prevention procedures, materials, equipment and related items shall be operated and maintained until such time as the dewatering operation is discontinued. Upon the removal of the materials, equipment and related items, the CONTRACTOR shall restore the area to the condition prior to its commencing work.

1.08 PRECAUTIONS DURING ADVERSE WEATHER

A. During adverse weather, and against the possibility thereof, the CONTRACTOR shall take all necessary precautions so that the work may be properly done and satisfactory in all respects. When required, protection shall be provided by use of tarpaulins, wood and building paper shelters, or other acceptable means. The CONTRACTOR shall be responsible for all changes caused by adverse weather.

B. The City may suspend construction operations at any time when, in his judgment, the conditions are unsuitable or the proper precautions are not being taken, whatever the weather conditions may be, in any season.

1.09 HURRICANE AND STORM WARNINGS

A. The CONTRACTOR shall take all precautions necessary to protect the job site during hurricane and storm watches and warnings.

1.10 PERIODIC CLEANUP AND BASIC SITE RESTORATION

A. During construction, the CONTRACTOR shall regularly remove from the site all accumulated debris and surplus materials of any kind which results from its operations. Unused equipment and tools shall be stored at the CONTRACTOR's yard or base of operations for the project.

B. The CONTRACTOR shall perform the cleanup work on a regular basis and as frequently as ordered by the ENGINEER. Basic site restoration in a particular area shall be accomplished immediately following the installation or completion of the required facilities in that area. Furthermore, such work shall also be accomplished, when ordered by the ENGINEER, if partially completed facilities must remain incomplete for some time period due to unforeseen circumstances.

C. Upon failure of the CONTRACTOR to perform periodic clean-up and basic restoration of the site to the ENGINEER's satisfaction, the ENGINEER may, upon 5 days prior written notice to the CONTRACTOR, employ such labor and equipment as it deems necessary for the purpose, and all costs resulting there from shall be charged to the CONTRACTOR and deducted from amounts of money that it may be due.

PART 2 - PRODUCTS (Not Used)

PART 3 -EXECUTION (Not Used)

END OF SECTION

SECTION 01568

EROSION CONTROL, SEDIMENTATION AND CONTAINMENT OF CONSTRUCTION MATERIALS

PART 1 – GENERAL

1.01 DESCRIPTION:

A. Provide all work and take all measures necessary to control soil erosion resulting from construction operations, prevent flow of sediment from construction site, and contain construction materials (including excavation and backfill) within protected working area as to prevent damage to any stream or wetlands.

1.02 REFERENCE:

A. "Guide-lines for Erosion and Sediment Control, Planning and Implementation" and "Processes, Procedures and Methods to Control Pollution Resulting from all Construction Activity", published by the United States Environmental Protection Agency.

B. Florida Department of Environmental Protection, Florida Department of Transportationand City of North Miami guidelines and procedures.

1.03 SUBMITTALS:

A. Two weeks prior to the start of the work, submit to Engineer, for review, a plan with detailed sketches showing the proposed methods to be used for controlling erosion during construction.

1.04 QUALITY ASSURANCE:

A. Use acceptable procedures, including use of water diversion structures, diversion ditches, settling basins, and sediment traps.

B. Operations restricted to areas of work indicated on drawings and area which must be entered for construction of temporary or permanent facilities.

C. If construction materials are washed away during construction, remove materials from fouled areas.

D. Stabilize diversion outlets by means acceptable to Engineer.

E. Engineer has authority to limit surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and fill operations and to direct immediate permanent or temporary pollution control measures to prevent contamination of any stream or

wetlands, including construction of temporary berms, dikes, dams, sediment basins, sediment traps, slope drains, and use of temporary mulches, mats, or other control devices or methods as necessary to control erosion.

PART 2 – PRODUCTS

2.01 BALES:

A. Hay or straw or other suitable material acceptable to Engineer.

2.02 WOOD STAKES:

A. 2 in. by 2 in. by 3 ft.

PART 3 – EXECUTION

3.01 GENERAL:

A. Do not discharge chemicals, fuels, lubricants, bitumen, raw sewage and other harmful waste into or alongside any body of water or into natural or man-made channels.

3.02 INSTALLATION:

A. Install baled hay or straw erosion checks in all locations as directed, surrounding base of all deposits of stored excavated material outside of disturbed area, and where directed by the Engineer.

B. Install checks immediately after site is cleared and before trench excavation. Locate checks, surrounding stored material, approximately 6 ft. from material.

C. Hold bales in place with two 2 in. by 2 in. by 3 ft. stakes so that each bale is butted tightly against ad-joining bale thereby precluding shortcircuiting of erosion check.

D. Construct earth berms or diversions to intercept and divert runoff water from critical areas.

E. Discharge silt-laden water from excavations onto filter fabric mat and/or baled hay or straw sediment traps to ensure that only sediment-free water is returned to watercourses.

F. Do not place excavated soil material adjacent to water-course in manner that will cause it to wash away by high water or runoff.

G. Prevent damage to vegetation by excessive watering or silt accumulation in the discharge area.

H. Do not dump spoiled material into any streams, wetlands, surface waters, or unspecified locations.

I. Prevent indiscriminate, arbitrary, or capricious operation of equipment in streams, wetlands or surface waters.

J. Do not pump silt-laden water from trenches or excavations into surface waters, streams, wetlands, or natural or man-made channels leading thereto.

K. Prevent damage to vegetation adjacent to or outside of construction area limits.

L. Do not dispose of trees, brush, debris, paints, chemicals, asphalt products, concrete curing compounds, fuels, lubricants, insecticides, washwater from concrete trucks or hydroseeders, or any other pollutant in streams, wet-lands, surface waters, or natural or man-made channels leading thereto, or unspecified locations.

END OF SECTION

Page Intentionally Left Blank

SECTION 01600

CONTROL OF MATERIALS

PART 1 - GENERAL

1.01 APPROVAL OF MATERIALS:

A. Unless otherwise specified, only new materials and equipment shall be incorporated in the work. All materials and equipment furnished by the Contractor shall be subject to the inspection and approval of the Engineer. No material shall be delivered to the work without prior approval of the Engineer.

B. As specified in Section 01300, the Contractor shall submit to the Engineer, data relating to materials and equipment he proposes to furnish for the work. Such data shall be in sufficient detail to enable the Engineer to identify the particular product and to form an opinion as to its conformity to the specifications.

C. Facilities and labor for handling and inspection of all materials and equipment shall be furnished by the Contractor..

D. The materials and equipment used on the work shall correspond to the approved shop drawing or other data.

1.02 BOLTS, ANCHOR RODS AND NUTS:

A. Shall be in accordance with the City and Miami-Dade Water and Sewer Department Standards.

B.

C. All necessary bolts, anchor rods, nuts, washers, plates and bolt sleeves shall be furnished by the Contractor in accordance herewith. Anchor rods and shall have suitable washers and hexagonal nuts.

D. All anchor rods, nuts, washers, plates, and bolt sleeves shall be galvanized unless otherwise indicated or specified.

E. Unless otherwise specified, stud, tap, and machine bolts, and nuts shall conform to the requirements of ASTM Standard Specification for Carbon Steel Externally and Internally Threaded Standard Fasteners, Designation A325. Hexagonal nuts of the same quality of metal as the bolts shall be used. All threads shall be clean cut and shall conform to ANSI Standard B1.1 for Unified Inch Screw Threads (UN and UNR Thread Form).

F. Bolts, anchor rods, nuts, and washers, specified to be galvanized, shall be zinc coated, after being threaded, by the hot-dip process in conformity with the ASTM Standard Specification for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip, Designation A123, or the ASTM Standard Specifications for Zinc Coating (Hot Dip) on Iron and Steel Hardware, Designation A153, as is appropriate.

G. Bolts, anchor rods, nuts, and washers specified to be stainless steel shall be Type 304 or Type 316 stainless steel, as indicated.

H. Anchor rods shall be set accurately. They shall be carefully held in suitable templates of acceptable design. Where indicated on the Drawings, specified, or required, anchor bolts shall be provided with square plates at least 4 in. by 4 in. by 3/8 in. or shall have square heads and washers and set in the concrete forms with suitable pipe sleeves, or both. If anchor are set after the concrete has been placed, all necessary drilling and grouting or caulking shall be done by the Contractor and care shall be taken not to damage the structure or finish by cracking, chipping, spalling, or otherwise during the drilling and caulking.

END OF SECTION

Page Intentionally Left Blank

SECTION 01610

DELIVERY, STORAGE AND HANDLING

PART 1 - GENERAL

1.01 GENERAL:

A. This Section specifies the general requirements for the delivery handling, storage and protection for all items required in the construction of the work. Specific requirements, if any, are specified with the related item.

1.02 TRANSPORTATION AND DELIVERY:

A. Transport and handle items in accordance with manufacturer's printed instructions.

B. Schedule delivery to reduce long term on-site storage prior to installation and/or operation. Under no circumstances shall equipment be delivered to the site more than one month prior to installation without written authorization from the Engineer.

C. Coordinate delivery with installation to ensure minimum holding time for items that are hazardous, flammable, easily damaged or sensitive to deterioration.

D. Deliver products to the site in manufacturer's original sealed containers or other packing systems, complete with instructions for handling, storing, unpacking, protecting and installing.

E. All items delivered to the site shall be unloaded and placed in a manner which will not hamper the Contractor's normal construction operation or those of subcontractors and other contractors and will not interfere with the flow of necessary traffic.

F. Provide equipment and personnel to unload all items delivered to the site.

G. Promptly inspect shipment to assure that products comply with requirements, quantities are correct, and items are undamaged. For items furnished by others (i.e. Owner, other Contractors), perform inspection in the presence of the Engineer. Notify Engineer verbally, and in writing, of any problems.

1.03 STORAGE AND PROTECTION:

A. Store and protect products and equipment in accordance with the manufacturer's instructions, with seals and labels intact and legible. Storage instruction shall be studied by the Contractor. Instructions shall be carefully followed and a written record of this kept by the Contractor for each product and pieces of equipment.

B. Arrange storage of products and equipment to permit access for inspection. Periodically inspect to make sure products and equipment are undamaged and are maintained under specified conditions.

C. Provide protective maintenance during storage consisting of manually exercising equipment, inspecting mechanical surfaces for signs or corrosion or other damage, lubricating, applying any coatings as recommended by the equipment manufacturer necessary for its protection and all other precautions to assure proper protection of all equipment stored and for compliance with manufacturers' requirements related to warranties.

D. Store loose granular materials on solid flat surface in a well-drained area. Prevent mixing with foreign matter.

E. Cement and lime shall be stored under a roof and off the ground and shall be kept completely dry at all times. Precast concrete shall be handled and stored in a manner to prevent accumulations of dirt, standing water, staining, chipping or cracking. Brick, block and similar masonry products shall be handled and stored in manner to reduce breakage, cracking and spalling to a minimum.

F. All mechanical and electrical equipment and instruments shall be covered with canvas and stored in a weathertight building or equivalent area to prevent injury. The area may be a temporary structure on the site or elsewhere. The storage shall be provided with adequate ventilation to prevent condensation. Maintain temperature and humidity within range required by manufacturer and to prevent condensation on the equipment being stored.

END OF SECTION

Page Intentionally Left Blank

SECTION 01700

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 SCOPE OF WORK:

A. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:

1. Closeout procedures.

2. Final cleaning.

3. Adjusting.

1.02 RELATED WORK:

A. Warranties and Bonds are included in Section 01740.

1.03 CLOSEOUT PROCEDURES:

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's inspection.

Submit As-builts in accordance with Miami-Dade Water and Sewer Department “As-built Requirements, GS-0.5” for water and sewer projects.

B. Provide submittals to Engineer that are required by governing or other authorities.

C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payment, and sum remaining due.

1.04 FINAL CLEANING:

A. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.

1. Remove labels that are not permanent labels.

2. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean.

3. Clean the site, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.

END OF SECTION

SECTION 01710

CLEANING UP

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK:

A. During its progress, the work and the adjacent areas affected thereby shall be cleaned up and all rubbish, surplus materials, and unneeded construction equipment shall be removed and all damage repaired so that the public and property owners will be inconvenienced as little as possible.

B. Where material or debris has washed or flowed into or been placed in existing watercourses, ditches, gutters, drains, pipes structures, work done under this contract, or elsewhere during the course of the Contractor's operations, such material or debris shall be entirely removed and satisfactorily disposed of during the progress of the work, and the ditches, channels, drains, pipes, structures, and work, etc., shall, upon completion of the work, be left in a clean and neat condition.

C. On or before the completion of the work, the Contractor shall, unless otherwise especially directed or permitted in writing, tear down and remove all temporary buildings and structures built by him; shall remove all temporary works, tools, and machinery or other construction equipment furnished by him; shall remove, acceptably disinfect, and cover all organic matter and material containing organic matter in, under, and around privies, houses, and other buildings used by him; shall remove all rubbish from any grounds which he has occupied; and shall leave the roads and all parts of the premises and adjacent property affected by his operations in a neat and satisfactory condition.

D. Upon completion of the work, the Contractor shall remove from the sites of the subsurface explorations all of his plant, machinery, tools, equipment, temporary work, and surplus materials; shall, unless otherwise directed or permitted in writing, remove all rubbish from any grounds which he has occupied; and shall leave the roads and all parts of the premises and adjacent property affected by his operations in a neat and satisfactory condition.

E. The Contractor shall thoroughly clean all materials and equipment installed by him and his sub-contractors, and on completion of the work shall deliver it undamaged and in fresh and new-appearing condition. All mechanical equipment shall be left fully charged with lubricant and ready for operation.

F. The Contractor shall restore or replace, when and as directed, any public or private property damaged by his work, equipment, or employees, to a condition at least equal to that existing immediately prior to the beginning of operations. To this end the Contractor shall do as required all necessary driveway, sidewalk, and landscaping work. Suitable

materials, equipment, and methods shall be used for such restoration. The restoration of existing property or structures shall be done as promptly as practicable as work progresses and shall not be left until the end of the contract period.

END OF SECTION

SECTION 01740

WARRANTIES AND BONDS

PART 1 - GENERAL

1.01 SCOPE OF WORK:

A. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturers standard warranties on products and special warranties.

1.02 RELATED WORK:

A. Refer to Conditions of Contract for the general requirements relating to warranties and bonds.

B. General closeout requirements are included in Section 01700 Project Closeout.

C. Specific requirements for warranties for the Work and products and installations that are specified to be warranted, are included in the individual Sections of Division 2 through 15.

D. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.

1.03 SUBMITTALS:

A. Submit written warranties to the Owner prior to the date fixed by the Engineer for Substantial Completion which starts the warranty period. If the Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Owner.

B. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Owner within fifteen days of completion of that designated portion of the Work.

C. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Engineer for approval prior to final execution.

D. Refer to individual Sections of Divisions 2 through 15 for specific content requirements, and particular requirements for submittal of special warranties. The minimum period for warranties is one (1) year from Substantial Completion.

E. At Final Completion, compile two copies of each required warranty and bond properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.

F. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-in. by 11-in. paper.

G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification Section in which specified, and the name of the product or work item.

H. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address and telephone number of the installer, supplier, and manufacturer.

I. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS," the Project title or name, and the name, address, and telephone numbers of the Contractor and equipment supplier.

J. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

K. Schedule of Special Warranties

None

1.04 WARRANTY REQUIREMENT:

A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

D. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights or remedies.

E. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.

F. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

G. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.05 DEFINITION:

A. Standard Product Warranties are pre-printed written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

B. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

Page Intentionally Left Blank

SECTION 02001

MOBILIZATION

PART 1 - DESCRIPTION

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

This Section specifies the minimum requirements for preparatory work and operations, including, but not limited to those activities necessary for the movement of personnel, equipment, supplies and incidentals to the project site; for the establishment of all offices, buildings, safety equipment, first aid supplies, sanitary and other facilities, and all other facilities necessary for work on the project; and for all other work and operations which must be performed or costs incurred prior to the beginning of work on the site.

PART 2 – SPECIFIC REQUIREMENTS

2.01 FDOT SPECIFICATIONS

If compliance with FDOT Specifications is specified on the Drawings or in the contract documents, this Section shall replace the entire Division II, Section 101 of the FDOT Standard Specifications for Road and Bridge Construction, dated 2013.

PART 3 – BASIS OF PAYMENT

3.01 MAXIMUM AMOUNT

The amount bid for MOBILIZATION shall not exceed 10% of the Total Bid Price for all work. In the event that an amount greater than 10% of the Total Bid Price is bid, the amount in excess of 10% will be deducted from the Total Bid Price such that the bid item for MOBILIZATION is equal to 10% of the adjusted Total Bid Price.

END OF SECTION

SECTION 02141

TEMPORARY BYPASS PUMPING SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY:

A. Section Includes: Furnishing all materials, labor, equipment, power, maintenance, etc. to implement a temporary pumping system for the purpose of diverting the existing raw wastewater flow around the work area at each lift station for the durations specified and disassembly of the bypass pumping system as specified herein.

B. Be responsible for the design, installation and operation of the temporary pumping system. The bypass system shall meet the requirements of all codes and regulatory agencies having jurisdiction.

C. The Contractor is responsible to maintain flow at each station throughout the contract period of construction. Once the Contractor mobilizes, the City cedes responsibilities of station operations to the Contractor until Substantial Completion is reached.

1.02 SYSTEM DESCRIPTION:

A. Design Requirements:

Provide all pumps of adequate size to handle peak flow, and temporary discharge piping to ensure that the total flow of the main can be safely diverted around the pumping station. Bypass pumping system will be required to operate 24 hours per day.

1. Provide control system for the bypass pumping system which will run the pump(s) between preset levels. Additional controls are required to for high-high level and low-low level alarms, and any pump faults.

2. Provide adequate standby equipment available and ready for immediate operation and use in the event of an emergency or breakdown. One standby pump for each size pump utilized shall be installed at the mainline flow bypassing locations, ready for use in the event of primary pump failure.

3. The bypass pumping system shall be capable of bypassing the flow around the work area as necessary for satisfactory performances of work.

4. Make all arrangements for bypass pumping during the time when the pumping station is shut down for any reason. System must overcome any existing force main pressure on discharge.

B. It is essential to the operations of the existing wastewater system that there be no interruption in the flow of sewage throughout the duration of the project. To this end, provide, maintain and operate all temporary facilities such as, pumping equipment (both primary and back-up units as required), conduits, all necessary power, and all other labor and equipment necessary to intercept the wastewater flow before it reaches the point where it would interfere with the work, carry it past the work and return it to the existing wastewater downstream of the work.

C. Provide all necessary means to safely convey the raw wastewater past the work area. Do not stop or impede the main flows under any circumstances.

D. Maintain wastewater flow around the work area in a manner that will not cause surcharging of wastewater, damage to existing pipe line and that will protect public and private property from damage and flooding.

E. Fluid Character: Provide pumping units to pump raw wastewater.

F. Furnish pumps which meet rating capacity and head indicated on Process Pump Schedule.

G. Pumps shall be capable of passing a minimum of a 3-inch non-deformable sphere.

1.03 SUBMITTALS:

A. ENGINEER approval is required for submittals with an “A” designation; submittals having an “FIO” designation are for information only. Provide all submittals, including the following, in accordance with applicable SUBMITTALS section.

B. Data:

1. Pump Data:

a. Pump performance curves. Draw curves for the specified conditions. Include head, brake horsepower, efficiency and required NPSH, all plotted as a function of capacity, from zero to maximum capacity.

b. Calculations of static 1ift, friction losses, and flow velocity.

c. Submit a specific, detailed description of the proposed pumping system.

d. Submit operating descriptions, component descriptions, control schematics, electrical connection diagrams and general arrangement drawings, for control equipment.

e.

C. Drawings:

1. Shop Drawings:

a. Submit shop drawings, including arrangement and erection drawings of the equipment and equipment operating characteristics. Include the following:

(1) Submit detailed plans and descriptions outlining all provisions and precautions to be taken regarding the handling of existing wastewater flows. The plan shall include schedules, locations elevations, capacities of equipment, materials and all other incidental items necessary and/or required to insure proper protections of the facilities, including protection of the access and bypass pumping locations from damage due to the discharge flows, and compliance with the requirements and all permit conditions

(2) The plan shall include but not be limited to details of the following:

(a) Staging areas for pumps;

(b) Number, size, material, location and method of installation of suction piping;

(c) Number, size, material, location of installation of discharge piping;

(d) Bypass pump sizes, capacity, number of each size to be on site and motor power of fuel requirements;

(e) Standby power generator size, location;

(f) Downstream discharge plan;

(g) Thrust and restraint block sizes and locations;

(h) Sections showing suction and discharge pipe depth, embedment, select fill and special backfill;

(i) Method of noise control for each pump and/or generator;

(j) Any temporary pipe supports and anchoring required;

(k) Design plans and computation for access to bypass pumping locations indicated on the drawings;

(l) Calculations for selection of bypass pumping pipe size;

(m) Schedule for installation of and maintenance of bypass pumping lines;

(n) Plan indicated selection location of bypass pumping line locations.

PART 2 - PRODUCTS

2.01 EQUIPMENT:

A. All pumps used shall be centrifugal self-priming units that do not require the use of foot-valves or Compressor in the priming system. The pumps shall be diesel or electric powered. Pumps shall have sound attenuation enclosure designed for operation at sound levels of 70 decibels and below. The Contractor is fully responsible for coordinating and obtaining temporary electrical service. All pumps used must be constructed to allow dry running for long periods of time to accommodate the cyclical nature of influent flows. The pumps shall not be hydraulic submersible type.

B. Provide the necessary stop/start control system for each pump. The control system shall remotely contact the contractor with notification of any problem. The contractor is responsible for responding within one (1) hour to the alarm and correcting the problem.

C. Discharge Piping – in order to prevent the accidental spillage of flows, all discharge systems shall be temporarily constructed of rigid pipe with positive, restrained joints.

D. Under no circumstances will aluminum “Irrigation” type piping and glued PVC pipe be allowed. Discharge hose will only be allowed in short sections and by specific permission from the ENGINEER. Provide piping materials of steel pipe, ductile iron pipe, or fused, high density polyethylene pipe.

2.02 MANUFACTURERS:

A. Acceptable manufacturers are listed below. Other manufacturers of equivalent products may be submitted.

1. Thompson Pump & Manufacturing Co., Inc.

PART 3 - EXECUTION

3.01 PRECAUTIONS:

A. Be responsible for locating any existing utilities in the area selected for installing the bypass pipelines. Locate bypass pipelines to minimize any disturbance to existing utilities and obtain approval of the pipeline locations from the ENGINEER. All costs associated with relocating utilities and obtaining all approvals shall be included in the Contract Price.

3.02 INSTALLATION AND REMOVAL:

A. Make connections to the existing wastewater pipe lines and construct temporary bypass pumping structures only at the access location indicated on the drawings and as may be required to provide adequate suction conduit.

B. Plugging or blocking of wastewater flows shall incorporate a primary and secondary plugging device. When plugging or blocking is no longer needed for performance and acceptance or work, it is to be removed in a manner that permits the wastewater flow to slowly return to normal without surge, to prevent surcharging or causing other major disturbances downstream.

C. The installation of the bypass pipelines is prohibited in all saltmarsh/wetland areas. The pipeline must be located off streets and sidewalks and on shoulder of the roads. When the bypass pipeline crosses local streets and private driveways, place the bypass pipelines in trenches and cover with temporary pavement. Upon completion of the bypass pumping operations, and after the receipt of written permission from the ENGINEER, remove all the piping, restore all property to pre-construction condition and restore all pavement. Be responsible for obtaining any approvals for placement of the temporary pipeline within public ways from the city.

3.03 FIELD QUALITY CONTROL AND MAINTENANCE:

A. Testing: Perform leakage and pressure tests of the bypass pumping discharge piping using clean water prior to actual operation. Test the piping at a test pressure of 50 psi. Provide 24 hours notice to the ENGINEER prior to testing.

B. Inspection: Inspect bypass pumping system as needed to ensure that the system is working correctly.

C. Maintenance Service: Insure that the temporary pumping system is properly maintained and a responsible operator is on hand at all times when pumps are operating.

D. Extra Materials:

1. Spare parts for pumps and piping shall be kept on site as required.

2. Adequate hoisting equipment for each pump and accessories shall be maintained on the site.

END OF SECTION

SECTION 02230

CLEARING AND GRUBBING

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Clear and grub the areas to be occupied by the facilities or utility systems to be constructed, including all areas to be excavated, filled, paved or planted as shown on the approved plans and as specified herein.

1.02 DEFINITIONS

A. Clearing shall consist of the cutting, removal and satisfactory disposal of all trees, stumps, brush, shrubs, rubbish and any other objectional material within the designated areas.

B. Grubbing shall consist of the removal and disposal of all stumps larger than 1-1/2 inches in diameter and other objectional material to a depth of at least 12 inches below the ground surface.

1.03 QUALITY ASSURANCE

In the course of the work, it may become to remove trees if they interfere with the work. Dade County and various municipalities have ordinances regulating the removal, relocation and pruning of trees in the public right-of-way, these ordinances shall be strictly adhered to. The Contractor shall obtain a permit from Dade County and/or other regulatory agencies having jurisdiction over the work area before removing, relocating and/or pruning any tree. The Contractor shall comply with all requirements and conditions of the permit.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

3.01 CLEARING AND GRUBBING

A. The Contractor shall remove and replace, where required all existing shrubbery, trees, grass, sprinklers, fences, signs, mailboxes, structures, roadways, sidewalks, curbs and similar items or structures in the way of all excavation necessary for the construction of the project.

B. Where pavements or sidewalks are cut, they shall be cut by means of a mechanical pavement saw to form true and straight edges. Where such cutting is for the purpose of pipeline installation, saw cutting shall be either parallel or at right angles with the centerline of the pipe,

C. To protect himself from being held liable for any existing damaged pavement, including detour routes, the Contractor is advised to notify in writing the authority having jurisdiction, prior to proceeding with any work in the vicinity.

3.02 PROTECTION OF ADJACENT AREAS

The Contractor shall protect areas shown on the Drawings or designated by the Engineer of Record to remain protected from damage by construction operations by erecting suitable barriers of other acceptable means.

3.03 DISPOSAL

All roots, vegetation and other refuse removed from the site during clearing and/or grubbing operations shall be legally disposed of by the Contractor. Where required, the Contractor shall obtain a permit from Miami-Dade County and/or other regulatory agencies having jurisdiction over the work area before burning any material on the site.

- END OF SECTION -

SECTION 02260

STEEL SHEET PILING

PART 1 - GENERAL

1.01 SCOPE

The Contractor shall furnish and install steel sheet piling as shown in the plans or as required for a complete and satisfactory installation.

PART 2 - PRODUCTS

2.01 STEEL SHEET PILING

A. Steel sheet piling shall conform to the requirements of "High-Strength Low-Alloy Columbium-Vanadium Steels of Structural Quality", ASTM A572/A572M-94b (AASHTO No. M223).

B. The Contractor will be responsible for design and selection. Structural plans for the sheet steel piling installation and the calculations for the required Section Modulus and the Sheet Piling Designation shall be prepared by a Professional Engineer registered in the State of Florida. Sealed plans shall be submitted to the Engineer of Record for approval prior to installation of the piling system.

B. Structural steel shall meet the requirements of ASTM Standard A36/A36M-94 "Structural Steel".

PART 3 - EXECUTION

3.01 The Contractor will be responsible for removing the temporary sheet piling and structural steel at the completion of the Project, such material will remain the property of the Contractor.

END OF SECTION

SECTION 02314

EXCAVATION, BACKFILL AND FILL FOR STRUCTURAL FACILITY AND UTILITY SYSTEMS

PART 1 - GENERAL

1.01 SCOPE OF WORK:

A. The work included under this Section consists of furnishing material and equipment, and performing all labor necessary for excavating, backfilling, filling and compaction of areas to be occupied by facilities or utility systems to be constructed.

B. Plan For Excavation: Prior to commencing the excavation, the Contractor shall submit a plan of his proposed operations to the Engineer of Record for approval. The Contractor shall consider, and his plan for excavation shall reflect, existing utilities that are to remain, the equipment and methods to be employed in the excavation.

1.02 QUALITY ASSURANCE

All excavations shall conform with South Florida Building Codes, the State of Florida Trench Safety Act, OSHA requirements and the provisions herein. Excavations shall be executed in accordance with all applicable requirements of Section 01016, including notification of Sunshine State One-Call Center (1-800-432-4770) 48 hours prior to any excavation.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Structural Fill: Structural fill shall consist of an inorganic, non-plastic, granular soil containing less than 10 percent material passing the No.200 mesh sieve (relatively clean sand or crushed limerock with a 2-inch max. particle size) with a Unified Soil Classification of GP, GW, SP, SP-GM, SW-SM or SP-SM.

B. Ballast Rock: Ballast rock shall be composed of hard, durable, sound pieces having a specific gravity of not less than 2.65. It shall be crushed rock conforming to the following gradation:

U.S. Standard sieve size	Percent by weight passing
1-1/2 inch	100
3/4 inch	30-75
½ inch	15-55
1/4 inch	0-5

C. Suitable Backfill Material: Backfill material shall be clean and free from all organic material, clay, marl or unstable materials, debris, lumps, or broken paving. No rocks or stones larger than 6 inches in diameter shall be allowed in any backfill. Material for backfill may be material resulting from excavation, if suitable in the opinion of the Department.

D. Select Backfill Material: Select backfill material specified herein shall meet all the general requirements for backfill material set forth above, and in addition, shall be free of any rocks or stones larger than 2 inches in diameter. Select backfill material may be material resulting from trench excavation, if suitable in the opinion of the Department, carefully selected to comply with these requirements.

PART 3 - EXECUTION

3.01 PREPARATION:

A. Clearing: The construction site shall be cleared of all obstructions and vegetation, including large roots and undergrowth, within 5 feet of the lines of excavation, in accordance with Section 02230. All debris created by this clearing operation shall be hauled from the site and disposed of by the Contractor.

B. Removals: Complete all removals within the lines of excavation prior to beginning excavation. Where required, all existing shrubbery, trees, grass, sprinklers, fences signs, mailboxes, structures, sidewalks, curbs, utility poles, or structures subject to damage resulting from the excavation should be transplanted, relocated, braced, shored, or otherwise protected and preserved.

3.02 EXCAVATION

A. The Contractor shall perform all excavation of every description and of whatever substances encountered, to the dimensions and depths shown on the approved plans, but in all cases as required for construction, and as specified herein. All excavations shall be made by open cut.

B. When the walls of the excavations are to be kept vertical and in order to protect the safety of workmen, the general public, this or other work or structures, or excavation walls, or pipe installation including materials encountered in the excavation which have a tendency to slough or flow into the excavation, undermine the banks, weaken the overlying strata, or are otherwise rendered unstable by the excavation operation shall be retained by steel sheeting, stabilization, grouting or approved methods. Said methods shall comply with the Trench Safety Act (TSA). Sheeting and shoring or other approved method shall be designed by a Professional Engineer licensed to practice in the State of Florida.

C. For structures, the Contractor shall maintain the bottom of the excavation firm and dry, and maintain an elevation of the water one (1) foot below the concrete to be placed, by use of pumps, tremie or other acceptable method.

D. In areas where trench widths are not limited by right-of-way or easement widths, property line restrictions, existing adjacent improvements including pavements, structures, and other utilities, and maintenance of traffic, the trench sides may be sloped to a suitable angle of repose of the excavated material.

E. Ladders or steps shall be provided for and used by workmen to enter and leave trenches.

F. Excavated material shall be stored and disposed of in such a manner that they will not interfere unduly with traffic on public streets and sidewalks. In congested areas, such materials, cannot be stored adjacent to the trench nor used immediately as backfill, shall be removed to convenient places of storage. If any material is creating a public hazard or other unsafe condition, it shall be removed immediately to a storage area.

G. Materials suitable for use as backfill be hauled to and used in areas where not enough suitable material is available from the excavation. Material unsuitable for use in backfill shall be removed promptly and disposed of by the Contractor. Any pockets of organic matter, concrete or other unsuitable material encountered in excavating shall be removed and replaced with material satisfactory to the Department.

H. The excavation of walls for forms will not be permitted.

I. Excavation for structures:

1. Clear, as stated above, all existing items or structures in the way of the proposed pipeline or structures, and excavate as necessary to the depths and dimensions shown on the Plans, but in all cases as necessary for satisfactory installation.

2. Where pavements or sidewalks are cut, they shall be cut by means of a mechanical pavement saw to form true and straight edges which shall, in general, be either parallel or at right angles.

3. In order to protect himself from being held liable for any existing damaged pavement, including detour routes, the Contractor is advised to notify in writing the authority having jurisdiction over the street where such defective pavement exists prior to proceeding with any work in the vicinity. A copy of all such notices shall be forwarded to the Department.

4. Where interlocking steel sheeting is used, the Department may require that the sheeting be cut off at a level two (2) feet above the top of the installed pipe and that portion below the level be left in place.

5. Excavation for manholes and other piping appurtenances shall be sufficient to leave at least two (2) feet clear between their outer surfaces and the embankment or sheeting.

6. If, in the opinion of the Engineer of Record or the Department, the soil at that depth is unsatisfactory as foundation material because it contains marl, muck, organic matter, or other unsuitable material, the excavation shall be continued two (2) feet deeper, except if a suitable foundation material is exposed at a lesser depth, further excavation will not be required.

7. When the pipe to be installed in a trench requires the pipe installers to work under and around the pipe, the Contractor may request the Department that he be allowed to exceed the 12" maximum clearance, specifying the clear distance desired.

8. The ends of existing mains shall be temporarily capped or plugged to keep them clean and the ends of all mains shall be temporarily anchored to keep the joints from blowing apart from internal pressure until the new mains can be reconnected to them.

9. In addition to specific construction methods specified, the general requirements in subsequent subsections, below, shall apply to the work of this project.

3.03 DEWATERING

A. Any water which accumulates in the excavations for structures shall be removed promptly by means satisfactory to the Engineer of Record in such a manner as to not create a nuisance to adjacent property or public thoroughfare. Pumps and engines for dewatering systems shall be operated with mufflers and at a minimum noise level suitable to a residential area. The Contractor shall be responsible for any nuisance created due to the disposal of the water from his drainage system.

B. Where applicable, the Contractor shall be required to obtain all necessary permits approving the location and proposed method of disposal before discharging water from any excavation into any portion of the public right-of-way or into any existing drainage structure or facility.

3.04 STOCKPILED MATERIALS

Suitable materials removed from the excavation shall be stored and disposed of in a manner which will not interfere with traffic at the site. Material suitable for backfill and not needed for backfill at the structure, but needed elsewhere shall be stockpiled until moved and used elsewhere.

3.05 BACKFILL

A. The excavation shall then be brought to the structures bottom elevation by placing and compacting 6-inch layers of Oolitic limerock (or material previously defined) to 95 percent of maximum density as determined by AASTHO T-180. Structural fill shall be supplied by the Contractor except as may otherwise be carefully selected from excavated material if deemed suitable in the opinion of the Engineer. Backfill around new structures up to the pavement base or surface of the ground shall be material not exceeding 6-inches in diameter, and shall be compacted in layers not exceeding 9 inches. Each layer shall be compacted with a powered hand tamper, or other approved method to at least 98% of maximum density as determined by AASHTO T-180

B. Backfill for precast manholes shall be drainfield limerock or specified pipe bedding material to a level to receive the manhole at the proper elevation.

END OF SECTION

SECTION 02315

TRENCHING AND BACKFILLING FOR PIPING SYSTEMS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. The work included under this Section consists of excavating, backfilling and compaction as required for the construction of the piping systems as specified herein. (See Section 02314 for excavation for structures.)

B. All excavations shall be executed in accordance with the South Florida Building Codes, the State of Florida Trench Safety Act (TSA), OSHA requirements and all applicable requirements of Section 01016, including notification of Sunshine State One-Call Center (1-800-432-4770), 48 hours prior to any excavation.

PARTS 2 - PRODUCTS

2.01 BACKFILL MATERIAL

A. Except where a 1:10 cement/sand or flowable fill concrete mix is required (See Section 02745), granular soil backfill materials shall be utilized. Suitable backfill material shall be clean, shall not be expansive nor have high organic content, shall be free of clay, marl, unstable materials, debris, lumps and clods, and shall meet the following requirements:

1. Maximum Liquid Limit shall not exceed 12 as determined by ASTM D 423.

2. Maximum Plasticity Index shall not exceed 35 as determined by ASTM D 424.

3. Not more than 10 percent of weight shall be finer than 74 micron (No. 200) U.S. Standard Sieve.

B. Backfill material containing limerock shall have sufficient sand to fill the voids in the limerock. No stones or rocks larger than 6-inches in diameter will be permitted in any backfill. Backfill material placed to a point at least one foot (1 ft.) above pipe and appurtenances shall be select backfill material not exceeding 2-inches in diameter. For PVC gravity sewers backfill material placed at least two feet (2 ft.) above pipe shall be select backfill material not exceeding 2-inches in diameter. In any case, above this point, but up to the upper 6-inches of the trench, backfill shall be of material not exceeding 6-inches in diameter.

C. Debris, broken paving or broken concrete shall not be used.

D. Material for backfill may be material resulting from excavation, only if it meets the above mentioned requirements, or if suitable in the opinion of the Department. If sufficient suitable backfill material, including select backfill material, is not available from the site, additional material shall be furnished.

2.02 SELECT BACKFILL MATERIAL

Select backfill material specified in these specifications or required by the Plans shall meet all the general requirements for backfill material set forth above, and in addition, shall be free of any rocks or stones larger than 2 inches in diameter. Select backfill for copper tubing shall be limerock screenings or sand. Select backfill material may be material resulting from excavation, if suitable in the opinion of the Department, carefully selected to comply with these requirements.

2.03 BEDDING MATERIAL

Pipe bedding material shall consist of one of the following types of material, and accordance with the Department's Standard Details: (See Section UC-300 for Gravity Sewer Piping Foundations)

A. Bedding may be select backfill material, as specified above, if approved by the Department.

B. Crushed stone (or drainfield limerock) shall be used for bedding of piping (except for copper pipe) and/or manholes as shown on the Standard Details. Crushed stone shall consist of hard, durable, sub-angular particles of proper size and gradation, and shall be free from organic material, wood, trash, sand, loam, clay, excess fines and other deleterious materials. The stone shall conform to the requirements of ASTM C 33, Size No. 57 (3/4-inch rock) and be graded within the following limits:

Sieve Size	**Percent Finer by Weight**
1 ½-inch	100
1-inch	95 to 100
½-inch	25 to 60
No. 4	0 to 10
No. 8	0 to 5

C. Sand for bedding copper pipe shall be a dry screened sand. Sand shall be graded sand with 100 percent passing a 3/8-inch sieve and not more than 5 percent passing a No. 200 sieve.

D. Limerock screenings, sand or other fine material shall not be used for bedding.

E. All pipe bedding material shall be new, unless otherwise approve by the Department. Existing pipe bedding material may not be used.

2.04 BACKFILL UNDER MANHOLES AND METER VAULTS

Any excavation below the levels required for the proper construction of manholes or meter vaults shall be filled with Class C concrete. The use of earth, rock, sand or other materials for this purpose will not be permitted. (See Section 02314 for excavation for structures.)

PART 3 - EXECUTION

3.01 CLEARING

A. The Contractor shall perform all clearing necessary for the proper installation of all piping and appurtenances in the locations shown in the Drawings, in accordance with Section 02230, "Clearing and Grubbing".

B. Where required, all existing shrubbery, trees, grass, sprinklers, fences, signs, mail boxes, structures, sidewalks, curbs, utility poles or structures subject to damage resulting from the excavation should be transplanted, relocated, braced, shored, or otherwise protected and preserved.

3.02 EXCAVATION

A. The Contractor shall perform all excavation of every description and of whatever substances encountered, to the dimensions and depth shown on the Drawings. All excavations shall be made by open cut.

B. When the walls of the excavations are to be kept vertical and in order to protect the safety of workmen, the general public, this or other work or structures, or excavation walls, or pipe installation including materials encountered in the excavation which have a tendency to slough or flow into the excavation, undermine the banks, weaken the overlying strata, or are otherwise rendered unstable by the excavation operation shall be retained by steel sheeting, stabilization, grouting or approved methods. Said methods shall comply with the Trench Safety Act (TSA). Sheeting and shoring or other approved method shall be designed by a Professional Engineer licensed to practice in the State of Florida.

C. In areas where trench widths are not limited by right-of-way or easement widths, property line restrictions, existing adjacent improvements including pavements, structures, and other utilities, and maintenance of traffic, the trench sides may be sloped to a suitable angle of repose of the excavated material, but only from a point one foot above the crown of the pipe.

D. A substantially and safely constructed moveable shield or box, as approved by the Engineer of Record, may be used in place of sheeting, except where specifically called for on the Plans to install sheeting. Where a moveable shield or trench box, is used in place of sheeting and shoring, the trench shall be opened immediately ahead of the shield as pipe laying proceeds inside the shield.

E. Ladders or steps shall be provided for and used by workmen to enter and leave trenches.

F. Materials removed from the trenches shall be stored and disposed of in such a manner that they will not interfere unduly with traffic on public streets and sidewalks. In congested areas, such materials, cannot be stored adjacent to the trench nor used immediately as backfill, shall be removed to convenient places of storage. If any material is creating a public hazard or other unsafe condition, it shall be removed immediately to a storage area.

G. Materials suitable for use as backfill be hauled to and used in areas where not enough suitable material is available from the excavation. Material unsuitable for use in backfill shall be removed promptly and disposed of by the Contractor

H. <u>Excavation for Pipes and Piping Appurtenances</u> (See Section UC-300 for additional requirements for gravity sewer piping):

1. Clear, as stated above, all existing items or structures in the way of the proposed pipeline or structures and excavate as necessary to the lines and grades shown on the Plans.

2. Where pavements or sidewalks are cut they shall be cut by means of a mechanical pavement saw to form true and straight edges which shall in general be either parallel or at right angles with the centerline of the pipe.

3. In order to protect himself from being held liable for any existing damaged pavement, including detour routes, the Contractor is advised to notify in writing the authority having jurisdiction over the street where such defective pavement exists prior to proceeding with any work in the vicinity. A copy of all such notices shall be forwarded to the Department.
4. Excavate pipe trenches to a minimum of 6-inches below the outside bottom of the proposed pipe barrel to provide for the installation of the bedding material.

5. If, in the opinion of the Department, the soil at that depth is unsatisfactory as foundation material because it contains unsuitable marl, muck, organic matter, or other unsuitable material, the excavation shall be continued 2 feet deeper, except if a suitable foundation material is exposed at a lesser depth, further excavation will not be required.

6. If the soil is still unsuitable after the additional excavation as prescribed above, the trench bottom shall be excavated further in one foot increments in accordance with "Trench Overcut", below.

7. Sheeting and shoring shall be installed where necessary to control trench width, protect the workmen and the general public, and prevent damage to this or adjacent work, or structures.

8. Where wood sheeting or certain designs of steel sheeting are used, the Department may require the sheeting to be cut off at a level 2-feet above the top of the installed pipe and that portion below that level shall be left in place.

9. If interlocking steel sheeting is used, the Department may permit its complete removal in lieu of cut-off, providing removal can be accomplished without disturbing the bedding, pipe or alignment of the pipe. Any damage to the pipe bedding, pipe or alignment of the constructed utility caused by removal of sheeting shall be cause for rejection of the affected portion of the work. Not more than 100-feet of trench shall be opened ahead of pipe laying operations at one time unless a greater length of open trench is approved by the Department.

10. Trench widths, when measured at a point 12 inches above the top of the pipe, shall provide a 12-inch maximum clearance on each side, between the outside of the pipe barrel and the face of the excavation, or sheeting if used. Minimum trench width shall provide at least 6-inches clearance on each side, between the outside of the pipe barrel and the face of the excavation, or sheeting if used.

11. Excavation for appurtenances, such as manholes and valves, shall be sufficient to provide a clearance between their outer surfaces and the face of the excavation or sheeting, if used, of not less than 12-inches. Manhole excavations shall be carried to sufficient depth to permit their construction on the undisturbed bottom of the excavation.

12. Excavation for thrust block shall be made in such a manner so that, when concrete is placed, it will bear against a firm, undisturbed, vertical trench wall with bearing are in accordance with the schedule shown in the Standard Details.

13. Selected backfill shall then be placed and compacted in 6-inch layers up to the level of the pipe bedding material.

14. When the pipe to be installed in a trench requires the pipe installers to work under and around the pipe, the Contractor may request the Department that he be allowed to exceed the 12" maximum clearance, specifying the clear distance desired. The decision of the Department in this regard shall be final.

15. The ends of existing mains shall be temporarily capped or plugged to keep them clean and the ends of all mains shall be temporarily anchored to keep the joints from blowing apart from internal pressure until the new mains can be reconnected to them.

16. In addition to specific construction methods specified, the general requirements in subsequent subsections, below, shall apply to the work of this project.

I. Excavation for PVC Gravity Sewers and Service Laterals:

1. The Contractor shall make all excavations necessary for the construction of the gravity sewers and service laterals to the lines and grades shown on the Plans, and in accordance with the Standard Details.

2. In stable soils, trench widths when measured to a point 12 inches above the top of the pipe shall provide a 12-inch maximum clearance on each side, between the outside of the pipe barrel and the face of the excavation, or sheeting if used. Minimum trench widths under the same conditions shall be 6-inches on each side for the pipe for 4-inch and 6-inch pipe, and 9-inches on each side of the pipe for 8-inch pipe and larger. Minimum trench widths are required to provide room for a man to place and compact the haunching and initial backfill material. Embedment material shall be Class I. (See Section UC-300)

3. In unstable soils (defined as peat, much or other organic soils, elastic silts and clays below the water table, and fine sands below the water level), trench widths when measured at a point 12-inches above the top of the pipe shall be a minimum of five (5) nominal pipe diameter in width. Slightly greater width are at the Contractor's option in order to accommodate his trenching equipment, but the pipe bedding material shall extend to the face of the excavation, or sheeting if used. Embedment material shall be Class II. (See Section UC-300)

3.03 TRENCH STABILIZATION

Trench bottoms which are rendered soft or unstable as a result of construction methods, such as improper or inadequate sheeting, dewatering or other causes, shall be stabilized. In no event shall pipe be installed when such conditions exist. The Contractor shall correct such conditions so as to provide proper bedding or foundations for the proposed installation.

3.04 TRENCH OVERCUT

A. If, after excavating the trench to a depth of 2 feet 6 inches below the outside bottom elevation of the proposed pipe barrel, and the soil at that depth is still unsatisfactory as foundation material because it contains marl, muck, organic matter, or other unsuitable material, the pipe trench shall be excavated further in one-foot depth increments until a suitable foundation material is found. As a point of reference, it has been the Department's experience that, typically, trench overcut does not extend to depths more than 6 feet. However, the Department reserves the right to require trench overcut to depths up to 6 feet, i.e., to a point 8.5 feet below the bottom of the pipe.

B. Select backfill, as defined above, shall then be compacted in 6-inch layers up to the bottom of the proposed 6 inches of pipe bedding.

3.05 REMOVAL OF WATER

A. It is a basic requirement of these Specifications that excavation shall be free from water before pipe or structures are installed. However, it is realized that in certain sections of the work this cannot be accomplished economically and the Contractor may request permission to use the "Alternate Method of Construction" defined below.

B. The Contractor shall provide all necessary pumps, underdrains, well point systems, and other means for removing water from trenches and other parts of the work including structures. The Contractor shall continue dewatering operations until the backfill has progressed to a sufficient height over the pipe to prevent flotation or movement of the pipe in the trench, so that the backfill is above the natural water level.

C. Where applicable, the Contractor shall be required to obtain all necessary permits approving the location and proposed method of disposal before discharging water from any excavation into any portion of the public right-of-away or into any existing drainage structure or facility.

D. Water from the trenches and excavation shall be disposed of in such a manner as will not cause injury to public health, to public or private property, to the work completed or in progress, to the surface of the streets, or to cause interference with the use of the same by public. Submit the proposed method of handling and disposal of trench waster for approval before starting the excavation.

E. The Contractor is cautioned that Dade County or other governing body having jurisdiction over the work location may have regulatory rules and ordinances prohibiting, or limiting, the discharge of water from any excavation into sanitary and storm sewer systems, or to canals and drainage ditches. Obtain all necessary permits approving the location and proposed method of disposal before discharging water from any excavation into any portion of the public right-of-way, or into any existing drainage structure or facility.

F. Pumps and engines for dewatering systems shall be operated with mufflers and a minimum noise level suitable to a residential area. The Contractor shall be responsible for any nuisance created due to the disposal of the water from his discharge system.

3.06 INSTALLATION OF BACKFILL

A. Backfilling of pipe trenches will not be allowed until the work has been approved by the Department, pressure tested if required, and the Department indicates that backfilling may proceed. Any work which is covered or concealed without the knowledge and consent of the Department shall be uncovered or exposed for inspection. Partial backfill may be made to help restrain the pipe during pressure testing, if previously authorized by the Department.

B. The Contractor shall backfill all trenches and other excavations made in the process of installing the pipe. He shall maintain the surface of the backfill free from major irregularities and potholes.

C. Select backfill material shall be placed under and around the pipe to one foot above the crown (or to two feet above crown for PVC gravity sewers) in 6-inch layers. Each layer shall be thoroughly compacted to at least 90 percent of maximum density as defined by AASHTO Standard No. T-180, "Moisture-Density Relations of Soils using a 10-lb. (4.54 kg.) Rammer and an 18-in. (457 mm) Drop". The material in the ditch may be compacted by either hand tamper or a mechanized power tamper, provided the results obtained meet the continued approval of the Department. Particular attention and care shall be exercised in obtaining thorough support for the branch of all service connection fittings. Care shall be taken to preserve the alignment and gradient of the installed pipe.

D. Backfilling and compacting of material lying above a point one foot (or two feet for PVC pipe), above the crown of the pipe and below the pavement base or the surface of the ground, if out of pavement, shall be accomplished in layers not exceeding 9 inches in thickness. Each layer shall be thoroughly compacted with a powered hand tamper or a mechanized power tamper to at least 98 percent of maximum density as determined by AASHTO Specification T-180 or such greater density as may be required by the governing authority over the area in which the work is performed. A testing laboratory will make periodic field tests to determine the density being obtained in each lift, or layer, or the backfill. When compacted backfill fails to meet the specified percentage of maximum density as shown by test results, it shall be reworked and recompacted, and then retested. The reworking, recompacting and retesting of the backfill shall be repeated as many times as may be necessary to obtain compacted backfill with density meeting or exceeding the specified percentage as indicated by test results.

E. The Contractor shall exercise proper care to insure that no pipe will be broken or displaced through the use of the type of mechanical compacting equipment he selects. Water shall be added as required to obtain optimum moisture to facilitate compaction, but ponding or inundation of backfill will not be permitted. These ponding limitations shall not prohibit backfill in a wet trench up to the level of the natural water table if the "Alternate Method of Construction" is utilized.

F. Backfill shall in general be kept up with the rate of pipe laying. The backfill up to the springline of the pipe shall be placed as soon as practical after the laying of the pipe. On parts of the line where ground water level may be high enough to float the pipe, the placing of the backfill and the rate of pumping the trench shall be so controlled as to prevent the pipe from floating or moving from the line and grade shown on the Plans.

G. In the event that sufficient suitable material is not available at any point to properly backfill the trench, the Contractor shall transport suitable material from points of the line where such material is available or shall otherwise furnish suitable material.

H. Suitable material in excess of all backfill requirements and all unsuitable material shall be removed from the work and disposed of by the Contractor.

I. Within paved areas of trench excavation, the base and surfacing shall be reconstructed as specified under Section 02745, "Pavement Removal and Replacement".

J. Where cuts have been made through unpaved, stabilized rock roadways, driveways and parkways, surface restoration shall consist of 3 inches of compacted limerock overlaid by 3 inches of gravel or graded and washed rock with a maximum diameter of ½-inch, except as otherwise directed by the Department. The rock shall be installed over the entire width of the disturbed area and shall closely match the existing rock at each location. Several grades of rock may be required to attain this end, but it is not anticipated that more than one grade will have to be used at any one location.

K. Backfill for Structures: See Section 02314.

3.07 INSTALLATION OF PIPE BEDDING - FORCE MAIN AND WATER MAIN

A. As described above, all pipe trenches shall be excavated to a level 6-inches below the outside bottom of the proposed pipe barrel. The resulting excavation shall be backfilled with approved pipe bedding material, up to the level of the outside bottom of the proposed pipe barrel. This material shall be tamped and compacted to provide a proper bedding for the pipe and shall then be shaped to receive the pipe, including recesses for the pipe bells and couplings. Placing and compacting bedding up to the level of the lower one-third of the pipe barrel shall immediately follow the installation of the pipe. Bedding shall be provided under the branch of all fittings to furnish adequate support and bearing under the fitting.

B. Select Backfill material may be utilized where the excavated trench bottom is above water.

C. Any excavation below the levels required for installation of the pipe bedding shall be backfilled with approved bedding material, tamped, compacted and shaped to provide proper support for the proposed pipe.

D. For installation of gravity sewers, see Section UC-300, "Gravity Sewer Pipe Foundation".

3.08 COMPACTION AND DENSITIES

A. Methods of control and testing of backfill construction to be employed in this work are:

1. Maximum density of the material in trenches shall be determined by AASHTO Designation T 180.

2. Field density of the backfill material in place shall be determined by AASHTO Designation T 238.

B. Laboratory and field density tests are necessary to establish compliance with the compaction requirements of these specifications. The Department will not accepts projects for which successful laboratory and field density test results are submitted. Tests will be made at depths and locations to the satisfaction of the Department.

C. Trench backfill which does not comply with the specified densities, as indicated by such tests, shall be reworked and recompacted until the required compaction is secured.

3.09 ALTERNATE METHOD OF CONSTRUCTION

A. General:

1. A combination of conditions in the substrata, water table, or method of disposal may be encountered during the course of the work which make dewatering impossible, or only possible through the use of unusual methods, the cost of which is excessive. When such conditions are encountered, but only after all reasonable means to dewater the excavation have been employed without success, the Contractor, with the concurrence of the Department may elect to employ the following alternate method of construction. The concurrence of the Department shall be obtained and the Contractor shall limit the use of the alternate method of construction to such specific portions of the work as determined applicable.

2. The requirements set forth in other sections of these Specifications shall establish the required standards of construction quality for this work. Use of the alternate method of construction described hereinafter shall in no way be construed as relieving the Contractor of his basic responsibility for satisfactory completion of the work.

3. Subject to all of the requirements stated hereinabove, including approval by the Department, construction will be permitted in accordance with the following specifications.

B. Removal of Water: The installation of pipe, manholes and appurtenances under water will be permitted and the dry-trench requirements of "Removal of Water" will be waived.

C. Excavation: Excavation shall be performed in accordance with normal applicable excavation specifications.

D. Pipe Bedding for Ductile Iron and Vitrified Clay Pipe:

1. Pipe bedding shall be placed from 6-inches below the outside bottom of the proposed pipe barrel up to the level of the springline of the pipe barrel of gravity sewers and to the level of the lower one-third of the pipe barrel for force mains or water mains. The bedding material shall be washrock, drainfield limerock or approved material. Limerock screenings, sand or other fine organic material shall not be used.

2. The bedding material used shall be tamped and graded to provide a proper bedding for the pipe and shall then be shaped to receive the pipe. Bedding shall be provided under the branch of all fittings to furnish adequate support and bearing under the fitting.

E. Bedding for PVC Pipe: The pipe bedding, haunching and initial backfill material shall conform to embedment material listed in Section UC-300 for either stable or unstable soil conditions as required, and shall be placed and compacted in as stated in "Installation of Pipe Bedding", above.

F. Backfill:

1. After the pipe is installed, backfilling shall proceed in accordance with the provisions of "Installation of Backfill", except that select backfill material or pipe bedding material shall be used to backfill around the pipe and to a level one foot above the outside top (crown) of the pipe. Under no circumstances shall material other than select backfill or specified pipe bedding material be considered satisfactory for this purpose.

2. If the Alternate Method of Construction is used, all backfill material, shall be carefully lifted into the trench and released to fall freely therein when the bucket or container is near or at a moderate height above water level. Height of release shall be to the satisfaction of the Department. Below the existing water level, and to a point not more than 18-inches above the water level, the backfill material shall be carefully placed into place in uniform layers, of equal depth on each side of the pipe. From a point not more than 18-inches above the water level, and below the pavement base or the surface of the ground if out of paving, backfill material shall be placed and compacted for normal backfilling as provided in "Installation of Backfill" and "Compaction and Densities".

G. Backfill for PVC Gravity Sewers:

1. After the pipe is installed, backfilling shall proceed in accordance with the provisions of "Installation of Backfill", except that select backfill material or pipe bedding material shall be used to backfill to a level two feet above the outside top (crown) of the pipe. Under no circumstances shall material other than select backfill or specified pipe bedding material be considered satisfactory for this purpose.

2. If the Alternate Method of Construction is used, all embedment and backfill material, shall be carefully lifted into the trench and released to fall freely therein until the bucket or container is at or just above water level. Below the existing water level, and to a point not more than 18-inches above the water level, the backfill material shall be carefully placed into place in uniform layers, of equal depth on each side of the pipe. From a point not more than 18-inches above the water level, and below the pavement base or the surface of the ground if out of paving, backfill material shall be placed and compacted for normal backfilling as provided in "Installation of Backfill" and "Compaction and Densities".

3.11 RESTORATION OF EXISTING SURFACES

Paved and grassed areas disturbed by the operations required under this Section shall be restored as indicated on the approved Plans and/or specified herein.

END OF SECTION

SECTION 02741

PRIME AND TACK COATS

PART 1 - GENERAL

1.01 SCOPE OF WORK

The work specified in this Section consists of the application of bituminous material on previously prepared base in accordance with these specifications and in conformity with the line, grades, dimensions and notes shown on the Drawings.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Liquid Asphalt for Prime Coat shall be Asphalt Emulsion Prime (AEP) meeting the requirements of D.O.T. Specifications Section 916-4 and Section 300.

B. Liquid Asphalt for Tack Coat shall be Asphalt Emulsion Prime (AEP), conforming to the requirements of D.O.T. Specification Section 916-4 and Section 300.

2.02 EQUIPMENT

A. The pressure distributor used for placing the tack or prime coat shall be equipped with pneumatic tires having sufficient width of rubber in contact with the road surface to avoid breaking the bond of or forming a rut in the surface. The distance between the centers of openings of the outside nozzles of the spray bar shall be equal to the width of the application required, within an allowable variation of 2-inches. The outside nozzle at each end of the spray bar shall have an area of opening of not less than 25 percent, nor more than 75 percent in excess of the other nozzles which shall have uniform openings. When the application covers less than the full width, the normal opening of the end nozzle at the junction line may remain the same as those of the interior nozzle.

B. Application of prime or tack coat shall be done with a distributor approved by the Engineer of Record.

PART 3 - EXECUTION

3.01 PREPARATION

A. Before applying any bituminous material, all loose material, dust, dirt, and foreign material, which might prevent proper bond with the existing surface, shall be removed. Particular care shall be taken to clean the outer edges of the strip to be treated in order to insure that the prime or tack coat will adhere.

B. When the prime or tack coat is applied adjacent to curb and gutter, or any other concrete surface (except where they are to be covered with a bituminous wearing course) such concrete surfaces shall be protected by heavy paper or other protective material while the prime or tack coat is being applied. Any bituminous material deposited on such concrete surfaces shall be removed immediately.

3.02 WEATHER LIMITATIONS

No bituminous material shall be applied when the air temperature is less than 50°F in the shade, or when the weather conditions or the condition of the existing surface is unsuitable. In no case shall bituminous material be applied while rain is falling or when there is water on the surface to be covered.

3.03 APPLICATION OF PRIME COAT

A. After the base has been finished, the full width of surface shall be swept with a power broom supplemented with hand brooms and mechanical blowers prior to the application of the prime coat. Care shall be taken to remove all loose dust, dirt and objectionable matter. If deemed necessary, the base shall be lightly sprinkled with water immediately in advance of the prime coat. The prime coat shall be applied to the full width of the base.

B. The temperature of the prime material shall be such as to insure uniform distribution. The material shall be applied with a pressure distributor as specified above. The amount to be applied shall be sufficient to coat the surface thoroughly and uniformly without any excess to form pools or to flow off the base. For limerock base, the rate of application shall not be less than 0.10 gallons per square yard.

C. If the roadway is to be opened for use following the application of the prime material, a light uniform application of clean sand shall be applied and rolled. The sand shall be nonplastic, shall be free from silt and rock particles and shall not contain any sticks, vegetation, grass, roots or organic matter. After the sand covering has been applied, the surface may be opened to traffic.

3.04 APPLICATION OF TACK COAT

A. In general, a tack coat will not be used on primed bases except in areas which have become excessively dirty and cannot be cleaned or where the prime has cured and lost all of its bonding effect.

B. No tack coat shall be applied until the primed base or leveling course or new or existing asphaltic concrete has been cleaned and is free from sand, dust or other objectionable material.

C. The tack coat shall be applied with a pressure distributor as specified above. It shall be heated to a suitable consistency and applied in a thin uniform layer at the rate of between 0.05 gallons and 0.15 gallons per square yard.

D. The tack coat shall be applied sufficiently in advance of the laying of the wearing surface to permit drying, but shall not be applied so far in advance or over such an area as to lose its

adhesiveness as a result of being covered with dust or other foreign material. The tack coat shall not advance ahead of the paving by more than 300 feet in business or residential areas unless otherwise approved by the Engineer. Suitable precautions shall be taken by the Contractor to protect the surface while the tack coat is drying and until the wearing surface is applied.

END OF SECTION

SECTION 02742

HOT-MIX ASPHALT PAVING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Furnishing material and equipment, and performing all labor necessary for:
   1. Asphalt Concrete Pavement.
   2. Pavement Markings.
   3. Wheel Bumpers Guards.
   4. Signage.

B. Related Sections:
   1. Division 2 – Water Distribution
   2. Division 2 - Sanitary Sewerage
   3. Division 2 – Storm Drainage
   4. Division 2 - Earthwork
   5. Division 2 – Cement Concrete Pavement

1.2 REFERENCES

A. American Society for Testing Materials (ASTM).

B. Miami-Dade Public Works Department (MDPWD).

C. Miami-Dade Water & Sewer Department (MDWASD).

D. Florida Department of Transportation (FDOT), Latest Edition, Standard Specifications for Road and Bridge Construction.

E. American Association of State Highway Transportation Officials (AASHTO).

1.3 QUALITY ASSURANCE

A. The Contractor shall be responsible for the adequacy of construction, maintenance and safety of adjacent structures during this operation.

1.4 REFERENCE SPECIFICATIONS

A.. The following reference specifications are **applicable** to this project:

1. Miami-Dade Public Works Department Specifications – **Section 00033** for Stabilized Subgrade.

2. Miami-Dade Public Works Department Specifications – **Section 00040** for Restoration of Trenches.

3. Miami-Dade Public Works Department Specifications – **Section 00051** for Lime rock Base.

4. Miami-Dade Public Works Department Specifications – **Section 00100** for Prime & Tack Coats.

5. Miami-Dade Public Works Department Specifications – **Section 00132** for AC Binder Course.

6. Miami-Dade Public Works Department Specifications – **Section 00133** for Asphalt Concrete.

7. Florida Department of Transportation Specifications – **Section 200** for Lime rock Base.

8. Florida Department of Transportation Specifications – **Section 330 and 331** for Asphalt Concrete.

PART 2 - PRODUCTS AND MATERIALS

A. All materials, manufacturers, pipes, structures & fittings shall be in accordance with Reference Specifications listed above.

B. Any deviation from the referenced specifications must be forwarded to the Owner and Engineer for approval prior to construction.

C. Traffic Paint: Provide as indicated on drawings and to restore existing markings that were destroyed as a result of cut and replaced asphalt.

1. Pavement Striping and Pavement Marking to be Per FDOT Specifications (current edition), Section 710, 711.

D. Precast Concrete Wheel Bumpers: Provide as indicated on drawings or to replace existing damaged as a result of construction at no additional expense to the owner.

1. Provide in accordance with Florida Department of Transportation Roadway & Traffic Design Standards, Index 300. (Current Edition)

E. Signs: Provide as indicated on drawings or to replace existing damaged as a result of construction at no additional expense to the owner and in accordance with FDOT Specifications (current edition), Section 962, 995.

PART 3 - EXECUTION

A. All installation and construction must be in strict accordance with procedures as noted in the afore stated reference specification sections.

B. Any deviation from the referenced specifications must be forwarded to the Owner and Engineer for approval prior to construction.

C. Connections to Existing Pavements: Sawcut with joints neat and inconspicuous as possible.

D. Patching Existing Pavements: Repair existing pavement if damaged or removed due to construction activities as directed by the Owner and Engineer.

E. Verify that compacted subgrade is dry and ready to support paving and imposed loads.

F. Verify gradients and elevations of base are correct.

G. Beginning of installation means acceptance of substrate.

H. Traffic Striping/Pavement Marking :

1. Cleaning: Sweep and clean parking and roadway surfaces to eliminate loose dust, dirt, debris, and other materials.

2. Application: Apply paint with mechanical equipment to produce dense, opaque uniform straight lines and edges. Four-inch stripe width without feathered edges, accurately located, and applied in two (2) coats under provisions of the paint manufacturer's printed instructions.

3. Location: As indicated on drawings. Items such as directional "arrows", pavement messages and "handicap" symbols as indicated on drawings. Colors should be consistent with current MUTCD Guidelines and Requirements and Florida Building Code.

4. Must be constructed in accordance with Civil Engineering Drawings.

.

END OF SECTION 02742

SECTION 02765

PAVEMENT MARKINGS AND TRAFFIC SIGNS

PART 1 - GENERAL

1.01 SCOPE

This section consists of pavement markings and traffic signs on the Drawings, specified herein and as required for a complete installation.

1.02 QUALITY ASSURANCE

A. The phrase "DOT Specifications" shall refer to the Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition. The DOT Specifications, are referred to herein and are hereby made a part of this Contract to the extent of such references, and shall be as binding upon the Contract as though reproduced herein in their entirety.

B. Pavement markings for this Project shall conform to the Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition. Pavement markings removed or obliterated by the Contractor's operations shall be promptly replaced in kind to the satisfaction of the Dade County Department of Public Works, Traffic Engineering Division, or other authority having jurisdiction over the work area.

1.03 CERTIFICATION

The Contractor shall furnish the manufacturer's certification that all signs furnished conform to these specifications and shall replace or repair at his expense all signs that fail to meet this requirement.

PART 2 - PRODUCTS

2.01 PAVEMENT MARKING

Paint for pavement strips shall be as specified in Part 3, Execution.

2.02 REFLECTIVE MARKERS

Reflective markers shall be installed in the pavement in accordance with OSHA, DOT and Dade County Public Works requirements.

2.03 TRAFFIC SIGNS

A. General: Traffic regulating signs shall conform to the colors, dimensions and requirements of the Manual on Uniform Traffic Control Devices (ANSI) and displaying the lettering and symbols indicated on the Drawings.

B. Sign Panels and Support Members: Sign panels and support members shall conform to Aluminum Association Alloy 6061-T6.

C. Bolts: Bolts shall conform to Aluminum Association Alloy 2024-T4 with an anodic coating 0.0002-inches thick minimum and chromate sealed.

D. Nuts: Nuts shall conform to Aluminum Association Alloy 6269-T9.

E. Reflective Sheeting: Reflective sheeting shall conform to DOT Type A requirements.

F. Construction Warning Signs: The CONTRACTOR shall install traffic and warning signs during construction in accordance with OSHA, DOT and Dade County Public Works requirements.

PART 3 - EXECUTION

3.01 TRAFFIC PAINT

A. This type of pavement painting shall be used where no thermoplastic paint is required or as temporary paint during the time required for paving "cure" prior to application of thermoplastic paint markings.

B. Traffic paint used for this work shall conform with the requirements of Section 971-12 of the Florida Department of Transportation Standard Specifications for Road and bridge Construction, or, at the Contractor's option, fast dry traffic paint, as specified in D.O.T. Specifications, Section 971-13, may be used.

C. The colors of the paint shall be yellow or white, as existed before the repair.

D. All equipment shall be of a type and design which will readily produce the required uniformity of application of the stripes, both as to thickness of coating and alignment. The paint machine shall be of the spray type, capable of spraying the paint to the required "spread" without thinning of the paint. The paint tank shall be equipped with a mechanical agitator. The nozzle shall have cut-off valves which will apply broken or "skip" lines automatically. Each nozzle shall also be provided with suitable line guides, either metallic shrouds or air blasts.

E. Painting shall be done only during daylight hours and, as far as practicable, shall be terminated in time to permit sufficient drying by sunset. No paint shall be applied when moisture is present on the surface to be painted or when the air temperature is below 40 degrees F. Painting shall not be done when winds are sufficient to cause spray dust.

F. The surface which is to be painted shall be cleaned, by compressed air or other effective means, immediately before the start of painting, and shall be clean and dry when the paint is applied. Any vegetation or soil shall be removed from the pavement before edge striping is begun.

G. The paint shall be thoroughly mixed before it is poured into the painting machine and no thinning of the paint will be allowed at any time. Before the start of each day's work, the

paint container, the connections, and the spray nozzles on the machine shall be thoroughly cleaned with paint thinner or other suitable cleaner.

H. The traffic stripe shall be of the specified width, with clean, true edges and without sharp breaks in the alignment. A uniform coating of paint shall be obtained and the finished stripe shall contain no light spots or paint skips. Any stripes which do not have a uniform, satisfactory appearance, both day and night, shall be corrected.

I. All newly painted stripes, including edge stripes, shall be protected until the paint is sufficiently dry to permit vehicles to cross the stripe without damage from the tires. While the center line stripes are being painted, all traffic shall be routed away from the painting operations and the newly painted stripe. When necessary, a pilot car shall be used to protect the painting operations from traffic interference.

J. Any portions of the stripes damaged by passing traffic or from other causes shall be repainted.

K. Paint for temporary pavement markings shall also be used where thermoplastic markings are to be applied after the asphaltic concrete has "cured." The cure time shall be based on thermoplastic manufacturer's recommendations. However, in accordance with FDOT requirements, asphalt shall have been in place for 30 days before application of thermoplastic stripe.

3.02 THERMOPLASTIC TRAFFIC STRIPES AND MARKINGS

A. Thermoplastic pavement markings, including stripes, pavement messages, stop bars, directional arrows, reflective pavement markers and other miscellaneous items, shall be replaced as existed before the repair was made. The thermoplastic compound shall be extruded or sprayed onto the pavement surface in a molten state by mechanical means, with surface application of glass spheres, when required. Upon cooling to ambient pavement temperature, the compound shall produce an adherent pavement marking of specified thickness and width and capable of resisting deformation.

B. The colors of the compound shall be white or yellow, as existed before the repair.

C. Where thermoplastic markings are to be applied to concrete pavement, a sealing primer, as specified in F.D.O.T. Specifications Section 711-2.2, shall be applied in advance of the placing of the stripes.

D. The thermoplastic shall be applied to the pavement utilizing either extrusion or spray application equipment. The application equipment shall be so constructed as to provide continuous mixing and agitation of the material. Conveying parts of the equipment between the main material reservoir and the shaping die or gun shall be so constructed as to prevent accumulation and clogging. The equipment shall be constructed so that all mixing and conveying parts up to and including the shaping die or gun, maintain the material at the plastic temperature with heat transfer oil or electrical element controlled heat. Direct fire heat transfer will not be allowed.

E. The application equipment shall be so constructed as to insure continuous uniformity in the dimensions of the stripe. The applicator shall provide a means for cleanly cutting off square stripe ends and shall provide a method of applying "skip" lines. The use of pans, aprons, or similar appliances which the die overruns will not be permitted.

F. Glass spheres applied to the surface of the completed stripe shall be applied by an automatic bead dispenser attached to the striping machine in such a manner that the beads are dispensed almost instantaneously upon the installed line.

G. Special kettle(s) shall be provided for melting and heating the thermoplastic material. The kettle(s) shall be equipped with automatic thermostatic control devises to provide uniform temperature control and prevent overheating of the material. The applicator and kettle(s) shall be equipped and arranged as to satisfy the requirements of the National Fire Underwriters, the State of Florida, Dade County and any municipal authority applicable to where the work is being done.

H. Applicators shall be mobile and maneuverable to the extent that straight lines can be followed and normal curves can be made in a true arc. The applicator equipment to be used on roadway installations shall consist of either hand equipment or truck mounted units depending on the type of marking required.

I. The hand applicator equipment shall be insulated, have sufficient capacity to hold 150 pounds of molten material, and be sufficiently maneuverable to install crosswalks; lane, edge and center lines; arrows and legends.

J. The truck mounted unit for lane, edge and center lines shall consist of a mobile self-contained unit carrying its own material capable of operating at a minimum speed of five miles per hour while installing striping.

K. Application time, weather limitations and surface preparation shall be in accordance with F.D.O.T. Specifications Sections 710-4, 710-5 and 710-8. In accordance with FDOT requirements, asphalt shall have been in place for 30 days before application of thermoplastic stripe.

L. The material, when formed into traffic stripes or other markings, shall be readily renewable by placing an overlay of new material directly over an old line of compatible material in such a manner that no splitting or separation takes place.

M. The application temperature shall be within the range specified by the manufacturer of the thermoplastic compound being used.

N. All pavement edge lines, gore, island and diagonal strip markings, bike lane symbols and messages, wherever located, shall have a minimum thickness of 0.060 inch at the edges and a maximum thickness of 0.120 inch at the center. A minimum average film thickness of 0.060 inch shall be maintained. All lane lines, center lines, transverse markings (except shoulder markings) and pavement markings within traffic wearing area (such as dotted turning guide lines) shall have a minimum thickness of 0.090 inch at the edges and a maximum thickness of 0.188 inch at the center. A minimum average film thickness of 0.090

shall be maintained. All thickness measurements shall be an average in any three foot length.

O. The glass sphere top coating shall be applied by a type of glass sphere dispenser or gun which will embed the spheres into the line surface to at least one-half their diameter. The glass sphere top coating shall not incur more than a 10 percent loss during the first 30 days of traffic exposure.

P. Reflective pavement markers shall be installed as they existed before the repair. They shall be replaced with the appropriate color or colors and oriented in the correct direction as specified in Section 706 of the F.D.O.T. Specifications. Paving markings for this Project shall conform to the Florida Department of Transportation Standard Specifications for Road and Bridge Construction, as revised by the governing agency.

3.03 FABRICATION

Preparation of sign blanks and fabrication of reflectorized faces shall conform to the applicable requirements of DOT Sections 700-4 and 700-5.

END OF SECTION

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 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: The Engineer may allow, at no additional cost to the Department, 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 bike/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. Curbpads 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. 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 Department's 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 or an AASHTO accredited laboratory designated by the State Materials Office 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 with 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 recompact the subgrade in the event of underwash or other damage occurring to the previously compacted subgrade. Perform any such recompaction at no expense to the Department. 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 undertolerance 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 Department 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.

Test Name	Quality Control	Verification	Verification for Shoulder-Only, Bike/Shared Use Path and Sidewalk Construction
Modified Proctor Maximum Density	One per two consecutive LOTs	One per eight consecutive LOTs	One per four LOTs
Density	One per LOT	One per four LOTs	One per two LOTs
Stabilizing Mixing Depth	Three per 500 feet	Witness one per LOT	Witness one per LOT
LBR	One per two consecutive LOTs	One per eight consecutive LOTs	One per four LOTs
Gradation, LL/PI & Soil Classification (Local materials)	Not Required	One per eight consecutive LOTs	One per four LOTs

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, using the Random Number generator approved by the Department. Notify the Engineer a minimum of 24 hours before checking mixing depths. Record results on forms supplied by the Department.

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, using the Random Number generator approved by the Department for the two LOTs under consideration. Retain the Verification and Resolution samples for the Department until the Engineer accepts the LOTs represented by the samples.

160-4.3.2 Department 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 Department's 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. The State Materials Office or an AASHTO accredited laboratory designated by the State Materials Office 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 Department 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. 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 FM 1-T 180, Method D.

The Engineer will compare the Resolution Test results with the Quality Control test results. If the Resolution Test result is within 4.5 lb/ft^3 of the corresponding Quality Control test result, the Engineer will use the Quality Control 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 Quality Control 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 Quality Control 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 Quality Control 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 Quality Control 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 of all stabilizing material required and any reprocessing of stabilization areas necessary to attain the specified bearing value. The Department 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.

Payment will be made under:

Item No. 160- 4- Stabilization - per square yard.

SECTION 285
OPTIONAL BASE COURSE

285-1 Description.

Construct a base course composed of one of the optional materials shown on the typical cross-sections.

285-2 Materials.

Meet the material requirements as specified in the Section covering the particular type of base to be constructed.

Graded Aggregate	Section 204
Asphalt	Section 234
Limerock	Section 911
Shell Base	Section 913
Shell-Rock	Section 913A
Cemented Coquina	Section 915

285-3 Selection of Base Option.

The Plans will include typical cross-sections indicating the various types of base construction (material and thickness) allowable.

Select one base option as allowed for each typical cross-section shown in the Plans. Only one base option is permitted for each typical cross-section.

Notify the Engineer in writing of the base option selected for each typical cross-section at least 45 calendar days prior to beginning placement of base material.

285-4 Construction Requirements.

Construct the base in accordance with the Section covering the particular type of base to be constructed.

Limerock	Section 200
Shell Base	Section 200
Shell Rock	Section 200
Cemented Coquina	Section 200
Graded Aggregate	Section 204
Asphalt	Section 234

285-5 Variation in Earthwork Quantities.

The Plans will identify the optional materials used by the Department for determining the earthwork quantities (Roadway Excavation, Borrow Excavation, Subsoil Excavation, Subsoil Earthwork, or Embankment). The Department will not revise the quantities, for those items having final pay based on plan quantity, to reflect any volumetric change caused by the Contractor's selection of a different optional material.

285-6 Thickness Requirements.

285-6.1 Measurements: For non-asphalt bases, meet the requirements of 200-7.3.1.2.

For subbases, meet the thickness requirements of 290-4.

The Engineer will determine the thickness of asphalt base courses in accordance with 234-8.1.

285-6.2 Correction of Deficient Areas: For non-asphalt bases, correct all areas of the completed base having a deficiency in thickness in excess of 1/2 inch by scarifying and adding additional base material. As an exception, if authorized by the Engineer, such areas may be left in place without correction and with no payment.

For asphalt bases, correct all areas of deficient thickness in accordance with 234-8.

285-7 Calculation of Average Thickness of Base.

For bases that are not mixed in place, the Engineer will determine the average thickness from the measurements specified in 285-6.1, calculated as follows;

(a) When the measured thickness is more than 1/2 inch greater than the design thickness shown on the typical cross-section in the Plans, it will be considered as the design thickness plus 1/2 inch.

(b) Average thickness will be calculated per typical cross-section for the entire job as a unit.

(c) Any areas of base left in place with no payment will not be included in the calculations.

(d) Where it is not possible through borings to distinguish the base materials from the underlying materials, the thickness of the base used in the measurement will be the design thickness.

(e) For Superpave asphalt base course, the average spread rate of each course shall be constructed in compliance with 234-8.

285-8 Method of Measurement.

The quantity to be paid for will be the plan quantity area in square yards, omitting any areas where under-thickness is in excess of the allowable tolerance as specified in 285-6. The pay area will be the surface area, determined as provided above, adjusted in accordance with the following formula:

$$Pay\ Area = Surface\ Area\ (\frac{Calculated\ Average\ Thickness\ per\ 285\text{-}7}{Plan\ Thickness})$$

The pay area shall not exceed 105% of the surface area.

There will be no adjustment of the pay area on the basis of thickness for base courses constructed utilizing mixed-in-place operations.

For Superpave asphalt base course, the quantity to be paid for will be the plan quantity.

285-9 Basis of Payment.

Price and payment will be full compensation for all work specified in this Section, including tack coat between base layers, prime coat, cover material for prime coat, bituminous material used in bituminous plant mix, and cement used in soil-cement.

Where the Plans include a typical cross-section which requires the construction of an asphalt base only, price adjustments for bituminous material provided for in 9-2.1.2 will apply to that typical cross-section. For typical cross-sections which permit the use of asphalt or other

materials for construction of an optional base, price adjustments for bituminous material provided for in 9-2.1.2 will not apply.

Payment will be made under:

Item No. 285- 7- Optional Base - per square yard.

SECTION 327
MILLING OF EXISTING ASPHALT PAVEMENT

327-1 Description.

Remove existing asphalt concrete pavement by milling to improve the rideability and cross slope of the finished pavement, to lower the finished grade adjacent to existing curb prior to resurfacing, or to completely remove existing pavement.

When milling to improve rideability, the Plans will specify an average depth of cut.

Take ownership of milled material.

327-2 Equipment.

Provide a milling machine capable of maintaining a depth of cut and cross slope that will achieve the results specified in the Contract Documents. Use a machine with a minimum overall length (out to out measurement excluding the conveyor) of 18 feet and a minimum cutting width of 6 feet.

Equip the milling machine with a built-in automatic grade control system that can control the transverse slope and the longitudinal profile to produce the specified results.

To start the project, the Engineer will approve any commercially manufactured milling machine that meets the above requirements. If it becomes evident after starting milling that the milling machine cannot consistently produce the specified results, the Engineer will reject the milling machine for further use.

The Contractor may use a smaller milling machine when milling to lower the grade adjacent to existing curb or other areas where it is impractical to use the above described equipment.

Equip the milling machine with means to effectively limit the amount of dust escaping during the removal operation.

For complete pavement removal, the Engineer may approve the use of alternate removal and crushing equipment in lieu of the equipment specified above.

327-3 Construction.

327-3.1 General: Remove the existing raised reflective pavement markers prior to milling. Include the cost of removing existing pavement markers in the price for milling.

When milling to improve rideability or cross slope, remove the existing pavement to the average depth specified in the Plans, in a manner that will restore the pavement surface to a uniform cross-section and longitudinal profile. The Engineer may require the use of a stringline to ensure maintaining the proper alignment.

Establish the longitudinal profile of the milled surface in accordance with the milling plans. Ensure that the final cross slope of the milled surface parallels the surface cross slope shown in the Plans or as directed by the Engineer. Establish the cross slope of the milled surface by a second sensing device near the outside edge of the cut or by an automatic cross slope control mechanism. The Plans may waive the requirement of automatic grade or cross slope controls where the situation warrants such action.

Operate the milling machine to minimize the amount of dust being emitted. The Engineer may require prewetting of the pavement.

Provide positive drainage of the milled surface and the adjacent pavement. Perform this operation on the same day as milling. Repave all milled surfaces no later than the day after the surface was milled unless otherwise stated in the Plans.

If traffic is to be maintained on the milled surface prior to the placement of the new asphalt concrete, provide suitable transitions between areas of varying thickness to create a smooth longitudinal riding surface. Produce a pattern of striations that will provide an acceptable riding surface. The Engineer will control the traveling speed of the milling machine to produce a texture that will provide an acceptable riding surface.

Prior to opening an area which has been milled to traffic, sweep the pavement with a power broom or other approved equipment to remove, to the greatest extent practicable, fine material which will create dust under traffic. Sweep in a manner that will minimize the potential for creation of a traffic hazard and to minimize air pollution.

Sweep the milled surface with a power broom prior to placing asphalt concrete.

In urban and other sensitive areas, use a street sweeper or other equipment capable of removing excess milled materials and controlling dust. Obtain the Engineer's approval of such equipment, contingent upon its demonstrated ability to do the work.

Perform the sweeping operation immediately after the milling operations or as directed by the Engineer.

327-3.2 Quality Control Requirements: Furnish an electronic level with a length of 4 feet and an accuracy of plus or minus 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 milling operations. Calibrate and compare electronic levels in accordance with 330-9.3.1 at a minimum frequency of once per day before any milling operation.

Multiple cuts may be made to achieve the required pavement configuration or depth of cut. Measure the cross slope of the milled surface by placing the level at the center location of a lane and perpendicular to the roadway centerline. Record all the measurements to the nearest 0.1% on an approved form and submit to the Engineer for documentation.

1. Tangent Sections: Measure the cross slope per lane at a minimum frequency of one measurement every 100 feet. Calculate the absolute deviation of cross slope at each measurement and then average the absolute deviation 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 327-1 and upon approval by the Engineer, the frequency of the cross slope measurements can be reduced to one measurement every 200 feet during milling operations.

2. Superelevated Sections: Measure the cross slope every 100 feet per lane within the length of full superelevation. Calculate the absolute deviation of each measurement and then average the absolute deviation of ten consecutive cross slope measurements. For every transition section, measure the cross slope at control points identified in the Plans or, if not shown in the Plans, at a control point at a location of 0.0% cross slope. For curves where the length of the fully superelevated section is less than 250 feet, measure the cross slope at the beginning point, midpoint and ending point of the fully superelevated section, 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 shown in Table 327-1, stop the milling operations 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 327-1, make corrections only in the deficient area to the satisfaction of the Engineer at no cost to the Department. For pavement with multiple cuts, the deficient areas not caused by the final cut may be left in place upon approval of the Engineer. All milling corrections shall be completed before placement of the asphalt course unless stated otherwise in the Plans or as determined by 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 Department. 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 an engineering determination indicates that the deficiencies are sufficiently separated so as not to significantly affect the final cross slope or project grade.

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 327-1
Cross Slope Milling Acceptance Tolerance

Roadway Feature	Individual Absolute Deviation	Average Absolute Deviation
Tangent section (including turn lanes)	0.4%	0.2%
Superelevated curve	0.4%	0.2%
Shoulder	0.5%	0.5%

In the event that the distance between tow edges of deficient areas is less than 100 feet, the correction work shall include the area between the deficient sections.

327-3.3 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. The Engineer will measure the cross slope of the milled 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 the acceptance tolerance as shown in Table 327-1, immediately make a comparison check at the QC test locations to verify the QC measurements in the questionable section. If the comparisons are beyond the acceptable comparison tolerance in accordance with 327-3.2, stop the milling operation until the problem is resolved to the satisfaction of the Engineer. Correct any cross slope not meeting the individual deviation acceptance tolerance at no cost to the Department. The Engineer reserves the right to check the cross slope of the milled surface at any time by taking cross slope measurements at any location.

327-4 Milled Surface.

Provide a milled surface with a reasonably uniform texture, within 1/4 inch of a true profile grade, and with no deviation in excess of 1/4 inch from a straightedge applied to the pavement perpendicular to the centerline. Ensure that the variation of the longitudinal joint between multiple cut areas does not exceed 1/4 inch. The Engineer may accept areas varying

from a true surface in excess of the above stated tolerance without correction if the Engineer determines that they were caused by a pre-existing condition which could not have reasonably been corrected by the milling operations. Correct any unsuitable texture or profile, as determined by the Engineer, at no additional expense to the Department.

The Engineer may require remilling of any area where a surface lamination causes a non-uniform texture to occur.

327-5 Method of Measurement.

The quantity to be paid for will be the plan quantity area, in square yards, over which milling is completed and accepted.

327-6 Basis of Payment.

Price and payment will be full compensation for all work specified in this Section, including hauling off and stockpiling or otherwise disposing of the milled material.

Payment will be made under:

Item No. 327- 70- Milling Existing Asphalt Pavement - per square yard.

SECTION 334
SUPERPAVE ASPHALT CONCRETE

334-1 Description.

334-1.1 General: Construct a Superpave Asphalt Concrete pavement with the type of mixture specified in the Contract Documents, 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, except as modified herein, including the provision for Quality Control (QC) Plans and QC Systems as specified in Section 105.

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 18,000 pound Equivalent Single Axle Loads (ESAL's). The five traffic levels are as shown in Table 334-1.

Table 334-1
Superpave Traffic Levels

Traffic Level	Traffic Level ($1x10^6$ ESAL's)
A	<0.3
B	0.3 to <3
C	3 to <10
D	10 to <30
E	≥30

The traffic levels for the project are as specified in the Contract Documents. A Type SP mix one traffic level higher than the traffic level specified in the Contract Documents may be substituted, at no cost to the Department (i.e., Traffic Level B may be substituted for Traffic Level A, etc.).

334-1.3 Gradation Classification: The Superpave mixes are classified as fine and are defined in 334-3.2.2.

The equivalent AASHTO nominal maximum aggregate size Superpave mixes are as follows:

Type SP-9.5 ..... 9.5 mm
Type SP-12.5 ..... 12.5 mm
Type SP-19.0 ..... 19.0 mm

334-1.4 Thickness: The total thickness of the Type SP asphalt layers will be the plan thickness as shown in the Contract Documents. Before paving, propose a thickness for each individual layer meeting the requirements of this specification, which when combined with other layers (as applicable) will equal the plan thickness. For construction purposes, the plan thickness and individual layer thickness will be converted to spread rate based on the maximum specific gravity of the asphalt mix being used, as well as the minimum density level, as shown in the following equation:

$$\text{Spread rate (lbs/yd}^2) = t \times G_{mm} \times 43.3$$

Where: t = Thickness (in.) (plan thickness or individual layer thickness)
G_{mm} = Maximum specific gravity from the verified mix design

The weight of the mixture shall be determined as provided in 320-3.2. For target purposes only, spread rate calculations should be rounded to the nearest whole number.

Note: Plan quantities are based on a G_{mm} of 2.540, corresponding to a spread rate of 110 lbs/yd^2-in. Pay quantities will be based on the actual maximum specific gravity of the mix being used.

334-1.4.1 Layer Thicknesses - Fine Mixes: The allowable layer thicknesses for fine Type SP Asphalt Concrete mixtures are as follows:

Type SP-9.5.....1 to 1-1/2 inches
Type SP-12.5..... 1-1/2 to 2-1/2 inches
Type SP-19.0.....2 to 3-1/2 inches

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

Type SP-9.5 - Limited to the top two structural layers, two layers maximum.

Type SP-9.5 – May not be used on Traffic Level D and E applications.

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

334-1.4.2 Additional Requirements: The following requirements also apply to Type SP Asphalt Concrete mixtures:

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

2. When construction includes the paving of adjacent shoulders (less than or equal to 5 feet wide), the layer thickness for the upper pavement layer and shoulder must be the same and paved in a single pass, unless called for differently in the Contract Documents.

3. All overbuild layers must be fine Type SP Asphalt Concrete designed at the traffic level as stated in the Contract Documents. Use the minimum and maximum layer thicknesses as specified above unless called for differently in the Contract Documents. On variable thickness overbuild layers, the minimum and maximum allowable thicknesses will be as specified below, unless called for differently in the Contract Documents.

Type SP-9.5..... 3/8 to 2 inches
Type SP-12.5..... 1/2 to 3 inches
Type SP-19.0..... 1-1/2 to 3-1/2 inches

4. Variable thickness overbuild layers constructed using a Type SP-9.5 or SP-12.5 mixtures may be tapered to zero thickness provided the contract documents require a minimum of 1-1/2 inches of dense-graded mix placed over the variable thickness overbuild layer.

334-2 Materials.

334-2.1 General Requirements: Meet the material requirements specified in Division III. Specific references are as follows:

Superpave PG Asphalt Binder.....Section 916
Coarse Aggregate.....Section 901
Fine Aggregate.....Section 902

334-2.2 Superpave Asphalt Binder: Unless specified otherwise in the Contract Documents, use a PG 67-22 asphalt binder. In addition, meet the requirements of 334-2.3.

334-2.3 Reclaimed Asphalt Pavement (RAP) Material:

334-2.3.1 General requirements: RAP may be used as a component of the asphalt mixture subject to the following requirements:

1. When using a PG 76-22 (PMA), or PG 76-22 (ARB), or PG 82-22 (PMA) asphalt binder, limit the amount of RAP material used in the mix to a maximum of 20% by weight of total aggregate. As an exception, amounts greater than 20% RAP by weight of total aggregate can be used if no more than 20% by weight of the total asphalt binder comes from the RAP material.

2. Assume full responsibility for the design, production and construction of asphalt mixes which incorporate RAP as a component material.

3. Use RAP from a Department approved stockpile or millings from a Department project.

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

5. Provide RAP material having a minimum average asphalt binder content of 4.0% by weight of RAP. As an exception, when using fractionated RAP, the minimum average asphalt binder content for the coarse portion of the RAP shall be 2.5% by weight of the coarse portion of the RAP. The coarse portion of the RAP shall be the portion of the RAP retained on the No. 4 sieve. The Engineer may sample the stockpiles to verify that this requirement is met.

334-2.3.2 Material Characterization for Mix Design: Assume responsibility for establishing the asphalt binder content, gradation, and bulk specific gravity (G_{sb}) of the RAP material based on a representative sampling of the material by roadway cores or stockpile samples. For roadway core samples, assume responsibility for the degradation that will occur during the milling operation.

334-2.3.3 RAP Stockpile Approval: Prior to the incorporation of RAP into the asphalt mixture, stockpile the RAP material and obtain approval for the stockpile by one of the following methods:

1. Continuous stockpile: When RAP is obtained from one or multiple sources and is either processed, blended, or fractionated, and stockpiled in a continuous manner, assure an adequate number of test results are obtained for stockpile approval. Test the RAP material for gradation and asphalt content at a minimum frequency of one sample per 1000 tons with a minimum of six test results. Test the RAP material for G_{mm} (for G_{sb} determination) at a minimum frequency of one sample per 5000 tons with a minimum of two test results. Based on visual inspection and a review of the test data, the Engineer will determine the suitability of the stockpiled material. In addition, address in the QC Plan the details and specifics of the processing, sampling, testing and actions to be taken.

2. Non-continuous single stockpile: When an individual stockpile is being constructed, obtain representative samples at random locations and test the RAP material for gradation and asphalt content at a minimum frequency of one sample per 1000 tons with a minimum of six test results. Test the RAP material for G_{mm} (for G_{sb} determination) at a minimum frequency of one sample per 5000 tons with a minimum of two test results. Based on visual inspection and a review of the test data, the Engineer will determine the suitability of the stockpiled material. Once the RAP stockpile has been approved, do not add additional material without prior approval of the Engineer.

Determine the asphalt binder content and gradation of the RAP material in accordance with FM 5-563 and FM 1-T 030, respectively. Establish the G_{sb} of the RAP material by using one of the following methods:

a. Calculate the G_{sb} value based upon the effective specific gravity (G_{se}) of the RAP material, determined on the basis of the asphalt binder content and maximum specific gravity (G_{mm}) of the RAP material. The Engineer will approve the estimated asphalt binder absorption value used in the calculation.

b. Measure the G_{sb} of the RAP aggregate, in accordance with FM 1-T 084 and FM 1-T 085. Obtain the aggregate by using a solvent extraction method.

334-2.3.4 Pavement Coring Report: When the Contract includes milling of the existing asphalt pavement, the Pavement Coring Report may be available on the Department's website.

334-2.3.5 Asphalt Binder for Mixes with RAP: Select the appropriate asphalt binder grade based on Table 334-2. Obtain a sample of the mixture for the Engineer within the first 1,000 tons of production and at a continuing frequency of one sample per 4,000 tons of mix. The Engineer reserves the right to change the asphalt binder type and grade at design based on the characteristics of the RAP asphalt binder, and reserves the right to make changes during production.

Table 334-2
Asphalt Binder Grade for Mixes Containing RAP

Percent RAP	Asphalt Binder Grade
0 - 15	PG 67-22
16 - 30	PG 58-22
>30	PG 52-28

334-2.4 Recycled Crushed Glass: Recycled crushed glass may be used as a component of the asphalt mixture subject to the following requirements:

1. Consider the recycled crushed glass a local material and meet all requirements specified in 902-6.
2. Limit the amount of recycled crushed glass to a maximum of 15% by weight of total aggregate.
3. Use an asphalt binder that contains a minimum of 0.5% anti-stripping agent by weight of binder. The anti-strip additive shall be one of the products listed on the Qualified Products List (QPL). The anti-strip additive shall be introduced into the asphalt binder by the supplier during loading.
4. Do not use recycled crushed glass in friction course mixtures or in structural course mixtures which are to be used as the final wearing surface.

334-3 General Composition of Mixture.

334-3.1 General: Compose the asphalt mixture using a combination of aggregate (coarse, fine or mixtures thereof), mineral filler, if required, and asphalt binder material. Size, grade and combine the aggregate fractions to meet the grading and physical properties of the mix design. Aggregates from various sources may be combined.

334-3.2 Mix Design:

334-3.2.1 General: Design the asphalt mixture in accordance with AASHTO R 35-12, except as noted herein. Prior to the production of any asphalt mixture, submit the proposed mix design with supporting test data indicating compliance with all mix design criteria to the Engineer. For Traffic Level B through E mix designs, include representative

samples of all component materials, including asphalt binder. Allow the State Materials Engineer a maximum of four weeks to either conditionally verify or reject the mix as designed.

Do not use more than three mix designs per nominal maximum aggregate size per traffic level per binder grade per year, where the year starts at the Notice to Proceed. Exceeding this limitation will result in a maximum Composite Pay Factor (CPF) of 1.00 as defined in 334-8.2 for all designs used beyond this limit.

Warm mix technologies (additives, foaming techniques, etc.) listed on the Department's website may be used in the production of the mix. The URL for obtaining this information, if available, is:
http://www.dot.state.fl.us/Specificationsoffice/implemented/URLinSpecs/files/WarmMixAsphalt.pdf .

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

334-3.2.2 Mixture 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 AASHTO M 323-12, Table 3. Aggregates from various sources may be combined.

334-3.2.2.1 Mixture Gradation Classification: Plot the combined mixture gradation on an FHWA 0.45 Power Gradation Chart. Include the Control Points from AASHTO M 323-12, Table-3, as well as the Primary Control Sieve (PCS) Control Point from AASHTO M 323-12, Table 4. Fine mixes are defined as having a gradation that passes above the primary control sieve control point and above the maximum density line for all sieve sizes smaller than the primary control sieve and larger than the No. 100 sieve.

334-3.2.3 Aggregate Consensus Properties: For Traffic Level C through E mixtures, meet the following consensus properties at design for the aggregate blend. Aggregate consensus properties do not apply to Traffic Level A and B mixtures.

334-3.2.3.1 Coarse Aggregate Angularity: When tested in accordance with ASTM D 5821-01 (2006), meet the percentage of fractured faces requirements specified in AASHTO M 323-12, Table 5.

334-3.2.3.2 Fine Aggregate Angularity: When tested in accordance with AASHTO T 304-11, Method A, meet the uncompacted void content of fine aggregate specified in AASHTO M 323-12, Table 5.

334-3.2.3.3 Flat and Elongated Particles: When tested in accordance with ASTM D 4791-10, (with the exception that the material passing the 3/8 inch sieve and retained on the No. 4 sieve shall be included), meet the requirements specified in AASHTO M 323-12, Table 5. Measure the aggregate using the ratio of 5:1, comparing the length (longest dimension) to the thickness (shortest dimension) of the aggregate particles.

334-3.2.3.4 Sand Equivalent: When tested in accordance with AASHTO T 176-08, meet the sand equivalent requirements specified in AASHTO M 323-12, Table 5.

334-3.2.4 Gyratory Compaction: Compact the design mixture in accordance with AASHTO T 312-12, with the following exception: use the number of gyrations at N_{design} as defined in Table 334-3. Measure the inside diameter of gyratory molds in accordance with AASHTO T 312-12.

Table 334-3 Gyratory Compaction Requirements	
Traffic Level	N_{design} Number of Gyrations
A	50
B	65
C	75
D	100
E	100

334-3.2.5 Design Criteria: Meet the requirements for nominal maximum aggregate size as defined in AASHTO M 323-12, as well as for relative density, VMA, VFA, and dust-to-binder ratio as specified in AASHTO M 323-12, Table 6. $N_{initial}$ and $N_{maximum}$ requirements are not applicable.

334-3.2.6 Moisture Susceptibility:

1. For Traffic Level A and B mixtures, use a liquid anti-strip additive, at a rate of 0.5% by weight of the asphalt binder. The anti-strip additive must be listed on the QPL. Other rates of anti-strip additive may be used upon approval of the Engineer.

2. For Traffic Level C through E mixtures, test 4 inch specimens in accordance with FM 1-T 283. Provide a mixture having a retained tensile strength ratio of at least 0.80 and a minimum tensile strength (unconditioned) of 100 psi. If necessary, add a liquid anti-stripping agent and/or hydrated lime (meeting the requirements of Section 337) in order to meet these criteria. The anti-strip additive must be listed on the QPL.

334-3.2.7 Additional Information: In addition to the requirements listed above, provide the following information with each proposed mix design submitted for verification:

1. The design traffic level and the design number of gyrations (N_{design}).
2. The source and description of the materials to be used.
3. The Department source number and the Department product code of the aggregate components furnished from a Department approved source.
4. The gradation and proportions of the raw materials as intended to be combined in the paving mixture. The gradation of the component materials shall be representative of the material at the time of use. Compensate for any change in aggregate gradation caused by handling and processing as necessary.
5. A single percentage of the combined mineral aggregate passing each specified sieve. Degradation of the aggregate due to processing (particularly material passing the No. 200 sieve) should be accounted for and identified.
6. The bulk specific gravity (G_{sb}) value for each individual aggregate and RAP component, as identified in the Department's aggregate control program.
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 target temperature for the mixture at the plant (mixing temperature) and a target temperature for the mixture at the roadway (compaction temperature) in accordance with 320-6.3. Do not exceed a target temperature of 340°F for PG 82-22 (PMA) asphalt binders, 330°F for PG 76-22 (PMA) and PG 76-22 (ARB) asphalt binders, and 315°F for unmodified asphalt binders.

9. Provide the physical properties achieved at four different asphalt binder contents. One of which must be at the optimum asphalt content, and must conform to all specified physical requirements.

10. The name of the Construction Training Qualification Program (CTQP) Qualified Mix Designer.

11. The ignition oven calibration factor.

12. The warm mix technology, if used.

334-3.3 Mix Design Revisions: During production, the Contractor may request a target value revision to a mix design, subject to meeting the following requirements: (1) the target change falls within the limits defined in Table 334-4, (2) appropriate data exists demonstrating that the mix complies with production air voids specification criteria, and (3) the mixture gradation meets the basic gradation requirements defined in 334-3.2.2.

Table 334-4
Limits for Potential Adjustments to Mix Design Target Values

Characteristic	Limit from Original Mix Design
No. 8 sieve and Coarser	± 5.0%
No. 16 sieve	± 4.0%
No. 30 sieve	± 4.0%
No. 50 sieve	± 3.0%
No. 100 sieve	± 3.0%
No. 200 sieve	± 1.0%
Asphalt Binder Content (1)	± 0.3%
Each Component of Aggregate Blend (2)	± 5.0 %

(1) Reductions to the asphalt binder content will not be permitted if the VMA during production is lower than 1.0% below the design criteria.
(2) Revisions to FC-5 mixtures to be determined by the Engineer.

Submit all requests for revisions to mix designs, along with supporting documentation, to the Engineer. In order to expedite the revision process, the request for revision or discussions on the possibility of a revision may be made verbally, but must be followed up by a written request. The verified mix design will remain in effect until the Engineer authorizes a change. In no case will 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 if aggregate sources change, or for any substitution of an aggregate product with a different aggregate code, unless approved by the Engineer.

334-4 Contractor Process Control (PC).

Assume full responsibility for controlling all operations and processes such that the requirements of these Specifications are met at all times. Perform any tests necessary at the plant and roadway for process control purposes. Enter all PC test data into the Department's Laboratory Information Management System (LIMS) database. The Engineer will not use these test results in the acceptance payment decision.

Address in the QC Plan how PC failures will be handled. When a PC failure occurs, investigate, at a minimum, the production process, testing equipment and/or sampling methods to

determine the cause of the failure, and make any necessary changes to assure compliance with these Specifications. Obtain a follow up sample immediately after corrective actions are taken to assess the adequacy of the corrections. In the event the follow-up PC sample also fails to meet Specification requirements, cease production of the asphalt mixture until the problem is adequately resolved to the satisfaction of the QC Manager.

334-5 Acceptance of the Mixture.

334-5.1 General: The mixture will be accepted at the plant with respect to gradation (P_{-8} and P_{-200}), asphalt content (P_b), and volumetrics (volumetrics is defined as air voids at N_{design}). The mixture will be accepted on the roadway with respect to density of roadway cores. Acceptance will be on a LOT by LOT basis (for each mix design) based on tests of random samples obtained within each sublot taken at a frequency of one set of samples per sublot. A roadway LOT and a plant production LOT shall be the same. Acceptance of the mixture will be based on Contractor QC test results that have been verified by the Department.

334-5.1.1 Sampling and Testing Requirements: Obtain the samples in accordance with FM 1-T 168. Obtain samples at the plant of a sufficient quantity to be split into three smaller samples; one for QC, one for Verification testing and one for Resolution testing; each sample at approximately 35 pounds. The split samples for Verification testing and Resolution testing shall be reduced in size and stored in three boxes each. The approximate size of each box must be 12 inches x 8 inches x 4 inches. Provide, label and safely store sample boxes in a manner agreed upon by the Engineer for future testing.

The asphalt content of the mixture will be determined in accordance with FM 5-563. The gradation of the recovered aggregate will be determined in accordance with FM 1-T 030. Volumetric testing will be in accordance with AASHTO T 312-12and FM 1-T 209. Prior to testing volumetric samples, condition the test-sized sample for one hour, plus or minus five minutes, at the target roadway compaction temperature in a shallow, flat pan, such that the mixture temperature at the end of the one hour conditioning period is within plus or minus 20°F of the roadway compaction temperature. Test for roadway density in accordance with FM 1-T 166.

334-5.1.2 Acceptance Testing Exceptions: When the total combined quantity of hot mix asphalt for the project, as indicated in the Plans for Type SP and Type FC mixtures only, is less than 2000 tons, the Engineer will accept the mix on the basis of visual inspection. The Engineer may require the Contractor to run process control tests for informational purposes, as defined in 334-4, or may run independent verification tests to determine the acceptability of the material.

Density testing for acceptance will not be performed on widening strips or shoulders with a width of 5 feet or less, open-graded friction courses, variable thickness overbuild courses, leveling courses, any asphalt layer placed on subgrade (regardless of type), miscellaneous asphalt pavement, shared use paths, crossovers, or any course with a specified thickness less than 1 inch or a specified spread rate that converts to less than 1 inch as described in 334-1.4. Density testing for acceptance will not be performed on asphalt courses placed on bridge decks or approach slabs; compact these courses in static mode only per the requirements of 330-7.7. In addition, density testing for acceptance will not be performed on the following areas when they are less than 1,000 feet (continuous) in length: turning lanes, acceleration lanes, deceleration lanes, shoulders, parallel parking lanes or ramps. Do not perform density testing for acceptance in situations where the areas requiring density testing is less than 50 tons within a sublot.

Density testing for acceptance will not be performed in intersections. The limits of the intersection will be from stop bar to stop bar for both the mainline and side streets. A random core location that occurs within the intersection shall be moved forward or backward from the intersection at the direction of the Engineer.

Where density testing for acceptance is not required, compact these courses (with the exception of open-graded friction courses) in accordance with the rolling procedure (equipment and pattern) as approved by the Engineer or with Standard Rolling Procedure as specified in 330-7.2. In the event that the rolling procedure deviates from the procedure approved by the Engineer, or the Standard Rolling Procedure, placement of the mix shall be stopped.

The density pay factor (as defined in 334-8.2) for areas not requiring density testing for acceptance will be paid at the same density pay factor as for the areas requiring density testing within the same LOT. If the entire LOT does not require density testing for acceptance, the LOT will be paid at a density pay factor of 1.00.

334-5.2 Full LOTs: Each LOT will be defined (as selected by the Contractor prior to the start of the LOT) as either (1) 2,000 tons, with each LOT subdivided into four equal sublots of 500 tons each, or (2) 4,000 tons, with each LOT subdivided into four equal sublots of 1,000 tons each. As an exception to this, the initial LOT of all new mix designs shall be defined as 2,000 tons, subdivided into four equal sublots of 500 tons each. Before the beginning of a LOT, the Engineer will develop a random sampling plan for each sublot and direct the Contractor on sample points, based on tonnage, for each sublot during construction.

334-5.3 Partial LOTs: A partial LOT is defined as a LOT size that is less than a full LOT. A partial LOT may occur due to the following:

1. The completion of a given mix type or mix design on a project.
2. Closure of the LOT due to time. LOTs will be closed 30 calendar days after the start of the LOT. Time periods other than 30 calendar days may be used if agreed to by both the Engineer and the Contractor.
3. A LOT is terminated per 334-5.4.4.

All partial LOTs will be evaluated based on the number of tests available, and will not be redefined. If a LOT is closed before the first plant random sample is obtained, then the LOT will be visually accepted by the Engineer and the LOT pay factor will be 1.00.

334-5.4 QC Sampling and Testing: Obtain all samples randomly as directed by the Engineer.

Should the Engineer determine that the QC requirements are not being met or that unsatisfactory results are being obtained, or should any instances of falsification of test data occur, approval of the Contractor's QC Plan will be suspended and production will be stopped.

334-5.4.1 Lost or Missing Verification/Resolution Samples: In the event that any of the Verification and/or Resolution samples that are in the custody of the Contractor are lost, damaged, destroyed, or are otherwise unavailable for testing, the minimum possible pay factor for each quality characteristic as described in 334-8.2 will be applied to the entire LOT in question, unless called for otherwise by the Engineer. Specifically, if the LOT in question has more than two sublots, the pay factor for each quality characteristic will be 0.55. If the LOT has two or less sublots, the pay factor for each quality characteristic will be 0.80. In either event, the material in question will also be evaluated in accordance with 334-5.9.5.

If any of the Verification and/or Resolution samples that are in the custody of the Department are lost, damaged, destroyed or are otherwise unavailable for testing, the

corresponding QC test result will be considered verified, and payment will be based upon the Contractor's data.

334-5.4.2 Plant Sampling and Testing Requirements: Obtain one random sample of mix per sublot in accordance with 334-5.1.1 as directed by the Engineer. Test the QC split sample for gradation, asphalt binder content and volumetrics in accordance with 334-5.1.1. Complete all QC testing within one working day from the time the samples were obtained.

334-5.4.3 Roadway Sampling and Testing Requirements: Obtain five 6 inch diameter roadway cores within 24 hours of placement at random locations as directed by the Engineer within each sublot. Test these QC samples for density (G_{mb}) in accordance with 334-5.1.1. Obtain a minimum of three cores per sublot at random locations as identified by the Engineer in situations where the sublot/LOT was closed or terminated before the random numbers were reached or where it is impractical to cut five cores per sublot. Do not obtain cores any closer than 12 inches from an unsupported edge. The Engineer may adjust randomly generated core locations for safety purposes or as the Engineer deems necessary. Maintain traffic during the coring operation; core the roadway, patch the core holes (within three days of coring); and trim the cores to the proper thickness prior to density testing.

Density for the sublot shall be based on the average value for the cores cut from the sublot with the target density being the maximum specific gravity (G_{mm}) of the sublot. Once the average density of a sublot has been determined, do not retest the samples unless approved by the Engineer. Ensure proper handling and storage of all cores until the LOT in question has been accepted.

334-5.4.4 Individual Test Tolerances for QC Testing: Terminate the LOT if any of the following QC failures occur:

1) An individual test result of a sublot for air voids does not meet the requirements of Table 334-5,

2) The average sublot density does not meet the requirements of Table 334-5,

3) Two consecutive test results within the same LOT for gradation or asphalt binder content do not meet the requirements of Table 334-5,

When a LOT is terminated due to a QC failure, stop production of the mixture until the problem is resolved to the satisfaction of the QC Manager and/or Asphalt Plant Level II technician responsible for the decision to resume production after a QC failure, as identified in 105-8.6.4. In the event that it can be demonstrated that the problem can immediately be or already has been resolved, it will not be necessary to stop production. When a LOT is terminated, make all necessary changes to correct the problem. Do not resume production until appropriate corrections have been made. Inform the Engineer of the problem and corrections made to correct the problem. After resuming production, sample and test the material to verify that the changes have corrected the problem. Summarize this information and provide it to the Engineer prior to the end of the work shift when production resumes.

In the event that a QC failure is not addressed as defined above, the Engineer's approval will be required prior to resuming production after any future QC failures.

Address any material represented by a failing test result in accordance with 334-5.9.5. Any LOT terminated under this subarticle will be limited to a maximum Pay Factor of 1.00 (as defined in 334-8.2) for each quality characteristic.

In the event that a G_{mm} test result differs by more than 0.040 from the mix design G_{mm}, investigate the causes of the discrepancy and report the findings and proposed actions to the Engineer.

Table 334-5 Master Production Range	
Characteristic	Tolerance [1]
Asphalt Binder Content (%)	Target ±0.55
Passing No. 200 Sieve (%)	Target ±1.50
Air Voids (%) Fine Graded	2.30 – 6.00
Density (minimum % G_{mm})	90.00
[1] Tolerances for sample size of n = 1 from the verified mix design [2] Based on an average of 5 randomly located cores	

334-5.5 Verification Testing: In order to determine the validity of the Contractor's QC test results prior to their use in the Acceptance decision, the Engineer will run verification tests.

334-5.5.1 Plant Testing: At the completion of each LOT, the Engineer will test a minimum of one Verification split sample randomly selected from the LOT. Results of the testing and analysis for the LOT will be made available to the Contractor within one working day from the time the LOT is completed. Verification samples shall be reheated at the target roadway compaction temperature for 1-1/2 hours, plus or minus 5 minutes, reduced to the appropriate testing size, and conditioned and tested as described in 334-5.1.1. In lieu of the 1-1/2 hours reheating procedure, the mixture may be reheated to within plus or minus 20°F of the roadway compaction temperature using a microwave oven. Stir the mixture as necessary during the reheating process to maintain temperature uniformity. Subsequently, condition and test the mixture as described in 334-5.1.1.

The Verification test results will be compared with the QC test results based on the between-laboratory precision values shown in Table 334-6.

Table 334-6 Between-Laboratory Precision Values	
Property	Maximum Difference
G_{mm}	0.016
G_{mb} (gyratory compacted samples)	0.022
Gmb (roadway cores)	0.015
P_b	0.44%
P_{-200}	FM 1-T 030 (Figure 2)
P_{-8}	FM 1-T 030 (Figure 2)

If all of the specified mix characteristics compare favorably, then the LOT will be accepted, with payment based on the Contractor's QC test data for the LOT.

If any of the results do not compare favorably, then the Resolution samples from the LOT will be sent to the Resolution laboratory for testing, as described in 334-5.6.

334-5.5.2 Roadway Testing: At the completion of each LOT, the Engineer will determine the density (G_{mb}) of each core (previously tested by QC) as described in 334-5.1.1

from the same sublot as the plant samples. For situations where roadway density is not required for the random sublot chosen, then another sublot shall be randomly chosen for roadway density cores only. Results of the testing and analysis for the LOT will be made available to the Contractor within one working day from the time the LOT is completed.

The individual Verification test results will be compared with individual QC test results by the Engineer based on the between-laboratory precision values given in Table 334-6.

If each of the core test results compare favorably, then the LOT will be accepted with respect to density, with payment based on the Contractor's QC test data for the LOT.

If any of the results do not compare favorably, then the core samples from the LOT will be sent to the Resolution laboratory for testing as specified in 334-5.6.

334-5.6 Resolution System:

334-5.6.1 Plant Samples: In the event of an unfavorable comparison between the Contractor's QC test results and the Engineer's Verification test results on any of the properties identified in Table 334-6, the Resolution laboratory will test all of the split samples from the LOT for only the property (or properties) in question. Resolution samples shall be reheated at the target roadway compaction temperature for 1-1/2 hours, plus or minus 5 minutes, reduced to the appropriate testing size, and conditioned and tested as described in 334-5.1.1. In lieu of the 1-1/2 hours reheating procedure, the mixture may be reheated to within plus or minus 20°F of the roadway compaction temperature using a microwave oven. Stir the mixture as necessary during the reheating process to maintain temperature uniformity. Subsequently, condition and test the mixture as described in 334-5.1.1.

334-5.6.2 Roadway Samples: In the event of an unfavorable comparison between the Contractor's QC test data and the Engineer's Verification test data on the density results, the Resolution laboratory will test all of the cores from the LOT. Testing will be as described in 334-5.1.1. Any damaged roadway cores will not be included in the evaluation; replace damaged cores with additional cores at the direction of the Engineer.

334-5.6.3 Resolution Determination: The Resolution test results (for the property or properties in question) will be compared with the QC test results based on the between-laboratory precision values shown in Table 334-6.

If the Resolution laboratory results compare favorably with all of the QC results, then acceptance and payment for the LOT will be based on the QC results, and the Department will bear the costs associated with Resolution testing. No additional compensation, either monetary or time, will be made for the impacts of any such testing.

If the Resolution laboratory results do not compare favorably with all of the QC results, then acceptance and payment for the LOT will be based on the Resolution test data for the LOT, and the costs of the Resolution testing will be deducted from monthly estimates. No additional time will be granted for the impacts of any such testing. In addition, in the event that the application of the Resolution test data results in a failure to meet the requirements of Table 334-5, address any material represented by the failing test result in accordance with 334-5.9.5.

In the event of an unfavorable comparison between the Resolution test results and QC test results, make the necessary adjustments to assure that future comparisons are favorable.

334-5.7 Independent Verification (IV) Testing:

334-5.7.1 Plant: The Contractor shall provide sample boxes and take samples as directed by the Engineer for IV testing. Obtain enough material for three complete sets of tests (two samples for IV testing by the Engineer and one sample for testing by the Contractor). If agreed upon by both the Engineer and the Contractor, only one sample for IV testing by the Engineer may be obtained. IV samples will be reheated at the target roadway compaction temperature for 1-1/2 hours, plus or minus 5 minutes, reduced to the appropriate testing size, and conditioned and tested as described in 334-5.1.1. The Contractor's split sample, if tested immediately after sampling, shall be reduced to the appropriate testing size, and conditioned and tested as described in 334-5.1.1. If the Contractor's sample is not tested immediately after sampling, then the sample shall be reheated at the target roadway compaction temperature for 1-1/2 hours, plus or minus 5 minutes, reduced to the appropriate testing size, and conditioned and tested as described in 334-5.1.1. For the IV and Contractor's samples, in lieu of the 1-1/2 hours reheating procedure, the mixture may be reheated to within plus or minus 20°F of the roadway compaction temperature using a microwave oven. Stir the mixture as necessary during the reheating process to maintain temperature uniformity. Subsequently, condition and test the mixture as described in 334-5.1.1. The Contractor's test results shall be provided to the Engineer within one working day from the time the sample was obtained.

If any of the IV test results do not meet the requirements of Table 334-5, then a comparison of the IV test results and the Contractor's test results, if available, will be made. If a comparison of the IV test results and the Contractor's test results meets the precision values of Table 334-6 for the material properties in question, or if the Contractor's test results are not available, then the IV test results are considered verified and the Contractor shall cease production of the asphalt mixture until the problem is adequately resolved (to the satisfaction of the Engineer), unless it can be demonstrated to the satisfaction of the Engineer that the problem can immediately be (or already has been) resolved. Address any material represented by the failing test results in accordance with 334-5.9.5.

If a comparison of the IV test results and the Contractor's test results does not meet the precision values of Table 334-6 for the material properties in question, then the second IV sample shall be tested by the Engineer for the material properties in question. If a comparison between the first and second IV test results does not meet the precision values of Table 334-6 for the material properties in question, then the first IV test results are considered unverified for the material properties in question and no action shall be taken.

If a comparison between the first and second IV test results meets the precision values of Table 334-6 for the material properties in question, then the first IV sample is considered verified and the Contractor shall cease production of the asphalt mixture until the problem is adequately resolved (to the satisfaction of the Engineer), unless it can be demonstrated to the satisfaction of the Engineer that the problem can immediately be (or already has been) resolved. Address any material represented by the failing test results in accordance with 334-5.9.5.

The Engineer has the option to use the IV sample for comparison testing as specified in 334-6.

334-5.7.2 Roadway: Obtain five 6 inch diameter roadway cores within 24 hours of placement, as directed by the Engineer, for IV testing. In situations where it is impractical to cut five cores per sublot, obtain a minimum of three cores per sublot at random locations, as identified by the Engineer. These independent cores will be obtained from the same LOTs and sublots as the Independent Verification Plant samples, or as directed by the Engineer. The

density of these cores will be obtained as described in 334-5.1.1. If the average of the results for the sublot does not meet the requirements of Table 334-5 for density, then a comparison of the IV Gmm test results and the Contractor's Gmm test results, if available, will be made in accordance with the procedure provided in 334-5.7.1. Address any material represented by the failing test results in accordance with 334-5.9.5.

334-5.8 Surface Tolerance: The asphalt mixture will be accepted on the roadway with respect to surface tolerance in accordance with the applicable requirements of 330-9.

334-5.9 Minimum Acceptable Quality Levels:

334-5.9.1 CPFs Below 0.90: In the event that an individual pay factor for any quality characteristic of a LOT falls below 0.90, take steps to correct the situation and report the actions to the Engineer. In the event that the pay factor for the same quality characteristic for two consecutive LOTs is below 0.90, cease production of the asphalt mixture until the problem is adequately resolved (to the satisfaction of the Engineer), unless it can be demonstrated to the satisfaction of the Engineer that the problem can immediately be (or already has been) resolved. Actions taken must be approved by the Engineer before production resumes.

334-5.9.2 CPFs Less Than 0.90 and Greater Than or Equal to 0.80: If the composite pay factor for the LOT is less than 0.90 and greater than or equal to 0.80, cease production of the asphalt mixture until the problem is adequately resolved (to the satisfaction of the Engineer), unless it can be demonstrated to the satisfaction of the Engineer that the problem can immediately be (or already has been) resolved. Actions taken must be approved by the Engineer before production resumes.

334-5.9.3 CPFs Less Than 0.80 and Greater Than or Equal to 0.75: If the CPF for the LOT is less than 0.80 and greater than or equal to 0.75, address the defective material in accordance with 334-5.9.5.

334-5.9.4 CPFs Less Than 0.75: If the CPF for the LOT is less than 0.75, remove and replace the defective LOT at no cost to the Department, or as approved by the Engineer.

334-5.9.5 Defective Material: Assume responsibility for removing and replacing all defective material placed on the project, at no cost to the Department.

As an exception to the above and upon approval of the Engineer, obtain an engineering analysis by an independent laboratory (as approved by the Engineer) to determine the disposition of the material. The engineering analysis must be signed and sealed by a Professional Engineer licensed in the State of Florida.

The Engineer may determine that an engineering analysis is not necessary or may perform an engineering analysis to determine the disposition of the material.

Any material that remains in place will be accepted with a CPF as determined by 334-8, or as determined by the Engineer.

If the defective material is due to a gradation, asphalt binder content or density failure, upon the approval of the Engineer the Contractor may perform delineation tests on roadway cores in lieu of an engineering analysis to determine the limits of the defective material that may require removal and replacement. Prior to any delineation testing, all sampling locations shall be approved by the Engineer. All delineation sampling and testing shall be monitored and verified by the Engineer. For materials that are defective due to air voids, an engineering analysis is required.

When evaluating defective material by engineering analysis or delineation testing, at a minimum, evaluate all material located between passing QC, PC or IV test results. Exceptions to this requirement shall be approved by the Engineer.

334-6 Comparison Testing.

At the start of the project (unless waived by the Engineer) and at other times as determined necessary by the Engineer, provide split samples for comparison testing with the Engineer. The purpose of these tests is to verify that the testing equipment is functioning properly and that the testing procedures are being performed correctly. In the event that the Engineer determines that there is a problem with the Contractor's testing equipment and/or testing procedures, immediately correct the problem to the Engineer's satisfaction. In the event that the problem is not immediately corrected, cease production of the asphalt mixture until the problem is adequately resolved to the satisfaction of the Engineer.

If so agreed to by both the Contractor and the Engineer, the split sample used for comparison testing may also be used for the QC sample. The split sample used for comparison testing must also meet the requirements for IV testing described in 334-5.7.

334-7 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. The pay quantity will be based on the project average spread rate, excluding overbuild, limited to a maximum of 105% of the spread rate determined in accordance with 334-1.4 or as set by the Engineer. The project average spread rate is calculated by totaling the arithmetic mean of the average daily spread rate values for each layer.

The bid price for the asphalt mix will include the cost of the liquid asphalt and the tack coat application as directed in 300-8. 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, the average asphalt content will be based on the percentage specified in 9-2.1.2. The weight will be determined as provided in 320-3.2 (including the provisions for the automatic recordation system).

Prepare a Certification of Quantities, using the Department's current approved form, for the certified Superpave asphalt concrete pay item. Submit this certification to the Engineer no later than Twelve O'clock noon Monday after the estimate cut-off or as directed by the Engineer, based on the quantity of asphalt produced and accepted on the roadway per Contract. The certification must include the Contract Number, FPID Number, Certification Number, Certification Date, period represented by Certification and the tons produced for each asphalt pay item.

334-8 Basis of Payment.

334-8.1 General: Price and payment will be full compensation for all the work specified under this Section (including the applicable requirements of Sections 320 and 330).

For materials accepted in accordance with 334-5, based upon the quality of the material, a pay adjustment will be applied to the bid price of the material as determined on a LOT by LOT basis. The pay adjustment will be assessed by calculating a Pay Factor for the following individual quality characteristics: pavement density, air voids, asphalt binder content, and the percentage passing the No. 200 and No. 8 sieves. The pay adjustment will be computed by

multiplying a CPF for the LOT by the bid price per ton. Perform all calculations using the latest version of the Department's Asphalt Plant Worksheet.

334-8.2 Pay Factors:

334-8.2.1 Partial LOTs: For Partial LOTs where no random sample is obtained due to insufficient tonnage, a CPF of 1.00 shall be applied.

334-8.2.2 Two or Less Sublot Test Results: In the event that two or less sublot test results are available for a LOT, Pay Factors will be determined based on the Small Quantity Pay Table. The Small Quantity Pay Table and Pay Factor calculations are determined in accordance with the instructions contained within the Department's Asphalt Plant Worksheet.

334-8.2.3 Three or More Sublot Test Results: When three or more sublot test results are available for a LOT, the variability-unknown, standard deviation method will be used to determine the estimated percentage of the LOT that is within the specification limits shown in Table 334-7. The Percent Within Limits (PWL) is determined in accordance with the instructions contained within the Department's Asphalt Plant Worksheet.

Table 334-7
Specification Limits

Quality Characteristic	Specification Limits
Passing No. 8 sieve (%)	Target ± 3.1
Passing No. 200 sieve (%)	Target ± 1.0
Asphalt Content (%)	Target ± 0.40
Air Voids (%)	4.00 ± 1.20
Density (% of G_{mm}):	93.00 + 2.00, - 1.20 (1)

Note (1): If the Engineer (or Contract Documents) limits compaction to the static mode only, or for all one-inch thick lifts, compaction shall be in the static mode. No vibratory mode in the vertical direction will be allowed. Other vibratory modes will be allowed, if approved by the Engineer. In either case, the specification limits will be as follows: 92.00 + 3.00, -1.20%of G_{mm}. No additional compensation, cost or time, shall be made.

334-8.2.3.1 Pay Factors (PF): Pay Factors will be calculated by using the following equation:

$$\text{Pay Factor} = (55 + 0.5 \times \text{PWL}) / 100$$

The PWL is determined in accordance with the instructions contained within the Department's Asphalt Plant Worksheet.

334-8.3 Composite Pay Factor (CPF): A CPF for the LOT will be calculated based on the individual PFs with the following weighting applied: 35% Density (D), 25% Air Voids (V_a), 25% asphalt binder content (P_b), 10% Passing No. 200 (P_{-200}) and 5% Passing No. 8 (P_{-8}). Calculate the CPF by using the following formula:

$$\text{CPF} = [(0.350 \times \text{PF D}) + (0.250 \times \text{PF } V_a) + (0.250 \times \text{PF } P_b) + (0.100 \times \text{PF } P_{-200}) + (0.050 \times \text{PF } P_{-8})]$$

Where the PF for each quality characteristic is determined in either 334-8.2.2 or 334-8.2.3, depending on the number of sublot tests. Note that the number after each multiplication will be rounded to the nearest 0.01.

The pay adjustment shall be computed by multiplying the CPF for the LOT by the bid price per ton.

334-8.4 Payment: Payment will be made under:

Item No. 334- 1- Superpave Asphaltic Concrete - per ton.

SECTION 337
ASPHALT CONCRETE FRICTION COURSES

337-1 Description.

Construct an asphalt concrete friction course pavement with the type of mixture specified in the Contract Documents, or when offered as alternates, as selected. This Section specifies mixes designated as FC-5, FC-9.5, and FC-12.5.

Meet the plant and equipment requirements of Section 320, as modified herein. Meet the general construction requirements of Section 330, as modified herein.

337-2 Materials.

337-2.1 General Requirements: Meet the requirements specified in Division III as modified herein. The Engineer will base continuing approval of material sources on field performance. Warm mix technologies (additives, foaming techniques, etc.) listed on the Department's website may be used in the production of the mix. The URL for obtaining this information, if available, is:
http://www.dot.state.fl.us/Specificationsoffice/implemented/URLinSpecs/files/WarmMixAsphalt.pdf .

337-2.2 Asphalt Binder: Meet the requirements of Section 916, and any additional requirements or modifications specified herein for the various mixtures. For projects with a total quantity of FC-5, FC-9.5, or FC-12.5 less than 500 tons, the Contractor may elect to substitute a PG 76-22 (PMA) or PG 82-22 (PMA) for the PG 76-22 (ARB), meeting the requirements of Section 916.

337-2.3 Coarse Aggregate: Meet the requirements of Section 901, and any additional requirements or modifications specified herein for the various mixtures.

337-2.4 Fine Aggregate: Meet the requirements of Section 902, and any additional requirements or modifications specified herein for the various mixtures.

337-2.5 Hydrated Lime: Meet the requirements of AASHTO M 303-89 (2010), Type 1.

Provide certified test results for each shipment of hydrated lime indicating compliance with the specifications.

337-2.6 Liquid Anti-strip Additive: Meet the requirements of 916-4 and be listed on the Department's Qualified Products List (QPL).

337-2.7 Fiber Stabilizing Additive (Required for FC-5 only): Use either a mineral or cellulose fiber stabilizing additive. Meet the following requirements:

337-2.7.1 Mineral Fibers: Use mineral fibers (made from virgin basalt, diabase, or slag) treated with a cationic sizing agent to enhance the disbursement of the fiber, as well as to increase adhesion of the fiber surface to the bitumen. Meet the following requirements for physical properties:

1. Size Analysis
   - Average fiber length: 0.25 inch (maximum)
   - Average fiber thickness: 0.0002 inch (maximum)
2. Shot Content (ASTM C612-10)
   - Percent passing No. 60 Sieve: 90 - 100
   - Percent passing No. 230 Sieve: 65 - 100

Provide certified test results for each batch of fiber material indicating compliance with the above tests.

337-2.7.2 Cellulose Fibers: Use cellulose fibers meeting the following requirements:

1. Fiber length: 0.25 inch (maximum)
2. Sieve Analysis
   a. Alpine Sieve Method
      Percent passing No. 100 sieve: 60-80
   b. Ro-Tap Sieve Method
      Percent passing No. 20 sieve: 80-95
      Percent passing No. 40 sieve: 45-85
      Percent passing No. 100 sieve: 5-40
3. Ash Content: 18% non-volatiles (plus or minus 5%)
4. pH: 7.5 (plus or minus 1.0)
5. Oil Absorption: 5.0% (plus or minus 1.0) (times fiber weight)
6. Moisture Content: 5.0% by weight (maximum)

Provide certified test results for each batch of fiber material indicating compliance with the above tests.

337-3 General Composition of Mixes.

337-3.1 General: Use a bituminous mixture composed of aggregate (coarse, fine, or a mixture thereof), asphalt binder, and in some cases, fibers and/or hydrated lime. Size, uniformly grade and combine the aggregate fractions in such proportions that the resulting mix meets the requirements of this Section.

337-3.2 Specific Component Requirements by Mix:

337-3.2.1 FC-5:

337-3.2.1.1 Aggregates: Use an aggregate blend which consists of either 100% crushed granite, 100% crushed Oolitic limestone or 100% other crushed materials (as approved by the Engineer for friction courses per Rule 14-103.005, Florida Administrative Code).

Crushed limestone from the Oolitic formation may be used if it contains a minimum of 12% silica material as determined by FM 5-510 and the Engineer grants approval of the source prior to its use.

A list of aggregates approved for use in friction course may be available on the Department's website. The URL for obtaining this information, if available, is: ftp://ftp.dot.state.fl.us/fdot/smo/website/sources/frictioncourse.pdf .

337-3.2.1.2 Asphalt Binder: Use an asphalt binder as called for in the Contract Documents meeting the requirements of Section 916.

337-3.2.1.3 Hydrated Lime: Add the lime at a dosage rate of 1.0% by weight of the total dry aggregate to mixes containing granite.

337-3.2.1.4 Liquid Anti-strip Additive: Use a liquid anti-strip additive at a rate of 0.5% by weight of the asphalt binder for mixtures containing limestone aggregate. Other rates of anti-strip additive may be used upon approval of the Engineer.

337-3.2.1.5 Fiber Stabilizing Additive: Add either mineral fibers at a dosage rate of 0.4% by weight of the total mix, or cellulose fibers at a dosage rate of 0.3% by weight of total mix.

337-3.2.2 FC-9.5 and FC-12.5:

337-3.2.2.1: Aggregates: Use an aggregate blend that consists of crushed granite, crushed Oolitic limestone, other crushed materials (as approved by the Engineer for

friction courses per Rule 14-103.005, Florida Administrative Code), or a combination of the above. Crushed limestone from the Oolitic formation may be used if it contains a minimum of 12% silica material as determined by FM 5-510 and the Engineer grants approval of the source prior to its use. As an exception, mixes that contain a minimum of 60% crushed granite may either contain: 1) up to 40% fine aggregate from other sources or 2) a combination of up to 20% RAP and the remaining fine aggregate from other sources.

A list of aggregates approved for use in friction course may be available on the Department's website. The URL for obtaining this information, if available, is: ftp://ftp.dot.state.fl.us/fdot/smo/website/sources/frictioncourse.pdf .

337-3.2.2.2: Asphalt Binder: Use an asphalt binder as called for in the Contract Documents meeting the requirements of Section 916.

337-3.3 Grading Requirements:

337-3.3.1 FC-5: Use a mixture having a gradation at design within the ranges shown in Table 337-1.

Table 337-1
FC-5 Gradation Design Range

3/4 inch	1/2 inch	3/8 inch	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200
100	85-100	55-75	15-25	5-10	--	--	--	--	2-4

337-3.3.2 FC-9.5: Meet the design gradation requirements for a SP-9.5 Superpave fine mix as defined in 334-3.2.2.

337-3.3.3 FC-12.5: Meet the design gradation requirements for a SP-12.5 Superpave fine mix as defined in 334-3.2.2.

337-4 Mix Design.

337-4.1 FC-5: The Department will design the FC-5 mixtures. Furnish the materials and all appropriate information (source, gradation, etc.) as specified in 334-3.2.7. The Department will have two weeks to design the mix.

The Department will establish the design binder content for FC-5 within the following ranges based on aggregate type:

Aggregate Type	Binder Content
Crushed Granite	5.5 - 7.5
Crushed Limestone (Oolitic)	6.5 - 8.0

337-4.2 FC-9.5 and FC-12.5: Provide a mix design conforming to the requirements of 334-3.2 unless otherwise designated in the plans.

337-4.3 Revision of Mix Design: For FC-5, FC-9.5 and FC-12.5, meet the requirements of 334-3.3. For FC-5, all revisions must fall within the gradation limits defined in Table 337-1.

337-5 Contractor's Process Control.

Provide the necessary process control of the friction course mix and construction in accordance with the applicable provisions of 320-2, 330-2 and 334-4.

The Engineer will monitor the spread rate periodically to ensure uniform thickness. Provide quality control procedures for daily monitoring and control of spread rate variability. If

the spread rate varies by more than 5% of the spread rate set by the Engineer in accordance with 337-8, immediately make all corrections necessary to bring the spread rate into the acceptable range.

337-6 Acceptance of the Mixture.

337-6.1 FC-9.5 and FC-12.5: Meet the requirements of 334-5.

337-6.2 FC-5: Meet the requirements of 334-5 with the following exceptions:

1. The mixture will be accepted with respect to gradation ($P_{-3/8}$, P_{-4}, and P_{-8}), and asphalt binder content (P_b) only.

2. Testing in accordance with AASHTO T 312-12 and FM 1-T 209 (and conditioning prior to testing) will not be required as part of 334-5.1.1.

3. The standard LOT size of FC-5 will be 2,000 tons, with each LOT subdivided into four equal sublots of 500 tons each.

4. The Between-Laboratory Precision Values described in Table 334-6 are modified to include ($P_{-3/8}$, P_{-4}, and P_{-8}) with a maximum difference per FM 1-T 030 (Figure 2).

5. Table 334-5 (Master Production Range) is replaced by Table 337-2.

6. The mixture will be accepted on the roadway with respect to surface tolerance in accordance with 334-5.8. No density testing will be required for these mixtures.

Table 337-2 FC-5 Master Production Range	
Characteristic	Tolerance (1)
Asphalt Binder Content (%)	Target ± 0.60
Passing 3/8 inch Sieve (%)	Target ± 7.50
Passing No. 4 Sieve (%)	Target ± 6.00
Passing No. 8 Sieve (%)	Target ± 3.50
(1) Tolerances for sample size of n = 1 from the verified mix design	

337-6.2.1 Individual Test Tolerances for FC-5 Production: Terminate the LOT if any of the following Quality Control (QC) failures occur:

1) An individual test result of a sublot for asphalt binder content does not meet the requirements of Table 337-2,

2) Two consecutive test results within the same LOT for gradation on any of the following sieve sizes ($P_{-3/8}$, P_{-4}, and P_{-8}) do not meet the requirements of Table 337-2. The two consecutive failures must be on the same sieve.

When a LOT is terminated due to a QC failure, stop production of the mixture until the problem is resolved to the satisfaction of the QC Managers and/or Asphalt Plant Level II technicians responsible for the decision to resume production after a QC failure, as identified in 105-8.6.4. In the event that it can be demonstrated that the problem can immediately be or already has been resolved, it will not be necessary to stop production. When a LOT is terminated, make all necessary changes to correct the problem. Do not resume production until appropriate corrections have been made. Inform the Engineer of the problem and corrections made to correct the problem. After resuming production, sample and test the material to verify that the changes have corrected the problem. Summarize this information and provide it to the Engineer prior to the end of the work shift when production resumes.

In the event that a QC failure is not addressed as defined above, the Engineer's approval will be required prior to resuming production after any future QC failures.

Address any material represented by a failing test result in accordance with 334-5.9.5. Any LOT terminated under this Subarticle will be limited to a maximum Pay Factor of 1.00 (as defined in 337-12.3) for each quality characteristic.

337-7 Special Construction Requirements.

337-7.1 Hot Storage of FC-5 Mixtures: When using surge or storage bins in the normal production of FC-5, do not leave the mixture in the surge or storage bin for more than one hour.

337-7.2 Longitudinal Grade Controls for Open-Graded Friction Courses: On FC-5, use either longitudinal grade control (skid, ski or traveling stringline) or a joint matcher.

337-7.3 Temperature Requirements for FC-5:

337-7.3.1 Air Temperature at Laydown: Meet the requirements of Table 330-1.

337-7.3.2 Temperature of the Mix: Heat and combine the asphalt binder and aggregate in a manner to produce a mix having a temperature, when discharged from the plant, meeting the requirements of 320-6.3. Meet all requirements of 330-6.1.3 at the roadway. The target mixing temperature shall be established by the Contractor. The target mixing temperature may be reduced when using warm mix technology.

337-7.4 Compaction of FC-5: Provide two, static steel-wheeled rollers, with an effective compactive weight in the range of 135 to 200 per linear inch (PLI), determined as follows:

$$\text{PLI} = \frac{\text{Total Weight of Roller (pounds)}}{\text{Total Width of Drums (inches)}}$$

(Any variation of this equipment requirement must be approved by the Engineer.) Establish an appropriate rolling pattern for the pavement in order to effectively seat the mixture without crushing the aggregate. In the event that the roller begins to crush the aggregate, reduce the number of coverages or the PLI of the rollers. If the rollers continue to crush the aggregate, use a tandem steel-wheel roller weighing not more than 135 lb/PLI of drum width.

337-7.5 Temperature Requirements for FC-9.5 and FC-12.5:

337-7.5.1 Air Temperature at Laydown: Meet the requirements of Table 330-1.

337-7.5.2 Temperature of the Mix: Heat and combine the asphalt binder and aggregate in a manner to produce a mix having a temperature, when discharged from the plant, meeting the requirements of 320-6.3. Meet all requirements of 330-6.1.3 at the roadway.

337-7.6 Prevention of Adhesion: To minimize adhesion to the drum during the rolling operations, the Contractor may add a small amount of liquid detergent to the water in the roller.

At intersections and in other areas where the pavement may be subjected to cross-traffic before it has cooled, spray the approaches with water to wet the tires of the approaching vehicles before they cross the pavement.

337-7.7 Transportation Requirements of Friction Course Mixtures: Cover all loads of friction course mixtures with a tarpaulin, or waterproof cover, meeting requirements of 320-7.

337-8 Thickness of Friction Courses.

337-8.1 FC-12.5 and FC-9.5: The thickness of the friction course layer will be the plan thickness as shown in the Contract Documents. For construction purposes, the plan thickness will be converted to spread rate as defined in 334-1.4.

Plan quantities are based on a G_{mm} of 2.540, corresponding to a spread rate of 110 lbs/yd^2-in. Pay quantities will be based on the actual maximum specific gravity of the mix being used.

337-8.2 FC-5: The total thickness of the FC-5 layer will be the plan thickness as shown in the Contract Documents. For construction purposes, the plan thickness will be converted to spread rate based on the combined aggregate bulk specific gravity of the asphalt mix being used as shown in the following equation:

$$\text{Spread rate (lbs/yd}^2) = t \times G_{sb} \times 40.5$$

Where: t = Thickness (in.) (Plan thickness)

G_{sb} = Combined aggregate bulk specific gravity from the verified mix design

The weight of the mixture shall be determined as provided in 320-3.2.

Plan quantities are based on a G_{sb} of 2.635, corresponding to a spread rate of 80 lbs/yd^2. Pay quantities will be based on the actual combined aggregate bulk specific gravity (G_{sb}) of the mix being used.

337-9 Special Equipment Requirements for FC-5.

337-9.1 Fiber Supply System: Use a separate feed system to accurately proportion the required quantity of mineral fibers into the mixture in such a manner that uniform distribution is obtained. Interlock the proportioning device with the aggregate feed or weigh system to maintain the correct proportions for all rates of production and batch sizes. Control the proportion of fibers to within plus or minus 10% of the amount of fibers required. Provide flow indicators or sensing devices for the fiber system, interlocked with plant controls so that the mixture production will be interrupted if introduction of the fiber fails.

When a batch plant is used, add the fiber to the aggregate in the weigh hopper or as approved and directed by the Engineer. Increase the batch dry mixing time by 8 to 12 seconds, or as directed by the Engineer, from the time the aggregate is completely emptied into the pugmill. Ensure that the fibers are uniformly distributed prior to the addition of asphalt rubber into the pugmill.

When a drum-mix plant is used, add and uniformly disperse the fiber with the aggregate prior to the addition of the asphalt rubber. Add the fiber in such a manner that it will not become entrained in the exhaust system of the drier or plant.

337-9.2 Hydrated Lime Supply System: For FC-5 mixes containing granite, use a separate feed system to accurately proportion the required quantity of hydrated lime into the mixture in such a manner that uniform coating of the aggregate is obtained prior to the addition of the asphalt rubber. Add the hydrated lime in such a manner that it will not become entrained in the exhaust system of the drier or plant. Interlock the proportioning device with the aggregate feed or weigh system to maintain the correct proportions for all rates of production and batch sizes and to ensure that all mixture produced is properly treated with hydrated lime. Control the proportion of hydrated lime to within plus or minus 10% of the amount of hydrated lime required. Provide and interlock flow indicators or sensing devices for the hydrated lime system with plant controls so that the mixture production will be interrupted if introduction of the hydrated lime fails. The addition of the hydrated lime to the aggregate may be accomplished by Method A or B as follows:

337-9.2.1 Method A - Dry Form: Add hydrated lime in a dry form to the mixture

according to the type of asphalt plant being used.

When a batch plant is used, add the hydrated lime to the aggregate in the weigh hopper or as approved and directed by the Engineer. Increase the batch dry mixing time by eight to twelve seconds, or as directed by the Engineer, from the time the aggregate is completely emptied into the pugmill. Uniformly distribute the hydrated lime prior to the addition of asphalt rubber into the pugmill.

When a drum-mix plant is used, add and uniformly disperse the hydrated lime to the aggregate prior to the addition of the asphalt rubber. Add the hydrated lime in such a manner that it will not become entrained in the exhaust system of the drier or plant.

337-9.2.2 Method B - Hydrated Lime/Water Slurry: Add the required quantity of hydrated lime (based on dry weight) in a hydrated lime/water slurry form to the aggregate. Provide a solution consisting of hydrated lime and water in concentrations as directed by the Engineer. Use a plant equipped to blend and maintain the hydrated lime in suspension and to mix it with the aggregates uniformly in the proportions specified.

337-9.3 Hydrated Lime Pretreatment: For FC-5 mixes containing granite, as an alternative to 337-9.2, pretreat the aggregate with hydrated lime prior to incorporating the aggregate into the mixture. Use a feed system to accurately proportion the aggregate and required quantity of hydrated lime, and mix them in such a manner that uniform coating of the aggregate is obtained. Control the proportion of hydrated lime to within plus or minus 10% of the amount required. Aggregate pretreated with hydrated lime in this manner shall be incorporated into the asphalt mixture within 45 days of pretreatment.

337-9.3.1 Hydrated Lime Pretreatment Methods: Pretreat the aggregate using one of the following two methods:

Pretreatment Method A - Dry Form: Add the required quantity of hydrated lime in a dry form to the aggregate. Assure that the aggregate at the time of pretreatment contains a minimum of 3% moisture over saturated surface dry (SSD) conditions. Utilize equipment to accurately proportion the aggregate and hydrated lime and mix them in such a manner as to provide a uniform coating.

Pretreatment Method B - Hydrated Lime/Water Slurry: Add the required quantity of hydrated lime (based on dry weight) in a hydrated lime/water slurry form to the aggregate. Provide a solution consisting of hydrated lime and water in a concentration to provide effective treatment. Use equipment to blend and maintain the hydrated lime in suspension, to accurately proportion the aggregate and hydrated lime/water slurry, and to mix them to provide a uniform coating.

337-9.3.2 Blending QC Records: Maintain adequate QC records for the Engineer's review for all pretreatment activities. Include as a minimum the following information (for each batch or day's run of pretreatment): pretreatment date, aggregate certification information, certified test results for the hydrated lime, aggregate moisture content prior to blending, as-blended quantities of aggregate and hydrated lime, project number, customer name, and shipping date.

337-9.3.3 Certification: In addition to the aggregate certification, provide a certification with each load of material delivered to the hot mix asphalt plant, that the material has been pretreated in conformance with these specifications. Include also the date the material was pretreated.

337-10 Failing Material.

Meet the requirements of 334-5.9. For FC-5, use the Master Production Range defined in

Table 337-2 in lieu of Table 334-5.

337-11 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. The pay quantity will be based on the project average spread rate, limited to a maximum of 105% of the spread rate determined in accordance with 337-8 or as set by the Engineer. The project average spread rate is calculated by totaling the arithmetic mean of the average daily spread rate values for each layer.

The bid price for the asphalt mix will include the cost of the asphalt binder (asphalt rubber (or polymer), asphalt cement, ground tire rubber, anti-stripping agent, blending and handling) and the tack coat application as directed in 300-8, as well as fiber stabilizing additive and hydrated lime (if required). There will be no separate payment or unit price adjustment for the asphalt binder material in the asphalt mix. The weight will be determined as provided in 320-3.2 (including the provisions for the automatic recordation system).

Prepare a Certification of Quantities, using the Department's current approved form, for the certified asphalt concrete friction course pay item. Submit this certification to the Engineer no later than Twelve O'clock noon Monday after the estimate cut-off or as directed by the Engineer, based on the quantity of asphalt produced and accepted on the roadway per Contract. The certification must include the Contract Number, FPID Number, Certification Number, Certification Date, period represented by Certification and the tons produced for each asphalt pay item.

337-12 Basis of Payment.

337-12.1 General: Price and payment will be full compensation for all the work specified under this Section (including the applicable requirements of Sections 320 and 330).

Based upon the quality of the material, a pay adjustment will be applied to the bid price of the material as determined on a LOT by LOT basis. The pay adjustment will be assessed by calculating a Pay Factor for individual quality characteristics. The pay adjustment will be computed by multiplying a Composite Pay Factor for the LOT by the bid price per ton. Perform all calculations with the Department's Asphalt Plant - Pay Factor Worksheets.

337-12.2 FC-9.5 and FC-12.5: Meet the requirements of 334-8.

337-12.3 FC-5: Meet the requirements of 334-8 with the following exceptions:

1. Pay factors will be calculated for asphalt binder content and the percentages passing the 3/8 inch, the No. 4, and the No. 8 sieves only.
2. The Small Quantity Pay Table for FC-5 Mixtures replaces the Small Quantity Pay Table for Dense Graded Mixtures in the Department's Asphalt Plant - Pay Factor Worksheets.
3. Table 337-3 replaces Table 334-7.
4. The Composite Pay Factor equation in 334-8.3 is replaced with the following:

CPF = [(0.20 x PF 3/8 inch) + (0.30 x PF No. 4) + (0.10 x PF No. 8) + (0.40 x PF AC)]

Table 337-3 Specification Limits for FC-5	
Quality Characteristic	Specification Limits

Table 337-3 Specification Limits for FC-5	
Quality Characteristic	Specification Limits
Asphalt Binder Content (%)	Target ± 0.45
Passing 3/8 inch sieve (%)	Target ± 6.00
Passing No. 4 sieve (%)	Target ± 4.50
Passing No. 8 sieve (%)	Target ± 2.50

337-12.4 Payment: Payment will be made under:

Item No. 337- 7- Asphaltic Concrete Friction Course - per ton.

SECTION 03375

FLOWABLE FILL

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. This Section specifies the requirements for flowable fill used for trenches, support for pipe structures, culverts, utility cuts and other works where cavities exist and where firm support is needed for pavements and structural elements. Flowable fill may also be used to fill water and sewer lines, and fuel tanks placed out of service, and at other locations approved by the Engineer of Record.

PART 2 - PRODUCTS

2.01 MATERIALS

The materials used shall conform with the requirements specified in Division III of the F.D.O.T. Standard Specifications for Road and Bridge Construction, latest edition, and herein. Specific references are as follows:

A. Portland Cement (Types I, II or III).....Section 921.

B. Fly Ash, Slag and other Pozzolanic Materials
for Portland Cement Concrete .....Section 929.

C. Fine Aggregate (Sand)* .....Section 902.

D. Water .....Section 923.

*Any clean sand with 100% passing 3/8" sieve and not more than 10% passing with 200 mesh may be used.

2.02 MIX PROPORTIONS

A. The Contractor shall be responsible for producing a flowable mixture using these guidelines and by adjusting his mixture design as called for by circumstances or as may be directed by the Engineer of Record.

B. Excavatable flowable fill material shall be proportioned to produce a 28-day compressive strength of 100 psi.

C. General mix quantities are as follows:

Components	Pounds per Cubic Yard
Cement	50-100*
Fly Ash or Granulated Blast Furnace Slag	0-600
Fine Sand	2,750 (adjust to yield one cubic yard of flowable fill)
Water	500 (Maximum)

* The percentage of cement may be increased above these limits only when early strength is required and future removal is unlikely.

D. Weights for fine aggregate and water shall be adjusted according to cementious content. The mix proportions shall be adjusted for removability, pumpability and flowability. If required, strength test data shall be provided prior to batching.

E. If required by the Engineer of Record, the flowability can be measured by afflux time determined in accordance with ASTM C 939 and shall be 30 seconds ± 5 seconds as measured on mortar passing the No. 4 sieve. The equipment required to perform this test shall be provided by the Contractor.

2.03 APPROVED MIXES OF "EXCAVATABLE FLOWABLE FILL"

FDOT - Approved Design Mixes for Dade County

Plant	Mix Number
Tarmac	04-FF-65
Rinker Materials Corp.	04-FF-52
Central Concrete Supermix Inc.	06-FF-41
Cemex	06-FF-48

PART 3 - EXECUTION

3.01 PRODUCTION AND PLACING

Flowable fill shall be produced and delivered using concrete construction equipment. Placing flowable fill shall be done by chute, pumping or other methods approved by the Engineer of Record.

3.02 CONSTRUCTION REQUIREMENTS

The flowable fill shall be placed to the designated fill line without vibration or other means of compaction. Placement shall be avoided during inclement weather, e.g. rain or ambient temperatures below 40 degrees F. The Contractor shall take all necessary precautions to prevent any damages caused by the hydraulic pressure of the fill during placement prior to hardening. Also, necessary means to confine the material within the designated space shall be provided by the Contractor.

3.03 ACCEPTANCE

A. The flowable fill shall be proportioned and placed as specified herein. In general, the strength desired is the maximum hardness that can be excavated at a later dated using conventional excavating equipment. No curing protection is required.

B. The fill shall be left undisturbed until material obtains sufficient strength. Sufficient strength is 250 psi penetration resistance as measured using a hand held penetrometer. The penetrometer shall be provided by the Contractor.

C. All flowable fill areas subject to traffic loads must have a durable riding surface.

D. An approved type of accelerator may be approved for the placement of "Flowable Fill" in traffic areas when submitted to the Department for D.O.T. approval.

END OF SECTION

SECTION 15010

BASIC MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.01 WORK INCLUDED:

Drawings and Specifications: The Drawings and Specifications shall be considered as complementary, one to the other, so that materials and work indicated, called for, or implied by the one and not by the other shall be supplied and installed as though specifically called for by both. The Drawings are to be considered diagrammatic, not necessarily showing in detail or to scale all of the equipment or minor items. In the event of discrepancies between the Drawings and the Specifications, or between either of these and any regulations or ordinances governing mechanical work, the Contractor shall notify the Engineer of Record in ample time to permit revisions.

1.02 SITE INVESTIGATION:

It shall be the responsibility of the Contractor to visit the site of the work and become familiar with all available information regarding the location of existing facilities. Failure of the Contractor to fully inform himself of all existing conditions will not be cause for additional compensation.

1.03 FEES, PERMITS, AND INSPECTIONS:

A. The Contractor shall obtain all permits for work under this contract and shall pay all expenses in conjunction therewith. He shall also procure and deliver to the Engineer of Record all certificates issued by the authorities having jurisdiction.

B. The Department will inspect the work during the course of construction. The Contractor shall provide provision for inspection by the Department and others having jurisdiction.

1.04 NEW EQUIPMENT AND MATERIALS:

A. All equipment and materials used in this installation shall be new, of the best quality and, unless otherwise noted, shall be standard catalog items of the various manufacturers.

1.05 STANDARDS:

A. The codes and standards covering mechanical work include, but are not limited to:

1) American National Standards Institute (ANSI)

2) American Society for Testing Materials (ASTM)

3) American Society of Mechanical Engineers (ASME)

4) American Welding Society (AWS)

5) National Fire Protection Association (NFPA)

6) National Electrical Manufacturers Association (NEMA)

7) American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)

8) National Sanitation Foundation (NSF)

9) Sheet Metal and Air Conditioning Contractors National Association (SMACNA)

10) South Florida Building Code (SFBC)

11) Codes, Regulations, Ordinances, etc., of the State, County, and/or Municipality, in which the construction is located, and any political division having jurisdiction over this work.

B. These codes, society and association recommendations constitute minimum requirements and no reductions from design requirements will be permitted, even if allowed by the applicable codes, without expressed written permission of the Engineer of Record. References are to the editions current at time of bidding.

1.06 SPACE AND ACCESS:

All equipment shall fit the allotted space and shall leave reasonable access room for servicing and repairs. Greater space and room required by substituted equipment shall be provided by the Contractor at his expense.

1.07 CUTTING AND PATCHING:

All cutting and patching necessary for the work shall be performed by the Contractor. Where interferences occur, and departures from indicated arrangements are required, the Contractor shall coordinate the mechanical work with the other trades involved and make a determination as to changed locations and elevations of the ductwork and/or piping and shall obtain approval from the Engineer of Record for the proposed changes.

1.08 SAFETY REQUIREMENTS:

In addition to the components specified and shown on the Drawings and necessary for the specified performance, the Contractor shall incorporate in the design and show on the shop drawings all the safety features required by the current codes and regulations, including but not limited to those of the Occupational Safety and Health Act of 1970, and Amendments thereto.

1.09 Electrical Work:

The Contractor shall furnish all electrical and control equipment associated with mechanical work including electrical controls, switches, contactors and starters for all equipment items requiring same. All work shall conform in all respects to the requirements of the applicable articles of Division 16.

1.10 METAL FASTENERS:

Unless otherwise indicated, metal fasteners and related parts shall be of aluminum or stainless steel and shall be of adequate strength for the purpose intended.

1.11 PREVENTION OF ELECTROLYSIS:

Where the contact of dissimilar metals may cause electrolysis and where aluminum will contact concrete, mortar or plaster, the contact surface of the metals shall be separated using not less than one coat of zinc chromate primer and one heavy coat of aluminum pigmented asphalt paint on each surface; or where deemed necessary by the Engineer of Record, not less than one course of asphalt saturated cotton fabric cemented to both metals with flashing cement, shall be used. Finished works shall be cleaned and excess cement removed.

1.12 FACTORY TESTS:

When equipment is required to be factory tested, the results of the tests shall be submitted to the Engineer of Record and approval of the test results shall be obtained before shipment of the equipment.

1.13 CLEANING AND ADJUSTMENTS:

Upon completion of work, the Contractor shall clean, oil and grease fans, motors compressors, pumps, and other running equipment and apparatus and mechanisms which he installs and shall make certain such apparatus and mechanisms are in proper working order and ready for test.

1.14 WARRANTY AND MAINTENANCE BOND:

The Developer shall warrant that all work, materials, equipment or facility shall be free from defects for a period of one year from the date of the final acceptance, that all the equipment has the capacity specified and that it will operate without excess noise or vibration caused by improper installation. In addition, the Developer shall provide the County with a Maintenance Bond in accordance with its agreement with the County.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION

SECTION 15060

PIPING AND FITTINGS

PART 1 - SCOPE

1.01 SCOPE:

A. The work included in this section consist of furnishing all material, equipment, labor and performing all operations necessary for the supply of all piping, fittings and accessories within the limits of work, as shown on the drawings and specified herein.

B. Where references are made to other standards or codes, unless specific date references are indicated the latest edition of said standard or code shall govern.

1.02 WORK NOT INCLUDED UNDER THIS SECTION:

Piping installation for various types of piping systems is specified various other sections herein. Installations specified in this section is supplementary to those sections and in the case of conflict the more stringent condition shall prevail.

1.03 RELATED SECTIONS:

A. Section 15010 - Basic Mechanical Requirements

B. Section 15065 - Miscellaneous Materials

C. All sections specifying various types of valves.

1.04 PIPING LAYOUT:

Field verify dimensions prior to preparation of layout and shop drawings. Obtain shop drawing approval prior to fabrication of piping. All items not specifically mentioned in the Specifications or noted on the approved Plans, but which are obviously necessary to make a complete working installation shall be included.

1.05 DELIVERY, STORAGE AND HANDLING

A. During shipping, delivery and installation of pipe and accessories, handle in a manner as to ensure a sound undamaged condition.

B. Exercise particular care not to injure pipe coatings.

PART 2 - PRODUCTS

2.01 PIPE AND FITTINGS: DUCTILE IRON AND CAST IRON

A. **GENERAL**

As used herein, "ANSI" denotes the American National Standards Institute, "AWWA" denotes the American Water Works Association, and "ASTM" denotes the American Society for Testing and Materials.

All pipe and fittings to be furnished hereunder shall conform to the referenced ANSI and/or AWWA Standard as modified herein, as appearing in the following sections.

All markings required on pipe and fittings, shall be clearly legible and located such that they will not be hidden or destroyed when assembled into the intended system.

B. **PIPE**

All pipe shall be ductile iron pipe conforming to ANSI/AWWA Standard C151/A21.51-02, "Ductile-Iron Pipe, Centrifugally Cast, for Water". All pipe and fittings for water applications shall be in full compliance with ANSI/NSF 61, "Drinking Water System Components-Health Effects". Manufacturers shall maintain their NSF certification for the duration of the Contract and any extensions thereof.

The pipe thickness and outside diameter of pipe for sanitary sewer and water usage shall conform to Tables 1 and 2 (for push-on and mechanical joint pipe, respectively) of ANSI/AWWA Standard C151/A21.51-02 for the following sizes (The pressure class specified is the minimum permitted):

Size	Pressure Class
4-inch through 12-inch	350
14-inch through 20-inch	250
24-inch	200
30-inch through 54-inch	150

For restrained joint pipe, the thickness of the pipe barrel remaining after grooves are cut, if required in the design of restrained end joints, shall not be less than the nominal wall thickness of equal sized non-restrained joint pipe as shown above.

Each piece of pipe shall be marked as required in Subsection 4.6 of AWWA C151-02. Letters and numerals on pipe sizes 12-inch and smaller shall be not less than 3/8-inch.

The Water and Sewer Department absolutely reserves the right to require the use of "thickness" class pipe or higher pressure class pipe in applications where in the opinion of the Engineer (ie the Chief, Engineering Division, M-D WASD or his representative) such use is in the best interest of the Department. The Engineer's decision in this regard shall be final.

A sufficient quantity of non-toxic vegetable soap lubricant shall be supplied with each shipment of pipe. The soap lubricant shall be suitable for use in subaqueous trench conditions.

For flanged ductile-iron pipe with integrally cast flanges or threaded flanges, the nominal wall thickness of the pipe barrel shall be as specified in Section 3.3, "Joints and Accessories" under "Flanged Joints", hereinbelow.

The single gasket push-on pipe shall be shipped in standard 18-foot or 20-foot lengths, but not both. The restrained single-gasket push-on joint pipe shall be shipped in standard 18 or 20-foot lengths as specified above or fabricated lengths as noted in each order. At least two lengths of each size of single gasket push-on pipe furnished under each order shall be tested with circumferential gauges to insure that the pipe may be cut at any point along its length and have an outside diameter which will be within the manufacturer's standard design dimensions and tolerances for plain pipe. These lengths shall be identified with an easily distinguished, painted marking, longitudinally along the full length of the pipe.

C. **FITTINGS**

Fittings Conforming with ANSI/AWWA C110/A21.11-98 (Water & Sewer Use)

Restrained push-on joint fittings shall be cast ductile iron for use with ductile-iron pipe as specified above. Standard mechanical joint, push-on joint and flanged joint fittings shall also be ductile iron for use with ductile-iron pipe as specified above. Cast ductile-iron fittings in the 3-inch through 24-inch size range shall be pressure rated at 350 psi, minimum; (except flange-joint fittings shall be rated at 250 psi, minimum); and in the 30-inch through 48-inch size range shall be pressure rated at 250 psi, minimum. All fittings with mechanical joints, flange joints and push-on joints shall conform to ANSI/AWWA Standard C110/A21.10-98, "Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In., for Water and Other Liquids". In addition, fittings with mechanical joints and push-on joints shall conform to ANSI/AWWA Standard C111/A21.11-00, "Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings".

The weight of fittings, shall be as given in ANSI/AWWA C110/A21.11-98 for ductile-iron fittings. The weight of mechanical joint fittings shall be as established in Tables 3 through 12. The weight of flanged joint fittings shall as established in Tables 13 through 20.

Fittings Conforming with ANSI/AWWA C153/A21.53-00 (Water & Sewer Use)

All fittings shall be cast ductile-iron for use with ductile-iron pipe as specified above. Fittings in the 3-inch through 24-inch size range shall be pressure rated at 350 psi, minimum; 30-inch through 48-inch size range shall be pressure rated at 250 psi, minimum; and in the 54-inch through 64-inch size range shall be pressure rated at 150 psi, minimum (except for those fittings such as plugs, caps, and sleeves which are normally rated at a higher pressure). No flanged fittings or mixtures of flanged with other end type fittings will be allowed in the range of 3-inch through 48-inch since they are not covered in the AWWA Standard. Flanged fittings conforming with and covered by this standard are allowed in sizes, 54, 60 and 64-inch. In conformance with the standard, 54, 60 and 64-inch flanged tees, crosses and reducers with outlets of smaller dimension as listed in ANSI/AWWA C153/A21.53-00 are permitted. All fittings with mechanical joints, flange joints and push-on joints shall conform to ANSI/AWWA Standard C153/A21.53-00, "Ductile-Iron Compact Fittings for Water Service". In addition, fittings with mechanical joints and push-on joints shall conform to ANSI/AWWA Standard C111/A21.11-00, "Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings" except as otherwise allowed in C153. Mechanical joint glands shall be ductile-iron only.

Since the C153 Standard provides only minimum dimensions, fully detailed drawings of all fittings proposed shall be supplied by the manufacturer with his bid. The tabulated nominal weight of each size and type of fitting shall also be supplied by the manufacturer for all items

proposed. This weight shall be that of the bare casting prior to application of any lining or coating. The weight of a fitting supplied under the contract shall not be less than ninety-five (95) percent of the tabulated nominal weight supplied by the manufacturer's catalog literature for that fitting. Further, the weight of fittings supplied shall not be more than five (5) percent above the same tabulated nominal weight.

C. JOINTS AND ACCESSORIES

Push-On Type Joints (Single Gasket and Single Gasket with Gasket Restraint)

Push-on joints shall conform to ANSI/AWWA Standard C111/A21.11-00, except that the gaskets for pipe and fittings shall be neoprene where so specified.

The required number of gaskets for each push-on joint pipe plus one extra for every 50 joints or fraction thereof, shall be furnished with each order. The gaskets shall be shipped in suitable protective containers. All single gasket pipe shall be as manufactured by United States Pipe and Foundry Company (Tyton), by the American Cast Iron Pipe Company (Fastite), by McWane, Inc. (Mix of Tyton and Fastite), Tyler/Union (Tyton) or approved equal.

Push-on joints together with both their regular and gasket-restraint gaskets shall be of the design, dimensions and tolerances of either those provided by American Cast Iron Pipe Company (Fastite/Fast-Grip) or those provided by United States Pipe and Foundry Company (Tyton/Field Lok). No other designs shall be acceptable. If required by the Miami-Dade Water and Sewer Department, the Vendor shall supply complete design drawings, with dimensions, tolerances and materials of the joint and gasket being supplied within fourteen (14) calendar days of the date of receipt of the letter, fax or E-mail requiring said submission. If so required by the Water and Sewer Department, this submission shall be signed, sealed and dated by an Engineer registered to practice in the State where the manufacturer is located. If the pipe is of non-domestic origin, signing, sealing and dating of the submission, when required, shall be performed by an Engineer registered in the state where the Vendor's main office is located or the State of Florida, at the discretion of the Chief, Engineering Division, Miami-Dade Water and Sewer Department or his designee.

Mechanical Joints

Mechanical joints for fittings shall conform to ANSI/AWWA Standard C111/A21.11-00, except that the gaskets for each fitting under Groups D and D1 shall be neoprene. Bolt holes for mechanical joints shall be equally spaced, and shall straddle the vertical centerline. Tee head bolts and hexagonal nuts for all mechanical joints in fittings shall be of high strength low-alloy steel with composition, dimensions and threading as specified in ANSI/AWWA Standard C111/A21.11-00. Glands shall be of ductile-iron construction for ductile iron fittings, and cast gray iron or ductile iron for cast gray-iron fittings.

The proper number of gaskets, glands, bolts and nuts, all conforming to ANSI/AWWA Standard C111/A21.11-00, plus one extra gasket for every 10 joints or fraction thereof, shall be furnished with each order. The gaskets and joint accessories shall be shipped in suitable protective containers. Follower glands held in place with set screws will not be acceptable. Segmented glands will not be acceptable.

Mechanical Joint and Push On Joint Megalug-Type Restraining Systems

Use of this type of restraint is restricted to underground mechanical joint or push on joint applications and in general may not be used above grade or as a substitute for flanged joints. Any above grade applications will require submission of shop drawings of the piping system where they are utilized and may require design by a Florida registered Professional Engineer.

In any mechanical joint or push on joint underground piping system of 30-inch nominal diameter and below this type of restraint may be utilized as design or field conditions dictate.
In sizes 36, 42 and 48-inch the prior written permission of the Engineer is required. In instances where written permission cannot be immediately obtained, verbal permission will be allowed but is to be confirmed in writing on the first business day following the substitution. If this type of restraint is used without permission or if permission is denied, the Contractor making the substitution shall be solely responsible for all costs, both direct and indirect, of immediately correcting the restraint system to the satisfaction of the Engineer.

It is recognized that flange adapters of this type form a useful tool for adjusting lengths of flanged pipe runs in instances such as runs with a large number of deflections where it is almost impossible to predict all lengths correctly. Therefore, a very restricted number of these joints will be allowed in instances where it can be clearly shown to the satisfaction of the Engineer that they are necessary. This application is restricted to 20-inch nominal diameter and below. Further, this use shall be designed in and shall not be made as a field substitution. In all instances flange adapters shall be rated for a minimum working pressure of 250 psi with a minimum safety factor of 2:1. In no case will these flange adapters be used as a general substitute for standard flanged joints.

The Department absolutely reserves the right to require other forms of restraint where in the opinion of the Engineer the use of this form of restraint is not in the best interest of the Department and his decision shall be final.

The Megalug restraint systems manufactured by EBAA Iron Sales, Eastland Texas, will be considered the standard of quality for comparison purposes and if the Department has any doubts as to the durability, quality or ability to restrain of a proffered substitute, the entity offering the substitute shall bear the entire burden of proving this equality to the complete satisfaction of the Engineer. Other manufacturers producing this type of restraint system shall submit data with their shop drawings showing that their restraint system has been in the marketplace for a minimum of three years in this country.

Each thrust-resistant mechanical joint or push on joint made up with this type of restraint and the pipe and fitting of which it is a part, shall be designed to withstand an axial thrust from an internal pipeline pressure of at least 150 psi at bulkhead conditions without reduction because of its position in the pipeline nor for support from external thrust blocks.

This type of joint restraint shall not be used above grade except as previously specified nor shall it be used as a carrier pipe within a casing. This type of restraint shall not be used with tape wrapped pipe or with too great a coating thickness on the exterior of the pipe.

Restrained Push-on Joints (Single Gasket Non-Gasket Restrained)

Restrained joints in pipe and fittings shall be of the single gasket push-on type, and shall conform to all applicable provisions of ANSI/AWWA Standard C111/A21.11-00, except that gaskets for pipe and fittings shall be neoprene, where so specified, and the following requirements:

Thickness of the pipe barrel remaining at grooves cut, if required in the design of restrained end joints, shall not be less than the nominal wall thickness of equal sized non-restrained pipe as

specified in Section 3.1 above.
Restrained joints using field welding, set screws, or gaskets with expanding metal inserts will not be acceptable.

The restraining components, when not cast integrally with the pipe and fittings, shall be ductile iron or a high strength non-corrosive alloy steel.

Tee head bolts and hexagonal nuts for all restrained joints in pipe and fittings shall be of high strength low-alloy steel with composition, dimensions and threading as specified in ANSI/AWWA Standard C111/A21.11-00, except that the length of the bolts shall meet the requirements for the restrained joint design.

The proper number of gaskets, bolts, nuts and all necessary joint material, plus one extra gasket for every 10 joints or fraction thereof, shall be furnished with each order. The gaskets and joint accessories shall be shipped in suitable protection containers.

Each thrust-resistant joint and the pipe and fitting of which it is a part, shall be designed to withstand the axial thrust from an internal pipeline pressure of at least 150 psi at bulkhead conditions without reduction because of its position in the pipeline nor for support from external thrust blocks.

Restrained push-on joint pipe and fittings shall be capable of being deflected after assembly. During deflection, all components in the restrained system shall be in contact to provide an equal force on all contact areas.

When restrained spigot ends are ordered for items of Group A, the corresponding bell ends of the pipe to be restrained (also within Group A), shall be furnished with the required matching restraining features at no additional cost other than the price bid per foot of pipe.

Flanged Joints

Connecting pieces with one end flanged and the other end either plain-end or mechanical joint, shall conform to ANSI/AWWA Standard C110/A21.10-98. Joint material for both the flanged end and the mechanical joint accessories for connecting pieces with a mechanical joint end shall be furnished as specified.

Flange adapters shall be used only on a restricted basis and shall not be used as a general substitute for regular flanged joints. Further, the Department absolutely reserves the right to require regular flanged or other types of joint when it is considered in the Department's best interest. The decision of the Engineer shall be final in such situation. Flanges shall be made of ductile iron conforming with ASTM 536. Flange shall be restrained by a number of individual gripping wedges operated by torque-limiting actuating screws. Each flange adapter shall have a permanently cast in identification number allowing tracing of the date, foundry and pour that fabricated the unit together with all test data for the material of the pour. Records for this purpose shall be retained by the foundry for a minimum of two years after the pour date and shall be supplied to the Department within no more than two weeks after request. Factor of safety shall be a minimum of 2 to 1.

Other types of flanged fittings, and flanged pipe, shall conform to the following requirements unless otherwise stated in the order:

Flanged fittings shall conform to ANSI/AWWA Standard C110/A21.10-98, as specified hereinabove.

Flanged ductile-iron pipe with integrally cast flanges shall be manufactured in accordance with ANSI/AWWA Standard C151/A21.51-02, and with provisions contained hereinabove for centrifugally cast ductile iron pipe, and shall be furnished with ANSI Standard Class 125 flanges, plain faced and drilled, conforming to ANSI Standard B16.1, "Cast Iron Pipe Flanges and Flanged Fittings", latest revision. Hollow back flanges are not acceptable.

Flanged ductile-iron pipe with threaded flanges shall be manufactured in accordance with ANSI/AWWA Standard C115/A21.15-99, "Flanged Ductile-Iron Pipe With Ductile-Iron or Grey-Iron Threaded Flanges", and shall be rated for a working pressure of 250 psi, minimum. The nominal thickness of flanged ductile-iron pipe, 6-inch and larger, shall not be less than those shown in Table 1 of ANSI/AWWA Standard C115/A21.15-99. The nominal thickness of 4-inch flanged ductile-iron pipe shall be Class 54 (min.) conforming to Tables 3 and 4 of ANSI/AWWA Standard C151/A21.51-02. The pipe shall be furnished with ANSI Standard Class 125 flanges, plain faced and drilled, conforming to ANSI Standard B16.1, latest revision. Hollow back flanges and grey-iron flanges shall not be acceptable for use as threaded flanges. Threaded flanges shall be individually fitted and machine tightened on the threaded pipe by the manufacturer, and shall not be interchangeable in the field. Pipe lengths shall be as ordered. Removal of flanges, cutting and re-threading the pipe, and re-installing the flanges will not be permitted in any case.

All flanges on ductile-iron pipe and fittings shall be of ductile iron. All joint materials for flanged pipe and fittings, shall be supplied with all pipe or fittings ordered. Bolts and nuts shall comply with all requirements of Appendix Section A.1 of ANSI/AWWA Standard C115/A21.15-99 except that both shall be stainless steel. Unless ring gaskets are specifically called for in the order, gaskets shall be full-faced, and gaskets shall be of 1/8-inch thickness. Gaskets shall fully conform with the requirements of ANSI/AWWA Standard C115/A21.15-99 Appendix Section A.2 except that gaskets shall be SBR for water and neoprene for sewer usages.

D. **LININGS AND COATINGS**

Asphaltic Coating

All pipe and fittings shall be outside-coated with an asphaltic material applied by means of the airless spray method. The exterior coating shall meet AWWA Specifications for this type of coating, shall be smooth without pinholes, thin, bare or overly thick areas. Smoothness shall be such that when hand rubbed, no “sand paper” feeling will be experienced and such that the spigot area will readily slide through the gasket without pulling, tearing, rolling or otherwise disturbing the sealing capabilities of the gasket. Spigot ends shall be beveled prior to painting and to an extent that will permit ready insertion of the spigot through the gasket area.

Cement-Mortar Lining

Pipe and fittings where so specified shall be cement-lined and seal-coated in accordance with ANSI/AWWA Standard C104/A21.4-95, "Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water".

Ceramic Epoxy Lining and Polyethylene Lining

Pipe and fittings where so specified shall be lined with either ceramic epoxy or virgin polyethylene. A Vendor may supply one or the other material but not both in the same order.

All sewer pipe and fittings of 4-inch nominal diameter and above, except for riser pipe for valves, shall be lined with either ceramic epoxy lining or virgin polyethylene. Polyethylene shall be compounded with carbon black to resist exposure to the ultraviolet rays during open-air storage, and comply with ASTM Standard D1248-00a, "Polyethylene Plastics Molding and Extrusion Materials". Ceramic epoxy shall contain pigmentation to resist ultraviolet exposure under the same conditions.

Ceramic Epoxy

All ductile iron pipe and fittings shall be delivered to the application facility without asphalt, cement lining or other lining on the interior surface or the first 6 inches on the spigot end of the pipe exterior.
The only ceramic epoxy material approved by the Department at this time is a high-build multi-component Amine cured Novalac epoxy, Protecto 401, by Vulcan Painters,Inc. of Bessemer, AL 35021.

Material must meet the following criteria and be accompanied by certification of the following test results:

A. A permeability rating of 0.00 when tested according to Method A of ASTM E96-00 "Test Method for Water Vapor Transmission of Materials", Procedure A with a test duration of 30 days.

B. The following test must be run on coupons from factory lined ductile iron pipe:

   1. ASTM B117 Salt Spray (scribed panel) - Results to equal no more than 0.5mm undercutting after one year.

   2. ASTM G95 Cathodic Disbondment 1.5 volts @ 77 degrees F. Results to equal no more than 0.5mm undercutting after 30 days.

   3. Immersion Testing rating using ASTM D714-87 (1994).

      a. 20% Sulfuric Acid - No effect after one year.
      b. 25% Sodium Hydroxide - No effect after one year.
      c. 160 degree F. Distilled Water - No effect after one year.
      d. 120 degree F. Tap Water (scribed panel) - 0.0 undercutting after one year with no effect.

C. A statement from the manufacturer attesting to the fact that at least 20% of the volume of the lining contains ceramic quartz pigment.

D. A statement concerning recoatability and repair to the lining.

Application

A. The lining shall be applied by a competent firm with a successful history of applying linings to the interior of ductile iron pipe and fittings.

B. Surface Preparation

Prior to abrasive blasting, the entire area which will receive the protective compound shall be inspected for oil, grease, etc., Any areas where oil, grease or any substance which can be removed by solvent is present shall be solvent cleaned using the guidelines outlined in SSPC-1 Solvent Cleaning. After the surface has been made free of grease, oil or other substances, all areas to receive the protective compounds shall be abrasive blasted using compressed air nozzles with sand or grit abrasive media. The entire surface to be lined shall be struck with the blast media so that all rust, loose oxides, etc., are removed from the surface. Only slight stains and tightly adhering annealing oxide may be left on the surface. Any area where rust reappears before coating must be reblasted to remove all rust.

C. Lining

After the surface preparation and within 8 hours of surface preparation, the interior of pipe and fittings shall receive a minimum forty (40) mils dry film thickness of the protective lining. No lining shall take place when the substrate or ambient temperature is below 40 degrees Fahrenheit. The surface also must be dry and dust free. If flange ends are included in the Project, the linings must not be used on the face of the flange; however, full face gaskets must be used to protect the ends of the pipe. The 40-mil system shall not be applied in the gasket grooves.

D. Coating of Gasket and Spigot Ends

Due to the tolerances involved, the gasket area and exterior of the spigot end for 6 inches back from the end of the spigot must be coated with six (6) mils minimum, ten (10) mils maximum of Protecto Joint Compound. This coating shall be applied by brush to ensure coverage. Care should be taken that the coating is smooth without excess buildup in the gasket groove or on the spigot end. All material for the gasket groove and spigot end shall be applied after the application of the lining as specified in the preceding paragraph.

E. Number of Coats

The number of coats of lining material applied shall be as recommended by the lining manufacturer. However, in no case shall this material be applied above the dry thickness per coat recommended by the lining manufacturer in printed literature. The time between coats shall never exceed that time recommended by the lining material manufacturer. No material shall be used for lining which is not indefinitely recoatable with itself without roughening the surface.

F. Touch-Up and Repair

Protecto Joint Compound shall be used for touch-up or repair. Procedures shall be in accordance with manufacturer's recommendations.

Inspection and Certification

A. Inspection

1. All ductile iron pipe and fitting linings shall be checked for thickness using a magnetic film thickness gauge. The thickness testing shall be done using the method outlined in SSPC-PC-2 Film Thickness Rating.
2. The interior lining of all pipe and fittings shall be tested for pinholes with a nondestructive 2,500 volt test.

3. Each pipe joint and fitting shall be marked with the date of application of the lining system and with its numerical sequence of application on the date.

B. Certification

The pipe or fitting manufacturer must supply a certificate attesting to the fact that the applicator met the requirements of this specification, and that the material used was as specified, and that the material was applied as required by the specification.

Procedures for Sealing Cut Ends and Repairing Field Damaged Areas

1. Remove burrs caused by field cutting of ends or handling damage and smooth out the edge of the lining if rough.

2. Remove all traces of oil, grease, asphalt, dust, dirt, etc.

3. Areas of loose or damaged lining associated with field cutting the pipe shall be repaired, if approved by the Engineer, as recommended by the pipe manufacturer. The damaged area shall be stripped back by chiseling or scraping about 1 to 2 inches into the well-adhered lining before patching.

   The exposed metal and the 1 to 2-inch lining overlap shall be roughened with a coarse grade of emery cloth (#40 grit), rasp or small chisel. Avoid wire brushing or similar buffing since these tend to make the surface too smooth for good adhesion.

4. With the area to be sealed or repaired absolutely, clean and suitably roughened, apply a coat of Protecto Joint Compound by brush in accordance with the manufacturer's recommendations.

<u>Polyethyline Lining</u>

The polyethylene shall be fused to the pipe and fittings with heat to form a tightly bonded uniform lining 40 mils thick, minimum, extending from the spigot end to the gasket seat in the bell of push-on, restrained push-on and mechanical type joints.

Prior to preheating the pipe, 75% or more of the high-temperature oxide film shall be removed through proper preparation of pipe interior surface. Fittings shall be sand blasted. Pipe and fittings shall be uniformly preheated to a temperature adequate to provide uniform fusing of the polyethylene powders and proper bonding to the interior of the pipe and fittings.

The lining at the ends (spigot and bell) shall be hermetically sealed with a coal-tar epoxy. This epoxy shall coat the inside of the bell of both pipe and fitting as well as the last six inches on the inside of the spigot end of the pipe and two to three inches on the outside of the spigot end.

The lining of all pipe and fittings shall be subjected to and pass a test for pinholes, bare spots, metal particles, insufficient lining thickness and other defects by a method conforming to ASTM Standard G62-87 (1998), "Holiday Detection in Pipeline Coatings", Method B (high voltage). Other test methods may be submitted to the Department for approval, but no approval will be granted unless it is clearly shown to the satisfaction of the Department that the method is equivalent to the specified tests insofar as detecting defects and insufficient lining thickness.

The manufacturer shall provide certifications on the holiday test as well as certifications on a

uniform (spigot end to gasket seat in bell) minimum 40-mils-thick lining.

C. **QUALITY ASSURANCE**

All pipe, fittings and other materials supplied under this contract shall be subject to inspection while still on the delivery truck. It is the sole responsibility of the vendor and supplier to make prior contact with the Storekeeper or the Construction Managment section and provide a minimum of 48-hours prior notice of delivery. When so notified, the Department will make arrangements for inspection of the material upon arrival or within a reasonable time thereafter. Material will not be unloaded without inspection taking place either prior to or, if necessary for examination, during the unloading procedure. The Department will not be responsible for any delays or additional costs created by non-compliance with the requirement for prior notification or the requirement for thorough inspection.

Materials shall be delivered in complete compliance with the AWWA Standards as modified herein, without damage, and shall match or exceed the quality of any samples supplied. The Department absolutely reserves the right to require samples of any material supplied and to perform whatever tests considered by the Engineer, whose decision shall be final, to be in the Department's best interest on said samples. Where such tests are of a destructive nature, the sample, if it passes the test will be paid for (at cost as shown by invoice) by the Department. Samples failing will be immediately replaced with suitable material at the supplier's/contractor's expense. Samples required prior to order as a condition for purchase or as a materials submittal for approval will be at the supplier's/contractor's expense but, if approved and not used for destructive tests, may be used in the work with permission from the Engineer.

Materials found to be defective, not in strict compliance with the quality standards of samples supplied or these specifications shall be immediately returned to the vendor at his expense. If defects are discovered at a later time, the vendor shall be required to remove said items and shall bare all costs for so doing together with any replacement costs. Rejection of items may subject the vendor to liquidated and/or actual damages as specified elsewhere herein.

Foundries supplying materials shall maintain their metallurgical records for a minimum period of two years after fabrication and firms not doing so may be found in default.

Flaws which provide cause for rejection include but are not limited to; incorrect metallurgy or metallurgy which cannot be verified to the complete satisfaction of the Engineer; foundry identification/location, size, pressure and material identification information lost, removed, non-existent, or not visible when assembled; not in complete compliance with all applicable AWWA Standards as modified herein and/or these specifications; not in compliance with NSF; not in compliance with approved shop drawings; out of roundness in excess of AWWA requirements; dimensional differences in excess of AWWA requirements; rough exterior coating; chipped, cracked, scratched or otherwise damaged interior or exterior coatings or linings; interior or exterior coatings which are too thin; coatings too thick to allow proper assembly; coatings too thick to allow proper grip by restraining gaskets or other restraining elements; pin holes or honey combing of pipe; weld spatter or excess metal in gasket grooves or the whole of the bell area; bell areas which are distorted or otherwise improperly cast; spigots which are out of round, not of proper dimension, or not beveled to an extent that will allow easy assembly of the pipe joint; gaskets which are defective or of the wrong material; lack of joint materials; improper or defective joint materials; bolting of the wrong material or size; electro galvanizing or other exterior plating when hot-dip galvanizing is required; incorrect, flawed or damaged interior coating or lining; lack or non-submittal of all required certifications; non-timely submission of certifications; incorrect/incomplete certifications or certifications lacking the signature, date and seal of a professional engineer when

so required; flanges which are too thin, not a right angles to the pipe centerline, or otherwise distorted; together with all other flaws or defects which in the opinion of the Engineer, who's decision shall be final, adversely affect the assembly and/or function of the piping system as intended.

2.02 PIPE AND FITTINGS: CAST IRON SOIL

A. Cast iron soil pipe and fittings shall be cast gray iron, extra heavy, conforming to the requirements of ASTM Standard A74 "Cast Iron Soil, Pipe and Fittings".

B. Joints in soil pipe and fittings shall be made with neoprene rubber, compression type gaskets conforming to ASTM Standard C564, "Rubber Gaskets for Cast Iron Soil Pipe and Fittings".

C. Hubless EHCI with stainless steel and neoprene "Band-Aid" connections is only approved for use in size 2-inches. All EHCI of larger diameter shall be hub pipe.

2.03 PIPE AND FITTINGS: POLY VINYL CHLORIDE (PVC)

A. **TYPE PSM SDR-35 PVC, AWWA C900 PVC AND C905 PVC SEWER PIPE AND FITTINGS**

1. TYPE PSM SDR-35 PVC SEWER PIPE
Type PSM SDR-35 PVC Sewer Pipe for sewer mains and laterals shall conform to ASTM Standard D 3034, "Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings", except as modified herein.

a. Pipe shall be made of PVC thermoplastic having a cell classification of 12454-B, 12364-B, 12364-C or 13364-B as defined in ASTM Standard D 1784-90, "Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds".

b. The PVC compounds used in the manufacture of the gravity sewer pipe shall be as listed in the Plastic Pipe Institute (PPI) Technical Report TR-4.

c. The PVC pipe shall be push-on type, with bells, spigots and elastomeric gaskets, in accordance with ASTM Standard D 3034, and in accordance with ASTM Standard D 3212, "Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals", except as otherwise modified herein. The gaskets shall be the sole element depended upon to make the joint flexible and watertight. Joints using solvent cement will not be permitted. The pipe bells shall have an annular recess or race to seat and retain the gasket, and the gaskets may be either prepositioned by the manufacturer, or shipped separately in suitable protective containers. Pipe spigots shall be beveled. Pipe bells shall be extruded integral with the pipe barrel with a thickness equal to or greater than that of the barrel.

d. The gaskets shall be fabricated from a high-grade elastomer compound in accordance with ASTM Standard F 477, "Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe", except as otherwise modified herein. The basic polymer for the gaskets shall be synthetic rubber. Natural rubber gaskets, or gaskets with both natural and synthetic rubbers will not be permitted. Gaskets shall be continuous, elastomeric, rubber ring type.

e. Nominal laid length of Type PSM SDR-35 PVC sewer pipe shall be 13 feet.

f. Type PSM SDR-35 PVC sewer pipe shall be double labeled (180 degrees apart) as follows at intervals of five (5) feet or less:

Date of manufacture - Manufacturer's name & Code - Nominal size - Cell classification - "Type PSM SDR-35 PVC Sewer Pipe" - "Specification D 3034"

2. Type PSM SDR-35 PVC Sewer Fittings

a. Type PSM SDR-35 PVC Sewer Fittings shall conform to ASTM Standard D 3034 and to the specifications for Type PSM SDR-35 PVC sewer pipe herein, except as modified below.

b. The waterway and bell wall thickness shall be equal to or greater than that specified for pipe, except that for reducing fittings or those with smaller inlets, the wall thickness of each inlet shall be no less than the minimum wall thickness for that size pipe.

B. AWWA C900 AND C905 PVC (CI) PIPE AND FITTINGS

1. TYPE C900 and C905 PVC PIPE

AWWA C900 and C905 PVC (CI) Pipe for sewer mains and laterals shall conform respectively to ANSI/AWWA C900, "Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In., for Water Transmission and Distribution", and ANSI/AWWA C905, “Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings 14 In. Through 48 In.” except as otherwise modified herein.

a. The dimensions and pressure classes shall be for Dimension Ratios 14, 18 and 25 (DR’s 14, 18 and 25) for C900 PVC pipe and DR’s of 14,18, 21,25, 26, 32.5, 41 and 51 for C905 PVC Pipe with equivalent cast iron pipe outside diameters.

b. AWWA C900 and C905 pipe shall be made from PVC thermoplastic having physical and chemical properties which meet or exceed a cell classification of 12454-A or 12454-B virgin compounds as defined in ASTM Standard D 1784.

c. The AWWA C900 and C905 pipe shall be push-on type, with bells, spigots and elastomeric gaskets in accordance with ASTM Standard D 3139, "Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals". The gaskets shall conform to ASTM Standard F477 and shall be synthetic rubber. One gasket shall be furnished with each length of elastomeric-gasket bell-end pipe. Pipe spigots shall be beveled. Pipe bells shall be extruded integral with the pipe barrel with a thickness equal to or greater than that of the barrel.

d. Nominal laid length of AWWA C900 and C905 PVC (CI) pipe shall be 20 feet.

e. The C900 and C905 pipe shall be labeled with the following at intervals of not more than five (5) feet:

Date of manufacture - Manufacturer's Name & Code
- Nominal size - "(CI)" - DR number – Pressure Class – Test Pressure for Hydro Tested or “NOT HYDROSTATIC PROOF TESTED” – AWWA designation number – Manufacturer’s name or trade mark and production run or lot code – Seal (Mark) of the testing agency verifying suitability of material for potable water service (must be NSF).

Couplings and fabricated fittings shall be marked with:
Nominal Size – “(CI)” – Deflection angle, if applicable – “PVC” – AWWA Pressure Class – AWWA designation number of the applicable standard (C900 or C905) – Manufacturer’s name or trademark - Seal (Mark) of the testing agency verifying suitability of material for potable water service (must be NSF).

2. TYPE C900 and C905 PVC FITTINGS
Fittings for AWWA C900 and C905, PVC (CI) shall conform to the requirements of ASTM Standard D 1784 and the specifications for AWWA C900 and C905, PVC (CI) pipe herein, except as modified below.

a. All fittings for C900 pipe shall be manufactured from PVC compound conforming to ASTM Standard D 1784-11. Fittings shall conform to the thickness requirements of DR18. All fittings, except wye branches, shall be Class 235 and shall be manufactured to withstand 755 psi quick burst pressure tested in accordance with ASTM Standard D 1599-99(2005), "Test Method for Short-Time Hydraulic Failure of Plastic Pipe, Tubing, and Fittings" and withstand 500 psi for a minimum of 1,000 hours tested in accordance with ASTM Standard D 1598-02(2009), "Test Method for Time-to-Failure of Plastic Pipe Under Constant Internal Pressure".

b. All fittings for C905 pipe shall be manufactured from PVC compound conforming to ASTM Standard D 1784-11. Fittings shall conform to the thickness requirements of DR18 for sizes 14 through 30-inch and DR25 for 36 through 48-inch. All fittings, except wye branches, shall be Class 235 for sizes 14 through 30-inch and Class 165 for 36 through 48-inch. Fittings 14 through 30-inch shall be manufactured to withstand 755 psi quick burst pressure tested in accordance with ASTM Standard D 1599-99(2005), "Test Method for Short-Time Hydraulic Failure of Plastic Pipe, Tubing, and Fittings" and withstand 500 psi for a minimum of 1,000 hours tested in accordance with ASTM Standard D 1598-02(2009), "Test Method for Time-to-Failure of Plastic Pipe Under Constant Internal Pressure". . Fittings 36 through 48-inch shall be manufactured to withstand 535 psi quick burst pressure tested in accordance with ASTM Standard D 1599-99(2005), "Test Method for Short-Time Hydraulic Failure of Plastic Pipe, Tubing, and Fittings" and withstand 350 psi for a minimum of 1,000 hours tested in accordance with ASTM Standard D 1598-02(2009), "Test Method for Time-to-Failure of Plastic Pipe Under Constant Internal Pressure".

3. Fittings shall be as manufactured by The Harrington Corporation, Lynchburg, VA, Head Manufacturing Company, Preston, ID, or approved equal.

C. MANHOLE COUPLINGS FOR TYPE PSM SDR-35 PVC SEWER PIPE shall conform to the requirements specified hereinbefore for Type PSM SDR-35 PVC Sewer Fittings and shall be completely coated on the exterior with fine aggregate bonded into/to the PVC surface. Manhole couplings for Type PSM SDR-35 PVC sewer pipe shall be as manufactured by Johns-Manville, Harrington Corporation, or approved equal.

D. MANHOLE COUPLINGS FOR AWWA C900 and C905, PVC (CI) PIPE shall conform to the requirements specified hereinbefore for AWWA C900 AND C905, PVC (CI) fittings and shall be completely coated on the exterior with fine aggregate bonded into/to the PVC surface. Manhole couplings for AWWA C900 and C905, PVC (CI) pipe shall be as manufactured by Harrington Corporation, or approved equal.

E. ADAPTER COUPLINGS shall have adjustable stainless steel shear rings. Insert shall be provided with coupling. Clamps shall be all stainless steel. Adapter couplings shall be as manufactured by The Logan Clay Products Company, Logan, Ohio, or approved equal.

F. SMALL DIAMETER PVC PIPE AND FITTINGS (SCHEDULES 40 AND 80)

1. Poly (vinyl chloride (PVC) pipe and fittings specified herein are small diameter PVC with threaded, flanged and solvent cemented joints.All poly (vinyl chloride) (PVC) pipe and fittings shall be made from high impact, rigid poly (vinyl chloride) compounds. Pipe and fittings shall be marked indicating size, type and schedule, ASTM Designation, manufacturer or trade mark, and shall bear the NSF (National Sanitation Foundation) seal of approval. Wherever the abbreviation PVC is used in these Specifications in relation to pipe and fittings, it shall mean poly (vinyl chloride) plastic pipe and fittings as specified herein.

2. PVC pipe shall be Schedule 80 as called for on the Plans or by the Engineer, Type I, Grade I, or Class 12454B with socket ends, and shall comply with ASTM Standard D1785, "Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120".

3. Schedule 80 socket-type fittings shall comply with ASTM Standard D2467, "Socket-Type Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80" and D2464 "Specification for Threaded Poly Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80, for threaded fittings.

4. Joining cement for PVC pipe and fittings shall comply with ASTM Standard D2564, "Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings". Cemented joints shall be made in accordance with ASTM Standard D2855, "Recommended Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings".

5. Flanges: One piece molded hub type flat face flanges, 125 pound standard as specified under fittings hereinbefore.

6. Gaskets: Full faced, 1/8-inch thick, neoprene (for sewer) or SBR (for water).

7. AISI Type 316 stainless steel, ASTM A193, Grade B8M hex bolts and ASTM A194 Grade E8 hex head nuts. Bolts shall be fabricated in accordance with ANSI B 1812 and provided with washers of the same materials as the bolts.

2.04 CERTIFICATION

A. The Contractor shall provide the Department with notarized Certifications, signed by an authorized agent of the manufacturer, that the material was manufactured, sampled, tested, and inspected in accordance with these specifications, and has been found to meet the requirements. A report of said test results shall be furnished.

B. No pipe or fitting will be accepted for use in the project until the Certifications have been submitted to and approved by the Department.

2.05 HANDLING AND STORING PVC PIPE AND FITTINGS

A. Pipe and fittings shall at all times be handled with great care to avoid damage. In loading or unloading operations, the manufacturer's unitized package of pipe and/or fittings shall be lifted with a forklift or other suitable equipment in such a manner as to prevent damage. Pipe may be unloaded by individual lengths, however, each length shall be slid or rolled on skidways in such a manner that the pipe is not dropped, and to avoid any shock. Under no circumstances shall pipe and/or fittings be dropped or allowed to roll or slide against obstructions.

B. Pipe and/or fittings having ultraviolet degradation, warpage, impact damage, abrasion damage, or gouges or cuts will not be accepted. Bell ends showing compression set, damage or deformation will not be acceptable.

C. Gaskets, if not prepositioned in the bell ends, shall be stored and shipped in suitable protective containers. Gaskets shall not be exposed to excessive heat, direct sunlight, oil or grease.

D. Pipe and fittings shall be stored in a manner that will prevent warpage or other damage as previously specified.

E. If the pipe and/or fittings are to be stored for any period in excess of six months in direct sunlight the items shall be covered with an opaque material. The cover shall be placed in such a manner that will permit air circulation above and around the items being covered to prevent excessive heat accumulation.

F. Pipe and fittings shall be manually or mechanically lowered into the trench for installation, and shall not be thrown, dropped or pushed in the trench.

2.06 PIPE AND FITTINGS: COPPER

A. Pipe: Copper pipe shall be Type K for interior piping and Type K Soft Temper for exterior piping, both conforming to ASTM B88, seamless, round, drawn tubing.

B. Fittings: Solder joint fittings shall be wrought copper and bronze fittings conforming to ANSI B16.22 or cast brass fittings conforming to ANSI Standard B16.18. Fittings for use with copper tubing shall be one of the following:

1. Cast Bronze Solder-Joint Fittings: Solder joint fittings of this type shall be cast bronze fittings conforming to ANSI B16.18, "Cast Brass Solder-Joint Fittings", and ASTM Standard B62, "Composition Bronze or Ounce Metal Castings", as manufactured by Chase Brass and Copper Co., Stanley G. Flagg & Co., Inc., or approved equal.

2. Wrought Copper Solder-Joint Fittings: Solder joint fittings of this type shall be wrought copper fittings in accordance with ASNI B16.22, "Wrought Copper and Bronze Solder-Joint Pressure Fittings".

C. Solder: Solder shall consist of 95 percent tin and 5 percent antimony. Soldering shall be

in conformance with Section 3 of the Copper and Brass Research Association Copper Tube Handbook.

D. Connection of copper pipe or fittings with galvanized pipe or fittings shall be made with dielectric fittings.

2.07 PIPE AND FITTINGS: GALVANIZED STEEL

A. Steel pipe, except as otherwise specified below, shall be Schedule 40, galvanized, seamless steel pipe, conforming to ASTM Standard A53, "Pipe, Steel Black and Hot-Dipped, Zinc-Coated Welded and Seamless", Type S, Grade A or B. Black steel pipe may be used in fabricating items which are to be hot-dip galvanized after fabrication.

B. Screwed fittings, except as otherwise specified, shall be 150 psi galvanized malleable iron. Screwed unions shall be galvanized malleable iron with ground brass seats. Pipe threads shall be American Standard B2.1 NPT. Joint compound shall be used on all threaded joints, applied to the male threads only.

C. Furnish data certified by the manufacturer that the pipe and fittings are of the material specified. No piping will be accepted or used in construction until certificates have been submitted to and approved by the Engineer of Record.

2.08 PIPE AND FITTINGS: VITRIFIED CLAY

A. Vitrified clay pipe and fittings for gravity sewers shall be extra-strength, non-perforated. Pipe and fittings shall conform to the latest edition of ASTM Standard C700, "Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated", and the following requirements.

B. A single fracture or crack passing through socket of the pipe bell and exceeding a length of one-half (½) inch in any direction shall be cause for rejection of the pipe. This requirement supersedes the portion of the ASTM Specifications cited above in conflict herewith.

C. The Contractor shall furnish certification from the manufacturer that the pipe and fittings used meet the requirements of ASTM Specifications C700.

D. The manufacturer shall furnish certification that the pipe and fittings supplied meet the requirements of ASTM Standard C700, latest edition. The Contractor shall be prepared to produce said certification when requested by the Department.

E. Only factory bonded joints will be permitted for all vitrified clay pipe. The joints shall have rubber "O" ring type compression seals conforming to "Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings", ASTM C425, latest edition.

F. Department approved pipe joints are Polyester Ring-Type joints as manufactured by Logan Clay Products Company under the trade name of "Logan-O-Ring", Can-Tex Industries under the trade name of "Can-O-Lock," or approved equal.

G. Where cast iron soil pipe or ductile iron pipe laterals are used with vitrified clay mains, the

wye or tee shall be vitrified clay. For the joint between the vitrified clay wye or tee and the lateral pipe use FERNCO "Donut" No. 6-10-601 with E.H.C.I. soil pipe and "Donut" No. 6-08-607 with ductile iron laterals, or approved equals. When using E.H.C.I. soil pipe with ductile iron tees or wyes, use transition gasket by Romac or approved equal.

2.09 HIGH DENSITY POLYETHYLENE (HDPE) PIPE

A. Smooth wall high density polyethylene pipe shall be a Type III, Class C, Category 5, Grade P34; PE 3408; as defined in ASTM D1248. Minimum classification, as given by ASTM D3350, shall be PE 335434C. Pipe shall meet the standards of ASTM F714, as modified herein, including the "Government/Military Procurement" sections. Minimum hydrostatic design basis shall be 1600 psi. In all cases, hydrostatic design basis and pressure rating shall be as determined using the methods of ASTM F714. Pipe of this type shall be butt-fusion welded at joints. All welding of joints shall be in strict conformity with the recommendations of the pipe manufacturer and by a firm or individual recommended to the Engineer of Record in writing by the manufacturer.

B. As a part of the shop drawing submittals, the Contractor shall furnish the following signed by a Florida Registered Engineer, all calculations to determine, the pipe thickness, SDR rating, allowable stresses, in accordance with ASME B31.8 -1992, Table A842.22 and recommended coating, as required by the pipe manufacturer.

2.10 HIGH DENSITY POLYETHYLENE (HDPE) FOR USE IN POTABLE WATER SERVICES 2-INCH NOMINAL DIAMETER AND LESS

All mechanical fittings utilized with HDPE pipe and tubing services, shall conform with ANSI/AWWA C800-01 "Underground Service Line Valves and Fittings" as modified herein, shall utilize AWWA Standard (Mueller) threads on tapped pipe and tapping saddles; shall be; designed and manufactured to withstand a sustained working pressure of 150 psi and to restrain the pipe against pull out under loading beyond that causing tensile yield in the HDPE pipe or tubing connected. The manufacturer shall supply certification of these capabilities and fittings shall not be accepted or installed without said certification. If fittings are being supplied to the Department the certification shall ship with the fittings and payment will not be made without this certification. At the discretion of the Engineer, this certification may be required to be signed and sealed by a professional engineer licensed to practice in the state where the supplying firm is located or in the State of Florida. His decision in this regard shall be final.

In all cases, fittings shall be installed in strict accordance with the manufacturer's instructions.

A. <u>HDPE PIPE FOR WATER SERVICES</u>:

All 2-inch high density polyethylene pipe used for services shall be IPS-O.D. Controlled with Standard Outside Dimension Ratio (SODR) of 9, pressure rating of 200 psi, nominal outside diameter of 2.375-inches, minimum wall thickness of 0.264-inches, PE 3408, all in conformance with ASTM D3035-95 "Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter". Pipe shall conform with ANSI/AWWA C901-96 "Polyethylene (PE) Pressure Pipe and Tubing, ½ In. (13 mm) Through 3 In. (76 mm), for Water Service" as modified herein. Pipe shall have a (natural) inner core with a blue colored outer shell. Pipe shall have footage marks at a maximum interval of every two feet. Po-

lyethylene material shall have a minimum cell classification in accordance with ASTM D3350-00 "Polyethylene Plastics Pipe and Fitting Materials" of 345444D for the core, which shall be 100% virgin material, and 345444E for the outer shell. Note that both of these materials are UV stabilized as signified by the "D" for natural colored and "E" for the colored shell. Pipe shall conform with NSF 61 or 14. Manufacturer shall supply certification of compliance with all of the above requirements. Certification shall ship with the pipe on material sold to the Department and shall always be submitted with shop drawings and catalogue cuts. When required by the Chief, Engineering Division, Miami-Dade Water and Sewer Department or his designee, certification shall be signed and sealed by a professional engineer licensed to practice in the state in which the manufacturer is located or in the State of Florida.

B. HDPE TUBING FOR WATER SERVICES:

All 1-inch high density polyethylene tubing used for services shall be CTS-O.D. Controlled with Standard Outside Dimension Ratio (SODR) of 9, pressure rating of 200 psi, nominal outside diameter of 1.125-inches, minimum wall thickness of 0.125-inches, PE 3408, all in conformance with ASTM D2737-99 "Polyethylene (PE) Plastic Tubing". Tubing shall conform with ANSI/AWWA C901-96 "Polyethylene (PE) Pressure Pipe and Tubing, ½ In. (13 mm) Through 3 In. (76 mm), for Water Service" as modified herein. Tubing shall have a (natural) inner core with a blue colored outer shell. Tubing shall have footage marks at a maximum interval of every two feet. Polyethylene material shall have a minimum cell classification in accordance with ASTM D3350-00 "Polyethylene Plastics Pipe and Fitting Materials" of 345444D for the core, which shall be 100% virgin material, and 345444E for the outer shell. Note that both of these materials are UV stabilized as signified by the "D" for natural colored and "E" for the colored shell. Tubing shall conform with NSF 61 or 14. Manufacturer shall supply certification of compliance with all of the above requirements. Certification shall ship with the tubing on material sold to the Department and shall always be submitted with shop drawings and catalogue cuts. When required by the Chief, Engineering Division, Miami-Dade Water and Sewer Department or his designee, certification shall be signed and sealed by a professional engineer licensed to practice in the state in which the manufacturer is located or in the State of Florida.

2.11 WALL SLEEVES, PIPES AND CASTINGS

A. Wall Sleeves: Wall sleeves shall be of cast iron, ductile iron or carbon steel with steel galvanized after fabrication as specified in Section 15065, Miscellaneous Materials, under wall pipe. Sleeves shall be provided with seals and shall be oversized as required for the installation of seals. Sleeves shall terminate flush with finished surfaces of walls and ceilings, and shall extend 2-inches above the finished floor. Escutcheons shall be provided at walls and floor to completely conceal the sleeves smaller than 3-inches. Escutcheons shall be brass or cast iron, nickel plated split-type.

B. Interior: Wall sleeves shall be installed for all piping passing through interior walls and floors, except where noted on the Drawings. Sleeves shall be of sufficient size to pass the pipe without binding.

C. Wall Sleeve Seals: Wall sleeve seals shall be modular mechanical type consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between

the pipe and wall sleeve. Links shall be loosely assembled with bolts to form a continuous rubber belt around the pipe with a pressure plate under each bolt head and nut. After the seal assembly is positioned in the sleeve, tightening of the bolts shall cause the rubber sealing elements to expand and provide an absolutely water-tight seal between the pipe and wall sleeve. The synthetic rubber shall be suitable for exposure to treated sewage effluent and groundwater. Bolts, nuts and hardware shall be 18-8 stainless steel. The seals shall be Link Seal as manufactured by Thunderline Corporation or equal, and the wall sleeve and seal shall be sized as recommended by the seal manufacturer.

D. All piping passing through exterior walls and base slabs shall be provided with wall pipes. All wall pipes shall be of ductile iron and shall have an intermediate flange or waterstop located in the center of the wall. Each wall pipe shall be of the same grade, thickness and interior coating as the piping to which it is joined. Those portions of the wall pipes that are buried shall have a coal tar outside coating.

2.12 STEEL CASING (JACKING AND BORING)

See Section 15070, "Jacking and Boring"

2.13 STEEL PIPE (AERIAL CROSSING)

See Section 15075, "Aerial Crossings"

PART 3 - EXECUTION

3.01 General:

A. The Contractor shall provide all barricades and/or flashing warning lights necessary to warn of the construction throughout the Project.

B. Pipe and fittings shall at all times be handled with great care to avoid damage. In loading and unloading, they shall be lifted with cranes or hoists or slid or rolled on skidways in such manner as to avoid shock. Under no circumstances shall this material be dropped or allowed to roll or slide against obstructions.

C. All work shall be performed by skilled workmen experienced in similar installations. All pipe and fittings shall be adequately supported by clamps, brackets, straps, concrete supports, rollers or other devices as shown and/or specified. Supports or hangers shall be spaced so that maximum deflection between supports or hangers shall not exceed 0.050 inch for pipe filled with liquid, but shall not be further than 6 feet apart, whichever is closer, unless otherwise shown. All pipe supports shall be secured to structures by approved inserts or expansion shields and bolts.

D. All pipe shall be thoroughly cleaned internally before being installed. All pipes, except oxygen service, air and gas, shall be flushed with water and swabbed to assure removal of all foreign matter before installation. Air and gas piping shall be tapped with a hammer to loosen scale or other foreign matter that might be within the pipe, then thoroughly blown with a high pressure air hose. Air shall be from the Contractor's air compressor.

E. Whenever possible, the pipe will be installed with minimum 48-inches of cover, however, due to the numerous utilities in the area, this burial could change substantially.

F. At all horizontal or vertical pipe deviation, the Contractor shall install both restrained pipe and thrust blocks. Joints may only be opened to adjust alignment by half of the AWWA or manufacturer's recommended opening (which is smaller).

G. Pipe Sleeves and Wall Castings: Pipe sleeves and wall castings shall be provided at the locations called for on the Drawings and/or specified herein. These units shall be as detailed and of the material as noted on the Drawings and/or specified herein. They shall be accurately set in the concrete or masonry to the elevations shown. All wall sleeves and castings required in the walls shall be in place when the walls are poured. Ends of all wall castings and wall sleeves shall be of a type consistent with the piping to be connected to them.

H. Tie Rods: Unless otherwise indicated on the Drawings, the size and number of tie rods for a joint or installation shall be as recommended by the manufacturer's design chart for a working pressure of 150 psi. Tie rods shall be installed as recommended by the manufacturer.

3.02 EXCAVATION FOR PIPING

A. The Contractor shall make all excavation necessary for the construction of the pipelines, connections, valves and appurtenances, to the lines and grades shown on the Plans.

B. The trench shall be excavated at least 6 inches below pipe laying grade as shown on the Plans. All sheeting and shoring shall be installed at the Contractor's expense where it is necessary for pipe installation and property protection or required by the Trench Safety Act. The cost of dewatering any excavation shall be at the Contractor's expense. The disposal of water removed from an excavation shall be in a manner which will not create a hazard, or be detrimental to the public health or to public or private property.

C. The Contractor shall obtain all necessary permits approving the location and proposed method of disposal before discharging water from any excavation into any portion of the public right-of-way or into any existing drainage structure or facility. All construction signs required shall be provided by the Contractor.

3.03 INSTALLATION OF PIPE, FITTINGS AND VALVES

A. General:

1. The design Drawings are in some cases diagrammatic. They may not show every bend, off-set, elbow or other fitting which may be required in the piping for installation in the space allotted. Careful coordination of the work of this Section with that of Division 2 and 16 is necessary to avoid conflicts. Install gravity lines at uniform grade to low point after field verification of low point invert.
2. The centerline of the pipe shall not vary by more than 2 inches from the location shown on the Plans and the top of the pipe shall not vary by more than 2 inches from the established grade, except at points where this tolerance must be changed to clear obstructions, or make connections. Deviation from this location will be permitted only upon written instructions from the Engineer.

3. Sandbags may be used to support the pipe in the ditch but no pipe shall be laid on blocks, except by the written permission of the Engineer of Record. The trench shall be dewatered to the extent that all poured lead joints in cast iron pipe and fittings may be made perfectly dry. Flanged joints, mechanical joints and push-on joints in cast iron pipe and fittings may be made under water.

B. Installation of Ductile Iron Pipe

1. All bends, tees, and plugs, unless otherwise specified, shall be backed with concrete to undisturbed ground. Provision shall be made to prevent concrete from adhering to plugs or bolts.

2. Bolts, nuts and rubber gaskets for use in flanged and mechanical joints shall be stored under cover. Gaskets shall not be exposed to heat, light or any petroleum products, shall be kept clean and shall not be handled with greasy or dirty hands.

3. Before making up flanged joints in cast iron pipe and fittings, the back of each flange under the bolt heads, and the face of each flange shall have all lumps, blisters and excess bituminous coating removed and shall be wire brushed and wiped clean and dry.

4. Before laying the ductile iron pipe, all lumps, blisters and excess coal-tar coating shall be removed from the bell and spigot ends of each pipe and the outside of the spigot and the inside of the bell wire brushed and wiped clean and dry. The entire gasket groove area shall be free of bumps or any foreign matter which might displace the gasket. The cleaned spigot and gasket shall not be allowed to touch the trench walls or trench bottom at any time. Vegetable soap lubricant shall be applied in accordance with the pipe manufacturer's recommendations, to aid in making the joint. The workmen shall exercise caution to prevent damage to the gasket or the adherence of grease or particles of sand or dirt. Deflections shall be made only after the joint has been assembled.

5. Cutting of ductile iron pipe for inserting valves, fittings, etc., shall be done by the Contractor with a mechanical pipe saw in a neat and workmanlike manner without damage to the pipe, the lining, or the coating.

6. Unless otherwise directed, ductile iron pipe shall be laid with the bell ends facing in the direction of laying; and for lines on an appreciable slope, the bells shall, at the discretion of the Engineer, face upgrade.

7. Push-on and mechanical joints in ductile iron pipe and fittings shall be made in accordance with the manufacturer's standards except as otherwise specified herein. Joints between push-on and mechanical joint pipe and/or fittings shall be made in accordance with AWWA Standard Specifications, "Installation of Ductile Iron Water Mains and Appurtenances," C600-87, except that deflection at joints shall not exceed one-half of the manufacturer's recommended allowable deflection, or one-half of the allowable deflection specified in AWWA C600-87, whichever is the lesser amount.

8. Flanged joints shall be used only where indicated on the Plans. Before making up flanged joints in the pipeline, the back of each flange under the bolt heads and the

face of each flange shall have all lumps, blisters and excess bituminous coating removed and shall be wire brushed and wiped clean and dry. Flange faces shall be kept clean and dry when making up the joint, and the workmen shall exercise caution to prevent damage to the gasket or the adherence of grease or particles of sand or dirt. Bolts and nuts shall be tightened by opposites in order to keep flange faces square with each other, and to insure that bolt stresses are evenly distributed.

9. Bolts and nuts in flanged and mechanical joints shall be tightened in accordance with the recommendations of the pipe manufacturer for a leak-free joint. The workmen shall exercise caution to prevent overstress. Torque wrenches shall be used until, in the opinion of the Engineer, the workmen have become accustomed to the proper amount of pressure to apply on standard wrenches.

C. Installation of PVC Pipe:

1. In the installation of glue joint PVC pipe, the pipe shall first be cut square and smooth. Wipe all surfaces to be connected with a cloth moistened with an appropriate solvent and remove any foreign matter from socket of fitting. Using an ordinary paint brush of width about equal to the nominal pipe size, apply a generous coat of cement to inside and shoulder of socket, flowing on but not brushing out. A similar coat shall then be applied to the end of the pipe for at least the same distance on the pipe as the depth of socket, and to the cut end. Pipe and fittings shall then be pressed firmly together and the pipe turned a quarter to a half turn to evenly distribute the cement. The cementing and joining operation must not exceed one minute. Allow 24 hours set-up time before applying pressure. Sand shall be used as backfill material around pipe installed underground.

2. Thread Sealant: Teflon tape.

3. All rigid PVC pipe shall be cut, made up, and installed in accordance with the pipe manufacturer's recommendations. Plastic pipe shall be laid by snaking the pipe from one side of the trench to the other. Offset shall be as recommended by the manufacturer for the maximum temperature variation between time of solvent welding and during operation.

4. Schedule 80 pipe shall not be threaded. Use Schedule 80 threaded nipple where necessary to connect to threaded valve or fitting.

5. Only strap wrenches shall be used for tightening threaded plastic joints, and care shall be taken not to over tighten these fittings.

6. Provide adequate ventilation when working with pipe joint solvent cement.

7. Testing: All lines shall be hydrostatically tested at the pressures specified elsewhere herein or at the design pressures.

8. Supports And Hangers: In accordance with the manufacturer's recommendations.

D. Installation of Copper Pipe:

1. Tubing above ground shall, whenever possible, be run in full lengths between fittings, valves and connections and joints shall be kept to a minimum. All connections shall

be made without sharp bends or kinks in the tubing. Above ground tubing shall be supported at short intervals to prevent sagging and vibration.

2. All copper pipe shall be reamed to full diameter before joining. The ends of pipe and the inside of fittings shall be cleaned and flux applied to the entire area of pipe to be soldered.

E. Joint Pipe:

1. Threaded Pipe: Ream all pipe after cutting and before threading. Use non-hardening pipe compound "Tite-Seal" or approved equal, on male threads only.

2. Provide nipples of same material and weight as pipe used. Provide extra strong nipples when length of unthreaded part of nipple is less than 1-1/2".

3. Provide reducing fittings rather than bushings where changes in pipe sizes occur.

4. Provide dielectric unions or flanges between copper and steel piping and between brassware and steel. Do not use steel and copper piping in the same system without such isolation.

F. Unions: Provide unions or flanges in all domestic water service lines at each piece of equipment, specialty valves or at other locations required for ready disconnect.

G. Pipe Protection:

1. Paint all uninsulated metal (ductile iron or steel) piping underground with two coats of asphaltic paint.

2. Wrap soil pipe that touches metal or is exposed to masonry with a layer of 6 mil polyethylene.

3. Spirally wrap all pipe lines embedded in concrete with two layers of 30 lb. felt.

4. Coat all exposed threads on galvanized steel pipe after assembly with two coats of zinc chromate.

H. Cleaning and Testing: All of the piping installed under this project shall be tested as follows and as directed by the Engineer.

1. With exceptions as noted below, all ductile iron piping installed under this Contract shall be cleaned and tested according to Paragraph I hereinbelow in this Section:

   a) Only potable water piping shall be disinfected.
   b) No leakage shall be permitted for flanged piping.
   c) No leakage shall be permitted for any type of above ground piping.

2. Unless otherwise specified elsewhere herein, all PVC pressure system bushings and galvanized steel piping shall be tested at 100 psig. No leakage will be permitted.

I. Installation of Aboveground and Exposed Piping

1. Aboveground and exposed pipe fittings, valves and accessories shall be installed as

shown or indicated on the Drawings.

2. Piping shall be cut accurately to measurements established at the job site and shall be worked into place without springing or forcing, properly clearing all equipment access areas and openings. Changes in sizes shall be made with appropriate reducing fittings rather than bushings. Pipe connections shall be made in accordance with the details shown and manufacturer's recommendations. Open ends of pipe lines shall be properly capped or plugged during installation to keep dirt and other foreign material out of the system. Pipe supports and hangers shall be provided where indicated and as required to insure adequate support of the piping.

3. Welded connections shall be made in conformity with the requirements of AWWA Standard C 206 and shall be done only by qualified welders. The Engineer may, at his option, require certificates that welders employed on the work are qualified in conformity with the requirements of this standard and/or sample welds to verify the qualifications of the welders. Before testing, field welded joints shall be coated with the same material as used for coating its pipe in accordance with the requirements of AWWA.

4. Flanged joints shall be made up by installing the gasket between the flanges. The threads of the bolts and the faces of the gaskets shall be coated with a suitable lubricant immediately before installation.

5. Joints using Dresser couplings shall be made up as recommended by the manufacturer.

6. Use of perforated band iron (plumber's strap), wire or chain as pipe hangers will not be acceptable. Supports for pipe less than 1-1/2 inches nominal size shall not be more than 8-feet on centers and pipe 2-inches nominal size and larger shall be supported at not more than 10-feet on centers, unless otherwise indicated. Supports for PVC pipe shall be spaced one-half the distance specified above unless otherwise indicated. Any noticeable sagging shall be corrected by the addition of extra supports at the Contractor's expense.

J. INSTALLATION OF HDPE SERVICES

All HDPE services require the use of a 10 gauge stranded copper blue tracer wire.

3.05 FIELD QUALITY CONTROL

A. All water mains shall be flushed to remove all sand, debris, rock and other foreign matter. Dispose of the flushing water without causing a nuisance or property damage.

B. Pressure and Leakage Testing: All pumps, piping and gauges shall be furnished, installed and operated by the Contractor and all such equipment and devices and their installation shall be approved by the Engineer. Pump shall be of a non-pulsating type suitable for this application and gauge accuracy certification may be required at the Engineer of Record's discretion. All pressure and leakage testing shall be done in the presence of a representative of the Department as a condition precedent to the approval and acceptance of the system.

C. Tests for Drain Lines:

1. Drain and gravity sewer lines shall be tested for infiltration and exfiltration.

2. The allowable limits of infiltration or exfiltration or leakage for the drain or sewer lines, or any portion thereof shall not exceed a rate of 100 gallons per inch of internal pipe diameter per mile of pipe per 24 hours with no allowance for laterals or manholes. Duration of test shall be a minimum of two hours.

3. Any part, or all of the system may be tested for infiltration or exfiltration, as directed by the Engineer. Prior to testing for infiltration, the system shall be pumped out so that normal infiltration conditions exist at the time of testing. The amounts of infiltration or exfiltration shall be determined by pumping into or out of calibrated drums, or by other approved methods.

4. The exfiltration test will be conducted by filling the portion of the system being tested with water to a level which will provide a minimum head of 2-feet in a lateral connected to the test portion, or, in the event there are no laterals in the test portion, a minimum difference in elevation of 5-feet between the crown of the highest portion of the drain or sewer and the test level.
5. Where infiltration or exfiltration exceeds the allowable limits specified herein, the defective pipe, joints, or other faulty construction shall be located and repaired by the Contractor.

6. The Contractor shall provide all labor, equipment and materials and shall conduct all testing required, under the direction of the Engineer of Record. No separate payment will be made for this work and the cost for this work shall be included in the prices quoted in the Proposal.

7. The Contractor shall locate and repair all leaks until the leakage is reduced to the limits specified. Any observed leaks or obviously defective joints or pipes shall be repaired or replaced as directed by the Engineer of Record, even though the total leakage is below that specified above.

END OF SECTION

SECTION 15065

MISCELLANEOUS MATERIALS

PART 1 - SCOPE

1.01 GENERAL

Miscellaneous materials necessary for a complete installation, not specified herein, shall be equal in quality to the specified materials suitable for the intended use, and shall conform to the details and notes shown on the Plans. All minor items implied, usually included or required for the construction of a complete operating system, shall be installed whether specified or shown on the Plans, or not.

1.02 The Contractor shall furnish and install where shown on the Plans or stated herein, the following materials or equals:

PART 2 - PRODUCTS

2.01	Anchors, chemical adhesive	Stainless Steel HVA type by Hilti Co, or approved equal
2.02	Anchor bolts, eyebolts, nuts washers-steel, including anchor bolts and tie-rods carbon steel	ASTM A325-88a, hot-dip galvanized
2.03	Anchor bolts, nuts, washers and screws-stainless steel	AISI Type 316 stainless steel
2.04	Anchor straps	1-1/2-inch by 1/8-inch hot dip galvanized each with two ½-inch by 3-inch anchor bolts and nuts (galvanized)
2.05	Angle Meter Stops	Conform with AWWA C800, 85-5-5-5 Brass, Inle t Type K Copper Tube, Outlet Meter swivel nut, Lock Wing, NSF 61 Certified, Mueller 14255W, Ford KV23-W, or approved equal.
2.06	Angle Meter Stops	Conform with AWWA C800, 85-5-5-5 Brass, Inle t Inside Iron Pipe Thread, Outlet Meter swivel nut, Lock Wing, NSF 61 Certified, Mueller 14265W, Ford KV13-W, or approved equal.
2.07	Angle valves (for air release valve and flushing valve outlet)	2-inch threaded inlet and outlet valves with hand wheel, bronze body and composition disc, replaceable disc and seat, screwed-in bonnet Nibco T-311Y, or approved equal.

2.08	Backflow preventer	Pressure reducing 2-inch Series 909, manu-factured by Watts Regulator, Co. (or other Department approved model for size and application)
2.09	Backflow preventer (hose)	3/4" bronze hose bibbs Watts No. 8
2.10	Ballast rock	Washed and graded limerock obtained from local sources. Aggregate size shall be 1-1/2 inch to 2-inches in diameter.
2.11	Banding straps for pipe skids	Hot-dip galvanized steel or stainless steel, 1/32-inch thick by 1-1/4 inch wide, minimum, with banding clamps of same material.
2.12	Bedding for copper tubing	Clean white masonry sand
2.13	Bentonite	Baroid Bentonite Mix as supplied by Southwest Florida Service and Supply, or Tony's Drilling Supply (Opa-Locka, FL).
2.14	Blind flanges, cast iron	AISI Standard B16.1, Class 125, plain-faced and drilled. “Hollow Back” flanges not acceptable.
2.15	Bolt, nuts and washers, Aluminum (where required on the Plans)	Aluminum bolts shall conform with AA 2024-T4 Alloy designation, anodized
2.16	Bolts and nuts for flanged pipe joints	Hot-dip galvanized steel, sized pipe joints per ANSI specifications. If in contact with aluminum or stainless steel, AISI Type 316 stainless steel, sized per ANSI specifications.
2.17	Bonding Agent for concrete	High polymer resin dispersed in water "Daraweld-C" by W. R. Grace Co.
2.18	Bore or bell donut adapters for tailpieces	Fernco, Inc.
2.19	Brackets and Pipe Support Clamps	ASTM A36, hot dip galvanized after fabrication
2.20	Branch Assembly (Meter)	Copper inlet with 2 meter swivel nut outlets, NSF 61 Certified, 85-5-5-5 brass, 7 ½- inch spacing between outlets, Mueller 15362, Ford UV23-42W, James Jones, A.Y. McDonalds 0802M or approved equal.
2.21	Caulking Compound	Hornflex-L (two component compound based on Thiokol polysulfide liquid polymers), W.R. Grace & Co. Apply per manufacturer's recommendation.
		See Metropolitan Dade County Public Works

2.22	Catch Basins	Department Std. Detail SD 2.3, unless shown otherwise on Plans or detailed on specified herein.
2.23	Chain Rail	Chain shall be straight-link machine chain, Type 316L Stainless Steel with approx. 15 links per foot. Each chain section shall be fitted with Type 316L Stainless Steel snap fittings and eye bolt at both ends. Eye bolts shall be affixed to end posts.
2.24	Check valves in meter hook-ups	1-1/2 inch to 2-inch brass with neoprene poppet by Stataflo Products, Inc., or approved equal
2.25	Clean-Outs (toilet area)	Josam 58020, adjustable, with Nikaloy top, or approved equal.
2.26	Concrete louver ventilator blocks	16-inch by 16-inch with bird screen, Denmark's Artstone Co., Miami or approved equal.
2.27	Copper tube straps	Chase No. 1019, 1019R, 1019S. Copper straps for 1-inch tubing, Grinnel Fig. 9124
2.28	Concrete pipe support saddle liner	Neoprene rubber sheet, 1/4 inch thick w/ 4-ply fabric reinforcement durometer grade 70, cut width ½ inch less than saddle with.
2.29	Concrete protecting coating (interior of fuel tank containment top of bottom slab and interior walls from bottom slab up to 3-1/2 feet)	Base: Strongcote WB-114, 1/32-inch by Strongwall Systems Inc. or approved equal. Top: Strongcote SC-112, by 1/32-inch thick Strongway Systems, Inc. or approved equal.
2.30	Copper Tubing	ASTM Standard B-88, Type K annealed and coiled
2.31	Corporation Stops	1-inch Mueller H-15000 (for chlorination, testing and 1-inch service connection). 1-½ inch Mueller H-10003, (for air release assembly and 2-inch service connection).
2.32	Coupling Adapters	Flanged, cast iron, Type 912 by Rockwell International, or approved equal.
2.33	Coupling, Flexible (Groove type)	Cast iron Victaulic Style 31 or approved equal, complying with AWWA C606-87. Compatible with pipe material, dimensions and service, and furnished with neoprene gaskets and stainless steel bolts and nuts.

2.34	Coupling, Flexible	Vibration and noise insulating expansion joint, design pressure 150 psi, acceptable for drinking water shall be Style 110-A by Unaflex Rubber Corp., distributed by H.S. White Co., Inc., Ft. Lauderdale, or approved equal.
2.35	Coupling, No. Hub	Flexible PVC body conforming with ASTM D5926 and C1173. Stainless steel bands. Fernco or approved equal.
2.36	Coupling, Transition (Ductile Iron)	Center sleeve and end rings of ductile iron conform with ASTM A536 grade 65-45-12; Gaskets NBR (Sewage) SBR (Water). High strength low alloy steel bolting. Coupling conforms with AWWA C219.
2.37	Coupling, Transition (Steel)	Center Sleeve of ASTM A53 grade A steel. End rings of ASTM A795 steel. Gaskets of EPDM. Complies with NSF 61 and AWWA C219. Fusion bonded epoxy interior and exterior coating.
2.38	Disinfectant	As specified in Section UC-175, herein
2.39	Dowel Bars	Continuous threaded, w/ splicer, Type DBT by Richmond Screw Anchor Co.
2.40	Duct caps (Grab Sample Ports)	6" Bronze Andrew industrial Type "DC", Kamlock or equal with 6-inch NPT bronze adaptor Andrews Industrial Type "A", Kamlock, or approved equal.
2.41	Electronic Marker System	Separate frequency for Water, Sewer and Re-use. <u>Any “approved equal” must be able to communicate with the markers called out below.</u> Search and read mode range of five feet. Each ball to have a separate readable ID number. Ball diameter 4 to 6 inches or less. Filling of ball to be mixture of propylene glycol and water and shall be environmentally harmless if container is ruptured. Shell to be HDPE or other corrosion proof material and completely water tight. 3M 1400 series or approved equal.
2.42	Epoxy for polylining repairs	Two-part coal tar epoxy Madewell 1104 by Madewell Products Corp.

2.43	Epoxy grout, non-shrinking (for setting equipment)	See Specification Section 03600
2.44	Epoxy grout, non-shrinking (for setting handrails)	"Wall-Nu" (Trowel Mix), by Steelcote Mfg. available locally at Florida Wire and Rigging Works, Inc., "Five Star" by U.S. Grout Corp., or equal, available from Coastal Construction Products.
2.45	Exhaust fan (for dry wells)	See Specification Section 15860
2.46	Expansion anchors and shields	Redhead by ITT Phillips Drill Division or approved equal.
2.47	Fiberglass bar grating	Polyester I-beam, 1-1/2 inch bars for 24-inch span with uniform loading, spaced 1-3/16 inch O/C. Cross bars spaced 6-inch O/C. As manufactured by McNichols Fiberglass Co., or approved equal.
2.48	Fill Cap (emergency pump out connection to force main)	4", lock-type, OPW 634-TT with 4 x 4-inch adaptor, OPW 633-T, by Dover Corp., or equal.
2.49	Flange coupling adapters	Smith-Blair, Dresser.
2.50	Flanged joint material	ANSI sized and approved, full faced 1/8 inch thick neoprene (for sewer) SBR (for water) gaskets and hot-dip galvanized bolts and nuts (except as otherwise specified for a particular service). Properties of gaskets to conform with ANSI/AWWA C111/A221.11. Bolts and nuts hot dip galvanized steel properly sized for ANSI Standard Class 125 flanged joints.
2.51	Flexible couplings (Compression type, if required during installation).	Compression type sleeve Dresser Style 38, Baker, or equal, compatible with pipe dimensions and service, and furnished complete with grade 27 gaskets and 316 stainless steel bolts and nuts.
2.52	Flexible connections, (stainless steel)	Stainless steel bellows type with flanged connections as manufactured by Ram-Tech Sales, Inc., Shreveport, LA, or approved equal.
2.53	Floor drain with strainer 4-inch (if required)	Adjustable body 30604-64 Josam with adjustable Super-Flow strainer, Bronze Top finish.
2.54	Gasket lubricant	Vegetable soap lubricant as recommended by the pipe, valve or gasket manufacturer for

		installation of pipe in subaqueous trench.
2.55	Gauges - pump discharge	0-60 psi range, Kunkle, Style G1110, case type N or equivalent by John C. Ernst, or Ashccroft with diaphragm seal.
2.56	Gauges - pump suction	0-15 psi range, Kunkle, Style G1130, case type N with diaphragm seal, 4-1/2 inch dial size. Gauges shall be furnished by the manufacturer supplying the diaphram seals assembled as a unit.
2.57	Gauges - Seal water pump	Kunkle, Style G1110, Case Type N, or equivalent by John C. Ernst, 0-60 psi range, 3-1/2 inch face.
2.58	Gauge cock	Bronze gauge cock Crane No. 744 equivalent by Stockam.
2.59	Gravel for venturi, valve or other pit (where required on Plans or herein)	Gravel shall be locally obtained from a fresh water source, free of deleterious matter and graded from 3/4 to 2-1/2 inches in size.
2.60	Grout for sealing between pipe and wall	Non-shrink, hydraulic cement grout. "Waterplug" by Thoro System Products.
2.61	Grout for boring and jacking	Portland cement-sand mixture. Type I (for water) Type II (for sewer) Portland cement and sand fineness that 100 percent will pass a standard 40-mesh sieve. Grout shall not contain greater than one part sand to one part cement.
2.62	Guard Post for hydrants	Galvanized steel pipe, Sch. 40, concrete filled. See Std. Detail 4.5
2.63	Hose bibbs	3/4" bronze, w/vacuum breakers where required by S. Fla. Building Code, American Valve Co., Fig. 76
2.64	Hose Clamps	All stainless steel, worm-gear type, Nos. 30032, 300188, by Breeze Corp, Inc. Hex head Type 316 Stainless Steel Series “68" Hy-Gear by Ideal
2.65	Hose, sump pump	2-inch I.D. Buna-N, "Plant Master" No. 119B by Gates.
2.66	Insulation guide support	1/2-inch insulation protection shield shall be ITT Grinnel, Fig. 167, or approved equal.
2.67	Insulation roll support	Pipe covering protection saddle shall be ITT Grinnel, Fig. 164, or approved equal. 20- inch adjustable roller stand with base plate shall be

		ITT Grinnell, Fig. 274, or approved equal.
2.68	Meter Box for Water Service	Per Department Standard Detail WS 2.10, by U.S. Precast , or approved equal
2.69	Meter Couplings	1-inch brass, NSF 61 Certified, Brass, straight, meter nut x pack joint or grip joint, Ford, Mueller or approved equal.
2.70	Meter Couplings	1-1/2 inch & 2-inch brass "Loc-Pak" by Ford Meter Box Co.
2.71	Neoprene pad (60 Durometer)	Neoprene Bearing Pad "Servicized" by W. R. Grace Co. Code No. 3340.
2.72	Neoprene (compressible pad)	Acmaseal by Acme Highway Products, Corp., Amherst, N.J.
2.73	Oils and Lubricants	Type, quality and quantity as recommended by manufacturer of machinery or equipment.
2.74	Paint - Zinc rich for galvanized items with minor damage (if approved by the Engineer)	Dry galve by Force Chemical Division, American Soldering and Flux Co.
2.75	Paint, for guard post and fire hydrant repairs if necessary	Neutralizer – 1 coat Sherwin Williams Galvanized iron primer, B50 WZ1. Finish paint - 2 coats Sherwin Williams Industrial Enamel OSHA yellow B54 Y 37
2.76	Paint, bituminous	Bitumastic No. 300M and Bitumastic No. 50, Kop-Coat Co.
2.77	Pea Rock	Local washed rock, 100% passing 1-inch mesh and retained on 1/4-inch mesh.
2.78	Pipe clamps	Hot-dipped galvanized steel.
2.79	Pipe straps (2-inch by 3/8-inch)	AISI Type 316 stainless steel with 3/8-inch diameter stainless steel bolts.
2.80	Pipe straps for Vent Pipe	Galvanized 2-inch No. 3039T19 by McMaster-Carr
2.81	Pipe supports (where required)	Aluminum Strut Channel 1 5/8-inch X 1 5/8-inch unistrut,
2.82	Pipe support (other types)	Fabricated as shown on the Plans, ASTM A36/A36M-90 steel, hot dip galvanized after fabrication.
2.83	Pipe Hanger, Clevis Type (where required)	Adjustable clevis, carbon steel, galvanized, ITT Grinnel Fig. 260.

2.84	Pipe Support, Rod Attachment (where required)	Forged Steel Clevis Type with pins. ITT Grinnell Fig. 299.
2.85	Polyethylene encasement material for main and line valves	Virgin polyethylene material for ductile iron conforming to ANSI/AWWA C-105/A21.5-88, Type I Class C, extruded tube formed with approved polyethylene adhesive tape. Shall be 0.008-inch (8-mil) thick minimum and conform with WASD Std. Detail A-9.
2.86	Polyethylene sheet for vapor barrier and for use with concrete anchors	.060-inch (6-mil), "Visqueen" by Ethyl Corp., or approved equal. (See Std. Detail GS 1.1)
2.87	Polysulfide Rubber Sealant	Hornflex-L by W.R. Grace and Co.
2.88	PVC double bell repair couplings, No-stop (sleeves)	ASTM Standard D3034 and Section UC-250.
2.89	PVC pipe and fittings (for sewer lines and service laterals)	See Specification Section Section UC-250.
2.90	PVC double bell transition couplings or adapters PSM SDR-35 PVC Sewer Pipe to ductile-iron or AWWA C900 CI-PVC Pressure Pipe	ASTM Standard D3034 and Section 15105-2.07, herein for fittings.
2.91	Riprap	Sand-cement in burlap sacks, well mixed, in the proportion of 5:1. The sacks shall absorb moisture to set-up in the position placed.
2.92	Roofing felt (miscellaneous)	Standard 30-pound asphalt impregnated felt, ASTM Standard D226-88.
2.93	Restrained Joint Connectors	“Megalug” or approved equal. (May only be used where shown on the Plans)
2.94	Sand for bedding - copper tubing	Clean white masonry sand.
2.95	Sand for Casing	Such fineness that 100% will pass a standard 4-mesh sieve.
2.96	Sealant for concrete joints	Dow Corning 888 Silicon Joint Sealant with 3/8-inch Dia. Expanded closed-cell polyethylene foam backer rod or approved equal.
2.97	Service Insulator Assembly	Nylon dielectric bushing with bronze coupling-female I.P. thread by flared copper Ford Meter Co, Inc.
2.98	Service Saddle – Double Strap	Conform with AWWA C800, NSF 61 Certified, Copper alloy 85-5-5-5 body per ASTM B62 & B584, Gasket Buna N, Straps of silicon bronze. Ford Meter Box Co. 202B, James Jones #J-979

		or approved equal.
2.99	Service Saddle – Single Strap	Conform with AWWA C800, NSF 61 Certified, Copper alloy 85-5-5-5 body per ASTM B62, Gasket Nitrile, Straps of silicon bronze. Mueller Co. H-10475 H-10480 or approved equal.
2.100	Service terminal fittings _ single	One inch lock wing style valve, drilled for wire sealing, Cat. No. KV23-444W Ford Meter Box Co. or Cat. No 14255, Mueller Co.
2.101	Service terminal fittings - dual	One-inch branch valve assembly, with standard 7½-inch spacing between outlet centers, drilled for wire sealing, Cat. No. UV23-42W Ford Meter Box Co. or one inch branch connection with standard 71/2-inch spacing between outlet centers Cat. No. H-15362, fitted with angle stops for 5/8-inch meters, drilled for wire sealing, Cat. No. H-14265, (3/4" Inlet) Mueller Co.
2.102	Solder, potable water copper tubing	ASTM B32-89 Alloy grade Sn 94 or Sn 95
2.103	Strainer	3/4-inch with screwed connections and 20 mesh 18-8 stainless steel straining element. Type SY-70, as manufactured by Cash Acme or approved equal.
2.104	Stainless steel screws for ladders	AISI Standard Type 316.
2.105	Stainless steel cable	AISI Type 316 wire rope.
2.106	Stainless steel repair clamps, with stainless steel bolts, PSM SDR-35 PVC sewer pipe to ductile-iron or AWWA C900 CI-PVC pressure pipe	Wide range, single or multiple panel, Style 3121 or 3122, Clow Corporation. Coat with bituminous paint after installation.
2.107	Street elbow (90 Degrees)	150 psi, galvanized, malleable iron, screwed, ANSI Standard B2.1 threaded (NPT).
2.108	Stop, Angle Meter	For type K copper inlet. START HERE
2.109	Stop, Corporation, 1-inch	For chlorination, testing and 1-inch service connection, AWWA taper thread inlet, copper service thread outlet (Type K copper tubing), 85-5-5-5 brass alloy, Mueller H-15000, Ford F-600 or approved equal.
2.110	Stop, Corporation, 1 ½ x 2-inch	For 2-inch services, ARV's, AWWA taper thread inlet, Iron Pipe Thread Outlet, 85-5-5-5 brass alloy, Muelle H-10003, Ford FB-800-6, or approved equal.
2.111	Stop, Curb, ¾-inch	For copper thread one side, inside iron pipe thread other side, 85-5-5-5 brass alloy, Mueller H-15175, Ford B21-333W or approved equal.

2.112	Stop, Curb, 1-inch	For inside iron pipe thread both sides, or flare copper 1 side and inside Iron Pipe Thread other side. 85-5-5-5 brass alloy, Mueller H-15175, Ford B21-444 (copper x iron pipe), Mueller H-10201, Ford B11-444 (inside iron pipe thread both sides) or approved equal.
2.113	Stop, Curb, 1 ½-inch	For inside iron pipe threads both sides, 85-5-5-5 brass alloy, Mueller H-10255, Ford B11-666, or approved equal.
2.114	Stop, Curb, 2-inch	For inside iron pipe threads both sides, 85-5-5-5 brass alloy, Mueller H-10255, Ford B11-666, or approved equal. Mueller H-10255, Ford B11-777 or approved equal.
2,115	Suction Bend	Cast iron, flange and flare, long radius 90-degree bend, US Pipe and Foundry Co.
2.116	Tread Plate	¼-Inch galvanized steel (raised checkered design)
2.117	Threaded rods	½-inch, 5/8-inch and 3/4-inch hot-dip galvanized steel.
2.118	Tie rods	Threaded each end, hot-dip galvanized steel, with galvanized nuts, washers and eye bolts. The eyebolts shall be Star National Products, Figure No. 7.
2.119	Timber skids and block	Wolmanized pressure-treated Southern Pine at 2.5 pounds per cubic foot retention. Skids and blocking shall be size so that the top of the bells or restrained joints of the carrier main will be two inches or less below the inside top of the casing pipe.
2.120	Turnbuckles	Grinnell Fig. 230, hot-dip galvanized
2.121	U-bolts (galvanized)	Hot-dip galvanized steel
2.122	U-bolts (stainless)	AISI Type 316 stainless steel.
2.123	Vent Cap	2-inch, OPW-63, by Dover Corp.
2.124	Valve (Foot)	1-inch, double poppet, bronze, OPW 92 by Dover Corp.
2.125	Valve boxes and covers	See Standard Details and Section 05550.
2.126	Wall pipes (cast iron)	Clow F-1400 series, American Cast Iron or equal, flange and flange or flange and plain end, or bolted mechanical joint, as required or as shown on the plans. Length to fit wall thickness.

2.127	Wall Sleeves for Pipe 4" and Smaller	Schedule 40, hot-dip galvanized steel pipe, cut flush with face of wall or floor and reamed.
2.128	Wall Sleeves for Pipe larger than 4-inches	Cast iron, sized as shown on the Plans, conforming to AWWA Standards, Class "D"pattern, with intermediate flange.
2.129	Water proofing system (where required by the Plans)	"Penecrete" cementitious water proofing system at joint and 2-inches of "Penetron" all around joint area, mixed and applied as required by the product manufacturer, International Coating Systems, Inc. - Danko Sales, Inc. (404)922-3351or approved equal.

Note: All metal underground piping for this project shall be encased in virgin polyethylene

2.130 CASTINGS (See Section 05550)

A. General:

1) Materials used in the manufacture of the castings shall conform to ASTM Standard A48, "Gray Iron Castings", for Class 30 iron. Manhole and valve box covers shall have a roadway or pedestrian type surface as required by location, machined mating surfaces and shall be non-rocking.
2) Unless otherwise specified, castings shall be as manufactured by U.S. Foundry and Manufacturing Corp., Neenah Foundry, or approved equal.

B. Valve Boxes and Covers:

Valve boxes and covers shall be Department No. 52 or No. 53 in accordance with the Standard Details. Valve box covers shall be cast labeled with the letter "S". The foundry and country of origin shall be cast on the bottom of the covers.

C. Fill Cap Manhole:

Fill cap manhole shall be 12-inch, cast iron with rubber gasket, type OPW 104-A by Dover Corp., or approved equal.

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 15100

VALVES, GENERAL

PART 1 - GENERAL

1.01 SCOPE

A. The Contractor shall provide all tools, supplies, materials, equipment, and labor necessary for furnishing, installing, adjusting, and testing of all valves and appurtenant work, complete and operable. For buried valves, the Contractor shall furnish and install valve boxes to grade, with covers, extensions, and position indicators.

B. The provisions of this Section shall apply to all valves and valve operators called out in the various Sections of these Specifications except where otherwise specified. Valves and operators in particular locations may require a combination of units, sensors, limit switches, and controls specified in other sections of these Specifications.

C. All valves specified herein shall be furnished with an affidavit from the manufacturer(s) certifying that the valves furnished comply with the applicable provisions of the AWWA specifications, as modified herein. That they were factory tested in accordance with the AWWA Standard Leakage and Hydrostatic Tests as modified herein, with a certified test report furnished to the Department for each valve.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Piping, General

B. Painting

C. Equipment General Provisions

D. Electrical

E. Valve (by type) Specification Sections

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Codes: All codes, as referenced herein, are specified in Section entitled "Reference Standards." As used herein, "ANSI" denotes the American National Standards Institute; "AWWA", the American Water Works Association; and "ASTM", the American Society for Testing and Materials.

B. Commercial Standards:

ANSI B16.1	Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800.

ANSI B16.5	Pipe Flanges and Flanged Fittings, Steel Nickel Alloy and Other Special Alloys.
ANSI/ASME B1.20.1	General Purpose Pipe Threads (Inch).
ANSI/ASME B31.1	Power Piping.
ASTM A 36	Specification for Structural Steel.
ASTM A 48	Specification for Gray Iron Castings.
ASTM A 126	Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
ASTM A 536	Specification for Ductile Iron Castings.
ASTM B 61	Specification for Steam or Valve Bronze Castings.
ASTM B 62	Specification for Composition Bronze or Ounce Metal Castings.
ASTM B 148	Specification for Aluminum-Bronze Castings.
ASTM B 584	Specification for Copper Alloy Sand Castings for General Applications.
ANSI/AWWA C500	Gate Valves for Water and Sewerage Systems.
AWWA C550	Protective Interior Coatings for Valves and Hydrants.

1.04 MANUFACTURER

All valves shall be the product of domestic manufacturing firms which have been engaged in the production of valves for not less than five (5) years.

1.05 QUALITY ASSURANCE

A. Valve Testing: The Contractor is advised that he is required to furnish all labor, materials and equipment necessary to pressure test each valve furnished by himself or the Department, bi-directionally, prior to installation, to the satisfaction of the Engineer of Record. If the valves are available, the tests shall be performed prior to the start of construction. Otherwise, the tests shall be performed as soon as the valves are available to afford the maximum time for any corrective work required. The Contractor shall include all costs for this requirement under the appropriate Proposal Item(s), no other compensation will be provided.

B. Bronze Parts: Unless otherwise specified, all interior bronze parts of valves shall conform to the requirements of ASTM B 62.

C. Provide valves that have the manufacturer's name and valve rating cast in body.

1.06 SUBMITTALS

A. Shop Drawing: Shop drawings of all valves and operators including associated wiring diagrams and electrical data.

B. Affidavit of Compliance: Submit for all AWWA valves an affidavit of compliance certifying that the valves and the materials used in their construction conform to the applicable requirements of AWWA Specifications as revised and cited below, and that all tests specified have been performed and that all test requirements have been met.

C. Approved Drawings: The Engineer of Record's drawings, which constitute an integral part of this Contract, indicate the general layout of the complete system. Field verification of scale dimensions on plans is directed since actual locations, distances and levels will be governed by actual field conditions. The Contractor shall also review architectural, structural, and mechanical plans and shall adjust his work to conform to all conditions indicated thereon. Discrepancies shown on different plans, or between plans and actual field conditions, or between plans and specifications, shall promptly be brought to the attention of the Engineer of Record, for a decision. All items not specifically mentioned in the specifications or noted on the drawings, but which can be reasonably assumed as necessary to make a complete working installation shall be included.

PART 2 - PRODUCTS

2.01 VALVES

A. General: The Contractor shall furnish all valves, gates, valve operating units, stem extensions, operators and other accessories as shown or specified. All valves and gates shall be new and of current manufacture. All non-buried valves, 6-inch and larger, shall have operators with position indicators. Where buried, these valves shall be provided with valve boxes, covers and valve extensions. Valves mounted higher than 6-feet above working level shall be provided with chain operators. All valves shall have a minimum design pressure rating of 150 psi unless otherwise specified elsewhere herein.

B. Cast iron parts of valves shall meet the requirements of ASTM A126, "Standard Specifications for Gray Iron Castings for Valves, Flanges and Pipe Fittings, Class 'B'." Flanged ends shall be flat-faced and have bolt circle and bolt patterns conforming to ANSI B16.1 Class 125.

C. All castings shall be clean and sound, without defects of any kind and no plugging, welding or repairing of defects will be permitted. All bolt heads and nuts shall be hexagonal conforming to ANSI B18.2. Gaskets shall be full-face and made of synthetic elastomers in conformance with ANSI B16.21 suitable for the service characteristics, especially chemical compatibility and temperature. Non-ferrous alloys of various types shall be used for parts of valves as specified. Where no definite specification is given, the material shall be the recognized acceptable standard for that particular application.

D. All buried valves shall be provided with cast-iron valve boxes unless otherwise indicated. The boxes shall conform with Department Standards and be installed perpendicularly, centered around and covering the upper portions of the valve operator. The top of each valve box shall be placed flush with finish grade unless otherwise indicated on the Drawings. Valve boxes shall be as specified elsewhere in this Section.

E. All buried valves and other valves located below a concrete operating deck or level, specified or noted to be key operated, shall have an operator to finish grade or deck level, non-rising stem, a 2-inch square AWWA nut with skirt, and cover or box and cover, as may be required.

F. Extension Shafts:

1. A one-piece extension shaft with an AWWA 2-inch square operator nut pinned at the top end and coupling shear pin shall be furnished with valves, where applicable, as shown in the Plans or Standard Details. Extension shafts shall be designed and furnished by the valve manufacturer and shall each be complete with coupling, standard AWWA 2-inch square operating nut with skirt, shear pins and centering-identification plate, for connection to the valve operator (or input) shaft as specified herein below. Shafts shall be of solid section. Hollow shafting is not acceptable.

2. All operator components between the operating nut and the adjustable stops shall be designed to withstand, without damage, an input torque of 300 ft. lbs. The shaft shall be furnished with an AWWA 2-inch square operating nut with skirt, mounted and pinned to the top of the shaft. A coupling shall be provided for the bottom of the shaft to connect the extension to the valve operator (or input) shaft.

3. The coupling shall be welded to the bottom end of the extension shaft after the exact required length of the shaft has been determined by field measurement during the valve installation and cut to size. The weld shall be wire brushed and painted with Kop-Coat Super Hi-Gard 891 or approved equal. The sized extension shaft with welded coupling shall be installed to the valve operator shaft and pinned with the coupling shear pin. The welding of the coupling to the extension shaft shall be performed by operators who are certified. The welding shall conform to all of the applicable recommendations of the American Welding Society and the American Institute of Steel Construction.

4. The pin through the coupling and valve operator (or input) shaft shall be of a larger diameter than the pin through the top nut and extension shaft, so that if torques exceed the designed limits, the pin through the nut will shear first. Pins shall be either force fit or mechanically locked. Mechanical locking shall be by lock washers, lock nuts, force fit or other sturdy and corrosion resistant means. No roll pins will be allowed. Riveted or welded type pins will not be allowed.

5. The extension shaft shall also be equipped with a combination centering-identification plate. The combination centering-identification plate, with a drilled or punched center hole, will be slipped onto the shaft prior to welding the shaft's bottom coupling as specified above. The center hole in the plate shall be 1/4 inch larger in diameter than the shaft, maximum. The plate shall be 1/8-inch thick AISI Type 316 stainless steel with an outside diameter of 6-3/4 inches. The top of the plate shall be buffed to remove mill scale, and the following information shall be stamped into the top of the plate in letters and numerals not less than 3/8 inch in height; valve manufacturer; valve type, size and class; direction to open; and number of turns to fully open from a fully closed position. The valves shall open by turning the operating nuts counterclockwise.

G. Valve Flanges: The flanges of valves shall be in accordance with Section 15060, "Piping and Fittings."

H. Gate Valve Stems: Gate valve stems shall be of bronze conforming to ASTM B62, containing not more than 5 percent of zinc nor more than 2 percent of aluminum.

I. Protective Coating: Except where otherwise specified, ferrous surfaces, exclusive of stainless steel surfaces, in the fluid passages of all valves 4-inch and larger shall receive an epoxy coating in accordance with AWWA C550. Flange faces of valves shall not be epoxy coated. The valve manufacturer, shall certify in writing that such coating has been applied and tested in the manufacturing plant prior to shipment, in accordance with these Specifications. Exterior coating shall be asphalt varnish conforming to Federal Specification TT-C-494A.

J. Valve Labeling: A label shall be provided on all shut-off valves exclusive of hose bibs and chlorine cylinder valves. The label shall be of 1/16-inch brass or stainless steel, minimum 2 inches by 4 inches in size, and shall be permanently attached to the valve or on the wall adjacent to the valve or as indicated by the Department.

2.02 VALVE OPERATORS

A. General

1. All butterfly valves, plug valves over 8-inch size and gate valves installed horizontally shall be furnished with geared operators, provided by the manufacturer. All valves of a particular size and pressure rating by a given manufacturer shall be supplied with the same operator. No variation will be permitted during the contract. All valve operators, regardless of type, shall be installed, adjusted, and tested by the valve manufacturer at the manufacturing plant. Operator orientation shall be verified with the Department prior to fabrication. If this requirement is not met, changes to orientation shall be made at no cost the Department.

2. All operators shall turn counter-clockwise to open. Operators shall have the open direction clearly and permanently marked. Field adjustment and testing of the operators and valves to ensure proper installation and operation shall be the responsibility of the Contractor.

B. Manual Operators

1. All manual operators shall be equipped with AWWA square nuts, handwheels or chain drives as appropriate. Some small (6-inch or less) valves may be lever operated if so specified elsewhere herein. Where buried, the valves shall have extensions with square nuts or floor stands as indicated on the Drawings. Valves mounted higher than 6 feet above floor or operating level shall have chain operators with chain terminating 4 feet above operating level.

2. Operation of valves and gates shall be designed so that the effort required to operate the handwheel, lever or chain shall not exceed 40 pounds applied at the extremity of the wheel or lever. The handwheels on valves 14 inches and smaller shall not be less than 8 inches in diameter, and on valves larger than 14 inches the handwheel shall not be less than 12 inches in diameter.

3. Chainwheel operator shall be fabricated of malleable iron with pocketed type chainwheels with chain guards and guides. Chainwheel operators shall be marked with

an arrow and the word "open" indicating direction to open. The operators shall have galvanized smooth welded link type chain. Chain that is crimped or has links with exposed ends is not acceptable.

2.03 TORQUE LIMITING DEVICE

Each valve shall be provided with a torque limiting device designed to protect the actuator and valve parts. The device shall consist of an overtorque protection mechanism enclosed in a hermetically sealed cast iron housing. The mechanism shall be permanently lubricated and factory set to trip between 200 and 220 ft. lbs. of applied torque. The housing shall have integrally cast, 2-inch AWWA operating nut and matching socket to operate and to fit over the actuator or extension shaft nuts, respectively. The socket shall be provided with a set screw to fit the device. The direction of rotation shall be permanently shown with word and arrow next to the operating nut. The entire device shall be coated inside and out with a 2-part epoxy. The torque limiting device shall be as manufactured by Annspach Controls Company of St. Louis, Missouri, or approved equal.

2.04 FLOOR STANDS

Floor stands shall be cast iron, non-rising stem type with lockable hand wheel operator, valve position indicator and stainless steel or bronze extension stem. Hand wheel shall be lockable in the full open and full closed positions. The floor stand shall be furnished with an armored padlock and six keys. Lock shall be as manufactured by Master, Schlage or equal. Floor stand shall be standard pattern type as manufactured by Clow Corporation, or equal.

2.05 VALVE BOXES

Cast iron valve boxes shall be provided for all valves installed underground. All valves boxes shall be No. 2 or 3 (for water) and No. 52 or 53 (for sewer) in accordance with Department Standards.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: All work shall be performed by skilled workmen experienced in similar installations. All valves shall be adequately supported by clamps, brackets, straps, concrete supports or other devices as shown or specified. All supports shall be secured to structures by approved inserts or expansion shields and bolts.

B. All valves shall be thoroughly cleaned internally before being installed. Installation of valves shall be done in accordance with construction methods specified in "Pipes and Fittings" Section of these Specifications.

C. Install valves as recommended by manufacturer.

D. Install valves so that they are easily accessible for operation, visual inspection and preventive maintenance.

E. Location of valves and chain operators: Install valves so as to be accessible for operation and free from interferences when operated. Position so that leakage will not contact any electrical equipment that may be located below.

F. The installation of all underground valves shall include a valve box and riser in accordance with the Details shown on the Plans or in the Standard Details for the various sizes and types of valves to be installed. Riser pipes and valve boxes shall be carefully centered and set flush with the finished grade if in paving, or with the top of the ground if out of paved areas. All valve boxes shall be held in position with concrete as shown on the Plans or in the Standard Details.

G. Upon completion of the Project, but prior to final acceptance, the Contractor in the presence of the Engineer, shall fully open each valve installed by him, except at connections to existing Department mains. For valves 16-inch and larger, the Contractor, shall count the number of turns required to operate each valve from a completely closed to a fully opened position, and shall paint the number on the bottom of the valve box lid or manhole cover. Valves at connections to existing Department mains shall only be operated by Department forces.

- END OF SECTION -

SECTION 15102

TAPPING SLEEVES AND TAPPING VALVES

PART 1 - GENERAL

1.01 SCOPE

A. The Contractor shall furnish and install tapping sleeves and tapping valves, as shown on the Plans and/or as specified herein. All items not specifically mentioned in these specifications or noted on the Drawings, but which can be reasonably inferred as necessary to make a complete working installation, shall be included.

B. Tapping sleeves, where shown on the Plans, shall fit the existing pipe to be tapped and the Contractor shall determine the outside diameter and type of pipe before ordering the sleeve. Field verification of dimensions is directed since actual locations, distances and levels will be governed by actual conditions. The Contractor shall adjust his work to conform to said field conditions.

C. Tapping sleeves shall only be used for tapping existing mains. Tapping saddles will not be permitted.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 15100 “Valves, General”
Section 15120 “Gate Valves”

1.03 MANUFACTURE

A. All valves shall be the products of domestic manufacturing firms which have been regularly engaged in the production of valves for at least 5 years. All valves specified herein shall be tested at the factory in accordance with the AWWA Standard Leakage and Hydrostatic Test as modified herein and a certified test report shall be furnished for each valve.

1.04 SUBMITTALS

A. Shop Drawings: Submit shop drawings for all tapping sleeves and valves.

B. Complete technical data and information on tapping sleeves for pipe other than cast iron shall be submitted to the Department for approval on an individual basis.

B. Submit for all AWWA valves an affidavit stating that the valves and all materials used in their construction conform to the applicable requirements of AWWA C500 as modified herein and that all tests specified have been performed and all test requirements have been met.

PART 2 - PRODUCTS

2.01 TAPPING SLEEVES

A. Tapping sleeves shall be of cast iron construction except as specified below, and shall be designed to withstand a working pressure of at least 150 psi.

B. The tapping sleeves, including outlet flanges shall be as dimensioned and thicknesses shall be as required by AWWA/ANSI C110/A21.10. The tapping sleeves shall be mechanical joint ended, on the run, and shall have a connecting flange outlet, with centering groove (for all valves size 12-inch and below and for valves above 12-inch if available from the manufacturer), for connecting to the tapping valve. For tapping sleeves with outlets 12 inches and smaller, the connecting flange joint between the tapping sleeve and the tapping valve shall be in compliance with all applicable provisions of MSS Standard Practice SP60, latest revision, as developed and approved by the Manufacturers Standardization Society of the Valve and Fittings Industry, 127 Park Street N.E. Vienna, VA. 22180. For tapping sleeves with outlets larger than 12 inches, the connecting flange must provide a matching fit with tapping valves by other manufacturers.

C. Each mechanical joint on the tapping sleeve shall be furnished complete with tee-head bolts and nuts complying with ANSI/AWWA C111/A21.11 "Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings" (latest edition). Tee-head bolts and hex nuts shall be of high strength cast iron. Bolts and nuts to join the two halves of the sleeve together shall be standard carbon steel, hex, or tee-head bolts and nuts which have been galvanized.

D. Each tapping sleeve shall be furnished complete with all necessary split end gaskets, longitudinal gaskets and two-piece (split) steel glands (follower glands held in place by set screws not acceptable). Gasket shall be shipped separately in suitable protective containers. Material for split end gaskets shall conform to ANSI/AWWA Standard C111/A21.11. Material for longitudinal gaskets shall be rubber conforming to ANSI/AWWA Standard C111/A21.11.

E. The sleeves shall be suitable for use with ductile iron pipe conforming to ANSI/AWWA Standard C151/A21.51, "Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids", with wall thickness and outside diameter as specified in Table 51.4 and 51.5. The sleeves shall also be suitable for use with other cast iron pipe with differing outside diameters and other types of pipe where required.

F. The Department will permit the use of the PowerSeal Pipeline Products Corp. No. 3490MJ Mechanical Joint tapping sleeve as an approved equal to ductile iron tapping sleeves. This unit has a mechanical joint branch outlet tapping connection which mates with a standard resilient-seated gate valve rather than the tapping flange x mechanical joint ends required by the standard design of tapping sleeve.

These units shall be manufactured of AISI Type 316 stainless steel passivated after welding or Type 316L. Threaded fasteners shall be Type 316 and gasketing shall be Neoprene, EPDM, or Nitrile for sanitary sewer use and SBR for potable water.

2.02 TAPPING VALVE - See Specification Section 15120 “Gate Valves”

PART 3 - EXECUTION

3.01 GENERAL

A. Where shown on the approved plans, the Contractor shall install the tapping sleeves and valves of the indicated size, without taking existing main out of service. Department forces will tap existing mains if tap is 20-inches in size or smaller. All cost for Department services shall be borne by the Contractor. Under no circumstances shall be Contractor be permitted to tap these existing mains. The Contractor shall pressure test the tapping sleeve and valve after installation on the main, but prior to tapping operations. The test shall be conducted in the presence of the Department's Inspector. No leakage will be permitted at any joint in either the tapping sleeve or tapping valve. Taps over 20-inches nominal size shall be made by tapping specialists with credentials acceptable to the Department.

B. Tapping valves 16-inch and smaller require the installation of a cast iron or C900 PVC riser pipe, complete with valve box and cover, centered over the operator, and set in concrete. Tapping valves 16-inch and larger shall be installed in a horizontal position with the operator in the vertical position with valve box over the operator and set in concrete.

C. Where a tapping valve with by-pass gate valve will be installed, the Contractor shall install a No. 3 (or 53 if sewer) valve box over the main valve and a No. 2 (or 52 if sewer) valve box over the by-pass valve. (See Standard Detail Nos. WS 3.10 and 3.11 or SS 12.0 and 13.0).

D. Bypass gate valves are required on all double disc tapping valves 20-inches and larger, and shall be installed in accordance with the Standard Details or approved Plans. The installation of bypass gate valves shall include ductile iron and C900 PVC riser pipes complete with valve boxes and covers, set in concrete.

E. The tapping sleeve and valve shall be installed complete, and the work shall include all necessary excavation, including interlocking sheeting and shoring, backfilling and compaction, surface repairs, and sheeting and shoring outside of the main trench line, dewatering, testing the sleeve and valve, supporting tapping by Department forces, constructing the concrete thrust anchor and all other appurtenant items and work. Installation of tapping sleeve shall be in accordance with Miami-Dade Water and Sewer Department Standard Detail GS 1.8.

G. Prior to ordering the tapping sleeve, the Contractor shall excavate and field verify the type and outside diameter of the main.

3.02 TAP BY DEPARTMENT FORCES

A. The Contractor shall notify the Department at least 48-hours in advance of when he will be ready to make the tap and shall have the tapping sleeve and valve installed on the existing main and satisfactorily tested as specified below, with a sufficient excavated work area prepared for the Department forces when they arrive to make the tap.

B. The Contractor shall furnish and install a mechanical joint plug on the free end of the tapping valve, and shall pressure test the tapping sleeve and valve after installation on the main, but prior to tapping operations. No leakage will be permitted at any joint in either the tapping sleeve or tapping valve. The tapping sleeve and valve shall be filled with water and then pressurized at 150 psi. Duration of the test shall be determined by the Department. The test shall be conducted in the presence of the Department's Inspector, who will notify Department forces of the satisfactory conclusion of the test, and arrange a definite time and date for them to arrive at the site to make the tap.

C. A crane or other suitable equipment as approved by the Department, shall be furnished by the Contractor to unload the tapping machine, position it in the trench for bolting to the valve, and to reload it after the tapping operation has been completed.

D. Department forces will connect the tapping machine to the valve, and disconnect it after the tap is complete; however, the Contractor shall furnish suitable devices or material to support the machine in the trench for proper alignment, as required by the Department. The Contractor shall aid the Department's forces whenever and to whatever extent necessary for the tapping operation to be performed efficiently and without any undue time lost.

3.03 TAPPING BY NON-DEPARTMENT FORCES

A. The Contractor shall comply with all applicable provisions of Subsections 3.01 and 3.02, above, including installation and pressure testing of tapping sleeve and tapping valve in the presence of the Department's Inspector.

B. Since cutting equipment used for this type of installation is of a special design, the Contractor shall make provisions for furnishing a tapping specialist to perform actual tapping operation. The qualifications of the tapping specialist shall be forwarded to the Department prior to any tapping work. The Contractor shall also furnish all incidental equipment necessary to operate the tapping machine.

C. The tapping valve shall be installed in the horizontal position with the operator in the vertical position, and shall include a valve box cover. Tapping valves shall be left in the closed position.

D. When the invert of the tapping valve is under water, interlocking sheeting and tremie concrete shall be used, unless otherwise approved by the Department. Seal the perimeter of all pipes passing through the sheeting below the water table. Only minimum seepage will be permitted. The cofferdam must be designed and sealed by a State of Florida, P.E. No work will be permitted within the cofferdam until it is demonstrated to the Department to be dry. Approval to remove the initial water in the cofferdam must be obtained from the Department and other governmental agencies jurisdiction over the work.

E. All tapping operations shall be conducted under the direct supervision of the previously approved tapping specialist. All operations shall have prior approval of the Department.

3.02 RECORD DRAWINGS

A. Record Drawing shall be prepared in accordance with Section 01720

B. The location and elevation for each valve, tapping flange outlet, fitting, service line and other appurtenances along the pipeline shall be recorded by the Contractor's Florida Registered Land Surveyor.

END OF SECTION

SECTION 15115

CHECK VALVES

PART 1 - GENERAL

1.01 SCOPE OF WORK

The Contractor shall furnish and install check valves complete and operable, including all appurtenances and accessories.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 15100 - Valves, General

PART 2 - PRODUCTS

2.01 CHECK VALVE

A. General

1. The swing-check valves shall be standard (plain), outside lever-and-weight or outside lever-and-spring types, for normal horizontal installations, conforming to all of the applicable requirements of the most current ANSI/AWWA Standard C508, "Swing-Check Valves for Waterworks Service, 2-in. Through 24 In. NPS", except as otherwise specified herein. The valves shall be iron body, bronze mounted and suitable for buried service.

2. Valve bonnet opening shall be large enough to allow ample clearance for direct removal of disc by hand.

B. External Ferrous Items

All external ferrous items, except cast iron, shall be hot-dipped galvanized in accordance with the most current ANSI/ASTM Standard A123, "Zinc (Hot-Galvanized) Coatings on Iron and Steel Products", or ANSI/ASTM Standard A153, "Zinc Coating (Hot-Dip) on Iron and Steel Hardware", or stainless steel.

C. Flanged Valves

_____Flanged valves shall have ends plain-faced and drilled conforming to ANSI Standard B16.1, "Cast Iron Pipe Flanges and Flanged Fittings", Class 125. Bolt holes in the flanges shall be equally spaced and shall straddle the vertical and horizontal centerline. All joint materials for flanged valves will be furnished with the valves; neoprene for sewer and SBR for water applications.

D. Clapper

1. The clapper shall swing clear of the waterway when the valve opens, permitting a full flow through the valve equal to the nominal diameter of the pipe.

2. The body and clapper seating surface shall be metal to metal, and shall be bronze.

3. The clapper disc and the clapper hinge arm, including the clapper disc cap screw, shall be bronze or cast iron. Clapper to hinge arm connection shall be such that the unit cannot be unscrewed by fluid flow.

D. Clapper Hinge Pin

1. The clapper hinge pin shall be stainless steel conforming to AISI Type 316. For check valves with outside levers, the clapper hinge pin shall rest in bronze bushings and shall extend through the casing on the right hand side when facing the valve inlet.

2. The clapper hinge pins shall rest in bronze bushings provided with a packing type sea[("O"-rings are not acceptable) and shall extend through the casing on the right hand side when facing the valve inlet. An opening shall be provided in each of two bosses on the body for easy access to either end of the hinge pin. The openings shall be tapped and provided with plugs.

E. See Part 2 of Section 15100, "Valves, General", for other components.

2.02 TESTING

All check valves shall be tested at the factory in accordance with Section 5.2 of the most current ANSI/AWWA Standard C508 and a Certified Test Report shall be furnished with each valve.

PART 3 - EXECUTION

3.01 GENERAL

All valves shall be installed in accordance with provisions of Section 15100, "Valves, General." Care shall be taken that all valves are well supported.

END OF SECTION

SECTION 15120

GATE VALVES

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish and install gate valves complete and operable, including all appurtenances and accessories.

B. The MD-WASD will permit the use of resilient seated type gate valves in potable water systems, as described herein. Such use shall be restricted to potable water systems of nominal sizes 4-inch through 36-inch. All other size or system applications shall be allowed only if reviewed and approved by the MD-WASD. Resilient seat gate valves shall only be used in sewer applications where cover depth is sufficient to mount the valve in the vertical position and only with review and approval of the MD-WASD. Sewer lines may not dipped or lowered in close proximity to a gate valve for the purpose of providing said cover. Resilient seat gate valves used as tapping valves in sanitary sewer systems and laid upon their side shall be left open when the line is placed in operation and backed up with a plug valve to provide flow control.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 15100 - Valves, General

PART 2 - PRODUCTS

2.01 GATE VALVES, GENERAL

A. As used herein, "ANSI" denotes the American National Standards Institute; "AWWA" denotes the American Water Works Association; and "ASTM" denotes the American Society for Testing and Materials.

B. All valves specified herein, whether manufactured under the provisions of AWWA C500-93 "Metal-Seated Gate Valves for Water Supply Service"; C509-94 "Resilient-Seated Gate Valves for Water Supply Service" or C515-01 "Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service" shall be furnished with an Affidavit of Compliance from the manufacturer as required by Section 6.3 of AWWA C515-01. **This Affidavit of Compliance shall state that the valve and all materials used in its construction conform to the applicable requirements of the standard under which the valve is manufactured and the MD-WASD's specifications and that all tests specified in the applicable standard have been performed and all test requirements met.** The affidavit shall accompany the invoice or in donations situations shall be furnished prior to installation of the valves. Payment will not be made nor installation allowed until after receipt of the affidavit.

C. The MD-WASD requires that suppliers shall submit with their proposals, if bidding on valve sales to the MD-WASD; or shop drawings, if supplying valves to the MD-WASD for contract or donations work; all data as listed in the "Data to Be Supplied by the Manufacturer" Sections of the referenced standards. This material is Section 1.3 in C500-93, 4.1 in C509-01 and 4.1 in C515-01 and is identical. Data to be furnished is as follows:
"*Catalogue Data.* The manufacturer shall supply catalogue data, including illustrations and a parts list that identifies the materials used for various parts. The information shall be in sufficient detail to serve as a guide in the assembly and disassembly of the valve and for ordering repair parts.
Weight information. The manufacturer shall provide a statement of the net assembled weight for each size of valve exclusive of joint accessories.
Assembly Drawings. The manufacturer or supplier shall submit to the purchaser one set of drawings showing the principal dimensions, construction details, and materials used for all parts of the valve. All work shall be done and all valves shall be provided in accordance with these drawings after the drawings have been reviewed and accepted by the purchaser."

Excerpted from AWWA Standard for Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service (ANSI/AWWA C515-01), by permission. Copyright © 2001, American Water Works Association. Complete document available from AWWA At 800-926-7337 or www.awwa.org.

In the quotation above, the word "purchaser" shall be construed to mean the Miami-Dade Water and Sewer Department in either direct purchase or contract/donations situations.

D. All work performed according to the three standards cited above, except prototype testing, shall be subject to inspection and acceptance by the MD-WASD or its representatives who shall have access to all places of manufacture where these valves are being produced and tested. Suppliers shall, with their shop drawing submittals, submit the company name and location of the actual manufacturer of the valve which shall include Country, City, and street address of the manufacturer. Where valves are not domestically produced and tested, the MD-WASD reserves the right to require that the Affidavit of Compliance be signed and sealed by a Professional Engineer, licensed to practice in the state of where the importing firm is located or the State of Florida. When this is required, the MD-WASD's decision as to its necessity shall be final and no extra compensation will be allowed.

E. All valves shall conform with ANSI/NSF Standard 61, "Drinking Water System Components-Health Effects".

F. Grades B and C bronze as listed in Table 1 of AWWA C500-93 shall not be used in the fabrication of any of the various valve types listed in this specification. Aluminum bronzes, if used, shall not dealuminize and the method of preventing this shall be fully described in the submittal.

G. AWWA Standard C515-01 lists a number of copper alloys for valve stems and gates. Of these the MD-WASD will accept alloys with the following Unified Numbering Series (UNS) numbers; C66100, C87600, C99400 and C99500. This same standard lists other copper alloys for Stem Nuts and Gates. Of these the MD-WASD will accept alloys with the following UNS numbers; C83600, C83450, C95200, C95500, C95800 C99400 and C99500.

H. Other copper alloys not listed in the standard may be used but must meet the performance requirements of the Standard, including but not limited to, minimum yield strength, chemical requirements and corrosion. The MD-WASD requires that alloys containing more than sixteen (16) percent zinc shall <u>not</u> be used.

2.01 METAL-SEATED GATE VALVES

A. Metal-seated gate valves 3-inch and larger shall be manufactured in accordance with the applicable provisions of ANSI/AWWA Standard C500, "Metal-Seated Gate Valves for Water Supply Service", as modified herein. The valves are to be installed under buried and/or submerged conditions.

B. All metal-seated gate valves shall be bronze-mounted, and shall have a cast iron body, parallel or inclined seats, double discs and a non-rising stem. Stem shall be bronze. Valve body and bonnet gaskets shall be rubber or rubber composition, inorganic mineral fiber and paper are not acceptable. Rubber and rubber composition materials shall be suitable for use in water containing chlorine or chloramines and in sanitary sewage. All valves 20-inch and larger shall be equipped with gearing conforming with their particular AWWA standard. Bevel or spur gearing shall be supplied as ordered with no cost differential. Disk spreading devices shall be Monel, AISA Type 316 stainless steel or bronze. Valves shall open by rotating the valve stem counterclockwise, and shall have an AWWA 2-inch square operating nut with skirt.

C. "O"-ring stem seals shall be neoprene, Buna-N, Nitrile or approved equal. No natural rubber compounds will be acceptable. The stem seals shall be of design that permits the replacement of the "O"-ring seals while the valve is in service, without undue leakage.

D. All external ferrous items, except cast iron, shall be hot-dipped galvanized in accordance with the most current ANSI/ASTM Standard A123, "Zinc (Hot-Galvanized) Coatings on Iron and Steel Products", or ANSI/ASTM Standard A153, "Zinc Coating (Hot-Dip) on Iron and Steel Hardware", or Type 304stainless steel.

E. Flanged valves shall have ends faced and drilled conforming to ANSI Standard B16.1, Class 125. Bolt holes in the flanges shall be equally spaced and shall straddle the vertical and horizontal centerlines. Joint materials for flanged valves will be furnished with the valve.

F. Mechanical joint valves shall have ends complying with ANSI/AWWA Standard C111/A21.11, "Rubber-Gasket Joints for Ductile Iron Pressure Pipe and Fittings". Mechanical joint gaskets, glands, tee-head bolts and hex nuts shall be included with the valve. Segmented glands or follower glands held in place by set screws will not be acceptable. Bolt holes in flanges of the mechanical joint shall be equally spaced and shall straddle the vertical centerline. Gaskets shall be shipped separately in suitable protective containers. Metal-seated valves for use in sewerage shall have neoprene gaskets.

G. Metal-Seated Gate valves 20-inch and larger shall have bypass gate valves sized in accordance with Table 8 of ANSI/AWWA Standard C500. The bypass valves shall conform to the applicable requirements for the gate valves specified herein, and also with the requirements listed below.

1. The bypass valves shall be one of the following types:
   (a) The valve shall have ANSI Standard B16.1, Class 125, end flanges for connecting to adapter fittings which in turn connect to bosses on the main valve. Joint materials shall be ANSI sized and approved, 1/8-inch thick full-faced rubber gaskets and hot-dip galvanized steel bolts and nuts.

   (b) The valve shall be integral with the bypass unit which connects directly to bosses on the

main valve without the use of adapter fittings. Joint materials and the shape of the gasket may be the manufacturers standard, except that the gasket shall be at least 1/8-inch thick, full-faced and the bolts and nuts shall be hot-dip galvanized steel.

2. The bypass valve shall be completely mounted to the gate valves specified herein by the manufacturer.

H. Torque limiting device: See Section 15100, "Valves, General"

I. Testing: All production tests on shall be performed on all valves supplied without exception. Operation and hydrostatic tests shall be performed as specified in Section 5.1 of ANSI/AWWA 500-93. A Affidavit of Compliance as specified in “Gate Valves General” above, shall be furnished to the MD-WASD prior to installation of the valve.

2.02 RESILIENT SEATED GATE VALVES

A. Resilient-seated gate valves shall be manufactured in accordance with the applicable provisions of the most recent ANSI/AWWA Standard C509-01, "Resilient-Seated Gate Valves for Water Supply Service" asw modified herein or in conformance with the applicable provisions of ANSI/AWWA Standard C515-01 “Reduced-Wall Resilient-Seated Gate Valves for Water Supply Service” as modified herein.

B. Valves shall have non-rising stems (NRS) and are to be installed under buried and/or submerged conditions. The design working water pressure shall be 200 psig for 3 through 12-inch sizes and 150 psig for 16 through 30-inch sizes. For valves manufactured in conformance with the provisions of AWWA C515 as modified herein, the design working water pressure shall be a minimum of 200 psig for all sizes. In addition to the pressure requirements, the valve assembly and mechanism shall be capable of withstanding an input torque of 200 ft.lbs. for valves 4-inch and smaller, and 300 ft. lbs. for valves 6-inch and larger. With the valve open the unobstructed waterway shall have a diameter not less than the full nominal diameter of the valve.

B. Valve body: All resilient-seated gate valves manufactured in conformance with AWWA C509-94 shall be iron-bodied and shall conform to ASTM Standard A126-95, "Gray Iron Castings for Valves, Flanges, and Pipe Fittings", Class B; ASTM Standard A395-99, "Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures"; or ASTM Standard A536-84, "Ductile Iron Castings". Valve body and bonnet thickness shall conform with the requirements of AWWA Standard C509-94.

Valves manufactured in conformance with AWWA C515-01 shall be iron-bodied and shall conform to ASTM Standard A395-99, "Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures" or ASTM Standard A536-84 "Ductile Iron Castings". Body and bonnet thickness shall conform with the requirements of AWWA Standard C515-01.

All ferrous metal items in contact with the line fluids, except gray or ductile cast iron, shall be AISI Type 316 stainless steel. Valve body and bonnet gaskets shall be rubber or rubber composition, inorganic mineral fiber and paper are not acceptable. Rubber and rubber composition materials shall be suitable for use in water containing chlorine or chloramines and in sanitary sewage.

C. Stems, stem nuts, glands and bushings shall be made of bronze as specified in ANSI/AWWA Standard C509-94 with no Grades B or C bronze being utilized. The same items for valves made

in conformance with C515-01 shall be made of the alloys specified above in the last paragraph of the "Gate Valves, General" section of this specification. The stem diameter shall conform to Table 4 of either C509 or C515 as appropriate. All valves shall be equipped with an ANSI/AWWA standard 2-inch square operating nut with skirt, or handwheel when required for above-ground service. Valve stems shall rotate counterclockwise to open. All valves 20-inch and larger shall be equipped with gearing conforming with their particular AWWA standard. Bevel or spur gearing shall be supplied as ordered with no cost differential.

D. "O"-ring stem seals shall be neoprene, Buna-N, or approved equal. No natural rubber compounds will be acceptable. The stem seals shall be of design that permits the replacement of the "O"-ring seals while the valve is in service, without undue leakage.

E. All external ferrous items, except gray or ductile cast iron, shall be hot dipped galvanized in accordance with ASTM Standard A123, "Zinc (Hot-galvanized) Coatings on Iron and Steel Products", or ASTM Standard A153, "Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware", or Type 304 stainless steel.

F. Resilient seats shall be applied to the disc only and shall seat against a corrosion-resistant surface. The surface may be either metallic or nonmetallic, applied in a manner to withstand the action of line fluids and the operation of the sealing gate under long-term service. A metallic surface shall have a corrosion resistance equal to or better than bronze. A nonmetallic surface shall be in compliance with ANSI/AWWA Standard C550, "Protective Epoxy Interior Coatings for Valves and Hydrants". Resilient seats shall be bonded or mechanically attached to the gate. No natural rubber products will be acceptable. If the resilient seat is a rubber material, the method used for bonding or vulcanizing shall be proven by ASTM Standard D429, "Test Methods for Rubber Property-Adhesion to Rigid Substrates", Method A or B. For method A, the minimum strength shall not be less than 250 psi. When Method B is applicable, the peel strength shall not be less than 75 lb/in. All exposed mechanical attaching devices and hardware used to retain the resilient seat shall be of AISI Type 316 stainless steel.

G. Flanged valves shall have ends faced and drilled conforming to ANSI Standard B16.1, Class 125. Bolt holes in the flanges shall be equally spaced and shall straddle the vertical and horizontal centerlines. Joint materials for flanged valves will be furnished with the valves.

H. Mechanical joint valves shall have ends complying with ANSI/AWWA Standard C111/A21.11, "Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings". Mechanical joint gaskets, glands, tee-head bolts and hex nuts shall be included with the valve. Segmented glands or follower glands held in place with set screws will not be acceptable. Bolt holes in the flanges of the mechanical joint shall be equally spaced and shall straddle the vertical centerline. Gaskets shall be shipped separately in suitable protective containers. Valves for use in sewage shall have neoprene gaskets.

I. Torque limiting device: See Section 15100, "Valves, General"

J. Painting and coatings shall conform to the requirements of Fed. Spec. TT-C-494a on exterior ferrous surfaces, and ANSI/AWWA Standard C550 for the interior of the valve. A coating shall be applied to all ferrous parts of the valves except for finished or seating surfaces. Surfaces shall be clean and dry before painting.

K. Testing: All production tests shall be performed on all valves supplied without exception.

Operation, shell and seat tests shall be performed as specified in Section 6.2 of AWWA C509-01 and Section 5.1.2 of AWWA C515-01 as appropriate to the standard which covers the valve in question. An Affidavit of Compliance as specified in paragraph two of the "GATE VALVES, GENERAL", section above, shall be furnished to the MD-WASD with the invoice for the valves. Final payment (jprior to installation in donations situations) by the MD-WASD will not be made until after receipt of these Affidavits of Compliance.

The gate valves shall conform with the appropriate AWWA standard as modified herein and as manufactured by U.S. Pipe and Foundry Co., American Flow Control, Mueller or approved equal.

2.03 TAPPING VALVES

A. Tapping valves, including the bypass valves for double-disc tapping valves 20-inch and larger, shall conform to the applicable requirements for the gate valves specified above herein, and also with the requirements listed below.

B. With the valve open, an unobstructed waterway shall be provided, the diameter of which shall be at least the full nominal diameter of the valve, to permit taps to be made through the valve.

C. Tapping valves shall have a mechanical joint outlet end conforming to ANSI/AWWA Standard C111/A21.11-90, "Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings" or a flanged outlet conforming to ANSI Standard B16.1 Class 125 (as called for in the particular valve order), for connection to new piping and a flanged inlet with centering ring (for all valves of 12-inch diameter and smaller and for all larger valves where the manufacturer produces a centering ring flange in that size), for connecting to the tapping sleeve. For tapping valves 12-inch and smaller, the sleeve shall be in compliance with all applicable provisions of MSS Standard Practice SP 60, latest revision, as developed and approved by the Manufacturers Standardization Society of the Valve and Fittings Industry, 127 Park Street N.E., Vienna, Virginia 22180. For tapping valves larger than 12-inch, the connecting flanged joint between the tapping sleeve and the tapping valve shall be industry standard; however, the tapping valve must provide a matching fit with tapping sleeves by other manufacturers.

D. The tapping valves, including bypass valve when applicable, shall be furnished complete with all joint materials. Joint materials for the flanged inlets shall be ANSI-sized and approved and shall include 1/8-inch thick full faced gaskets and hot-dip galvanized carbon steel bolts and nuts with internal threads tapped or retapped after galvanizing or stainless steel bolts and nuts. The flanged inlet gaskets shall conform to the gasket material and property requirements set forth in ANSI/AWWA Standard C111/A21.11-90. All pipe connection gaskets for use in sewer applications shall be neoprene and natural rubber shall not be used in any application. Seal shall be neoprene, Buna-N, Nitrile, EPDM or approved equal, but not natural rubber. The mechanical joint outlets shall include the necessary joint materials conforming to the requirements of joint materials for mechanical joint ended gate valves of the appropriate type specified above herein (neoprene for use with sewer). Bolt holes in the flanges of the mechanical joint shall be equally spaced and shall straddle the vertical centerline. Gaskets shall be shipped separately in suitable protective containers.

E. Valve operators for tapping valves 20-inch and larger shall be located to the right or left (when looking into the mechanical joint outlet end) as ordered by the MD-WASD.

F. The valves shall be suitable for use with ductile-iron pipe conforming to ANSI/AWWA Standard

C151/A21.51-96, "Ductile-Iron Pipe, Centrifugally Cast, for Water", with wall thickness and outside diameter as specified in Tables 3 and 4, (Special Thickness Classes) for the following sizes:

Size	Thickness Class
4-inch	54
6-inch	53
8-inch	52
10-inch and larger	50

and with wall thicknesses and outside diameter as specified in Tables 1 and 2 (Standard dimensions and weights) of the same standard.

Pressure Class Pipe (Potable, Reuse and Raw Water Only)

Size	Pressure Class
4-inch through 12-inch	350
14-inch through 20-inch	250
24-inch	200
30-inch through 48-inch	150

G. All production tests shall be performed on all valves supplied without exception. Operation and hydrostatic tests shall be performed as specified in Section 5.1 of ANSI/AWWA C500-93, operation, shell and seat tests shall be performed as specified in Section 6.2 of AWWA C509-94 or Section 5.1.2 of AWWA C515-01 as appropriate to the standard which covers the valve in question. An Affidavit of Compliance as specified in paragraph two of the "GATE VALVES, GENERAL", section above, shall be furnished to the MD-WASD prior to installation of the valves. Final payment (installation in donations situations) by the MD-WASD will not be made until after receipt of these Affidavits of Compliance.

The tapping valves shall conform with the appropriate AWWA valve standard as modified herein and as manufactured by U.S. Pipe and Foundry Co.,American Flow Control, Mueller or approved equal.

PART 3 - EXECUTION

3.01 GENERAL

All valves shall be installed in accordance with provisions of Section 15100, "Valves, General." Care shall be taken that all valves are well supported.

END OF SECTION

SECTION 15125

PLUG VALVES

PART 1 - GENERAL

1.01 SCOPE

The Contractor shall furnish and install plug valves, complete and operable, as shown and specified herein, appurtenances, operators, and accessories.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 15100, “Valves, General”

PART 2 - PRODUCTS

2.01 PLUG VALVE

A. The plug valves shall be of the non-lubricated eccentric type, with resilient faced plugs, and shall be designed for a minimum working water pressure of at least 150 psi for valves through 36-inch. Plug valves 20-inch and smaller shall have an 80 percent minimum port area. Plug valves 24-inch and larger shall be full opening with 100 percent port area. Plug valves, 8-inch and smaller shall be designed for operation in a horizontal pipeline with the valve shaft in a vertical position. Plug valves larger than 8-inch shall be designed for operation in a horizontal pipeline, with the valve shaft in a horizontal position and the operating shaft in a vertical position. The plug valves shall be as manufactured by DeZurik - a unit of General Signal, Olson Technologies, Inc., or approved equal, and shall be the standard product of a manufacturer which has produced and sold such equipment for a period of at least five (5) years. Valves shall be suitable for buried, submerged service.

B. Flanged valves shall have ends plain-faced and drilled conforming to ANSI Standard B16.1, "Cast Iron Pipe Flanges and Flanged Fittings", Class 125. Bolt holes in the flanges shall be equally spaced and shall straddle the vertical and horizontal centerlines. All joint materials for flanged valves will be furnished by others.

C. Mechanical joint valves shall have ends complying with ANSI/AWWA Standard C111/A21.11. "Rubber-Gasket Joints for Ductile Iron Pressure Pipe and Fittings". Mechanical joint gaskets, glands, tee-head bolts and hex nuts shall be included with the valve. Segmented glands or follower glands held in place by set screws will not be acceptable. Bolt holes in flanges of the mechanical joint shall be equally spaced and shall straddle the vertical centerline. Gaskets shall be shipped separately in suitable protective containers. Valves shall have neoprene gaskets.

D. Plug valve body and plug shall be of cast iron conforming to the requirements of ASTM Standard A126, "Gray Iron Castings for Valves, Flanges and Pipe Fittings", Class B, and all exposed nuts, bolts, springs, washers, and similar component items shall be AISI Type 316 stainless steel. Resilient plug facing shall be of neoprene.

E. Plug valves shall be furnished with a corrosion-resistant seat consisting of a welded-in overlay of

high nickel content on all surfaces contacting the plug face and shall comply with ANSI/AWWA Standard C507, "Ball Valves, 6 In. Through 48 In. (150 mm Through 1200 mm)", Section 3.2.

F. Plug valves shall be furnished with replaceable, sleeve-type AISI Type 316 stainless steel bearings in the upper and lower journals, and shall comply with ANSI/AWWA Standard C507, Section 3.2.

G. Plug valve shaft seals shall be designed for replaceable, manually adjustable, multiple ring "V" or "U" type packing of Buna-N or neoprene. The valves shall be of the bolted-bonnet type and shall comply with ANSI/AWWA Standard C507, Section 3.

H. Plug valves shall have stops at the fully-opened and fully-closed positions.

I. Plug valves shall be designed for drip-tight shut-off in wet service applications at pressure differentials up the full rating of the valve with pressure in either direction. Plug valves shall be provided with a manual operator sized to suit the maximum differential pressure across the valves. Minimum plug valve operator output torques shall equal or exceed the values specified in the following table:

PLUG VALVE SIZE	REQUIRED ACTUATOR 100 PSI	OUTPUT TORQUE 150 PSI
12"	1,063 FT-LBS	1,438 FT-LBS
14"	1,638 FT-LBS	2,225 FT-LBS
16"	2,213 FT-LBS	3,013 FT-LBS
18"	3,300 FT-LBS	4,500 FT-LBS
20"	4,388 FT-LBS	5,975 FT-LBS
24" (100%)	10,000 FT-LBS	12,790 FT-LBS
30" (100%)	15,875 FT-LBS	19,550 FT-LBS

J. Manufacturer shall supply operators producing larger output torque values if so required by their valves, but in no case shall operator output torque be less than that shown for the particular valve size and pressure.

K. In addition, the operator shall be capable of withstanding an input torque of 300 ft.lbs. on the operating nuts or a pull of 200 pounds on the handwheel without damage to operator components between the input and the stops. Operators on valves 30-inch and larger shall also be equipped with an AWWA input shaft stop.

L. All external ferrous items, except cast iron, shall be hot-dipped galvanized in accordance with ASTM Standard A123, "Zinc (Hot-Galvanized) Coatings on Iron and Steel Products", or ASTM Standard A153, "Zinc Coating (Hot-Dip) on Iron and Steel Hardware", or stainless steel.

M. Manual operators for valves 8-inch and smaller shall be lever actuated unless otherwise specified elsewhere herein.

N. Manual operators for valves 10-inch to 24-inch shall be totally enclosed traveling-nut or worm gear type, permanently lubricated, suitable for buried and/or submerged conditions.

O. Manual operators for valves 30-inch and larger shall be totally enclosed worm gear operators, permanently lubricated, suitable for buried and submerged operation, and shall be Limitorque type HBC, or approved equal, in accordance with ANSI/AWWA Standard C504-94, with AWWA input shaft stop.

P. Manual operators shall be provided with completely enclosed mounting brackets or adapters. The operators shall be equipped with adjustable stops to prevent overtravel in both the open and closed position with standard 2-inch square operating nuts with skirts and extension shafts as listed elsewhere herein, or with handwheel if for above ground service. All plug valves shall open by turning the operating nut or handwheel counterclockwise. Orient operators with horizontal plug shafts such that the plug rotates upward upon opening.

Q. Operator extension shafts shall be designed and furnished by the valve manufacturer and shall each be complete with coupling, AWWA standard 2-inch square operating nut with skirt, shear pins and centering-identification plate, for connection to the valve operator (or input) shaft as specified in Section 15100 “Valves, General”.

R. All operator components between the operating nut and the adjustable stops shall be designed to withstand, without damage, an input torque of 300 ft. lbs.

S. Torque limiting device: See Part 2 of Section 15100, "Valves, General".

T. The exterior valve surfaces shall be shop painted with two coats of asphalt varnish conforming to Federal Specifications TT-C-434A.

U. Testing: Plug valves shall be tested in accordance with ANSI/AWWA C504, “AWWA Standard for Rubber-Seated Butterfly Valves”, Section 5, Subsection 5.2. The performance test (Subsec. 5.2.1) and hydrostatic test (Subsec. 5.2.3) shall be performed as stated, however the leakage test (Subsec. 5.2.2) shall be performed bidirectionally; first on one side of the valve, and then on the other. The manufacturer shall furnish a certified test report with every valve stating that the valve has met the requirements of the tests.

PART 3 - EXECUTION

3.01 GENERAL

A. All valves shall be installed in accordance with provisions of Section 15100, "Valves, General." Care shall be taken that all valves are well supported.

B. The Contractor shall install valves with seats on the downstream side and unless shown otherwise, set valve (above 8-inch size) with the main axis of the plug horizontal.

C. Inspect a valve fully open and then tightly closed and test the various nuts and bolts for tightness before installation. Take special care to prevent any foreign matter from becoming lodged in or on the valve seat. Any valve that does not operate correctly shall be removed and replaced.

D. The installation of a buried eccentric plug valves shall include the installation of a concrete bearing pad and a ductile iron riser pipe, complete with valve box and cover, set in concrete. The valve operator shall be installed with the extension shaft, coupling nut, and data plate supplied by the

valve manufacturer, which shall be supported as previously specified and shown on the Plans.

E. After the coupling has been welded to the extension shaft, the weld shall be wire brushed and painted with Kop Coat Bitumastic No. 50, or approved equal.

F. For all quarter-turn plug valves installed, the Contractor shall paint the underside of the valve box cover with red paint.

END OF SECTION