

ADDENDUM #3

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SECTION 1 - Technical Specifications

STANDARD SPECIFICATIONS

- A. All work of this Contract shall conform to the applicable technical specifications of Florida Department of Transportation Standard Specifications for Road and Bridge Construction, July 2017, and Supplemental Specification, Special Provisions and addenda thereto, except as modified and supplemented hereinafter. Reference to Article numbers herein-after apply to the FDOT Standard Specifications, and reference in FDOT Standard Specifications to Department shall be taken as the Owner or its appointed Representative. Wherever the Specifications, Supplementals, etc. may refer to the "Owner", "Department", "State of Florida Department of Transportation", or words relating to offices of State Government, such words shall be taken as meaning Owner or Indian River County, Florida. Wherever the word "Owner's Engineer", "District Engineer", "Engineer", "Project Engineer", etc., appears, it shall be taken to mean the Registered Professional Project Engineer of the Indian River County Public Works Department, Engineering Division acting directly or through duly authorized representatives. Wherever the word "Resident Engineer" appears, it shall be taken to mean an authorized representative of the Owner's Engineer on the Project (Resident Construction Inspector) who will act as an agent for Indian River County, assigned to observe the progress quantity and quality of the work.

The work to be performed per line items 700 through 711 shall conform to the applicable standards of Indian River County Typical Drawings for Pavement Markings, Signing & Geometrics Revised March 2012.

The work to be performed for utility work (if any) shall conform to the applicable technical specifications of the "Indian River County Department of Utility Services, Water, Wastewater, and Reclaimed Water Utility Construction Standards" March, 2018 or the current version, and The City of Vero Beach Water and Sewer Department.

SECTION - 4 - SCOPE OF WORK

Section 4-3.9 Value Engineering Incentive is deleted in its entirety.

SECTION - 101 - MOBILIZATION

The work specified in this item shall conform to Section 101 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

PART 1 - GENERAL

1.01 The work specified in this section shall include:

- A. Field engineering and layout shall be in conformance to Section 01050, Field Engineering and Layout of Division 1, General Requirements.

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- B. Public Construction Bond shall be done and conform to Section 00610 – Public Construction Bond
- C. Trench Safety Compliance (Over 5') shall be done and comply to Section 00454 – Sworn Statement under the Florida Trench Safety Act
- D. Trench Safety Compliance (Shoring) shall be done and comply to Section 00454 – Sworn Statement under the Florida Trench Safety Act
- E. The Contractor shall maintain all grassed and landscaped areas within the project limits in a satisfactory condition until final acceptance of the project. Such maintenance within the limits of construction shall include the mowing of all existing grassed areas within the Right-of-Way, removal of all trash and debris on a weekly basis, and keeping vegetation trimmed on all sidewalks. Grass height shall not exceed 6" without mowing. Clippings shall be removed from sidewalk.

Item of Payment

Payment for the work specified in this item shall be made under:

Bid Item No. 101-1 - Mobilization – Per Lump Sum

Bid item No. 101-1A – Mobilization (W&S) – Per Lump Sum

SECTION - 102 - MAINTENANCE OF TRAFFIC

The work specified in this item shall conform to Section 102 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction, except as modified herein.

- A. **GENERAL PROVISIONS-DESCRIPTION:** The work specified in this Section consists of maintaining traffic within the limits of the project for the duration of the construction period, including any temporary suspensions of the work. It shall include the construction and maintenance of any necessary detour facilities; the providing of necessary facilities for access to residences, businesses, etc., along the project; the furnishing, installing and maintaining of traffic control and safety devices during construction, the control of dust through the use of calcium chloride if necessary, and any other special requirements for safe and expeditious movement of traffic as may be called for on the plans. The term, Maintenance of Traffic, as used herein, shall include all of such facilities, devices and operations as are nuisance; all as specified in this Itemized Section 14 of these provisions and Paragraph 24 in General Conditions Section.
- B. **BEGINNING DATE OF CONTRACTOR'S RESPONSIBILITY:** **The Contractor shall present his Maintenance of Traffic Plan at the pre-construction conference.** The Maintenance of Traffic Plan shall indicate the type and location of all signs, lights, barricades, striping and barriers to be used for the safe passage of pedestrians and vehicular traffic through the project and for the protection of the workmen. The plan will indicate conditions and setups for each phase of the Contractor's activities. When the project plans include or specify a specific Maintenance of Traffic Plan, alternate proposals will be considered when they are found to be equal to or better than the plan specified.

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In no case may the Contractor begin work until the Maintenance of Traffic Plan has been approved in writing by the Engineer. Modifications to the Maintenance of Traffic Plan that become necessary shall also be approved in writing. Except in an emergency, no changes to the approved plan will be allowed until approval to change such plan has been received.

The cost of all work, including the Maintenance of Traffic Plan prepared by a professional engineer licensed in the State of Florida, shall be included in the pay item for Maintenance of Traffic.

The Contractor shall be responsible for performing daily inspections, including weekends and holidays, with some inspections at nighttime, of the installations on the project and replace all equipment and devices not conforming with the approved standards during that inspection. The project personnel will be advised of the schedule of these inspections and be given the opportunity to join in the inspection as is deemed necessary. **Maintenance of Traffic plan shall include provisions for maintaining access to the Indian River County Fairgrounds during the Firefighters Fair between March 13 and March 22, 2020.**

- C. **TRAFFIC CONTROL - STANDARDS:** The FDOT Design Standards For Design, Construction, Maintenance and Utility Operations On The State Highway System, Edition as dated on the plans set forth the basic principles and prescribes minimum standards to be followed in the design, application, installation, maintenance and removal of all traffic control devices and all warning devices and barriers which are necessary to protect the public and workmen from hazards within the project limits. The standards established in the aforementioned manual constitute the minimum requirements for normal conditions, and additional traffic control devices warning devices, barriers or other safety devices will be required where unusual, complex or particularly hazardous conditions exist.

The above referenced standards were developed using F.H.W.A., U.S.D.O.T. Manual on Uniform Traffic Control Devices (MUTCD).

- D. **TRAFFIC CONTROL DEVICES, WARNING DEVICES AND BARRIERS - INSTALLATION:** The responsibility for installation and maintenance of adequate traffic control devices, warning devices and barriers, for the protection of the travel in public and workmen, as well as to safeguard the work area in general shall rest with the Contractor. Consideration shall be given to recommendations of the Engineer. The required traffic control devices, warning devices and barriers shall be erected by the Contractor prior to creation of any hazardous condition and in conjunction with any necessary re-routing of traffic. The Contractor shall immediately remove, turn or cover any devices or barriers which do not apply to existing conditions. All traffic control devices shall conform to MUTCD standards and shall be clean and relatively undamaged. Damaged devices diminishing legibility and recognition, during either night or day conditions, are not acceptable for use.
- E. **NO WAIVER OF LIABILITY:** The Contractor shall conduct his operations in such a manner that no undue hazard will result due to the requirements of this article, and

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the procedures and policies described therein shall in no way act as a waiver of any of the terms of the liability of the Contractor or his surety.

- F. Variable Changing Message Signs shall be in place two (2) weeks prior to ALL road closings. Cost shall be included in the Maintenance of Traffic pay item.
- G. Variable Changing Message Signs necessary for the Maintenance of Traffic Plan and the cost of the signs shall be included in the Maintenance of Traffic pay item.
- H. In addition to above, the Contractor shall comply with INDIAN RIVER COUNTY TRAFFIC ENGINEERING DIVISION SPECIAL CONDITIONS FOR RIGHT-OF-WAY CONSTRUCTION in Appendix C.

Item of Payment

Payment for the work specified in this item shall be made under:

Bid Item No. 102-1 - Maintenance of Traffic – Per Lump Sum

Bid Item No. 102-1A - Maintenance of Traffic (W&S) – Per Lump Sum

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

PART 1 – GENERAL

1.1 SCOPE

- A. This Section covers erosion control and the treatment of dewatering water and stormwater runoff from the construction site and work area. Pollution control measures shall prevent polluted or turbid waters from being discharged from the construction site or work area to undeveloped portions of the site or offsite, including but not limited to Multiple Separate Storm Sewer Systems (MS4s) and Waters of the State.
- B. The OWNER considers pollution from dewatering water and stormwater runoff from a construction site or work area to be a very serious offense. The CONTRACTOR is solely responsible for preventing pollution caused by dewatering water and stormwater runoff from the construction site or work area. Note that state regulations do not allow mixing stormwater and dewatering groundwater in the same release – separate and independent discharges are required.
- C. Pollution control measures specified herein represent minimum standards to be adhered to by the CONTRACTOR throughout the Project's construction. The OWNER reserves the right to require the CONTRACTOR to employ additional pollution control measures, when in the sole opinion of the OWNER, they are warranted. If site specific conditions require additional erosion and stormwater pollution control measures during any phase of construction or operation to prevent erosion or to control sediment or other pollution, beyond those specified in the Drawings, the Project's approved Stormwater Pollution Prevention Plan (SWPPP),

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or herein, implement additional best management practices as necessary, in accordance with [Chapter 4, "Best Management Practices for Erosion and Sedimentation Control" of the Florida Erosion and Sediment Control Inspector's Manual](#) and other references as may be applicable or required by regulatory permits.

- D. The OWNER may terminate this Contract if the CONTRACTOR fails to comply with this Section. Alternatively, the OWNER may halt the CONTRACTOR's operations until the CONTRACTOR is in full compliance with this Section. If the OWNER halts the CONTRACTOR's Work as a result of failure to comply with this Section, the Contract time clock will continue to run.
- E. In addition to these Specifications, comply with [Chapter 4 - "Best Management Practices for Erosion and Sedimentation Control"](#) and [Chapter 5 - "Best Management Practices for Dewatering" of the Florida Erosion and Sediment Control Inspector's Manual](#). In the event of a conflict between the referenced chapters and these Specifications, the more stringent requirement shall prevail.
- F. Submit to SJRWMD a "Notice to District of Dewatering Activity" (SJRWMD Form No. 40C-2.900(12)) prior to commencement of dewatering in accordance with F.A.C. 40C-2.042(9). Provide a copy of the Notice to Indian River County.

1.2 PERMITS

- A. The OWNER has obtained certain permits for this project and they are listed in [paragraph 6.08.B of the EJCDC Standard General Conditions of the Construction Contract \(General Conditions\)](#). Per [paragraph 6.08.C of the General Conditions](#), apply for and obtain all other required federal, state, and local permits, licenses, sampling, and tests.
- B. Provide copies of all approved permits to the OWNER and ENGINEER and comply with all conditions contained in all permits at no extra cost to the OWNER. If there is a conflict between any permit requirement and these Specifications or requirements between permits, the more stringent specification or requirement shall govern.
- C. Pay for all required water quality sampling and laboratory tests.

1.3 GENERAL

- A. Do not begin any other construction work until the pollution control and treatment system has been constructed in accordance with approved plans, permits, and these Specifications; and the installed system has been examined by the OWNER for compliance.
- B. From time to time, the OWNER or ENGINEER will inspect the pollution control and treatment system and may take effluent samples for analysis by a testing laboratory selected and paid for by the OWNER. If at any time, the OWNER or ENGINEER determines that the pollution control and treatment system is not in compliance with the approved system, the OWNER or ENGINEER will shut the portion of the project

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down that is not in compliance, and it shall remain shut-down until the pollution control and treatment system is properly constructed or repaired, and complies with the approved pollution control and treatment system plans, specifications, contract documents, and permits.

- C. Schedule construction to minimize erosion and stormwater runoff from the construction site. Implement erosion control measures on disturbed areas as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 7 days after the construction activity in that portion of the site has temporarily or permanently ceased. In addition to other temporary erosion control measures that may be implemented, application of polyacrylamide is required on all such disturbed areas within 7 days after the construction activity in that portion of the site has temporarily or permanently ceased, unless final landscaping has been installed. Polyacrylamide application shall be as specified herein. Include polyacrylamide application in the Project's SWPPP.
- D. Inspect each pollution control system at least once per day and after each rainfall event. Clean and maintain each pollution control system as required until the system is no longer needed. If a water quality violation occurs, immediately cease all work contributing to the water quality violation and correct the problem. Immediately report all water quality violations to the OWNER. Immediately report the discharge of any hazardous substance to the State Warning Point at 800-320-0519 or 850-413-9911.
- E. Discharge shall not violate State or local water quality standards in receiving waters, nor cause injury to the public health or to public or private property, nor to the Work completed or in progress. The receiving point for water from construction operations shall be approved by the applicable owner, regulatory agency, and the ENGINEER. The receiving point shall be shown on the Project SWPPP.
- F. Promptly repair all damage at no cost to the OWNER.

1.4 SUBMITTALS

- A. Shop Drawings: Submit shop drawings of the proposed pollution control and treatment systems in accordance with [Section 1340](#).
- B. Approved Stormwater Pollution Prevention Plan.
- C. "Contractor's Affidavit Regarding Erosion Control and Treatment of Dewatering Water and Stormwater From Construction Activities"

1.5 STORMWATER TREATMENT AND EROSION CONTROL SYSTEM RESPONSIBILITY

- A. Prepare a site-specific design of the erosion and stormwater pollution control system. Install and maintain all erosion and stormwater pollution control devices under the supervision of a State Certified Stormwater, Erosion, and Sedimentation Control Inspector. Maintain the erosion and stormwater pollution control devices

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until in the ENGINEER's sole opinion, the devices are no longer necessary (such time not to extend past the date the OWNER formally accepts the project as complete). Before beginning construction, submit to Indian River County, Florida Department of Environmental Protection (FDEP) and other applicable regulatory agencies for review and approval, a Stormwater Pollution Prevention Plan (SWPPP), prepared by the certified erosion control subcontractor. Construction shall not begin until the SWPPP has been approved by Indian River County, FDEP, and all applicable regulatory agencies. Submit the approved SWPPP to the ENGINEER before beginning construction. Include in the SWPPP, the "Contractor's Affidavit Regarding Erosion Control and Treatment of Dewatering Water and Stormwater From Construction Activities" (located at the end of this Section).

1.6 "POLLUTION" AND CERTAIN UNCONTESTABLE POLLUTION EVENTS DEFINED

- A. With respect to this Section and as may be further defined in paragraphs [1.6.B](#), [1.6.C](#), and [1.6.D](#), "pollution" is the presence in off-site waters of any substances, contaminants, or manmade or human-induced impairment of off-site waters or alteration of the chemical, physical, biological, or radiological integrity of off-site water in quantities or at levels which are or may be potentially harmful or injurious to human health or welfare, animal or plant life, or property. Pollutants to be removed include but are not limited to, sediment and suspended solids, solid and sanitary wastes, phosphorus, nitrogen, pesticides, oil and grease, concrete truck washout, stucco mixer washout, curb machine washout, washout from other construction equipment, construction chemicals, and construction debris.
- B. When the Discharge is Directly Into an Existing Water Body An existing water body (including ditches and canals) is defined to be polluted by the CONTRACTOR's operations when at any time, the turbidity of the water immediately downstream of the CONTRACTOR's discharge point(s) is at least 29 nephelometric turbidity units (NTUs) higher than the turbidity of the background water upstream of the discharge point(s). [\[See Fla. Administrative Code 62-302.530\]](#) Exception: When the discharge is directly into or through an outfall discharging into "Outstanding Florida Waters," designated by [Florida Statute 403.061\(27\)](#), the turbidity of the discharged water cannot exceed the turbidity of the immediate receiving water. The ENGINEER or OWNER shall determine the locations where the turbidity is measured.
- C. When the Discharge is not Directly Into an Existing Water Body In some instances, dewatering water or stormwater runoff from the construction site or work area may reach a water body indirectly, such as by overland flow. If the discharge water's TSS and turbidity measurements exceed pre-construction background values by 20 percent for TSS and 29 NTUs for turbidity, then the discharge is defined to be polluted.
- D. When Pollution Always Occurs The discharge from a construction site or work area is defined to be polluted whenever the pH of the discharge is less than 6.5 or greater than 8.5, or whenever any of the following is present in the discharge water:
- (1) Hazardous waste or hazardous materials in any quantity,
 - (2) Any petroleum product or by-product in any quantity,
 - (3) Any chemical in any quantity, or

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- (4) Concentrated pollutants.
- E. Above paragraphs 1.6.B, 1.6.C, and 1.6.D do not in any way, limit the types of conditions in which pollution may be determined to occur.

1.7 PENALTIES FOR NONCOMPLIANCE WITH THIS SECTION

- A. In addition to the OWNER's specific remedies, if erosion or pollution is caused by dewatering water or stormwater runoff from the construction site, the OWNER may report the violations to Indian River County Stormwater Enforcement, SJRWMD, FDEP, Indian River Farms Water Control District (or other F. S. Chapter 298 Drainage District, as appropriate), and other pertinent regulatory or enforcement agencies.

PART 2 - MATERIALS AND INSTALLATION

2.1 GENERAL

- A. Polyacrylamide: As required in Paragraph 1.3.C, place polyacrylamide (PAM) on bare ground to reduce the potential for erosion and cover it with hay, jute, or mulch. PAM may also be used in water bodies to remove turbidity. In all cases, use the anionic form of polyacrylamide that does not stick to fish gills. For PAM information and its proper application, a contact is Applied Polymer Systems, Inc., (678) 494-5998, www.siltstop.com.
- B. Staked Silt Fences:
1. General: Use silt fences to control runoff from the construction site where the soil has been disturbed.
 2. Installation: Install per the manufacture's recommendations and as specified herein. In general, install the silt fence in a manner that allows it to stop the water long enough for the sediment to settle while the water passes through the silt fence fabric. All supporting posts shall be on the down-slope side of the fencing. Place the bottom of the fabric 6-inches minimum, under compacted soil to prevent the flow of sediment underneath the fence. Place silt fences away from the toe of slopes. Otherwise, work shall conform to Section 104 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.
 3. Product: All material shall be new and unused. Use FDOT Types III through IV silt fences where large sediment loads are anticipated, where slopes are 1:2 (vertical: horizontal) or steeper, or as directed by the ENGINEER; otherwise use FDOT Type II silt fence.
- C. Turbidity Barriers:
1. General: Use turbidity barriers to control sediment contamination of rivers, lakes, ponds, canals, etc.
 2. Installation: Install per the manufacturer's recommendations and per Section 104 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction unless directed otherwise by the ENGINEER.

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3. Product: All material shall be new and unused. The turbidity barrier shall be a pervious barrier and the fabric color shall be yellow. Use staked turbidity barriers in water less than one-foot deep. Use floating turbidity barriers in water one-foot or deeper.
- D. Sedimentation Control From Dewatering or Pumping Operations Using Filter Bags:
1. Filter bags shall be manufactured using a polypropylene non-woven geotextile and sewn by a double-needle machine, using a high strength nylon thread. The bag shall have a fill spout large enough to accommodate a 4-inch pump discharge hose. Straps shall be attached to the bag to secure the hose and prevent pumped water from escaping without being filtered.
 2. Installation: Install in accordance with the manufacturer's specifications. Use as many filter bags as required, at no additional cost to the OWNER. Legally dispose of the bags offsite, at no cost to the OWNER. If the bags are placed on aggregate to facilitate filtration efficiency, do not use limerock aggregate – use non-calcareous rock.
 3. Product: The filter bag shall be supplied with lifting straps.
 - a. "DIRTBAG 53 or 55 as applicable," supplied by ACF Environmental, Inc. (1-800-448-3636).
 - b. "DANDY DEWATERING BAG" supplied by Dandy Products, Inc. (1-800-591-2284).
 - c. Or equivalent.
- E. Curb Inlet Protection:
1. Filter stormwater before it enters curb inlets.
 2. Installation: Install in accordance with the manufacturer's specifications. Use as many of the specified filtration devices as required, at no additional cost to the OWNER.
 3. Product: All materials shall be new and unused. The length of the curb inlet filtration device shall be at least 2-feet longer than the curb inlet opening.
 - a. "GUTTERBUDDY," supplied by ACF Environmental, Inc. (1-800-448-3636).
 - b. Or equivalent.
- F. Catch Basin Protection:
1. Filter stormwater before it enters catch basins (drop inlets). The filter "sack" shall be manufactured from woven polypropylene geotextile and sewn by a double-needle machine, using a high strength nylon thread. The sack shall be manufactured to fit the opening of the catch basin or drop inlet and it shall have the following features: two dump straps attached at the bottom to facilitate emptying; lifting loops as an integral part of the system to be used to lift the sack from the basin; and a colored restraint chord approximately halfway up the sack to keep the sides away from the catch basin walls. The colored restraint chord shall also serve as a visual means of indicating when the sack should be emptied.
 2. Installation: Install in each catch basin in accordance with the manufacturer's specifications. Use as many of the specified filtration devices as required, at no additional cost to the OWNER.
 3. Product: All materials shall be new and unused.

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- a. "SILTSACK" (regular flow), supplied by ACF Environmental, Inc. (1-800-448-3636).
 - b. "FloGuard+PLUS," supplied by Kristar Enterprises, Inc. (1-800-579-8819).
 - c. Or equivalent.
- G. Construction Site Egress Driveways: Minimize the transport of sediment and soil from the construction site or work area by vehicle wheels. Construct a crushed rock driving surface at the vehicle exit point(s). Locate the site egress driveways a minimum of 25 feet from all drainage inlets or pipes. Provide an area large enough to remove the sediment and soil from vehicle wheels before the vehicle leaves the construction site or work area. Provide wash-down stations as required to wash vehicle tires and retain all washwater on-site. Do not use limerock.
- H. Rock and Stone for Erosion Control and Pollution Control and Treatment:
1. Crushed Limerock: Limerock shall not be used under any circumstance.
 2. Acceptable Material: FDOT #4 non-calcareous aggregate, washed and meeting the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 901.
- I. Hay Bales: Hay bales shall not be used.

PART 3 - EXECUTION

- A. Design, construct, and maintain the pollution control and treatment system to minimize erosion and capture and remove pollutants from the construction site and from all other areas disturbed by construction activities.
- B. Apply polyacrylamide in strict accordance with the polyacrylamide manufacturer/supplier's recommendations and specifications.
- C. REPAIR ALL EROSION DAMAGE – At no additional cost to the OWNER and regardless of the state of completion of the Work, immediately clean all dirt and debris from all pipes and drainage structures; and repair all flooding, washouts, and all other erosion damage to the Work. This responsibility shall not end until Final Acceptance of the Work by the OWNER. Included is damage caused by erosion of any kind (e.g. wind, waves, stormwater runoff, hurricanes, etc.) including Acts of God. Restore all erosion damaged areas to design grades and elevations. Also, refer to [General Conditions 6.13.B](#).

Item of Payment

Payment for the work specified in this item shall be made under:

Bid Item No. 104-1 – Prevention, Control and Abatement of Erosion and Water Pollution – Per Lump Sum

Bid Item No. 104-1A – Erosion Control (W&S) – Per Lump Sum

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PERMITTEE'S AFFIDAVIT REGARDING POLLUTION

This sworn statement is submitted to Indian River County for the following project (list project name and site address): 58TH AVENUE (FROM NORTH OF 57TH TO 85TH STREET)
FULL DEPTH RECLAMATION, VERO BEACH, FLORIDA 32697.

STATE OF _____
COUNTY OF _____

Personally before me the undersigned authority, appeared

_____, who upon oath duly administered, stated as follows:

1. This sworn statement is submitted by the PERMITTEE,

_____,
whose business address is _____

and (if applicable) its Federal Identification No.(FEIN) is _____.

2. My name is _____ and my relationship to the entity named above is _____.
(If signing as Owner's Agent, attach Letter of Authorization to Sign from Owner)

3. Permittee understands and agrees that in addition to complying with the terms and conditions of the Stormwater Management System Permit issued by Indian River County, Permittee is responsible for complying with the terms and conditions of the following as applicable to the site:

- (a) State of Florida Generic Permit for Stormwater Discharge From Large and Small Construction Activities (for projects one acre or larger),
- (b) Stormwater Pollution Prevention Plan (regardless of project size),
- (c) St. Johns River Water Management District permit(s) (regardless of project size),
- (d) Florida Department of Environmental Protection permit(s) (regardless of project size),
- (e) All other permits required for this project not specifically listed herein, and
- (f) All Codes and Ordinances of Indian River County.

4. Permittee understands and agrees that "pollution" as defined by Florida Statutes Chapter 403.031(7) includes: ". . . the presence in the outdoor atmosphere or waters of the state of any substances, contaminants, noise, or manmade or human-induced impairment of air or waters or alteration of the chemical, physical, biological, or radiological integrity of air or water in quantities or at levels which are or may be

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potentially harmful or injurious to human health or welfare, animal or plant life, or property or which unreasonably interfere with the enjoyment of life or property, including outdoor recreation unless authorized by applicable law.”

5. Permittee understands and agrees that in addition to the definition set forth in Item 4 above, “pollution” is also defined by Florida Administrative Code 62-302.530 and as may be further defined in the Indian River County permit(s).
6. Permittee understands that Indian River County requires the design, installation, and maintenance of proper erosion control measures at all times during construction until complete stabilization is achieved at the project site. Permittee understands that this requirement is for this project regardless of the project size.
7. Permittee understands that there are civil and criminal penalties for pollution listed in Florida Statutes Ch. 403.141 and Ch. 403.161 and that there are other penalties listed in Indian River County’s permits, including but not limited to, Indian River County issuing a Cease and Desist Order for the project. Permittee understands that it may be liable for these and other penalties if offsite pollution occurs as a result of activities associated with the Project.
8. Transfer of Ownership or County Issued Permits:
 - (a) Transfer of Interest in Real Property: Within twenty-one (21) days of any transfer of ownership or control of the real property at which the permitted activity, facility, or system is located or authorized, the Permittee shall notify in writing, both the Indian River County Engineering Division and the Indian River County Stormwater Division of the transfer. Permittee shall provide the name, mailing address, and telephone number of the transferee and a copy of the instrument effectuating the transfer. Said notification is in addition to notifying the County Attorney’s Office as required by County Code.
 - (b) Transfer of a County Permit. To transfer a County issued permit, Permittee must provide (1) the information required in Item 8(a); (2) a written statement from the proposed transferee that it will be bound by all terms and conditions of the permit; and (3) a new “Permittee’s Affidavit” form properly executed by the transferee. Upon proper receipt of these items the County shall transfer the permit to the transferee.
 - (c) Permittee is encouraged to request a permit transfer prior to the sale or legal transfer of the real property at which a permitted facility, system, or activity is located or authorized. However, the transfer shall not be effective prior to the sale or legal transfer.
 - (d) An “Illicit Discharge Sign” must be present at the site at the time of transfer. Replacement or additional signs may be obtained from the Indian River County Public Works Department at a cost of \$30.00 per sign.

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Under penalty of perjury, Permittee declares that it has read the foregoing affidavit and the facts stated in it are true.

FURTHER AFFIANT SAYETH NAUGHT

Permittee: _____

Authorized Signature: _____
(If signing as Owner's Agent, attach Letter of Authorization to Sign from Owner)

Printed Name: _____

Date: _____

Work Telephone: _____

Mobile Telephone: _____

Email Address: _____

The foregoing instrument was subscribed and sworn to before me this ____ day of _____, 20__ by _____, who is personally known to me or has produced _____ as identification and who did take oath.

Notary Public State of Florida at Large

My Commission expires: _____

+ + END OF SECTION + +

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SECTION - 110 - CLEARING AND GRUBBING

The work specified in this item shall conform to Section 110 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction with the following modifications:

- A. Prior to any clearing and grubbing, the contractor will stake the right-of-way. Unimproved areas shall be cleared of trees, logs, stumps, brush, vegetation, rubbish and other perishable or objectionable matter within limits shown on the plans excepting for certain trees and shrubs shown on the plans or as directed by the Engineer which are to remain undisturbed and protected. Stumps and roots between slope stakes in cuts and in embankments 3 feet or less in depth shall be removed to a depth of 18 inches below subgrade. No stumps, roots, or perishable matter of any description shall remain under concrete slabs or footing, including pavement and sidewalks.
- B. No trees shall be removed or relocated until the Engineer or his representative has marked all trees to be saved, after a review of the project site with the Contractor's representative.
- C. Where the final pavement or structural work will be close to existing trees, the Contractor shall exercise care in the vicinity of the trees. Further, the Contractor shall saw cut along the edge of the outside limits of the stabilization, structure subgrade or sidewalk to a minimum depth of 4 feet below the finish grade and paint with a commercial grade pruning paint the ends of all sawn roots. If directed by the Engineer or where shown on the drawings, work shall be done by hand in order to protect the trees.
- D. The Contractor shall exercise care when working in the vicinity of all trees to remain so as to not damage or remove major root structures. The Contractor shall not pull hair or major root structures. All severed roots shall be sawn clean and paint with pruning paint. Stumps, roots, etc., shall be completely removed and disposed of by the Contractor. Undesirable, dead, and/or damaged trees (as so designated by the Engineer) shall be removed.
- E. All trees to be removed shall be disposed of off site; burning will be strictly prohibited.
- F. All trees or shrubs which are to remain shall be preserved and protected by the Contractor. Where the removal of valuable trees or shrubs specifically for transplanting is required, this work shall be done in cooperation with the Owner and at no additional expense to the Owner.
- G. All items to be removed shall be excavated to their full depth. All culverts removed from residential driveway entrances within the right-of-way shall become the property of the respective homeowner. Those homeowners not desiring the culverts may donate them to the County free of charge. (See Paragraph C, Special Provisions) The Contractor shall transport the culverts to the County's storage yard. All metal castings for catch basins, manholes, or other structures shall be carefully

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removed and stored in the County's Storage Yard if they are deemed salvageable by the Engineer. The excavated materials shall be removed from the job site and disposed in a location designated or approved by the Owner. Any culverts, structures or any material excavated or removed from the project site under clearing and grubbing deemed unsalvageable by the Engineer shall be disposed of in a legal manner by the Contractor. Where required, suitable material as approved by the Engineer shall then be backfilled and compacted to restore the original contour of the ground. The fill material shall be backfilled and compacted in accordance with Section 120 of these specifications.

- H. No additional payment will be made, nor will additional work, or change orders be authorized for work needed to remove, relocate, protect, or otherwise account for in the construction of the work depicted in the plans, for any feature, or item that would be apparent from a careful inspection of the site and review of the plans, even though such feature or item is not specifically called out in the plans. It is therefore essential the contractor make such inspection and review.
- I. The unit price bid for this item shall include the cost of all labor, tools, and equipment necessary to excavate, remove, and dispose of those items as directed by the Engineer and where designated on the Drawings. The cost of restoration and backfill and compaction for the specific area of removal shall also be included under this item.

Item of Payment

Payment for the work specified in this item shall be made under:

Bid Item 110-1-1 - Clearing & Grubbing – Per Lump Sum

Bid Item 110-1-1A – Clearing and Grubbing (W&S) – Per Lump Sum

Bid Item 110-7-1 – Mailbox Relocation – Per Each

SECTION - 120 – EXCAVATION AND EMBANKMENT

- A. This item shall include but not be limited to;
 - Swale and shoulder excavation
 - The excavation and utilization of the boxed out material sections where the new paved shoulder will be constructed.
 - Final grading to meet the proposed sections on the plans.
- B. Earthwork, including earthwork for drives outside the right-of-way limits, shall be paid for as embankment. Cost shall include all work specified in this section and Section 120 of the Standard Specifications. Such price and payment shall specifically include all cost of any roadway, lateral ditch or canal, and final dressing operations.
- C. Earthwork quantities shall be considered as in-place material with no shrinkage or expansion factors.
- D. Subsoil Excavation - Any excavation below the proposed bottom elevation of the

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select fill, isolated swale bottom locations, isolated locations for pipe installations and as approved by the engineer shall be paid for as subsoil excavation. Approximately 2.0 ft of subsoil excavation is required in sublateral canals. Cost of replacement embankment shall be included in cost of subsoil excavation. Contractor to coordinate with county representative prior to any subsoil excavation.

- E. Embankment - General Requirements for Embankment Materials: The following is added after the first paragraph of Subarticle 120-7.2:

Roadway Design Standard Index No. 505, Embankment Utilization Details is modified by the addition of the following:

Any stratum or stockpile or soil which contains obvious pockets of highly organic material may be designated as muck or unsuitable for construction of subgrade by the Owner.

Backfill material containing more than 2.0% by weight of organic material, as determined by FM 1-T 267 and by averaging the test results for three randomly selected samples from each stratum or stockpile of a particular material, shall not be used in construction of the reinforced volume. If an individual test value of the three samples exceeds 3.0%, the stratum or stockpile will not be suitable for construction of the reinforced volume.

No A-8 material permitted in embankment.

Item of Payment

Payment for the work specified in this item shall be under:

Bid Item No. 120-1 – Regular Excavation - Per Cubic Yard

Bid Item No. 120-1A– Excavation of Existing Asphalt and Base–Per Square Foot

Bid Item No. 120-1B – Excavation and Embankment (W&S) – Per Lump Sum

Bid Item No. 120-2 – Borrow Excavation (Reclaimed FDR) – Per Cubic Yard

Bid Item No. 120-6 – Embankment – Per Cubic Yard

SECTION - 121 – FLOWABLE FILL

The work specified in this item shall conform to Section 121 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

Item of Payment

Payment for the work specified in this item shall be made under:

Bid Item No. 121-70 –Flowable Fill (Non-Excavatable) – Per Cubic Yard

SECTION - 160 - STABILIZING

- A. Section 160 is modified by the addition of the following:

"The stabilization thickness indicated on plans shall be considered a minimum

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"The stabilization thickness indicated on plans shall be considered a minimum thickness. Thickness will vary to conform to the lines, and grades shown in the plans." Minimum L.B.R. = 40 - No under-tolerance.

Item of Payment

Payment for the work specified in this item shall be made under:

Bid Item No. 160-4 - Type B Stabilization 3' Shoulder & Widening (LBR 40) 12" - Per Square Yard

SECTION - 283 – RECLAIMED ASPHALT PAVEMENT BASE

DESCRIPTION - This work is the in-place construction of a Reclaimed Asphalt Base Course, using either reclaimed asphalt pavement (RAP) material and/or reclaimed aggregate material (RAM), and existing road base material combined with virgin aggregates and/or bituminous material. It is the intent of this contract to recycle 100% of the existing asphalt pavement and part or all of the existing base course to ensure that the completed reclaimed base course will be of a consistent material and thickness throughout. This will include, but is not limited to, all existing asphalt pavement adjacent to all concrete curbing, storm sewer inlets, manholes, sanitary sewer manholes, and all utility valve boxes.

This item will include, but not be limited to moving the base material to the boxed out sections for the proposed paved shoulder, imported select material required to meet the proposed sections on the plans, grading, compaction, prime and tack coat, sawcut and removal of existing materials for driveways and side streets.

CONTRACTOR QUALIFICATIONS - Bidders shall have a minimum of three years of experience in the construction of reclaimed asphalt base course. Bidders shall provide a list of five successfully completed full depth reclamation projects within the State of Florida along with contact information for the Owners of those projects, and the completion date for each project. Bidders shall also provide a list of the major equipment that will be used on this project.

SUBMITTALS – Submit Mix Designs for Reclaimed Asphalt Base Course and detailed Traffic Control Plan to the County for approval prior to the start of construction. Submittals must be transmitted to the County a minimum of 3 working days prior to the start of construction.

BASE COURSE DESIGN - The Contractor shall review the core data provided for the existing roadway and shall perform testing and/or coring prior to submitting a Bid to verify that the Cold Recycled Bituminous Base Course Mix Design or the Reclaimed Asphalt Base Course Mix Design, as applicable, has a minimum Structural Number (SN) of 1.8 for the total thickness of the finished/completed base course. The Contractor shall be responsible for preparing Mix Designs for the Cold Recycled Bituminous Base Course Mix Design or the Reclaimed Asphalt Base Course Mix Design, as applicable, prior to the start of construction. The Contractor will also be required to test the completed base course and provide test results that verify that the completed base course meets the specified Structural Number. In the event that the completed reclaimed asphalt base does not meet

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the minimum Structural Number specified, the County may require corrective work on the base course or the placement of additional asphalt surface course. All Mix Design testing/preparation and testing for verification of the Structural Number shall be performed by an independent testing laboratory and **all costs associated with the Mix Design preparation and SN verification testing shall be the responsibility of the Contractor.**

The Testing Laboratory performing Cold Recycled Bituminous Base Course Mix Designs or the Reclaimed Asphalt Base Course Mix Designs and SN verification testing shall be an accredited laboratory that is regularly engaged in asphalt testing including the preparation of Mix Designs for Cold Recycled Bituminous Base Course or Reclaimed Asphalt Base Course, and testing to establish and verify Structural Number for asphalt base course layers. The Contractor shall provide information for proposed testing laboratories and mix designs shall be subject to the approval of the County.

1. Reclaiming

The work item for Reclaimed Asphalt Base Course shall consist of pulverizing an existing bituminous pavement and its base course and mixing them together, adding water and new base material, injecting the specified stabilizing agent directly into the mixing chamber of the reclaiming machine and uniformly mixing it with the pulverized material at the rate and depth specified; and watering, shaping, grading, and compacting the blended material to produce a stabilized base course, true to the established line and grade of the road. The Contractor will be required to perform reclaiming work while traffic is maintained in another lane or lanes of the road. The work item for Reclaimed Asphalt Base Course shall include all necessary traffic control services provided during the reclaiming operation which are not covered under other work items in the Contract. All traffic control and maintenance of traffic is to be performed in conformity with Agency standards with Roadway and Traffic Design Standards, published by the Florida DOT, and with the Manual for Traffic Control Devices, published by the U.S. Department of Transportation.

2. Materials

a. References: the abbreviated title, "FDOT Specifications," used herein refers to the Standard Specifications for Road and Bridge Construction, of the Florida Department of Transportation.

b. Stabilizing Agent: Stabilizing agent shall consist of emulsified asphalt, type CSS-1h, meeting the requirements of ASTM D2397-98 and shall be injected in the base material.

c. Asphalt Emulsion Mix Design: Asphalt emulsion is to be used as the stabilizing agent. The Contractor shall obtain a mix design study based on the material in the existing layers. Prior to scheduling the work, the Contractor shall obtain the services of an independent laboratory which shall sample the pavement, base, subgrade and shall perform a modified Marshall Stability Test and a recommendation as the depth of mixing and the rate and depth of emulsion treatment. The Reclaimed Asphalt Base Course shall have a minimum Structural Number (SN) of 1.8 for the total thickness of the finished/completed base course. The Contractor shall be responsible for preparing Mix Designs for the Reclaimed Asphalt Base Course prior to the start of construction. The Contractor will also be required to test the completed base course and provide test results that verify that the completed base

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course meets the specified Structural Number. All Mix Design testing/preparation and testing for verification of the Structural Number shall be performed by an independent testing laboratory and **all costs associated with the Mix Design preparation and SN verification testing shall be the responsibility of the Contractor.** The assumed Project Mix Design is based on a mixture of 9" of reclaimed asphalt and limerock or cemented coquina base and 2.75 gallons/SY of CSS-1H Emulsified Asphalt. The target Mix Design shall have a minimum Asphalt Structural Number (SN) of 0.20 per inch. The Mixture used in the work shall be as determined by the project specific Mix Design Testing. The Testing Laboratory preparing the Reclaimed Asphalt Base Course Mix Designs and SN verification testing shall be an accredited laboratory that is regularly engaged in asphalt testing including the preparation of Mix Designs for Cold Recycled Bituminous Base Course or Reclaimed Asphalt Base Course, and testing to establish and verify Structural Number for asphalt base course layers. The Contractor shall provide information for proposed testing laboratories and mix designs shall be subject to the approval of the County. The Mix Design study and recommendations shall be forwarded to the County at least five work days prior to starting operation.

d. Granular Base Material: Granular base material to be added to the reclaimed layers shall consist of limerock meeting the requirements for Limerock Stabilized Base of the FDOT Specifications, Section 911. Further, it shall have a minimum LBR value of 100.

3. Equipment

a. General: The Contractor shall accomplish the work utilizing a road reclaimer, a motor grader, a vibratory roller or three-wheeled roller, a water truck with spray bar and such additional equipment as may be necessary to the operation. The required equipment shall be subject to the County's approval, and the County may, at any time during the work, disapprove the use of a particular machine for unsafe, erratic, or inadequate performance. Utilization of a proper road reclaimer and compaction equipment as specified herein is essential to this work, and substitution of other equipment or a different technique shall not be acceptable.

b. Reclaimer: The work shall be performed utilizing a road reclaimer machine originally designed for pavement reclaiming. The road reclaimer shall be a CAT 350, larger or a comparable model of equal or greater horsepower and rotor size, produced by another manufacturer. The reclaimer shall be capable of pulverizing and mixing pavement, base materials, and subgrade soil to depth of 16 inches. It shall be capable of injecting asphalt emulsion into the rotor chamber at an accurately controlled rate and of doing so in confined areas inaccessible to a tanker truck.

c. Compacting Equipment: The Contractor shall compact the reclaimed base material with a vibratory roller weighing not less than 13,000 lbs. or by a three wheeled roller weighing not less than 11 tons. The vibrator must be fully operable at maximum amplitude throughout the compacting process.

4. Construction Procedure

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a. General: When the work is to be performed under traffic, each lane shall be completed in segments, the lengths and limits of which shall be approved by the County. The County may limit the length of the work zone to avoid causing a traffic hazard or undue delay. Before commencing the reclaiming operations, the Contractor shall set alignment stakes (laths) at intervals of 200 feet or less on both sides of the road, offset at least 4 feet from the proposed edge of pavement for use in preparing the base and placing the new pavement. The setting of laths shall be in addition to any other markers or reference points required under the Contract, and the placing of surveying markers or other references elsewhere shall not substitute for the required laths along the existing pavement. Prior to beginning work, the Contractor shall relocate all mailboxes, newspaper boxes, signs, and other appurtenances which are located within such proximity to the roadway as to risk damage or to interfere with the work. Before this work may begin, residents and businesses shall be notified of the impending work by means of portable changeable message signs (PCMS). After all other work items are complete, the removed items shall be replaced in their original locations, except that the distance from the proposed edge of pavement shall be as prescribed by County requirements or guidelines.

b. Reclaiming: The Contractor shall pulverize the existing pavement in multiple passes of the reclaimer, applying sufficient mechanical effort to reduce the fragments to a maximum size of 3 inches. In this process the pulverized material shall be combined uniformly with the base and subgrade to a depth specified in the Contractor's Mix Design. Following the reclaimer, a roller shall be applied to compact the blended material sufficiently to support traffic temporarily. The County requires removal of approximately 2-1/2 in of pulverized material prior to addition of the stabilizing agent. When the pulverizing and mixing step is complete, the material shall be graded, watered, remixed, shaped, and compacted as necessary to establish proper grade and uniform thickness and to support traffic temporarily. Water shall be applied if necessary to obtain uniform moisture content as required by the Contractor's Mix Design. The Contractor shall apply additional water at frequent intervals as needed to suppress dust, preserve the surface, and maintain the specified moisture content. The stabilizing agent shall then be applied and mixed to the depth specified by the County, and grading and compaction of the combined base material shall proceed immediately behind the mixing of the stabilizing agent. Before final grading and the addition of the emulsion, the Contractor shall adjust the cross-slope, super elevation, and profile grade by adding granular base material as required to provide the required grade and cross slope for the road, or removing material.

c. Compaction: The Contractor may employ other compaction equipment and methods in addition to the vibratory roller to accomplish the final grading and to compact and finish the surface. Transverse joints shall be compacted by cross rolling parallel to the joint. After the material has been compacted to load-bearing strength, the Contractor shall proof-roll the prepared base in the presence of the Inspector. The County may, as it deems necessary, direct the Contractor to correct areas of weakness and excess moisture in the base by scarifying, aerating, and reworking shore sessions to the full depth of the layer. If, after an area has been reworked and recompacted, it remains soft or does not attain the required density,

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the County may direct the Contractor to remove the material and replace it with Granular Base Material meeting the requirements of these specifications.

5. Basis of Payment

a. Mobilization for Reclaiming: No payment for mobilization shall be due for returning the equipment to the site when it has been removed and returned for the Contractor's own purposes or because of breakdowns and repairs, weather delays, labor problems, accidents, or the like, or when work has been resumed after being stopped by the County because of unsatisfactory materials, equipment, or performance. Payment for Mobilization shall be Lump Sum for the project.

b. Reclaimed Asphalt Base: In place and accepted, shall be paid for at the contract unit price per square meter or square yard, as indicated in the Bid Sheet. The area of work for the purpose of payment shall be the overall length of each reclaimed lane times the specified total base width for the lane. The total base width shall include the widening width, if any, in which the reclaimer is to be used to blend new base material with the pulverized layers. Payment under this item shall be full compensation for all work included in or incidental to the reclaiming operation, for the grading, shaping, and compacting of the Reclaimed Asphalt Base, for the mix design study, for furnishing, delivering, and applying water, for applying and mixing and furnishing asphalt emulsion or other stabilizing agent as specified, and for all other work and material incidental to the reclaiming operation.

Completed Base Course Testing – The Contractor shall perform a minimum of 8 tests of the completed base course to verify that the completed base course meets the specified minimum Structural Number of 1.8. Test locations shall be determined by the County. In the event that the minimum Structural Number is not achieved, the County may require corrective action, including the placement of additional asphalt structural course at the expense of the Contractor.

c. Payment for Granular Base Material: This is included in the cost of the Reclaimed Asphalt Base. The Contractor shall determine how much if any granular base is required and shall include the cost for granular base in the cost of the Reclaimed asphalt base.

d. Asphalt Emulsion: Emulsified asphalt, type CSS-1h, shall be uniformly incorporated in the layer at the rate specified by the Mix Design. Payment is in gallons of Asphalt Emulsion Type CSS-1h.

e. Manholes: Each manhole shall be protected during the reclamation process. After final pass of reclaimer and final compaction, manholes shall be adjusted to the appropriate height to accommodate the asphalt overlay finish grade.

f. Water Shutoffs: Water shutoffs and other valves or shutoffs shall be protected during the reclamation process. After final pass of reclaimer and final compaction, water shutoffs and other valves and shutoffs shall be adjusted to the appropriate height to accommodate the asphalt overlay finish grade.

g. Material/Removal: Material shall be removed from the roadway area in order to prepare for a desired final grade or removal of unsuitable material. Approximately 2-

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1/2" removal shall be required off the top after initial pulverization. All suitable material shall be utilized in the asphalt pavement base course.

Items of Payment

Payment for the work specified in this item shall be made under:
Bid Item No. 283-71 – Reclaimed Asphalt Base Course (Full Depth Reclamation),
12" – Per Square Yard

SECTION - 285 – OPTIONAL BASE COURSE

The work specified in this item shall conform to Section 285 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

Items of Payment

Payment for the work specified in this item shall be made under:
Bid Item No. 285-706 - Optional Base Course, 8" Limerock, (LBR=100) (W&S) – Per
Square Yard
Bid Item No. 285-709 – Optional Base, Group 9 (LBR100) Limerock – Per Cubic
Yard

SECTION - 300 – PRIME AND TACK COATS

The work specified in this item shall conform to Section 300 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

Item of Payment

Payment for the work specified in this item shall be made under:
Bid Item No. 300-1 – Asphalt Emulsion Type CSS-1h – Payment will be based on
actual quantity – Per Gallon
Bid Item No. 300-2 – Cement Type 1 or Type 2 – Payment will be based on actual
quantity – Per Ton

SECTION - 327 – MILLING OF EXISTING ASPHALT PAVEMENT

The work specified in this item shall conform to Section 327 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

Item of Payment

Payment for the work specified in this item shall be made under:
Bid Item No. 327-70-6 – Mill Existing Asphalt (1.5" Average Depth) – Per Square
Yard

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SECTION - 334 - SUPERPAVE ASPHALT CONCRETE

The work specified in this item shall conform to Section 334 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

Sub article 334-8.1 through 334-8.3 – Basis of Payment shall be deleted in entirety.

Sub article 334-8.4 – Payment shall be amended as follows:

Item of Payment

Payment for the work specified in this item shall be made under:

Bid Item No. 334-1-13A – Type S.P. - 12.5, Asphaltic Concrete, (2" Thick) - Per Square Yard

Bid Item No. 334-1-13B – Type S.P. - 12.5, Asphaltic Concrete Conform (Variable Thickness) – Per Ton

Bid Item No. 334-1-13C – Type S.P. - 12.5, Asphaltic Concrete Driveway, (1-1/2") – Remove and Replace – Per Square Yard

Bid Item No. 334-1-13D – Superpave Asphalt Concrete, 2" SP 12.5 (W&S) – Per Square Yard

SECTION - 337 - ASPHALT CONCRETE FRICTION COURSES

The work specified in this item shall conform to Section 337 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

Item of Payment

Payment for the work specified in this item shall be made under:

Bid Item No. 337-7-82 – Type F.C – 9.5 Asphaltic Concrete (1" Thick) – Per Square Yard

SECTION - 400 – CONCRETE STRUCTURES

The work specified in this item shall conform to Section 400 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

Item of Payment

Payment for the work specified in this item shall be made under:

Bid Item No. 400-4-2A – Concrete Headwall (Include Steel) - Per Each

SECTION - 425 - INLETS, MANHOLES, AND JUNCTION BOXES

The work specified in this item shall conform to Section 425 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

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Item of Payment

Payment for the work specified in this item shall be made under:

- Bid Item No. 425-2-14 – Manhole Alt A, 4', P-7 <10' – Per Each
- Bid Item No. 425-3-81 – Junction Box, Drainage, Special, <10', 6'X10' – Per Each
- Bid Item No. 425-3-81A – Junction Structure, Type H, <10' – Per Each
- Bid Item No. 425-5 – Manhole Adjustment – Per Each
- Bid Item No. 425-5A – Vault Adjustment – Per Each
- Bid Item No. 425-6 – Valve Box Adjustment – Per Each
- Bid Item No. 425-6A – Fire Hydrant Adjustment – Per Each
- Bid Item No. 425-6B – Fire Hydrant Relocation – Per Each
- Bid Item No. 425-15-21 — Ditch Bottom Inlet, Type C, <10 - Per Each

SECTION - 430 – PIPE CULVERTS

The work specified in this item shall conform to Section 430 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

Item of Payment

Payment for the work specified in this item shall be made under:

- Bid Item No. 430-175-112 - Pipe Culvert, RCP, Round, 12" S/CD – Per Linear Foot
- Bid Item No. 430-175-112A - Pipe Culvert, CMP, Round, 12" S/CD – Per Linear Foot
- Bid Item No. 430-175-115A - Pipe Culvert, CMP, Round, 15" S/CD – Per Linear Foot
- Bid Item No. 430-175-118 – Pipe Culvert, RCP, Elliptical, 23" X 14", S/CD – Per Linear Foot
- Bid Item No. 430-175-124 - Pipe Culvert, RCP, Round, 24" S/CD – Per Linear Foot
- Bid Item No. 430-175-124A - Pipe Culvert, CMP, Round, 24" S/CD – Per Linear Foot
- Bid Item No. 430-175-148 - Pipe Culvert, RCP, Round, 48" S/CD – Per Linear Foot
- Bid Item No. 430-175-152 - Pipe Culvert, RCP, Round, 52" S/CD
(Field Verify) – Per Linear Foot
- Bid Item No. 430-175-276 - Pipe Culvert, RCP, Elliptical, 76"x48" S/CD
(Field Verify) - Per Linear Foot
- Bid Item No. 430-982-121 – Mitered End Section, RCP, Round, 12" – Per Each
- Bid Item No. 430-982-123 – Mitered End Section, CMP, Round, 15" – Per Each
- Bid Item No. 430-982-129 – Mitered End Section, CMP, Round, 24" – Per Each
- Bid Item No. 430-982-129A – Mitered End Section RCP, Round, 24" – Per Each
- Bid Item No. 430-982-625 – Mitered End Section, RCP, Elliptical, 23" x 14" – Per Each

SECTION - 520 – CONCRETE GUTTER, CURB ELEMENTS AND TRAFFIC SEPARATOR

The work specified in this item shall conform to Section 520 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

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Item of Payment

Payment for the work specified in this item shall be made under:
Bid Item No. 520-1-10 – Concrete Curb & Gutter, Type F – Per Linear Foot
Bid Item No. 0520-2-1 – Concrete Curb (Type A) – Per Linear Foot

SECTION - 522 – CONCRETE SIDEWALK AND DRIVEWAYS

The work specified in this item shall conform to Section 522 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction

Item of Payment

Payment for the work specified in this item shall be made under:
Bid Item No. 522-1 – Concrete, 6” Thick, Fiber Reinforced Sidewalk, Remove and Replace – Per Square Yard
Bid Item No. 522-1A – HC Ramp, 6” Thick, Remove and Replace – Per Square Foot
Bid Item No. 522-2 – Driveway Concrete 6” Thick, Remove and Replace – Per Square Foot
Bid Item No. 522-4 – Bus Shelter Pad – Concrete, 8”, Reinforced – Per Square Foot

SECTION - 527 – DETECTABLE WARNINGS

The work specified in this item shall conform to Section 527 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

Item of Payment

Payment for the work specified in this item shall be made under:
Bid Item No. 527-2 – Detectable Warning Strips – Per Square Foot

SECTION - 530 – REVETMENT SYSTEMS

The work specified in this item shall conform to Section 530 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

Item of Payment

Payment for the work specified in this item shall be made under:
Bid Item No. 530-3-3A – Rip Rap, Rubble, Bank and Shore – Per Cubic Yard

SECTION - 536 – GUARDRAIL

The work specified in this item shall conform to Section 536 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

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Item of Payment

Payment for the work specified in this item shall be made under:

Bid Item No. 536-1-1A – Guardrail, Long Steel Posts with A.C. Pavement – Per Linear Foot

Bid Item No. 536-85-24 – Guardrail End Anchorage Assembly Parallel with A.C. Pavement – Per Each

SECTION - 550 – FENCING

The work specified in this item shall conform to Section 550 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

Item of Payment

Payment for the work specified in this item shall be made under:

Bid Item No. 550-10-231 – Fence, Type B with Barbed Wire – Per Linear Foot

SECTION - 570 – PERFORMANCE TURF

The work specified in this item shall conform to Section 570 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

- A. Description: Sod for the project shall be of the variety that is common to the area and of a variety approved by the Engineer. This work shall also include mowing, to be mowed at maximum 6" height with a mulching mower.
- B. Work Included: Scope of Work: The work specified in this section consists of the establishing of a stand of grass, within the project, right-of-way, easements, and other areas indicated on the Drawings, by furnishing and placing grass sod. Also included are fertilizing, watering and maintenance as required to assure a healthy stand of grass. Two applications of fertilizer will be required with the initial application being fertilizer and the second application being "weed and feed".
- C. Guarantee: All sodded areas shall be guaranteed for one year after date of final acceptance.

Replacement of Defective Sod: Any dead sod or sod showing (less than 95% of a square) indication of probable non survival or lack of health and vigor, or which do not exhibit the characteristics to meet specifications, shall be replaced within two weeks of notice from Owner or Engineer. All replacement sod shall be furnished/installed at no additional cost to the Owner and shall be guaranteed for three months. All replacement shall meet original specifications.

The Contractor shall notify the Owner and Engineer ten days prior to the end of the guarantee period and such guarantee shall be extended until notification is received.

At the end of the guarantee period, all sod that is dead or in unsatisfactory growth shall be replaced within two weeks.

- D. Fertilizer: Commercial fertilizers shall comply with the Indian River County Fertilizer Ordinance 2013-012 and Supplement Ordinance 2013-014 (see Appendix B).

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- E. Water for Grassing: Contractor shall provide the water used in the sodding operations as necessary to meet the requirements of Article 570-3.6.
- F. Preparation of Ground: The area over which the sod is to be placed shall be scarified or loosened to a depth and then raked smooth and free from debris. Where the soil is sufficiently loose and clean, the Owner, at his discretion, may authorize the elimination of ground preparation.
- G. Application of Fertilizer: Before applying fertilizer, the soil pH shall be brought to a range of 6.0 - 7.0.

Contractor shall apply two (2) applications. The initial shall be fertilizer and the second application shall be "weed and feed".

The fertilizer shall be spread uniformly over the sodded area at the rate of 436 pounds per acre, or 10 pounds per 1,000 square feet, by a spreading device capable of uniformly distributing the material at the specified rate.

Contractor shall apply applications as per manufacturer's specification. All tickets from bags shall be handed over to the County Inspector.

On steep slopes, where the use of a machine for spreading or mixing is not practicable, the fertilizer shall be spread by hand and raked in and thoroughly mixed with the soil to a depth of approximately 2 inches.

- H. Placing Sod: The sod shall be placed on the prepared surface, with edges in close contact and shall be firmly and smoothly embedded by light tamping with appropriate tools.

Where sodding is used in drainage ditches, the setting of the pieces shall be staggered so as to avoid a continuous seam along the line of flow. Along the edges of such staggered areas, the offsets of individual strips shall not exceed 6 inches. In order to prevent erosion caused by vertical edges at the outer limits, the outer pieces of sod shall be tamped so as to produce a featheredge effect.

Where sodding is placed abutting paved shoulder, the contractor is to ensure that the finished sod elevation is 1½" below paved shoulder.

On slopes greater than 3:1, the Contractor shall prevent the sod from sliding by means of wooden pegs driven through the sod blocks into firm earth, at suitable intervals.

Sodding shall not be performed when weather and soil conditions are, in the Engineer's opinion, unsuitable for proper results.

Sod shall be placed around all structures, equipment pads, etc.

- I. Watering: The areas on which the sod is to be placed shall contain sufficient moisture, as determined by the Engineer, for optimum results. After being placed, the sod shall be kept in a moist condition to the full depth of the rooting zone for at least 2 weeks. Thereafter, the Contractor shall apply water as needed until the sod roots and starts to grow for a minimum of 60 days (or until final acceptance, whichever is latest).
- J. Maintenance: The Contractor shall, at his expense, maintain the sodded areas in a satisfactory condition until final acceptance of the project. Such maintenance shall

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include repairing of any damaged areas and replacing areas in which the establishment of the grass stand does not appear to be developing satisfactorily.

Replanting or repair necessary due to the Contractor's negligence, carelessness or failure to provide routine maintenance shall be at the Contractor's expense.

The Contractor shall maintain the sodded area up to the final acceptance date as directed by the Engineer. Grass height shall not exceed 6" without mowing. Clippings shall be removed from sidewalk.

- K. Article 570-9. The first two paragraphs under this Article are deleted and the following is added:

The contract unit price for performance turf shall include the costs of sod, fertilizer (2 applications), sidewalk sweeping after mowing, mowing, pegging disposal of clippings, water, tools, equipment, labor and all other incidentals necessary.

Item of Payment

Payment for the work specified in this item shall be made under:

Bid Item No. 570-1-2 – Performance Turf - Sod (Bahia or Match Exist) - Per Square Yard

Bid Item No. 570-1-2A – Sod and Site Restoration (W&S) – Per Square Yard

SECTION - 630 – CONDUIT

The work specified in this item shall conform to Section 630 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

Item of Payment

Payment for the work specified in this item shall be made under:

Bid Item No. 630-2-11 - Conduit, F&I, Open Trench – Per Linear Foot

Bid Item No. 630-2-11A - Conduit (Includes 2-2" DIA. HDPE), F&I, Open Trench – Per Linear Foot

Bid Item No. 630-2-11B – 4-2" Conduits – Per Linear Foot

Bid Item No. 630-2-12A – Conduit (Includes 2-2" DIA. HDPE), F&I, Directional Drill – Per Linear Foot

Bid Item No. 630-2-14 – Conduit, F&I, Aboveground – Per Linear Foot

SECTION - 632 – SIGNAL CABLE

The work specified in this item shall conform to Section 632 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

Item of Payment

Payment for the work specified in this item shall be made under:

Bid Item No. 632-7-1 – Signal Cable – New or Reconstructed Intersection, Furnish & Install – Per Installation

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SECTION - 633 – COMMUNICATION CABLE

The work specified in this item shall conform to Section 633 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

Item of Payment

Payment for the work specified in this item shall be made under:

Bid Item No. 633-2-31 – Fiber Optic Connection, Install, Splice – Per Each

Bid Item No. 633-3-11 – Fiber Optic Connection Hardware, F&I, Splice Enclosure,
– Per Each

Bid Item No. 633-3-15 – Fiber Optic Connection Hardware, F&I, Preterminated
Patch Panel - Per Each

SECTION - 634 – SPAN WIRE ASSEMBLY

The work specified in this item shall conform to Section 634 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

Item of Payment

Payment for the work specified in this item shall be made under:

Bid Item No. 634-4-153 – Span Wire Assembly, F&I, Two Point, Box – Per
Installation

SECTION - 635 – PULL, SPLICE, AND JUNCTION BOXES

The work specified in this item shall conform to Section 635 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

Item of Payment

Payment for the work specified in this item shall be made under:

Bid Item No. 635-2-11 – Pull & Splice Box, F&I, 13"x24" Cover Size – Per Each

Bid Item No. 635-2-12 - Pull & Splice Box, F&I, 24"x36" Cover Size – Per Each

Bid Item No. 635-2-12A - Pull Box, F&I, With 6" Fiber Concrete Collar – Per Each

SECTION - 639 – ELECTRICAL POWER SERVICE ASSEMBLIES

The work specified in this item shall conform to Section 639 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

Item of Payment

Payment for the work specified in this item shall be made under:

Bid Item No. 639-1-122 – Electrical Power Service, F&I, UG, Meter Purchased by
Contractor – Per Assembly

Bid Item No. 639-2-1 – Electrical Service Wire, Furnish & Install – Per Linear Foot

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SECTION - 641 – PRESTRESSED CONCRETE POLES

The work specified in this item shall conform to Section 641 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

Item of Payment

Payment for the work specified in this item shall be made under:

Bid Item No. 641-2-18 – Prestressed Concrete Pole, F & I, Type P-VIII – Per Each

Bid Item No. 641-2-80 – Prestressed Concrete Pole, Complete Removal – Per Each

SECTION - 650 – VEHICULAR TRAFFIC SIGNAL ASSEMBLIES

The work specified in this item shall conform to Section 650 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

Item of Payment

Payment for the work specified in this item shall be made under:

Bid Item No. 650-1-24 – Traffic Signal, Furnish & Install Polycarbonate w/Alum
Top, 3 Section, 1 Way - Per Assembly

Bid Item No. 650-1-29 – Traffic Signal, Furnish & Install, Polycarbonate w/Alumin, 5
Section Cluster, 1 Way – Per Assembly

SECTION - 660 – VEHICLE DETECTION SYSTEM

The work specified in this item shall conform to Section 660 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

Item of Payment

Payment for the work specified in this item shall be made under:

Bid Item No. 660-4-11 – Vehicle Detection System – Video, F&I Cabinet
Equipment – Per Each

Bid Item No. 660-4-12 – Vehicle Detection System – Video, F&I, Above Ground
Equipment – Per Each

SECTION - 670 – TRAFFIC CONTROLLER ASSEMBLIES

The work specified in this item shall conform to Section 670 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

Item of Payment

Payment for the work specified in this item shall be made under:

Bid Item No. 670-5-111 – Traffic Controller Assembly, F&I – Per Assembly

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SECTION - 684 – NETWORK DEVICES

The work specified in this item shall conform to Section 684 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

Item of Payment

Payment for the work specified in this item shall be made under:
Bid Item No. 684-1-1 – Managed Field Ethernet Switch, Furnish & Install – Per Each

SECTION - 700 – HIGHWAY SIGNING

The work specified in this item shall conform to Section 700 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction with the following modifications.

- A. Signing for traffic control shall conform to the requirements of the Standard Specifications, Manual on Uniform Traffic Control Devices, Supplemental Specifications, Roadway and Traffic Design Standards, manufacturer's specifications.
- B. Traffic Signs: All existing signs which are the property of the Owner shall be transported to the Indian River County Road and Bridge Maintenance Yard by the Contractor during construction if they are within the construction limits. Care shall be exercised by the Contractor during removal, storage and relocation so as not to damage the signs. If any damage occurs, as determined by the Owner's Engineer or Resident Construction Inspector, the sign shall be replaced by the Contractor with no compensation.

Item of Payment

Payment shall be made under:
Bid Item No. 700-1-11 – Single Post Sign, F&I Ground Mount
Up to 12 SF – Per Assembly
Bid Item No. 700-1-50 – Single Post Sign, Relocate – Per Assembly
Bid Item No. 700-1-60 – Single Post Sign, Remove – Per Assembly
Bid Item No. 700-3-601 – Sign Panel, Remove, Up to 12 SF – Per Each
Bid Item No. 700-5-22 – Internally Illuminated Sign, F&I, Overhead Mount,
12 – 18 SF – Per Each

SECTION - 706 - RETROREFLECTIVE PAVEMENT MARKERS AND BITUMINOUS ADHESIVE

The work specified in this item shall conform to Section 706 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

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Item of Payment

Payment for the work specified in this item shall be made under:

Bid Item No. 706-3 – Reflective Pavement Markers (white/red) – Per Each

Bid Item No. 706-3 – Reflective Pavement Markers (Yellow/yellow) – Per Each

Bid Item No. 706-3 – Reflective Pavement Markers (Blue/Blue) – Per Each

SECTION - 711 – THERMOPLASTIC PAVEMENT MARKINGS

The work specified in this item shall conform to Section 711 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

Item of Payment

Payment for the work specified in this item shall be made under:

Bid Item No. 711-11-123 – Thermoplastic, Standard, White, Solid, 12” for Crosswalk and Roundabout – Per Linear Foot

Bid Item No. 711-11-125 – Thermoplastic Standard White, Solid, 24” for Stop Line and Crosswalk – Per Linear Foot

Bid Item No. 711-11-141 – Thermoplastic, Standard, White, 2'-4' Dotted Guideline / 6'-10' Gap Extension, 6” – Per Gross Mile

Bid Item No. 711-11-170 – Thermoplastic, Standard, White, Arrow – Per Each

Bid Item No. 711-11-224 – Thermoplastic, Standard Yellow, Solid, 18” for Diagonal or Chevron – Per Linear Foot

Bid Item No. 711-11-241 – Thermoplastic, Standard, Yellow, 2'-4' Dotted Guideline / 6'-10' Gap Extension, 6” – Per Gross Mile

Bid Item No. 711-14-160 – Thermoplastic, Preformed, White, Message – Per Each

Bid Item No. 711-14-170 – Thermoplastic, Preformed, White, Arrow (Bike Thru) – Per Each

Bid Item No. 711-16-101 – Thermoplastic, Standard-Other Surfaces, White, Solid, 6” – Per Gross Mile

Bid Item No. 711-16-201 – Thermoplastic, Standard-Other Surfaces, Yellow, Solid, 6” – Per Gross Mile

Bid Item No. 711-16-231 – Thermoplastic, Standard-Other Surfaces, Yellow, Skip 6” – Per Gross Mile

SECTION - 715 – HIGHWAY LIGHTING SYSTEM

The work specified in this item shall conform to Section 715 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

Item of Payment

Payment for the work specified in this item shall be made under:

Bid Item No. 715-5-31 – Luminaire & Bracket Arm, F & I, Aluminum – Per Each

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SECTION - 999 – RECORD DRAWINGS/AS-BUILTS

GENERAL

Maintain, prepare and provide the ENGINEER with record documents as specified below, except where otherwise specified or modified within the scope of work provided in the specific project contract documents. The Contractor and/or Developer shall be responsible for, and required to provide, Record Drawings as outlined in this section.

MAINTENANCE OF RECORD DOCUMENTS:

1. The CONTRACTOR's is to maintain on-site in clean, dry, legible condition complete sets of the following project documents: Drawings, Specifications, Addenda, approved Shop Drawings, samples, photographs, Change Orders, other modifications of Contract Documents, test records, survey data, Field Orders, and all other documents pertinent to CONTRACTOR'S Work.
2. Provide files and racks for proper storage and easy access.
3. Make documents available at all times for inspection by ENGINEER and OWNER.
4. Do not use record documents for any other purpose and do not remove them from the field office.
5. Label each document "RECORD DRAWING" in 2-inch high printed letters.
6. Keep record documents current at all times.
7. No work shall be permanently concealed until the required record data has been obtained.

RECORD / AS-BUILT DRAWINGS

- A. During the construction operation, the CONTRACTOR shall maintain records of all deviations from the approved Project Plans and Specifications and shall prepare therefrom "RECORD" drawings showing correctly and accurately all changes and deviations from the work made during construction to reflect the work as it was actually constructed.
- B. The Record/As-Built survey shall be performed and subsequent plans prepared by a Professional Surveyor and Mapper, registered in the state of Florida and certified to the standards set forth in Chapter 472, Florida Statutes and Chapter 5J-17.050 Florida Administrative Code (Florida Minimum Technical Standards).
- C. Field measurements of vertical or horizontal dimensions of constructed improvements shall be obtained so that the constructed facility can be delineated in such a way that the location of the construction may be compared with the construction plans. Clearly shown by symbols, notations, or delineations, those constructed improvements located by the survey.
- D. All vertical information (elevations) provided on the Record Drawings shall be referenced to the North American Vertical Datum of 1988 (NAVD 88) unless otherwise specified by the Project Engineer.

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- E. The horizontal information provided on the Record Drawings shall be referenced to the State of Florida, State Plane Coordinate System, Florida East Zone as established by Global Positioning System (GPS) which meets or exceeds Third Order Class I Accuracy Standards according to current publication of the Federal Geodetic Control Committee (FGCC) procedures.
- F. All Record/As-Built drawings shall be prepared in digital format (AutoCAD Civil 3D 2013) and shall utilize the digital design drawings as prepared by the Project Engineer as a base for the Record/As-Built drawings. It is the responsibility of the Surveyor to request these files from the Contractor or Project Owner in order to produce the Record/As-Built drawing set.
- G. All improvements proposed to be constructed as shown on the approved construction plans shall be field measured upon completion and shown on the Record/As-Built survey. Any improvements that appear in both plan and profile views shall show the Record/As-Built information in both views.
- H. The following items are required to be shown on all Indian River County project Record/As-Built drawings submitted to the County:

DRAINAGE:

1. Right-of-way Swale/Drainage – All culvert inverts, elevations and station offsets; inlet grate and bottom elevations; swale beginning and end bottom elevations; and highs and lows along top of bank. Size of swale.
2. Pipe Culvert/PVC Sleeves – All inverts, pipe size, stations and offsets.
3. Outfalls – All pipe inverts, pipe size, elevations and station offsets, weir box elevations, weir elevation, bleeder elevation and sizes.
4. Roadway/Off Site Drainage – All inverts, elevations and station offsets; manhole top elevation; grate top elevations.
5. Retention Ponds – Provide perimeter elevations, grade breaks, depths and calculated pond areas at control elevation and grade breaks above and below water surface. Show as-built of typical cross section as shown on design plan.

ROADWAY:

1. Stations and offsets related to controlling baseline and elevations of all structures, sidestreet and major driveway radius returns (edge of pavement), bends and/or change in direction of roadway alignment, minimum of 1000' intervals along roadway alignment.
2. Elevations along Profile Grade Line (PGL), of all edge of pavements on each side of Profile Grade Line (PGL), at medians at the high/low and PVI points along Profile Grade Line (PGL).
3. All final Elevations to be plotted on PGL AND Plan & Profile sheets as applicable.
4. Elevations of edge of pavement and flow line at curb inlets and on the adjacent edge of pavement at curb inlets.

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WATER, FORCE, AND RECLAIMED WATER MAINS:

1. Show size and type of material used to construct mains.
2. Show horizontal location and elevation of all tees, crosses, bends, terminal ends, valves, fire hydrants, air release valves, and sampling points, etc., by distances from known reference points.
3. Show location, size and type of material of all sleeves and casing pipes.
4. Elevation and horizontal location of all storm sewers, gravity sewers including laterals, force mains, water mains, etc. which are crossed; including clearance dimension at all conflicts or crossings.
5. Top of pipe elevation and horizontal location of all water and force main stub-outs.
6. Horizontal location of all services at the property lines.
7. Horizontal and vertical location of pipe including size of all mains and ground elevation shall be obtained at one-hundred (100) foot intervals. Contractor shall place temporary PVC stand pipes (tell-tales) at each of the one-hundred (100) foot intervals and at all fittings and conflicts/crossings to facilitate the record drawing survey. The tell-tale pipes shall be constructed of 2-inch PVC pipe, shall be placed on the top of the pipes to be surveyed, and shall be removed by the Contractor after completion of the field survey by the "As-Built" Professional Surveyor.
8. Location of fire lines.
9. Dedicated easement locations, identified by O.R. Book and Page Number.

GRAVITY SEWER:

1. Manholes: Elevation of top rim, bottom elevation and invert of each influent and effluent line.
2. Show distance between manholes center-to-center and horizontal location by baseline station and offset.
3. Show material size and type used to construct sewer mains.
4. Show length (center of manhole to end of stub) distances from known reference points or baseline offsets, and elevation of stub-outs.
5. Show which services have twenty (20) foot length of DIP at water main crossings.
6. Show station and offset location of sanitary services at property line. Particular care in dimensioning needed in special situations, i.e., cul-de-sacs and locations where services are not perpendicular to wye.
7. Show invert elevation of sanitary service at property line.
8. Any and all necessary dedicated easement locations, identified by O.R. Book and Page Number.

PUMP / LIFT STATION:

Record Drawings shall show elevations for the top and bottom and diameter of wet well along with invert of effluent line. Record Drawings should also indicate the make, model number, horsepower, impeller and condition point of pumps selected and installed, shape of wet well, location of control panel, location of pump out

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connection, float level settings, any deviation from the plans, and serial number(s) of the pump(s).

SURVEY CONTROL

1. Install/re-establish: It shall be the contractor's responsibility to hire a Professional Surveyor and Mapper as defined per Chapter 472, Florida Statutes, to replace any horizontal and vertical control shown on the engineering plans that was destroyed during construction.
2. New roadway alignment control points (survey baseline or controlling line and all points as indicated on the plans or control sheet) upon final roadway completion. Include all intersections and side streets. State plane coordinates and elevations for all control points.
3. If shown on plans or not: Any Public Land Corner or Governmental Survey Control point(s), vertical control (bench marks), property corners destroyed and/or disturbed during the scope of the project shall be properly re-established as per standards as set forth within Florida Statutes, Administrative code and Minimum Technical Standards for that type of survey. All said surveying mentioned above shall be performed under the direct supervision of a registered Professional Surveyor and Mapper in the state of Florida and certified accordingly. Said Governmental agency(s) shall be notified in writing of disturbance and re-establishments.

RECORD/AS-BUILTS DRAWINGS FORMAT - SUBMITTAL

- A. ENGINEER will supply the CONTRACTOR with the electronic file of the approved construction plans for the input of the As-Built (record) information.
- B. CONTRACTOR shall deliver two (2) certified sets of Record/As-Builts with Electronic Drawing files prepared in AutoCAD Civil 3D 2013 AND PDF format or in current version as agreed by the ENGINEER.
- C. CONTRACTOR's surveyor shall review, sign and seal As-Builts or Record drawing(s). Said drawing(s) shall clearly state type of survey, positional tolerances, adhere and be certified to by a registered Professional Surveyor and Mapper in the state of Florida, any standards set forth by Florida Statutes, Administrative code and Minimum Technical Standards for As-Built/Record surveys.
- D. All Record/As-Built drawings are subject to review and approval by County Surveyor.

ACCURACY

The CONTRACTOR will be held responsible for the accuracy and completeness of Record Drawings and Electronic As-Builts and shall bear any costs incurred in finding utilities as a result of incorrect data furnished by the CONTRACTOR.

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COMPLETION OF WORK

Upon Substantial Completion of the Work, deliver Record Drawings/As-Built Drawings to ENGINEER. Final payment will not be made until satisfactory record documents are received and approved by ENGINEER.

Item of Payment

Payment for the work specified in this item shall be made under:
Bid Item No. 999-1 – Record Drawings/As-Builts – Per Lump Sum

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Board of Professional Surveyors and Mappers

Record As-Built Survey Checklist

Lic. Name _____ Date: _____

Project Name: 58TH AVENUE (FROM NORTH OF 57TH TO 85TH STREET) FULL DEPTH RECLAMATION

Project No.: IRC-1325

Chapter 61G17-6 Minimum Technical Standards F.A.C

61G17-6.003 General Survey, Map, and Report Content Requirements

(1) **REGULATORY OBJECTIVE:** The public must be able to rely on the accuracy of measurements and maps produced by a surveyor and mapper. In meeting this objective, surveyors and mappers must achieve the following minimum standards of accuracy, completeness, and quality:

(a) Accuracy of survey measurements based on the type of survey and expected use.

(b) Measurements made in accordance with the United States standard, feet or meters.

(c) Records of measurements maintained for each survey (check field notes.)

(d) Measurement and computation records dated.

(e) Measurement and computation records substantiate the survey map.

(f) Measurement and computation records support accuracy statement (closure calculations or redundant measurements, if applicable.)

(2) Other More Stringent Requirements:

(a) Met more stringent requirements set by federal, state, or local governmental agencies.

(3) Other Standards and/or Requirements that Apply to All Surveys, Maps, and/or Survey Products:

(a) **REGULATORY OBJECTIVE:** In order to avoid misuse of a survey and map, the surveyor and mapper must adequately communicate the survey results to the public through a map, report, or report with an attached map.

(b) Survey map or report identified the responsible surveyor and mapper and contain standard content. In meeting this objective, surveyors and mappers must meet the following minimum standards of accuracy, completeness, and quality:

(c) Type survey stated on map and report:

As-Built Survey

Boundary Survey

Condominium Survey

Construction Layout Survey

Control Survey

Hydrographic Survey

Mean High Water Line Survey

Quantity Survey

Record Survey

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Specific or Special Purpose
Survey

Topographic Survey

(d) Name, certificate of authorization number, and street and mailing address of the business entity on the map and report.

- (e) Name and license number of the surveyor and mapper in responsible charge.**
- (f) Name, license number, and street and mailing address of a surveyor and mapper practicing independent of any business entity on the map and report.**
- (g) Survey date (date of data acquisition.)**
- (h) Revision date for any graphic revisions (when survey date does not change.)**
- (i) Map and report statement “Survey map and report or the copies thereof are not valid without the signature and the original raised seal of a Florida licensed surveyor and mapper.”**
- (j) Insurance statement in ¼” high letters “The survey depicted here is not covered by professional liability insurance” if there is no professional liability insurance.**
- (k) Additions or deletions to survey maps or reports by other than the signing party or parties is prohibited without written consent of the signing party or parties.**
- (l) All computed data or plotted features shown on survey maps supported by accurate survey measurements unless clearly stated otherwise.**
- (m) Bearings, distances, coordinates, and elevations shown on a survey map shall be substantiated by survey measurements unless clearly stated otherwise.**
- (n) Bearing reference (well established and monumented line)**
- (o) A designated “north arrow”**
- (p) Stated scale or graphic scale**
- (q) Abbreviations in legend or notes.**
- (r) Special conditions and any necessary deviation from the standards noted upon the map or report.**
- (s) Responsibility for all mapped features stated on the map or report**
- (t) Map or report clearly states the individual primarily responsible for the map or report when mapped features have been integrated with others.**
- (u) Map Accuracy.**
- (1) Vertical Feature Accuracy:**

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- (a) Vertical Control: Field-measured control for elevation information shown upon survey maps or reports shall be based on a level loop or closure to a second benchmark.
 - (b) Closure in feet must be accurate to a standard of plus or minus .05 ft. times the square root of the distance in miles.
 - (c) All surveys and maps or reports with elevation data shall indicate the datum and a description of the benchmark(s) upon which the survey is based.
 - (d) Minor elevation data may be obtained on an assumed datum provided the base elevation of the datum is obviously different than the established datum.
- (2) Horizontal Feature Accuracy:**
- (a) Horizontal Control: All surveys and maps or reports expressing or displaying features in a publicly published coordinate system shall indicate the coordinate datum and a description of the control points upon which the survey is based.
 - (b) Minor coordinate data may be obtained and used on an assumed datum provided the numerical basis of the datum is obviously different than a publicly published datum.
 - (c) The accuracy of control survey data shall be verified by redundant measurements or traverse closures. All control measurements shall achieve the following closures:
Commercial/High Risk Linear: 1 foot in 10,000 feet;
Suburban: Linear: 1 foot in 7,500 feet;
Rural: Linear: 1 foot in 5,000 feet;
 - (d) When statistical procedures are used to calculate survey accuracies, the maximum acceptable positional tolerance, based on the 95% confidence level, should meet the same equivalent relative distance standards as set forth in 61G17- 6.003(3)(p)(2.) (c) F.A.C.
 - (e) Intended Display Scale: All maps or reports of surveys produced and delivered with digital coordinate files must contain a statement to the effect of: "This map is intended to be displayed at a scale of 1/___ or smaller".

61G17-6.004 Specific Survey, Map, and Report Requirements

- (1) As-Built/Record Survey:**
- (a) Obtained field measurements of vertical or horizontal dimensions of constructed improvements so that the constructed facility can be delineated in such a way that the location of the construction may be compared with the construction plans.
 - (b) Clearly shows by symbols, notations, or delineations, those

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- constructed improvements located by the survey.
- (c) All maps prepared shall meet applicable minimum technical standards.
 - (d) Vertical and horizontal accuracy of the measurements made shall be such that it may be determined whether the improvements were constructed consistent with planned locations.

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+++END OF SECTION+++

ADDENDUM #3

SECTION – 1050 to 1080 – WATERMAIN RELOCATION

Section 1

Water Mains – Ductile Iron Pipes (DIP) and Fittings

1.01 General

- A. DIP shall be allowed for use as water pipe where compatible with the specific conditions of the project. The use of material other than ductile iron may be required by IRCDUS during construction permit review or by IRCDUS field personnel during construction, if it is determined that DIP is unsuitable for the particular application.
- B. All DIP shall be manufactured in accordance with AWWA Specification C150 (A21.50-96), or latest revision and shall be pressure Class 300 or 350 minimum as depicted on Table 1.1 on page 1-2. All DIP crossings under roadways and other traffic areas shall be pressure Class 350 minimum.
- C. Unless specifically indicated otherwise, restrained push-on joint underground piping shall be manufactured restrained bell and spigot and above ground piping shall be flanged.
- D. Cutting of DIP shall be by sawing only.

1.02 Pipe

- A. DIP shall be bell and spigot cast in accordance with AWWA Specification C150 (ANSI A21.50), or latest revision. Cast ductile iron shall have a minimum tensile strength of 60,000 psi with a minimum yield strength of 42,000 psi. Pipe wall thicknesses shall be computed in accordance with AWWA Specification C150 (ANSI A21.51), or latest revision, using the physical characteristics cited above with a minimum working pressure of 200 psi and a Laying Condition "Type 2." Unless otherwise indicated or specified herein, the pipe shall have the minimum wall thickness according to class designation for diameters shown. All pipe shall be given a minimum factory hydrostatic test of 500 psi.

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Table 1.1
Pressure Class 300 and 350

Nominal Size Diameter (Inches)	Actual Outside Diameter (Inches)	300 psi Wall Thickness (Inches)	350 psi Wall Thickness (Inches)
3	3.96	---	0.25
4	4.80	---	0.25
6	6.90	---	0.25
8	9.05	---	0.25
10	11.10	---	0.26
12	13.20	---	0.28
14	15.30	0.30	0.31
16	17.40	0.32	0.34
18	19.50	0.34	0.36
20	21.60	0.36	0.38
24	25.80	0.40	0.43
30	32.00	0.45	0.49
36	38.30	0.51	0.56
42	44.50	0.52	0.63
48	50.80	0.64	0.70
54	57.56	0.72	0.79
60	61.61	0.76	0.83
64	65.67	0.80	0.87

1.03 Fittings

- A. All underground fittings shall be either push-on, restrained, or mechanical joint. Mechanical joints shall conform to AWWA Specification C110 (ANSI 21.10-98) or C153 (ANSI 21.53-00), or latest revisions. All aboveground fittings shall be flanged joint.
- B. The pressure rating shall be 350 psi (Class 350).
- C. Joint restraints, when required, shall be in accordance with IRCDUS Approved Manufacturers' Products List or an approved equal.
- D. All fittings shall be lined with the same material as specified for the pipe as per paragraph 1.04.

1.04 Lining and Coating

- A. Unless otherwise indicated, all DIP shall be factory lined and coated.

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- B. All pipe shall be cement mortar lined and seal coated in accordance with AWWA Standard C104 (ANSI A21.4-95), or latest revision unless double lining is required by IRCDUS.
- C. Unless specified otherwise, all ductile iron pipe shall be bituminous coated outside to a dry film thickness of at least 1 mil.
- D. Anywhere that the coating is removed purposely or accidentally, the area shall be cleaned of any rust, grease, and dirt and re-coated to a minimum dry film as specified for the individual piece.
- E. If and where directed by IRCDUS's Engineer, a polyethylene encasement shall be provided around pipe, fittings, and valves. The material, installation, and workmanship shall conform to applicable sections of AWWA C105 (ANSI A21.5-99), or latest revision. Installation methods A or B shall be employed using flat tube polyethylene. The Contractor shall make provisions to keep the polyethylene from direct exposure to sunlight prior to installation. Backfilling following installation shall be completed without delay to avoid exposure to sunlight.
- F. All exposed (i.e. aerial crossings) DIP water mains shall be primed and painted "blue" as per IRCDUS Approved Manufacturers' Products List or equal.

1.05 Bell and Spigot Connections

- A. Joints in bell and spigot pipe shall be push-on, mechanical, or restrained joints in accordance with AWWA Standard C111 (ANSI 21.11-00), or latest revision. Pipe restraints shall also be in accordance with IRCDUS Standards or as directed by IRCDUS's Engineer.

1.06 Flanged Connections

- A. All flanged pipe barrels shall comply with the physical and chemical requirements as set forth in the Handbook of DIP of the Cast Iron Pipe Research Association, latest revisions. Flanges shall be in accordance with ANSI Specification B16.1 for Class 125 flanges. Bolts shall comply with ANSI Specification B18.2.
- B. Flanged pipe shall be faced and drilled to the American Standard Drilling, unless special drilling is called for or required. Where tap or stud bolts are required, flanges shall be tapped. Flanges shall be accurately faced and drilled smooth and true, at right angles to the pipe axis and shall be covered with zinc dust and tallow or a rust preventive compound immediately after facing and drilling.

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- C. Flanged pipe with screwed-on flanges shall be furnished with long hubs, and the flanges shall be screwed on the threaded end of the pipe in the shop, and the face of the flange and end of pipe refaced together. There shall be no leakage through the pipe threads and the flanges shall be designed to prevent corrosion of the threads from outside.
- D. Flanged joints shall be made with bolts or stud bolts and nuts. Bolts, stud bolts, and nuts shall conform to American Standard heavy dimensions, semi-finished with square or hexagonal heads and cold punched hexagonal nuts, meeting the requirements of ASTM Designation A-316SS. Bolt sizes shall be American Standard for the flanges specified, and bolts and nuts shall have good, true threads.
- E. Gaskets shall be in accordance with AWWA Standard C115 (ANSI A21.15-99), latest revision.

1.07

Submittals

- A. Before starting fabrication of the DIP and fittings, the Contractor shall submit one set of complete working drawings (shop drawings) to the Engineer of Record and IRCDUS for approval. Such drawings shall show the pipe, fittings, valves, expansion joints, hangers, supports, and other appurtenances to be installed. Where special fittings are required, they shall be shown in large detail with all the necessary dimensions. The Engineer of Record shall review the drawings and notify IRCDUS of the drawings approved and not approved. IRCDUS will also review the drawings and coordinate approvals and disapprovals with the Engineer of Record and Contractor. The drawings submitted shall show flanged jointed sections placed so as to be removable without disturbance to the main pipe sections.

1.08

Marking

- A. Number 10 stranded conductor copper trace wire shall be spiral wrapped or affixed to the top of the pipe. See Trace Wire Details Drawing M-13 for specifications regarding installation.
- B. Trace wire is required over or around all pipes unless otherwise approved by IRCDUS.
- C. Location tape is required over all pipes. Tape is to be installed 12" below proposed grade and additional tape shall be adhered directly on top of the pipe if required by IRCDUS engineering.

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1.09 Installation

- A. Handling and Protection of Pipe: Unless otherwise noted on the drawings or in other sections of this specification, the pipe shall be handled and installed in strict accordance with the manufacturers' instructions and with the applicable provisions of AWWA C600-99, latest revision. If a conflict exists between the manufacturers' instructions and the AWWA Standards, the manufacturers' instructions shall govern. The Contractor shall use every precaution during construction to protect the pipe against the entry of non-potable water, dirt, wood, small animals, and any other foreign material that would hinder the operation of the pipeline. Where the groundwater elevation is above the bottom of the trench, the Contractor shall provide suitable dewatering equipment. All piping shall be placed in a dry trench, unless otherwise approved by IRCDUS.
- B. Depth of Cover and Pipe Elevation: Unless otherwise shown on the drawings, or otherwise approved by IRCDUS, all pipe shall have a minimum cover of 36 inches. Contractor shall determine top of pipe elevation and top of ground elevation for every two joints of pipe installed using a level. Pipe must have the minimum cover described above and must be within +/- 0.2 feet of the top of pipe elevation indicated on the drawings. Installed pipe, which does not meet these requirements, shall be reinstalled until it does meet these requirements. Contractor shall record top of pipe and top of ground elevations and the locations of where these elevations were determined and submit this information to IRCDUS. IRCDUS reserves the right to have Contractor excavate and check top of pipe and top of ground elevations to see if they conform to the aforementioned requirements, at no cost to IRCDUS.

END OF SECTION

Section 2

Water Mains Polyvinyl Chloride Pipe (PVC) and Fittings

2.01 General

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- A. PVC pipe shall be allowed for use as potable water pipe where compatible with the specific conditions of the project. IRCDUS may require the use of material other than PVC during construction permit review or by IRCDUS field personnel during construction, if it is determined that PVC pipe is unsuitable for the particular application.
- B. The pipe shall be identified by its nominal pipe size, plastic pipe material code, SDR class, pressure rating, ASTM Designation, manufacturers' name, production code, and the National Sanitation Foundation seal for potable water (NSF-pw).

2.02 PVC Pipe 3 Inches in Diameter and Smaller

- A. PVC pipe 3 inches and smaller in diameter intended for conveying potable water shall conform to ASTM D2241, latest revision.
- B. Pipe shall be Iron Pipe Size (IPS), and SDR 21 with a pressure rating of 200 psi.
- C. Joint design tested to the requirements of ASTM D3139.
- D. Gaskets shall conform to ASTM F477 and D1869.
- E. No solvent weld joints are permitted.
- F. The pipe shall be "blue" in color.
- G. PVC pipe shall be in accordance with IRCDUS Approved Manufacturers' Products List or equal.

2.03 PVC Pipe 4 Inches in Diameter and Larger

- A. PVC pipe intended for conveying or transmitting potable water shall conform to AWWA Standard Specifications C900-16 (or latest revision) and ASTM D1784 Cell Class 12454.
- B. Pipe shall be Ductile Iron Pipe Size (DIPS), and SDR 18 with a pressure rating of 235 psi.
- C. Joint design tested to the requirements of ASTM D3139. Gaskets shall conform to ASTM F477.
- D. Gasket material shall conform to ASTM F477.
- E. The pipe shall be "blue" in color.
- F. The pipe shall be identified by its nominal pipe size, plastic pipe material code, DR class, pressure rating, ASTM Designation, manufacturers' name, code, and the National Sanitation Foundation seal for potable water (NSF-pw).
- G. PVC pipe shall be in accordance with IRCDUS Approved Manufacturers' Products List or equal.

ADDENDUM #3

2.04 Joints

- A. Joints for PVC pipe shall be bell and spigot push-on rubber gasket type only unless otherwise approved by IRCDUS. No solvent weld or threaded joints will be permitted.
- B. Restraining joints, when required, shall be in accordance with IRCDUS Approved Manufacturers' Products List or equal.

2.05 Fittings

- A. All fittings shall be ductile iron mechanical joint and shall conform to AWWA Standard Specifications C110/A21.10-98 or C153/A 21.53-00, or latest revisions. Fittings shall be cement mortar lined and seal-coated in accordance with AWWA Standard Specifications C104/A21.4, or latest revision.
- B. The pressure rating shall be 350 psi (3" – 24" diameter), and 250 psi (30" – 48" diameter).
- C. Joint restraint, when required, shall be in accordance with IRCDUS Approved Manufacturers' Products List or equal.

2.06 Submittals

- A. Before starting installation of the PVC pipe and fittings, the Contractor shall submit one set of complete working drawings (shop drawings) to the Engineer of Record and IRCDUS for approval. Such drawings shall show the pipe, fittings, valves, hydrants, blow-offs, services, and other appurtenances to be installed. Where special fittings are required, they shall be shown in large detail with all the necessary dimensions. The Engineer of Record shall review the drawings and notify IRCDUS of the drawings approved and not approved. IRCDUS shall also review the drawings and coordinate approvals and disapprovals with the Engineer of Record and Contractor.

2.07 Marking

- A. Number 10 stranded conductor copper trace wire shall be spiral wrapped or affixed to the top of the pipe. See Trace Wire Details Drawing M-13 for specifications regarding installation.
- B. Trace wire is required over or around all pipes.
- C. Location tape is required over all pipes. Tape is to be installed 12" below proposed grade and additional tape shall be adhered directly on top of the pipe if required by IRCDUS engineering.

2.08 Storage

- A. PVC pipes are not to be stored where exposed to direct sunlight because of

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possible ultraviolet light degradation. Pipes stored on the jobsite are to be covered. PVC pipes that exhibit discoloration or fading from their original color will be rejected by IRCDUS field representatives.

2.09

Installation

- A. Handling and Protection of Pipe: Unless otherwise noted on the drawings or in other sections of these standards, the pipe shall be handled and installed in strict accordance with the manufacturers' instructions and with the applicable provisions of AWWA Standard Specifications C605-94, or latest revision. If a conflict exists between the manufacturers' instructions and the AWWA Standard Specifications, the manufacturers' instructions shall govern. The Contractor shall use every precaution during construction to protect the pipe against the entry of non-potable water, dirt, wood, small animals, and any other foreign material that would hinder the operation of the pipeline. Where the groundwater elevation is above the bottom of the trench, the Contractor shall provide suitable dewatering equipment. All piping shall be placed in a dry trench, unless approved by IRCDUS.

- B. Depth of Cover and Pipe Elevation: Unless otherwise shown on the drawings, or otherwise authorized by IRCDUS, all pipe shall have a minimum depth of cover of 36 inches. Contractor shall determine top of pipe elevation and top of finished grade elevation for every two joints of pipe installed using a level. Pipe must have the minimum cover described above and must be within +/- 0.2 feet of the top of pipe elevation indicated on the drawings. Installed pipe, which does not meet these requirements, shall be reinstalled until it does meet these requirements. Contractor shall record top of pipe and top of ground elevations and the locations of where these elevations were determined and submit this information to Engineer or his representative. IRCDUS reserves the right to have Contractor excavate and check top of pipe and top of ground elevations to see if they conform to the aforementioned requirements.

END OF SECTION

ADDENDUM #3

Section 3

Water Services - Crosslinked Polyethylene (PEXa) Tubing and Water Mains - High Density Polyethylene Pipe (HDPE)

Water Services Crosslinked Polyethylene Tubing (PEXa)

3.01 General

Crosslinked polyethylene (PEXa) tubing shall be allowed for use as potable water pipe where compatible with the specific conditions of the project. IRCDUS may require the use of material other than PEXa during construction permit review or by IRCDUS field personnel during construction if it is determined that PEXa pipe is unsuitable for the particular application.

3.02 Polyethylene (PEXa) Tubing 3 inches Diameter and Smaller

- A. This specification requires PEXa to be designated as PEXa, high pressure peroxide method.
- B. PEXa tubing shall comply with applicable requirements for extrusion compound PEXa plastic material as stated in AWWA Standard Specifications C904, or latest revision, and shall comply with the following:
 - 1. Tubing shall have a working pressure of 200 psi at 73.4° F.
 - 2. Tubing surfaces shall be glass smooth, and shall be free from bumps and irregularities. Materials must be completely homogeneous and uniform in appearance.
 - 3. Tubing dimensions and tolerances shall correspond with values listed in ASTM D-2239, with a standard outside dimension ratio (SDR) of 9.
 - 4. Tubing shall carry the following markings every (3) feet: Manufacturers' name or trademark, nominal size, PEXa 3306 (material designation) SDR (standard dimension ratio), POTABLE TUBING, ASTM F876/F877/F2080, CSA B137.5, NSF-pw, UP Code 200psi/73.4°F 100psi/180°F, manufacturing date and footage mark.

3.03 Joints

- A. Joints for PEXa tubing shall be of the compression type or compression-sleeve type, utilizing a totally confined grip seal and coupling nut, unless otherwise approved by IRCDUS. Stainless steel tube stiffener inserts shall also be used for PEXa tubing services.

3.04 Installation

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- A. Backfill shall be free of rocks and debris.
- B. Bending radius shall be large enough so that tubing is not crimped or damaged and so that the flow of water is not restricted. Manufacturers' minimum radius recommendations are to be utilized during installation of PEXa tubing.
- C. PEXa tubing shall have ability for kink repair using a heat gun.

3.05 Marking

- D. Number 10 stranded conductor copper trace wire shall be spiral wrapped or affixed to the top of the pipe. See Trace Wire Details M-14 for specifications regarding installation.
- E. Trace wire is required over or around all pipes.
- F. Location tape is required over all pipes. Tape is to be installed 12" below proposed grade and additional tape adhered directly on top of the pipe if required by IRCDUS engineering.

3.06 Pressure PEXa Pipe

- A. PEXa pipe shall be allowed for use as all pressure utility pipes where compatible with the specific conditions of the project. The use of material other than PEXa pipe may be required by IRCDUS during construction permit review or by IRCDUS field personnel, if it is determined that PEXa is unsuitable for the particular application.
- B. Documentation from the resin's manufacturer showing results of the following tests for resin identification:
 - 1. Melt Flow Index ASTM D 1238
 - 2. Density ASTM F876
- C. All PEXa pipe and fittings shall be from a single manufacturer on the Approved Manufacturers' Product List. The pipe shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with these Specifications. See Approved Manufacturers' Product List.
- D. Finished Product Evaluation
 - 1. Production staff for the items listed below shall check each length of pipe produced. The results of all measurements shall be recorded on production sheets that become part of the manufacturers' permanent records.
 - a. Pipe in process shall be checked visually, inside and out for cosmetic defects (grooves, pits, hollows, etc.)

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- b. Pipe outside diameter shall be measured using a suitable periphery tape to ensure conformance with ASTM F714 or ASTM D-3035 whichever is applicable.
- c. Pipe wall thickness shall be measured at 12 equally spaced locations around the circumference at both ends of the pipe to ensure conformance with ASTM F714 or ASTM D-3035, whichever is applicable.
- d. Pipe length shall be measured.
- e. Pipe marking shall be examined and checked for accuracy.
- f. Pipe ends shall be checked to ensure they are cut square and clean.
- g. Subject inside surface to a “reverse bend test” to ensure the pipe is free of oxidation (brittleness).

E. Stress Regression Testing

- 1. The PEXa pipe manufacturer shall provide certification that stress regression testing has been performed on the specific PEXa resin being utilized in the manufacturing of this product. This stress regression testing shall have been done in accordance with ASTM D2837 and the manufacturer shall provide a product supplying a minimum Hydrostatic Design Basis (HDB) of 1,600 psi as determined in accordance with ASTM D2837.

F. Developer is responsible for compatibility between pipe materials, fittings and appurtenances.

G. The pipe manufacturer shall provide a warranty against manufacturing defects of material and workmanship for a period of ten (10) years after the final acceptance of the project by the IRCDUS. The manufacturer shall replace at no expense to IRCDUS any defective pipe material including labor within the warranty period.

3.07 High Density Polyethylene Pipe (HDPE) 4 inches in Diameter and Larger

- A. HDPE pipe intended for conveying or transmitting potable water shall conform to AWWA Standard Specifications C906-15 (or latest revision).
- B. Pipe shall be Ductile Iron Pipe Size (DIPS) and SDR 11 with a pressure rating of 200 psi.
- C. HDPE pipe shall be made from a PE 4710 resin compound conforming to ASTM D3350 with the cell classification 445574/4C/E.
- D. Dimensions and workmanship shall be as specified by ASTM F714. HDPE fittings and transitions shall meet ASTM D3261. HDPE pipe shall have a minimum density of 0.955 grams per cubic centimeter. All HDPE pipe and fittings shall have a Hydrostatic Design Basis (HDB) of 1,600 psi.
- E. If rework compounds are required, only those generated in the manufacturers' own plant from resin compounds of the same class and type from the same raw material supplier shall be used.

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- F. The pipe manufacturer must certify compliance, with the above requirements.
- G. HDPE flange adapters at pipe material transitions shall be backed up by stainless steel flanges conforming to ANSI B16.1 and shaped as necessary to suit the outside dimensions of the pipe. The flange adapter assemblies shall be connected with corrosion resisting bolts and nuts of Type 316 Stainless Steel as specified in ASTM A726 and ASTM A307. All bolts shall be tightened to the manufacturers' specified torques. Bolts shall be tightened alternatively and evenly.
- H. HDPE pipe shall be striped blue for potable water, green for wastewater, and purple for reclaimed/reuse water.
- I. HDPE pipe shall be in accordance with IRCDUS Approved Manufacturers' Products List or equal.

3.08 Fittings

- A. All molded fittings and fabricated fittings shall be fully pressure rated to match the pipe SDR pressure rating to which they are made. All fittings shall be molded or fabricated by the manufacturer. No fabricated fittings shall be used unless approved by IRCDUS.
- B. The manufacturer of the HDPE pipe shall supply or specify all HDPE fittings and accessories as well as any adapters and/or specials required to perform the work as shown on the drawings and specified herein.
- C. All transitions from HDPE pipe to PVC or ductile iron shall be made per the HDPE, PVC, or ductile iron pipe manufacturers' recommendations and specifications whichever is more stringent. A molded flange connector adapter within a carbon steel back-up ring assembly shall be used for pipe type transitions. Ductile iron back-up rings shall mate with cast iron flanges per ANSI B16.1. A 316 stainless steel back-up ring shall mate with a 316 stainless flange per ANSI B16.1.
- D. The pipe manufacturer must certify compliance with the above requirements.

3.09 Joints

- A. The HDPE pipe shall be joined with butt, heat fusion joints. All joints shall be made in strict compliance with the manufacturers' recommendations.
- B. Lengths of pipe shall be assembled into suitable installation lengths by the butt-fusion process. All pipes so joined shall be made from the same class and type of raw material made by the same raw material supplier. Pipe shall be furnished in standard lay lengths not to exceed 50 feet.
- C. All above ground HDPE pipe shall have flange adapters. Below ground shall be MJ adapters. Stainless Steel inserts allowed on water main only 4" to 6". FM 4" and larger MJ adapter only with no insert. Pipe material transitions

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shall be backed up by stainless steel flanges conforming to ANSI B16.1 and shaped as necessary to suit the outside dimensions of the pipe. The flange adapter assemblies shall be connected with corrosion resisting bolts and nuts of Type 316 Stainless Steel as specified in ASTM A726 and ASTM A307. All bolts shall be tightened to the manufacturers' specified torques. Bolts shall be tightened alternatively and evenly.

3.10 Pipe Identification

- A. The following shall be continuously indent printed on the pipe or spaced at intervals not exceeding 5-ft.
 - 1. Name and/or trademark of the pipe manufacturer.
 - 2. Nominal pipe size and OD base.
 - 3. Material Code
 - 4. Dimension ratio.
 - 5. Pressure Class
 - 6. Current AWWA C906 (if Applicable)
 - 7. Manufacturing standard reference, e.g., ASTM F714 or D-3035, as required.
 - 8. A production code from which the date and place of manufacture can be determined.
- B. Number 10 stranded conductor copper trace wire shall be spiral wrapped or affixed to the top of all pipe and fittings. See Trace Wire Details Drawing M-13 for specifications regarding installation.

3.11 Installation by Open Cut Method

- A. HDPE Pipe shall be installed in accordance with the instruction of the manufacturer, as shown on the Drawings and as specified herein. A factory qualified joining technician as designated by the pipe manufacturer shall do all heat fusion joints.
- B. Care shall be taken in loading, transporting and unloading to prevent injury to the pipe. Pipe or fittings shall not be dropped. All pipe or fittings shall be examined before installation, and no piece shall be installed which is found to be defective. Any damage to the pipe shall be repaired as directed by the Engineer of Record and IRCUDS. If any defective pipe is discovered after it has been installed, it shall be removed and replaced with a sound pipe in a satisfactory manner by the Contractor, at his own expense.
- C. Under no circumstances shall the pipe or accessories be dropped into the trench.
- D. Care shall be taken during transportation of the pipe such that it will not be cut, kinked, or otherwise damaged.
- E. Ropes, fabric, or rubber protected slings and straps shall be used when handling pipes. Chains, cables, or hooks inserted into the pipe ends shall

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not be used. Two slings spread apart shall be used for lifting each length of pipe.

- F. Pipes shall be stored on level ground, preferably turf or sand, free of sharp objects, which could damage the pipe. Stacking of the PE pipe shall be limited to a height that will not cause excessive deformation of the bottom layers of pipes under anticipated temperature conditions. Where necessary due to ground conditions, the pipe shall be stored on wooden sleepers, spaced suitably and of such width as not to allow deformation of the pipe at the point of contact with the sleeper or between supports.
- G. Care shall be exercised when lowering pipe into the trench to prevent damage or twisting of the pipe.
- H. Pipe shall be laid to lines and grade shown on the Drawings with bedding and backfill as shown on the Drawings.
- I. When installation of pipe is not in progress, including lunchtime, the open ends of the pipe shall be closed by fabricated plugs, or by other approved means.
- J. Pipe shall be stored on clean level ground to prevent undue scratching or gouging. The handling of the pipe shall be in such a manner that the pipe is not damaged by dragging it over sharp and cutting objects. The maximum allowable depth of cuts, scratches or gouges on the exterior of the pipe is 5 percent of wall thickness. Sections of pipe with cuts, scratches or gouges exceeding five percent of the pipe wall thickness shall be removed completely and the ends of the pipeline rejoined. The interior pipe surface shall be free of cuts, gouges or scratches.
- K. HDPE pipe shall be joined by the method of thermal butt fusion, as outlined in ASTM D2657. All joints shall be made in strict compliance with the manufacturers' recommendations.
- L. Mechanical connections of the HDPE pipe to auxiliary equipment such as valves, pumps and tanks shall be through flanged connections which shall consist of the following:
 - 1. An HDPE flange shall be thermally butt-fused to the stub end of the pipe. A stainless steel or ductile iron back-up ring shall be used on both sides of the connection prior to thermally butt-fusing the PE flange.
 - 2. A 316 stainless steel back-up ring shall mate with a 316 stainless steel flange.
 - 3. Ductile iron back-up rings shall mate with cast iron flanges.
- M. Flange connections shall be provided with a full-face neoprene gasket.
- N. All HDPE pipe must be at the temperature of the surrounding soil at the time of backfilling and compaction.

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- O. No single piece of pipe shall be laid unless it is straight. The centerline of the pipe shall not deviate from a straight line drawn between the centers of the openings at the ends of the pipe by more than 1/16-in per foot of length. If a piece of pipe fails to meet this requirement check for straightness, it shall be rejected and removed from the site. Laying instructions of the manufacturer shall be explicitly followed.
- P. If a defective pipe is discovered after it has been installed, it shall be removed and replaced with a sound pipe in a satisfactory manner. All pipe and fittings shall be thoroughly cleaned before installation, shall be kept clean until they are used in the work and when laid, shall conform to the lines and grades required.
- Q. As soon as the excavation is complete to normal grade of the bottom of the trench, bedding shall be placed, compacted and graded to provide firm, uniform and continuous support for the pipe. Bell holes shall be excavated so that only the barrel of the pipe bears upon the bedding. The pipe shall be laid accurately to the lines and grades indicated on the Construction Plans. Blocking under the pipe will not be permitted. Bedding shall be placed evenly on each side of the pipe to mid-diameter and hand tools shall be used to force the bedding under the haunches of the pipe and into the bell holes to give firm continuous support for the pipe. Bedding shall then be placed to 12-in above the top of the pipe. The initial 3 feet of backfill above the bedding shall be placed in 1 foot layers and carefully compacted. Generally, the compaction shall be done evenly on each side of the pipe and compaction equipment shall not be operated directly over the pipe until sufficient backfill has been placed to ensure that such compaction equipment will not have a damaging effect on the pipe. The pipe manufacturers' representative prior to use shall approve equipment used in compacting the initial 3 feet of backfill. Pipe shall be installed per IRCDUS Drawing M-1 or M-2, Trench Details.
- R. Good alignment shall be preserved during installation. The deflection at joints shall not exceed that recommended by manufacturer. Fittings, in addition to those shown on the Drawings, shall be provided, if required, in crossing of utilities that may be encountered upon opening the trench.
- S. Each length of the pipe shall have the assembly mark aligned with the pipe previously laid and held securely until enough backfill has cramped.
- T. Before any joint is made, the pipe shall be checked to assure that a close joint with the next adjoining pipe has been maintained and that the inverts are matched and conform to the required grade. The pipe shall not be driven down to grade by striking it.
- U. Precautions shall be taken to prevent flotation of the pipe in the trench.
- V. When moveable trench bracing such as trench boxes, moveable sheeting, shoring or plates are used to support the sides of the trench, care shall be used in placing and moving the boxes or supporting bracing to prevent movement of the pipe, or disturbance of the pipe bedding and the backfill.

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Trench boxes, moveable sheeting, shoring or plates shall not be allowed to extend below the top of the pipe. As trench boxes, moveable sheeting, shoring or plates are moved, pipe bedding shall be placed to fill any voids created and the backfill shall again be compacted to provide uniform side support for the pipe.

- W. Sheeting and shoring will be required as determined in the field in accordance with OSHA regulations.
- X. Restrained joints shall be installed where shown on the Construction Plans, as required by IRCDUS Standards, or otherwise as directed by IRCDUS.

3.12 Marking

- A. Number 10 stranded conductor copper trace wire shall be spiral wrapped or affixed to the top of the pipe. See Trace Wire Details, M-13 for specifications regarding installation.
- B. Trace wire is required over or around all pipes.
- C. Location tape is required over all pipes. Tape is to be installed 12" below proposed grade and additional tape shall be adhered directly on top of the pipe if required by IRCDUS.

3.13 Trenchless Installation of High Density Polyethylene (HDPE) Pressure Mains by Directional Bore

- A. Description
 - 1. Portions of the pressure mains shall be installed by the directional bore method within the limits indicated of the contract plans and as specified here in. Generally, as a minimum, the pressure main is to be located within the road right-of-way and shall be installed by directional boring.
 - 2. This section includes material, performance and installation standards, and the contractor's responsibilities associated with the furnishing of labor, material, equipment, and identical required to install, complete, required trenchless installation of pressure mains, as shown on the Drawings and as specified herein.
- B. Experience
 - 1. The Contractor must demonstrate expertise in trenchless method by providing a list of ten utility references for which similar work has been performed in the last two years. The references should include a name and phone number where the contact can be made to verify the Contractor's capability. The Contractor must provide documentation showing successful completion of the projects used for reference. Conventional trenching experience will not be considered applicable.

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2. Supervisory personnel must be adequately trained and shall have at least four years of experience in directional boring. The Contractor shall submit the names and resumes of all supervisory field personnel prior to construction.
3. Directional boring equipment shall be capable of installing the minimum pipe diameter noted on the drawings.

C. Submittals

1. Submit technical data for equipment including clay slurry material, method of installation with working drawings, and proposed sequence of construction for approval by the IRCDUS.
2. Prior to approval for directional boring, the Contractor must submit the names of supervisory personnel, and history information of the directional boring experience. In addition, the Contractor must submit for approval the nameplate, data for the drilling equipment, mobile spoils removal units and Material Safety Data Sheets (MSDS) for the drilling slurry compounds.
3. The Contractor is required to bring to the attention of the engineer any known design discrepancies with actual tunneling methods that the contractor will be performing. This shall be stated in writing to the Engineer at the pre-construction meeting.

D. Installation

1. Installation shall be in a trenchless manner producing continuous bores.
2. The tunneling system shall be remotely steerable and permit electronic monitoring of tunnel depth and location. Accurate placement of pipe within a +/- 2-inch window is required both horizontally and vertically. Turning capability of 90-degree radius in 40 feet is required. Continuous monitoring of the boring head is required, including across open water if necessary.
3. The directional boring Contractor shall submit certification, by a Professional Engineer licensed in the State of Florida, that the directional boring has been performed in accordance to the construction drawings, and shall submit signed and sealed drawings. AS-Built Record Drawings shall be provided both in electronic format and hard paper copy.
4. Tunneling shall be performed by a fluid-cutting process (high pressure-low volume) utilizing liquid clay i.e. bentonite. The clay lining will maintain tunnel stability and provide lubrication in order to reduce frictional drag while the pipe is being installed. In addition, the clay fluid must be totally inert and contain no environmental risk. The Contractor must also have a

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mobile vacuum spoils recovery vehicle on site to remove the drilling spoils from the access pits. The spoils must then be transported from the job site and be properly disposed off the site. The drilling spoils shall not, under any circumstances, be disposed into a sanitary sewer, storm, or other public or private drainage system. Spoils may be transported to the County's Solid Waste Facility and the cost of disposal shall be at the Contractor's expense.

5. Liquid clay type colloidal drilling fluid shall consist of at least 10 percent of high-grade carefully processed bentonite to consolidate cuttings of the soil, to seal the walls of the hole, and to furnish lubrication for subsequent removal of cuttings. The slurry that is heavier than the surrounding material, is high in colloids of the bentonite type and it will deposit a thin filter cake of low permeability material on the walls of the bore. This will allow only a small amount of the fluid to pass into the surrounding soils and will stabilize the bore. The colloidal content of the fluid imparts excellent lubricating qualities to the slurry that is a distinct aid to the removal of the soil cuttings.
6. Pneumatic or water-jetting methods will be considered unacceptable due to the possibility of surface subsidence.
7. After an initial bore has been completed, a reamer will be installed at the termination pit and the pipe shall be pulled back to the starting pit. The reamer shall be capable of discharging liquid clay to facilitate the installation of the pipe into a stabilized and lubricated tunnel.
8. A minimum of two insulated #6 stranded conductor copper tracer wire shall be wrapped or affixed to the top of the pipe and fittings along with the HDPE pipe. The tracer wire shall be tested for continuity or traceability upon completed installation. Should both tracer wires fail to test for continuity then the test shall be considered a failure and the wires shall be replaced.
9. Upon completion of boring and pipe installation, the Contractor shall remove all spoils from the starting and termination pits. All pits shall be restored to their original condition.
10. Restoration shall be as required by IRC DUS. The shoulders, ditches, banks, and slopes of roads and railroads crossed and paralleled shall not wash out before becoming accepted.

END OF SECTION

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SECTION 02413 HORIZONTAL DIRECTIONAL DRILLING

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. The CONTRACTOR shall furnish all labor, equipment, and materials necessary to install carrier pipe by horizontal directional drilling (HDD) at the locations shown on the Contract Documents and as specified herein.
- B. The directional boring scope shall include, but not be limited to, steerable directional boring equipment, operator control cabin, mud plant, entry and exit pits, pumps, hoses, and other equipment, sheeting, location signs as required, and miscellaneous appurtenances to complete the entire Work as shown on the Contract Drawings. Directional boring operations shall be performed within the right-of-way and/or easements shown on the Contract Drawings.
- C. The ENGINEER has relied upon subsurface data for general information purposes only and the data are not part of the Contract Documents. The CONTRACTOR shall examine the site and or undertake his own geotechnical investigation prior to submitting his bid, taking into consideration all conditions that may affect his work. The OWNER and ENGINEER will not assume responsibility for variations of subsurface conditions at locations other than places shown and at the time the investigation was made.

1.02 RELATED WORK

- A. High density polyethylene (HDPE) pipe and fittings are included in Section 3.
- B. Trenching, backfilling and compaction are included in Section 1.

1.03 DEFINITIONS

- A. Annular Space: The space between the excavated HDD final reamed bore diameter and the pipe.
- B. Bent Sub: A section of drill pipe behind the cutting tools that is inclined at an angle at one to three degrees from the axis of the bore in the desired direction of steering. The bent sub allows steering while rotating the cutting tools.
- C. Drilling Fluid/Mud: A mixture of water, bentonite, and/or polymers continuously pumped to the drilling tools to facilitate the removal of soil cuttings, and stabilization of the bore. These fluids also cool the cutting tools and lubricate the drill pipe and product pipe string.
- D. Drill String: The total length of the drill pipe in the borehole.
- E. Drilling Tool/Bit: Any tool or system of tools which excavates at the face of a bore.
- F. Entry Pit: The location where the pilot bore initially penetrates the ground surface and where the HDD rig is positioned.

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- G. Exit pit: The location where the pilot bore exists the ground surface.
- H. Horizontal Directional Drilling: A surface-launched, guided, steerable drilling system used for the trenchless installation of pipes, conduits, and cables.
- I. HDD Work Plan: Written descriptions, together with sketches, profile drawings, schedules, and other documents defining CONTRACTOR's plans and procedures for horizontal directional drilling.
- J. Inadvertent Return – Uncontrolled flow of drilling fluid/mud to the surface at a location other than the entry or exit pit. In certain conditions, this may also be known as hydrofracture or frac-out.
- K. Geotechnical Investigation Report: A report which provides the geotechnical boring locations and logs, geotechnical and environmental laboratory data results, and testing procedures.
- L. Obstruction: Any object lying completely or partially within the design pathway of the bore and pipe that prevents further advancement of the drill pipe, pre-reamer, reamer, and/or pipe, after all reasonable CONTRACTOR attempts to advance past the object or re-drill around the object have failed.
- M. Pilot Bore: The action of creating the first guided pass of the HDD process which is then reamed in one or more passes to the size required to allow pullback of the pipe.
- N. Pullback: The part of a horizontal directional drilling process in which the drill pipe, swivel, and product pipe or cable is pulled back through the bore to the entry.
- O. Pullback Loads: The loads (forces) applied to a drill string and product pipe during the pullback process. In addition to the tensile pullback loads, bending, buckling and combination loads must be considered during construction.
- P. Reamer: A cutting tool pushed or pulled through the borehole in order to enlarge the pilot bore hole to a diameter sufficient for the installation of the product pipe.
- Q. Settlement Point: A fixed point with elevation and spatial location established by survey prior to construction to monitor ground movements.

1.04 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. API Bulletin 13D, 1985. Bulletin on the Rheology of Oil-Well Drilling Fluids, Second Edition, Dallas, Texas, American Petroleum Institute.
- B. API Recommended Practice 13B-1, 1990. Standard Procedures for Field Testing Water-Based Drilling Fluids, First Edition, Dallas, Texas, American Petroleum Institute.
- C. API Recommended Practice 13B-1, 1990. Standard Procedures for Field Testing Water-Based Drilling Fluid Materials, Fifteenth Edition, Dallas, Texas. American Petroleum Institute.
- D. Horizontal Directional Drilling Good Practices Guidelines, Latest Edition, HDD

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Industry Consortium, 300pp.

- E. IADC Drilling Manual, 1992. Eleventh Edition, Houston, Texas, International Associated of Drilling Contractors.
- F. Installation of Pipelines Beneath Levees Using Horizontal Directional Drilling, US Army Corps of Engineers, Waterways Experiment Station, Final Report, CPAR-GL-98-1, April 1998.
- G. Installation of Pipelines Beneath Levees Using Horizontal Directional Drilling, US Army Corps of Engineers, Waterways Experiment Station, Final Report, CPAR-GL-98-1, April 1998.
- H. Installation of Pipelines by Horizontal Directional Drilling, Pipeline Research Committee, American Gas Association, PR-227-9424, April 1995.
- I. Pipeline Design for Installation by Horizontal Directional Drilling, ASCE Manuals and reports on Engineering Practice No. 108, 2005.
- J. Pressure Pipelines Design for Water and Wastewater, American Society for Civil Engineers, 2nd ed., 1992.
- K. Tables for Hydraulic Design of Pipes and Sewers, American Society for Civil Engineers, 5th ed., 1990.

1.05 SUBMITTALS

A. Following is the summary of information to be included in submittals required for the HDD Work. The CONTRACTOR may combine submittals at his discretion but at a minimum the following information must be addressed and provided for review.

- 1. Risk Mitigation
- 2. Contingency Plan for Remediation of Potential Problems
- 3. Disposal of Spoils and Drilling Fluids Plan
- 4. Equipment Layout Plan and confirmation of work area on design plans is acceptable.
- 5. Inadvertent Return (Frac-Out) and Surface Spill Contingency Plan
- 6. Horizontal Directional Drilling Work Plan
- 7. Maximum Allowable Drilling Fluid Pressure Calculations
- 8. Methods, Equipment, and Materials Description Plan
- 9. Pipe Filling Methods and Testing during Pullback
- 10. Protection of Adjacent Structures and Facilities Plan
- 13. Qualifications of Superintendent and Key Personnel
- 14. Radius of Curvature Confirmation
- 15. Rig Capacity Plan
- 16. Health and Safety Plan
- 17. Construction Activities Schedule
- 19. Surveying Equipment and Procedures
- 20. Construction Progress
- 21. Settlement Monitoring Plan

B. In addition to other requirements indicated throughout this Specification, the

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following sections describe the above required submittals in more detail.

1. Submittals shall be in accordance with the requirements of the Specifications, providing sufficient detail to allow the ENGINEER to judge whether or not the proposed equipment, materials, and procedures will meet the Contract requirements. The ENGINEER's review of submittal details and data will be based on considerations for the completed Work, utilities, and the possibility of necessary delays in the execution of the Work to be constructed under this Contract. Review and acceptance of the CONTRACTOR's submittals by the ENGINEER shall not be construed in any way as relieving the CONTRACTOR of its responsibilities under this Contract.
 2. The CONTRACTOR shall submit all Shop Drawings to the ENGINEER. Unless otherwise noted, all Shop Drawings shall have been reviewed and accepted by the ENGINEER prior to CONTRACTOR's mobilization. All Drawings shall be legible with dimensions accurately shown and clearly marked in English.
- C. Contingency Plan for Remediation of Potential Problems: The CONTRACTOR shall submit a Contingency Plan for Remediation of Potential Problems that may be encountered during the drilling operations. The contingency plans shall address the observations that would lead to the discovery of the problem and the methods that would be used to mitigate the problem. Potential problems that shall be addressed in this Plan include, but are not limited to, the following:
1. Loss of returns/loss of circulation of drilling fluids.
 2. Inadvertent returns (frac-out)/hydrofracture or surface spills resulting in drilling fluids entering water or reaching the surface. Stand-by equipment shall be provided by the CONTRACTOR to recover fluids. Turbidity barriers or other appropriate methods of containing and clean-up shall be part of the stand-by equipment to minimize dispersion in the event that drilling fluids reach the surface.
 3. Encountering obstruction during pilot bore or reaming/pullback.
 4. Drill pipe or product pipe cannot be advanced.
 5. Deviations from design line and grade exceed allowable tolerances.
 6. Drill pipe or product pipe broken off in borehole.
 7. Product pipe collapse or excessive deformation.
 8. Utility strike.
 9. Deviation from planned bore path.
 10. Hydrolock occurs or is suspected.
 11. Excessive ground settlement or heave.
- D. Disposal of Spoils and Drilling Fluids Plan: The CONTRACTOR shall submit Plans for disposal of waste materials resulting from the pipeline construction, including drilling fluids, cuttings, waste oil, fuel, discharge water, etc. The CONTRACTOR shall identify the disposal site and submit a letter indicating willingness and legal authority to accept the described and anticipated waste products.
- E. Equipment Layout Plan: The CONTRACTOR shall submit a plan which provides sketches depicting the layout and locations of equipment within the rig side work area and pipe side work area, including any proposed drilling fluid containment and recirculation pits. The CONTRACTOR shall confirm that all operations shall be completely contained within the permanent and Right of Way, and any temporary

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construction easement that may be shown on the Contract Documents.

- F. CONTRACTOR shall be responsible to for design and implementation (including all required costs, equipment and personnel) of Maintenance of Traffic (MOT) Plans necessary for the completion of the work as depicted in the design drawings, specifications and all referenced documents. MOT Plan shall be prepared submitted to the Indian River County Public Works Department for review and approval prior to any implementation or construction activities.
- G. Inadvertent Return (Frac-Out) and Surface Spill Contingency Plan: An Inadvertent Return (Frac-Out) and Surface Spill Contingency Plan shall be prepared for the installation of the pipeline using HDD. The Contractor shall submit letter signed by an authorized representative of Contractor confirming that the Plan will be followed. If required by permit conditions, Contractor shall revise the Plan as necessary to satisfy the associated regulatory agency.
- H. Horizontal Directional Drilling Work Plan: The CONTRACTOR shall submit a HDD Work Plan complete with drawings and written description identifying details of the proposed method of construction and the sequence of operations to be performed during construction including placement, entry and exit points, and method of attachment and pullback of bundled carrier pipes.
 - 1. The Plan shall include a detailed plan and profile of the bore showing any proposed deviations from the drawings included in design documents and plotted at a scale no smaller than one inch equals 40 feet horizontal and one inch equals four feet vertical.
 - 2. The drilling plan shall provide detail of the planned drilled bore path and the method for monitoring and controlling the speed, line, grade, and rate of fluids delivery. It shall include the sequence, size, and description of each reamer and capabilities of each through various geologic formations. Any drill plan should include a swabbing of the bore path prior to pipe pullback.
- I. Maximum Allowable Drilling Fluid Pressure Calculations: The CONTRACTOR shall submit calculations identifying the critical downhole pressure that would cause hydrofracture or inadvertent return of drilling fluid. The calculations shall identify the critical points in the alignment beneath the channel and near the exit point where the soil cover above the bore is low. The calculations shall identify all parameters used and state all assumptions made in the calculations.
- J. Methods, Equipment, and Materials Description Plan: The CONTRACTOR shall submit detailed description of methods, equipment, and materials to be used for the pipeline installation. Descriptions of drilling fluid additives shall be accompanied by Materials Safety Data Sheets (MSDS) and Manufacturers' descriptions and warranties. Descriptions of equipment shall include Manufacturers' specifications, calibrations, appropriate drawing, photographs, and descriptions of any modifications since manufacture. This plan shall also include the CONTRACTORs means for complying with all local noise ordinances.
- K. Pipe Filling Methods and Testing during Pullback: The CONTRACTOR shall submit methods and procedures for filling the pipe with water during pull back and testing.
- L. Protection of Adjacent Structures and Facilities Plan: The Contractor shall submit a

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plan that provides details on measures to be taken to monitor and protect adjacent utilities, structures, roadways and sidewalks, and provide details on monitoring equipment and provisions, including the layout of all settlement points and other monitoring points. Provide two (2) copies of pre-construction survey of adjacent structures and photographs with captions to document pre-construction conditions prior to beginning HDD construction.

- M. Qualifications of Superintendent and Key Personnel: The CONTRACTOR shall submit written documentation of HDD superintendent and key personnel experience in accordance with Paragraph 1.07A and 1.07B. Submit evidence of OSHA Certification for the Site Safety Representative.
- N. Radius of Curvature Confirmation: The CONTRACTOR shall confirm that the bore can be completed using the radius of curvature and geometry shown on the Contract Drawings along with the calculations showing that installation stresses do not exceed allowable pipe stresses.
- O. Rig Capacity Plan: The CONTRACTOR shall submit a plan which provides details on the capacity of the drill rig verifying that the pullback capacity is greater than the required pullback calculated and submitted by the CONTRACTOR under paragraph 1.05N.
- P. Health and Safety Plan: The CONTRACTOR shall submit a Health and Safety Plan, including the name of the CONTRACTOR's Site Safety Representative, emergency telephone numbers for medical facilities, and precautions for handling and disposal of any hazardous or flammable materials. The Safety Plan shall include a code of safe practices and an emergency plan in accordance with OSHA and Florida/OSHA requirements.
- Q. Construction Activities Schedule: At least fifteen (15) working days prior to mobilization for HDD operations, the CONTRACTOR shall submit a detailed schedule for the HDD installation showing all major construction activities and durations, with beginning and completion dates shown. The schedule shall be updated at least every week or more frequently, as directed by the ENGINEER, and shall include:
1. "One call" utility locate requests and visual confirmation of all crossing utilities and all parallel utilities within the vicinity of the bore centerline.
 2. Rig mobilization and setup.
 3. Pilot bore drilling.
 4. Pre-reaming and reaming.
 5. Layout and fusing of pipe.
 6. Pressure testing of pipe prior to pullback.
 7. Final reaming and pullback of pipe.
 8. Pressure testing of pipe after installation.
 9. Mandrel/pig test to confirm deformations of pipe are within allowable tolerances.
 10. Cleanup, surface restoration, and demobilization.
- R. The following shall be submitted as construction progresses and at the completion of construction.
1. Daily Logs and Records: The CONTRACTOR shall submit complete, legible, written daily logs and records as specified in Paragraph 1.07C and as directed

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by the ENGINEER, by noon of the following day to which the records correspond.

2. Drilling and Reaming Rates: The CONTRACTOR shall submit maximum drilling speeds and reaming rates for pilot bore and each reaming pass and confirm that the pump capacity is adequate for these anticipated drilling rates for the mud and/or drilling fluid weights and viscosities anticipated. These shall be submitted to the ENGINEER on a daily basis.
 3. Drilling Fluid Viscosity and Density (Mud Weight): The CONTRACTOR shall submit measured mud and/or drilling fluid weights used during pilot boring and reaming of the bore measured at a minimum of three times per shift or at least once per 200 feet of drilled or reamed length, whichever is more frequent, with at least two (2) hours between readings.
 4. Pilot Bore As-Built Profile: The CONTRACTOR shall submit an as-built profile of the pilot bore within 24 hours of completion of the pilot bore.
 5. Pressure Test Records: The CONTRACTOR shall submit all pressure test records for both the pre-installation and post-installation tests. These shall be submitted within 24 hours of completion of such tests.
 6. Variations in Plan and Profile: The CONTRACTOR shall document any variations between the actual Contract Drawings and profile of the bore path and the location shown on the Contract Drawings. The CONTRACTOR shall notify in writing and by telephone the ENGINEER immediately upon discovery of any deviations.
- S. Settlement Monitoring Plan: The Contractor shall submit a settlement monitoring plan showing location of proposed settlement points and frequency of readings.
- T. Risk Mitigation: At least seven (7) working days prior to each major operations milestone, the CONTRACTOR and HDD superintendent shall attend a risk mitigation meeting with representatives of the ENGINEER and OWNER for each HDD crossing. The major operations milestones shall include the following as a minimum:
1. Rig mobilization and setup.
 2. Pilot bore drilling.
 3. Pre-reaming and reaming.
 4. Layout and fusing of pipe.
 5. Pressure testing of pipe prior to pullback.
- U. CONTRACTOR to provide Record Drawings of the completed Directional Drill including a vertical record of the location of the drilling head at a minimum of 20 Ft. horizontal increments along the path of the Bore.

1.06 PERFORMANCE REQUIREMENTS

- A. The CONTRACTOR shall provide all equipment, materials, and personnel necessary for completing the installation as shown on the Contract Drawing and specified herein. The equipment and materials shall include but are not limited to:

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1. Directional drilling rig with all ancillary equipment, including drill pipe, drilling fluid, cutting tools, reaming bits, swivels, expanders, motors, pumps, hoses, mixing equipment, drilling fluid processing equipment (cuttings separation equipment), downhole survey equipment, energized surface grid tracking system, fluid pressure and flow rate monitoring equipment, spare parts, pipe handling equipment (cranes, backhoes, rollers, side boom tractors) control equipment, and office equipment.
 2. Drilling fluids, water, fuel, lubricant, polymers, or other additives.
 3. Any other expendable or reusable materials, supplies, and equipment needed for the installation.
- B. The drilling equipment shall be capable of advancing through the geologic conditions to be encountered at the site, as presented in the Contract Documents, the Geotechnical Report and as anticipated by the CONTRACTOR.
- C. The drilling fluid shall be designed for the geologic conditions to be encountered at the site and as anticipated by the CONTRACTOR.
- D. The drilling system shall include a fluid pump and separation plant that can achieve the rates of drilling fluid pumping, spoil separation, and slurry cleaning required by the CONTRACTOR to achieve planned production rates for the soils described in the Geotechnical Report, and as anticipated by the CONTRACTOR. Shaker screens and hydrocyclones may be required for efficient separation of spoils. The CONTRACTOR is advised that the separation plant must fit within the allowable Work areas shown on the Contract Drawings.
- E. All spoil and slurry must be contained in trucks, tanks, approved recirculation pits, or other containers at all times. Dumping of spoil or slurry on the ground, discharge into sewers, or discharge into the water bodies will not be permitted. All spoils will be transported and disposed of off-site at an approved disposal facility that meets all State of Florida and local requirements.
- F. Perform all Work within Work areas shown on the Contract Drawings.
- G. The pipeline shall be installed using the radii of curvature and entry and exit angles shown on the Contract Drawings; unless deviations are approved in writing by the ENGINEER.
- H. Pipe rollers and lifters will be required to help the transition of the carrier pipe into the bore and to minimize the pull force. The number of pipe rollers and lifters shall be determined by the Contractor in accordance with the pipe supplier's recommendations. Location and spacing of the rollers and lifters will be done in accordance with the pipe manufacturer's recommendations based on bend radius.
- I. It shall be the CONTRACTOR's sole responsibility that all Work is done in conformance with all applicable federal, state, and local safety requirements. Required safety equipment and procedures shall be employed by the CONTRACTOR at all times. All materials and methods of construction shall meet the applicable requirements of the State of Florida Administrative Code.

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- J. The pipe shall be certified by the CONTRACTOR as meeting all requirements of the Contract Documents. The fabricated pipe will be pressure-tested by the CONTRACTOR prior to pullback and after installation is completed.
- K. The CONTRACTOR shall allow access to the OWNER and/or ENGINEER and shall furnish necessary assistance and cooperation to aid the ENGINEER in observations and data and sample collection, including, but not limited to the following:
 - 1. The OWNER and/or ENGINEER shall have full access to the operator control center prior to, during, and following all HDD operations. This shall include, but not be limited to, providing visual access to real-time operator control screens, gauges, and indicators.
 - 2. The OWNER and/or ENGINEER shall have full access to the slurry separation plant prior to, during, and following all HDD operations. This shall include, but not be limited to, full access to shaker screens, hydrocyclones, conveyor belts, and slurry and spoil holding tanks. The ENGINEER shall be allowed to collect soil samples from the shaker screens and/or spoil holding tanks on the slurry separation plant a minimum of once per installed pipe section, and whenever changes in conditions are observed or suspected. If requested, the CONTRACTOR shall assist in the collection of these samples as directed by the ENGINEER.
- L. CONTRACTOR shall comply with all local noise ordinances. Sound levels in excess of these values are sufficient cause to have the Work halted until equipment can be quieted to these levels. Work stoppage for excessive noise shall not relieve the CONTRACTOR of the portions of this Specification including, but not limited to completion of all Work within specified Contract Time and Contract Price. The CONTRACTOR shall submit a Plan prior to construction identifying all noise reduction/abatement procedures. The Plan will be reviewed by the ENGINEER prior to construction.
 - 1. If mufflers cannot achieve the necessary noise reduction, noise abatement shall be accomplished by the CONTRACTOR's installation of baffles (or other acceptable means) positioned to break line-of-sight from the noise source to affected residences and/or commercial structures. Minimum noise abatement measures shall consist of equipping all engines with hospital grade mufflers or silencers.

1.07 QUALITY ASSURANCE

- A. Contractor Qualifications and Experience: The Contractor shall meet the following minimum qualifications:
 - 1. Contractor must be licensed in the State of Florida as an underground utility Contractor for a minimum of five (5) years.
 - 2. The Contractor shall have at least five (5) years of demonstrated successful experience installing pipelines by the means of HDD.
 - 3. The Contractor must have successfully completed three (3) water or sewer projects where the pipe was installed with HDD techniques, each (unless

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otherwise noted) meeting the following criteria.

- a. Minimum carrier pipe nominal diameter of at least 16-inches.
- b. Minimum length of 600 linear feet in a single pull through soil.
- c. The carrier pipe must be high density fusible polyethylene (HDPE) pipe.

And provide the following for each project.

- a. Project Description.
- b. Pipe-Size, Length, Material.
- c. Bore Length.
- d. Soil Types.
- e. OWNER's Contact Information.
- f. ENGINEER's Contact Information.
- g. Change Orders.
- h. Scheduled Completion Date and Actual Completion Date.

4. The Contractor will be required to employ skilled, experienced superintendent(s), equipment operator(s) and personnel throughout the project. The superintendent for this project shall have at least five (5) years of successful experience using the HDD process, with at least two (2) projects meeting the criteria identified in Paragraph 1.07A.3.
5. The HDD equipment operator for this project shall have at least five (5) years of successful experience using the HDD process, with at least one (1) project meeting the criteria identified in Paragraph 1.07A.3.

B. The Contractor shall furnish resumes of the superintendent(s) and key personnel. Personnel experience records should include project names, locations, pullback lengths, ground conditions, pipe materials, project description, project Owner, Engineer, and references with names, addresses, and telephone numbers. The superintendent listed in the submittal shall be on site during all construction related activities required for the HDD installation for this project.

C. Daily Logs and Records: Daily logs and records shall be maintained by the Contractor and shall include the following

1. drilling lengths,
2. location of drill head,
3. drilling fluid pressures and flow rates,
4. drilling fluid losses,
5. inadvertent returns (Frac-out),
6. drilling times required for each pipe joint,
7. any instances of retraction and re-drilling of the pilot bore or segments thereof, and
8. any other relevant observations, including any observed settlement, heave, frac-outs, or surface spills.

The downhole annular drilling fluid pressures shall be measured and recorded throughout the pilot hole drilling. These records shall be maintained and provided daily to the Engineer. The position of the drill head shall be continuously tracked

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and recorded by a downhole tracking locator system. A plot of actual locations of the bore path shall be maintained and updated daily, or more frequently, as directed by the Engineer. These records shall be maintained and provided daily to the Engineer.

- D. Advance Notices and Inspections: The Contractor shall provide at least 24 hours advance written notice to the Engineer of the planned inspection of major drilling activities, including pilot bore launch, pre-reaming, reaming, and pipe pullback. The Contractor shall immediately notify the Engineer, in writing, when any significant problems are encountered or if ground conditions are considered by the Contractor to be materially and significantly different than those represented with the Geotechnical Report. All Work by the Contractors shall be performed in the presence of the Engineer unless Engineer grants prior written approval to perform such Work in Engineer's absence.
- E. Surveying Equipment and Procedures: All surveying equipment used for downhole surveying and tracking of the bore path and drill head shall be inspected and calibrated by the equipment manufacturer prior to use. Proof of this inspection and calibration shall be provided to the Engineer prior to commencement of drilling operations.

PART 2 – PRODUCTS

2.01 DRILLING FLUIDS

- A. The CONTRACTOR shall select drilling fluid mixture proportions to ensure continuous circulation, bore stability, reduce drag on the pipe, and completely fill the annular space between the bore and the pipe to control settlement. Management and disposal of drilling fluids shall be the CONTRACTOR's responsibility. Drilling fluids shall not be disposed of on-site or discharged to sanitary or storm sewers, or the waterways or adjacent wetlands.

2.02 DRILL PIPE

- A. The CONTRACTOR shall provide high quality drill pipes that have been inspected and determined to be adequate for the project requirements. Bent, racked, or fatigued drill pipes shall not be used. Threads must be in good condition. The length of each drill pipe shall be measured and recorded.

2.03 PIPE

- A. The CONTRACTOR shall provide and HDPE pipe in accordance with Section 3.
- B. The pipe thickness must conform to the most conservative design with respect to design calculations for the critical combination of internal and external pressure, pullback and bending. The carrier pipe shall meet the dimension ratio (DR-11) or greater as depicted in the design drawings.

2.04 WATER

- A. Testing and construction water will be provided via construction water connection as detailed on the design drawings and located on the 12" Dia. bypass connection to be installed on the existing 30" Dia. DIP watermain at the north end of the project.

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- B. Water required for the HDD operations shall be provided by the OWNER

PART 3 - EXECUTION

3.01 GENERAL

- A. The CONTRACTOR shall provide adequate control of surface water and drilling fluids drainage and runoff, and provide silt fences, hay bales, and wattles to prevent surface water or drilling fluids from being transported off-site.
- B. The CONTRACTOR shall not initiate HDD until all submittals as specified in Paragraph 1.05 are received, reviewed, and approved by the ENGINEER.
- C. The CONTRACTOR shall not initiate HDD until all required permits are obtained. Copies of all permits shall be provided to the ENGINEER prior to construction.
- D. It is the CONTRACTOR's responsibility to provide barricades, fencing, or other safety measures to prevent public access into Work and staging areas.

3.02 PROTECTION OF UNDERGROUND UTILITIES

- A. The Contract Drawings show existing buried utilities that are believed to be near the directional drill alignment. There is no guarantee that these utilities are located as shown or that other utilities are not present. It will be the CONTRACTOR's responsibility to field locate all nearby utilities or other potential subsurface obstructions that may interfere with the Work.
- B. The CONTRACTOR shall notify "One Call" system to request marking of utilities that subscribe to One Call, at least 72 hours (excluding Saturdays, Sundays and Legal Holidays) before excavating in any public way and shall individually notify all other known or suspected utilities to request marking of these utilities. The CONTRACTOR shall confirm that all requested locates are made prior to commencing drilling operations. CONTRACTOR shall make all diligent efforts to locate any unmarked or abandoned utilities using all available information, maps, and drawings. The CONTRACTOR shall visually confirm and stake all existing lines, cables, or other underground facilities including exposing all crossing utilities and utilities within twenty (20) feet laterally of the centerline of designed drilled path at the discretion of the ENGINEER.
- C. The CONTRACTOR shall control drilling practices to prevent damage to existing utilities, existing pavement and sidewalks.
- D. The CONTRACTOR shall make diligent effort to locate surface evidence of any other potential subsurface obstructions, such as piers and piles.
- E. The CONTRACTOR shall be responsible for all losses and repairs occasioned by damage to underground utilities, structures and pavement/sidewalks resulting from drilling operations.

3.03 WORK STAGING AREA

- A. Barricades, Warning Signs, and Lights: The CONTRACTOR shall, in accordance with FDOT Standards erect appropriate barriers, warning lights, and signs, painted with approved colors, warnings, and graphics to ensure adequate warnings to

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personnel and the public.

- B. **Combustible Materials:** Combustible materials (fuel, oil, lubricants, etc.) shall be stored off-site or in a well-ventilated storage facility removed from the immediate vicinity of the drilling area by at least twenty (20) feet.
- C. **Construction Impacts:** The CONTRACTOR shall maintain the Work area in a manner that shall minimize adverse impacts on other public use activities. The CONTRACTOR shall proceed with Work in a safe, orderly manner, while maintaining the Work site free of debris and unnecessary equipment and materials.
- D. **Control of Drilling Fluids:** The CONTRACTOR shall follow all requirements of the Inadvertent Return (Frac-Out) and Surface Spill Contingency Plan as submitted and approved and shall control operational pressures, drilling mud weights, drilling speeds, and any other operational factors required to avoid hydrofracture fluid losses to formations, and control drilling fluid spillage. This includes any spillages or returns at entry and exit locations or at any intermediate point. All inadvertent returns (Frac-Outs) or spills shall be promptly contained and cleaned up by the CONTRACTOR. The CONTRACTOR shall maintain on-site mobile spoil removal equipment during all drilling, pre-reaming, reaming, and pullback operations and shall be capable of quickly removing spoils. The CONTRACTOR shall immediately notify ENGINEER of any inadvertent returns (Frac-Outs) or spills and immediately contain and clean up the return or spill.
- E. **Removal of Temporary Facilities:** At the completion of construction, the CONTRACTOR shall remove all temporary facilities installed by the CONTRACTOR. Unused soil, aggregate, and other materials shall be removed and disposed of at approved sites in accordance with Federal, State, and Local regulations. Any damage to streets, lawns, common areas, and sidewalks shall be restored to original or better conditions. All disturbed areas shall be re-vegetated.
- G. **Temporary Lighting:** The CONTRACTOR shall procure and maintain all temporary lighting needed for CONTRACTOR's operations, safety, testing, and inspection. Temporary lighting shall be removed immediately after completion of construction.
- H. **Work Staging:** The CONTRACTOR shall limit staging and Work operations to the areas shown on the Contract Drawings, or as otherwise accepted in writing by the ENGINEER and all necessary approvals and permits for storage of equipment and materials, parking, drilling and other Work.
- I. **Pipe Layout Staging Areas:**
 - 1. The Contractor shall visit and fully evaluate the proposed work areas prior to submitting a bid for this work.
 - 2. CONTRACTOR is responsible for securing all necessary permits and approvals for the use of the temporary staging area layout of the pipe. All costs associated with this shall be included in the CONTRACTOR's bid price.

3.04 MOBILIZATION

- A. The CONTRACTOR shall mobilize all equipment, materials, and personnel necessary to construct the casing and carrier pipes using the HDD process at the

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locations shown in the Contract Drawings.

1. **Entry Area:** The CONTRACTOR shall set up temporary workspace within the areas delineated on the Contract Drawings. Appropriate precautions and measures shall be employed by the CONTRACTOR to prevent erosion, surface drainage, and spillage of drilling fluids or other materials that could adversely impact the environmental quality of the site. Silt fences, hay wattles, and hay bales shall be used to line the Work area to minimize erosion and contain any spillage or runoff. Shovels, brooms, buckets, and barrels shall be kept on-site to facilitate containment and cleanup. A vacuum truck or trailer unit will be on standby and capable of responding within one hour to any spill or inadvertent return incident.
2. **Exit Area:** The exit area shall have appropriate precautions and measures for containing drilling fluids and cuttings. The CONTRACTOR shall use appropriate methods to minimize erosion and runoff. Containment and cleanup equipment shall be available to contain and clean up any surface spills and frac-outs.
3. **Pipe Layout Area:** Layout area shall be free of stones, wood, debris, and obstructions. Pipe rollers shall be provided by the CONTRACTOR during the fusion process to facilitate pipe fusion and pullback. The pipe layout area may not allow the entire length to be fused in a single length before start of pull-in. CONTRACTOR will plan work accordingly.

3.05 HORIZONTAL DIRECTIONAL DRILLING

- A. **Drill Rig Capacity:** The capacity of the directional drilling system used by the CONTRACTOR shall be adequate to install the specified pipes.
- B. **Pump Capacity:** The pumps used by the CONTRACTOR shall be adequate to supply the required flow rate and pressures at the anticipated drilling fluid viscosity at all times. Drilling speeds shall not exceed pump capacity. Drilling speeds shall be monitored continuously during HDD operations.
- C. **Bore Tracking and Monitoring:** At all times during the pilot bore the CONTRACTOR shall provide and maintain a bore tracking system that is capable of accurately locating the position of the drill head in the x, y, and z axes. The CONTRACTOR shall record these data at least once per drill pipe length or every thirty (30) feet, whichever is less.
 1. **Downhole and Surface Grid Tracking System:** CONTRACTOR shall monitor and record x, y, and z coordinates relative to an established surface survey benchmark from downhole survey data. The data shall be continuously monitored and recorded at least once per drill pipe length.
 2. **Deviations between the recorded and design bore path shall be calculated and reported on the daily log. If the deviations exceed tolerances specified, such occurrences shall be reported immediately to the ENGINEER. The CONTRACTOR shall undertake all necessary measures to correct deviations and return to design line and grade.**
 3. **Drilling Fluid Pressures and Flow Rates:** Drilling fluid pressures and flow rates shall be continuously monitored and recorded by the CONTRACTOR. The

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pressure shall be monitored at the pump. These measurements shall be made during pilot bore drilling, reaming, and pullback operations.

4. Drilling Speeds: Maximum allowable drilling speeds shall be calculated by the CONTRACTOR for pilot boring and each reaming pass and shall not be exceeded for pilot boring or reaming passes. Measurements shall be taken every thirty (30) feet or thirty (30) minutes, whichever is more frequent.
 5. Drilling Fluid Viscosity and Density (Mud Weight): The CONTRACTOR shall measure and record drilling fluid viscosity and density at least three (3) times per shift or at least once per 200 feet of drilled and reamed length, whichever is more frequent with at least two (2) hours between readings, using calibrated Marsh funnel and mud balance. These measurements shall be included in daily logs submitted to the ENGINEER. The CONTRACTOR shall document modifications to the drilling fluids, by noting the types and quantities of drilling fluid additives and the dates and times when introduced. The reason for the addition of drilling fluid additives or other modifications shall be documented and reported.
- D. Location of Entry and Exit Points: Entry and exit points shall be as shown on the Contract Drawings, unless otherwise approved in writing by the ENGINEER or as shown on the approved HDD Work Plan. The CONTRACTOR shall employ experienced licensed surveyors registered in the state of Florida to locate the entry and exit points, and to establish horizontal and vertical datum for the bore and the pipe layout and fabrication areas.
- E. Entry and Exit Angles: Drill entry and exit angles shall be as shown on the Contract Drawings, unless otherwise approved in writing by the ENGINEER.
- F. Pilot Bore: The pilot bore shall follow the design path of the bore shown on the Contract Drawings.
1. Horizontal and Vertical Tolerances: Horizontal and vertical deviations shall be less than plus or minus two (2) feet from the design path centerline. The CONTRACTOR shall continuously monitor horizontal and vertical position and record the position at least once per drill pipe length, or at thirty (30) feet, whichever is less.
 2. Radius of Curvature: The radius of curvature shall not be less than that shown on the Contract Drawings. The radius of curvature shall be calculated over the distance of three (3) drill pipe sections.
 3. Entry and Exit Tolerances: The location of the entry and exit points shall be in accordance with the approved HDD Work Plan. The CONTRACTOR shall be solely responsible for all Work necessary to correct excessive deviations from line and grade, including re-drilling, redesigning connections, and acquiring additional easement, at no additional cost to the OWNER and without schedule extension.
- G. Pre-reaming and Reaming: The pilot bore shall be pre-reamed and reamed using equipment and methods submitted by the CONTRACTOR. The CONTRACTOR shall completely pre-ream the bore to the final diameter prior to pullback.

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- H. Hydrostatic Pretest: CONTRACTOR shall perform a low hydrostatic water pressure test per Section 1. Test shall be at a reduced pressure (Minimum 50 psig) prior to pipe pullback.
- I. Pipe Pullback:
1. A final swabbing of the bore path prior to pipe pullback is required, unless otherwise approved by the ENGINEER prior to the start of drilling operations, pipe pullback of new pipe without prior swabbing of the bore path to the furnished bore path inside diameter will not be permitted. The pipe shall be installed by pulling it into the reamed bore path in a continuous operation, behind a final reaming tool selected by the CONTRACTOR.
 2. The pipe shall be isolated from excessive torsional and axial stresses by a swivel device.
 3. All measurements shall be made, recorded, and submitted on the daily logs during final reaming and pipe pullback.
 4. Pulling Loads: The maximum pull (axial tension force) exerted on the carrier pipeline shall be measured continuously in the control center and at the pulling head and limited to the maximum allowed by the pipe Manufacturer so that the pipe or joints are not overstressed. A factor of safety over the maximum allowable is not required.
 5. Pipeline Support: The pipelines shall be adequately supported during installation so as to prevent overstressing or buckling. The CONTRACTOR shall provide adequate support/rollers along the stringing area to support the required length of the carrier pipe for each bore. Such support/rollers shall be spaced according to the pipe supplier, and the rollers be comprised of a non-abrasive material arranged in a manner to provide support to the bottom and bottom quarter points of the pipeline allowing for free movement of the pipeline during pullback. The pipe layout area shall be cleared of all large stones, construction debris, or other foreign objects that could damage the piping during pullback.
 6. The pipe shall have ballast during pullback (filled with water).
 7. The leading end of the pipe shall be closed during the pullback operation, in accordance with the pipe supplier's recommendations. A pulling head shall be used that is rated at the allowable pull force capability of the pipe section being installed, in accordance with the pipe supplier's recommendations.
 8. Each length of pipe shall be inspected and cleaned as necessary to be free of debris immediately before joining.
 9. Two separate and complete runs of tracer wire will be attached to the leading end of the pipe pulling head and shall extend the full length of the installed pipe. No mid span splices will be permitted. Tracer wire and continuity testing shall be in accordance with IRCDUS construction standards and specifications.
 10. The CONTRACTOR shall at all times handle the pipe in a manner that does not overstress or otherwise damage the pipe. Vertical and horizontal curves shall be limited to manufacturer's recommended bend radius so that wall stresses do

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not exceed the allowable bending radius as recommended by the pipe supplier. If the pipe is buckled or otherwise damaged due to CONTRACTOR's acts or omissions, the damaged section shall be removed and replaced by the CONTRACTOR at his expense. The CONTRACTOR shall take appropriate steps during pullback to ensure that the carrier pipe and tracer wires will be installed without damage.

11. If the pipe has mid-welds, the CONTRACTOR shall engage the pipe supplier to provide a fusion technician to ensure Quality Assurance and Quality Control (QA/QC) of the mid-welds during the pullback operation.
 12. The CONTRACTOR shall monitor and inspect pipe rollers and method for suspending pipe at entry during the pullback operation to avoid damage to the pipe.
 13. The CONTRACTOR shall cease operations if the pipe is damaged and shall remove the pipe from the bore and repair the pipe using the Manufacturer's recommended procedure or replace the damaged pipe before resuming installation.
 14. Damage to the pipe resulting from installation or contact grouting is the responsibility of the CONTRACTOR, including costs for replacement and labor and materials at no cost to the OWNER. To confirm no damage to the pipe, upon completing of pullback and grouting, the CONTRACTOR shall perform the following test on the completed pipeline.
 - a. A mandrel or pig, one inch less in diameter than the internal diameter (including fusion beads) of the product pipe, which is capable of allowing water to pass through it, complete with a pulling cable on either side of mandrel or pig, shall be pulled through the entire length of the pipeline. If the pig or mandrel cannot pass through the pipe, it shall be considered collapsed and damaged and the CONTRACTOR shall be responsible for replacement of the carrier pipe and all costs associated with the replacement. Check Manufacturer's tolerance and fuse bead size.
 15. After the casing pipe is completely pulled through the bore, a sufficient period as recommended by the pipe Manufacturer shall be provided before the final pipe tie-in.
 16. Final Hydrostatic Test: The CONTRACTOR shall conduct a final hydrostatic test of the installed pipeline. Final test shall be in accordance with Section 3. The CONTRACTOR shall repair any defects discovered during the test, and repeat until the pipe passes the test.
 17. Upon completion of the installation and successful pressure testing of the directional bore and ancillary piping, CONTRACTOR shall provide bacteriological testing of the main in accordance with FDEP standards for certification.
- K. Obstructions: The CONTRACTOR shall notify the ENGINEER immediately in the event that any obstruction is encountered that prevents further advancement of the drill pipe, or pullback of the pre-reamer, reamer, and/or pipe. The CONTRACTOR shall make all diligent and reasonable efforts to advance past the object by drilling slowly through the object, pulling back, and drilling along a new bore path that

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avoids the object, or excavating and exposing and removing the object, and all other reasonable attempts to continue the bore. The CONTRACTOR shall notify the ENGINEER or proposed measures to attempt to advance past the object, prior to initiating the attempt. If the CONTRACTOR attempts to pullback and re-drill, the CONTRACTOR shall adhere to line and grade tolerances established in this Specification section, unless the ENGINEER approves variance, in writing, prior to the CONTRACTOR's attempt to re-drill. The CONTRACTOR and ENGINEER shall investigate the cause and together determine an appropriate response. Appropriate response may include revisions to equipment or methods, retraction and re-drilling of a portion of the bore, or abandonment of the hole. If abandonment is deemed necessary, the CONTRACTOR shall recover, to the extent practicable, any drill pipe, product pipe, and tools in the bore, and properly abandon the bore by contact grouting unless otherwise directed in writing by the ENGINEER. If the bore is abandoned, the CONTRACTOR shall be allowed to begin a second attempt to install the pipeline at an alternate location subject to approval, in writing, by the ENGINEER. The CONTRACTOR shall take all reasonable actions to complete the installation with minimal delays. The extra costs and payments associated with encountering a confirmed obstruction shall be negotiated between the Owner and Contractor, based on reasonable time and materials.

- L. Site Restoration and Demobilization: The CONTRACTOR shall remove all equipment, materials, drilling fluids, muck, waste, and debris from the site and restore the site to its original condition upon completion of the installation. Restoration and demobilization shall be completed by the CONTRACTOR within seven (7) calendar days of the completion of the pipeline installation.

*** * END OF SECTION * ***

ADDENDUM #3

SECTION 18

Approved Manufacturers' Products List

Air Release Valves – Sewer

- A.R.I.

Air Release Valves – Water

- APCO
- A.R.I.
- GA Industries
- Val-Matic

Backflow Preventer (RPZ) and Double Detector Check Valves with RPZ Assembly

- AMES Fire and Waterworks -Silver Bullet Series
- FEBCO
- Watts
- Wilkins

Blow-Off Valves

- John C. Kupferle Foundry Co. – Model Eclipse #85 or approved equal

Bronze Gate Valves

- American Valve Inc.
- East Jordan
- NIBCO
- Red-White Valve Corp.
- United Brass Works

Casing Spacers/Insulators

- APS- Advance Product &Systems
- Cascade Waterworks Mfg.
- GPT
- Raci North America

Check Valves- Weight & Lever Resilient Seat

- American Darling
- Clow Valve Company
- Kennedy Valve
- M&H Valve
- Mueller Co.
- Val-Matic

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Corporation Stops

- A.Y. McDonald Mfg. Co
- The Ford Meter Box Co. Inc. - FB1100 x G-NL Style, FB1700
- Mueller Co. Part #'s H-15028 & H10046

Couplings

- EBAA-Iron
- Krausz-HYMAX
- Smith-Blair (Pump Stations EZ with Seal and Restraint)
- Wal-Rich Dresser™ Pipeline Solutions

Curb Stops

- The Ford Meter Box Co. Inc. - KV43-342WG, KV43444WG, BA43342WG, BA43444WG, B41666WG, B41777WG, BFA43-666WG *& BFA43777WG
- AY McDonald: (Equal to Ford Part Numbers)
- Mueller: (Equal to Ford Part Numbers)

Ductile Iron Pipe

Water: Cement Lined Class 350/50

Sewer/Force Main: Protecto 401 Lines Class 350/50

- American
- Clow Valve Co.
- Griffin Pipe Products Co.
- McWane
- U.S. Pipe

Ductile Iron Fittings

Water: Cement Lined Class 350/50

Sewer/Force Main: Protecto 401 Lines Class 350/50

- American Valve
- Clow
- McWane Ductile
- Star Pipe Products
- Tyler
- U.S. Pipe

Electrical Equipment as listed or approved equal

- Crouse-Hinds
 1. Cable Connectors "CGB" Series
 2. Emergency Power Receptacle – 3W, No. AR1042-S22 with AR610 Panel Adaptor for pumps less than 25hp, AR2042-S22 with AR610 Panel Adaptor for pumps greater than 25hp
- Eagle Signal Bulletin 705

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1. HK series Elapsed Timer Meter

- Square D
 1. Unfused Safety Switch
 2. Thermal Magnetic Air Circuit Breaker
 3. Magnetic Motor Starter
 4. Reduced Voltage Motor Starter
 5. Pump Mode Selector Switch
 6. Indicator Lamps

Fire Hydrants 5 ¼" Valve Opening

- Clow – Medallion F2545
- East Jordan Iron Works – Part no. 5CD250
- Mueller-Centurion 250

Generator Sets

1000 KW or Greater

- Caterpillar
- Cummins/Onan
- Detroit Diesel

1000 KW or Less

- Atlas-Copco
- Katolight
- Kohler Power
- Tradewinds Power
- Winco

Lift Station Access Door

- Bilco – Type J-AL Single Leaf with Stainless Steel Hardware-Waterproof
- Halliday Products – Single Leaf with Stainless Steel Hardware-Waterproof

Lift Station Control Panels

- ECS (Economy Control Systems, Jacksonville, FL)

Lift Station Joint Sealer

- Marbri Supply Co.
 1. Embeco 636 Grout
 2. Embeco 885 Grout

Lift Station and Manhole Sealant and Coatings

- Pro-Tech EW-1 Water Base Epoxy
- CANUSA WRAPID SEAL

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Lift Station Submersible Pumps

- ABS Pump - If a grinder pump is proposed, only ABS type grinder pumps under 5.0 hp are permitted. ABS V2 Pirana Grinder Pumps are not permitted
- Xylem Flygt.

Lift Station Valve Pit Access Door

- Bilco
- Halliday Products

Lift Station Valve Pit Quick Disconnect

- Kamloc Male Kwik Disconnect
- Kamloc Coupler 4"

Lift Station Valve Pit Safety Grate

- Halliday Products
- Bilco

Line Setter for Meter Boxes

6" – Part # Retro-2BVBHH-NL
5/8" X 3/4" Meter Retrosetter

12" – Part # VHH42-12W-NL
5/8" X 3/4" Meter Retrosetter
No Lead 3/4" Key Valve
By Dual Check Valve

- Ford Meter Box

Marker Balls Electronic

- 3M – Water 3M 1403XR, Sewer 3M 1404XR

Manhole Frames and Covers

- U. S. Foundry – Drawing No. 420-C
- PAM –Pamrex Hinged Manhole Cover and Frame

Manholes Flexible Plastic Gaskets

- Press Seal Gasket Corp
- Ram-Nek

Manhole and Lift Station Linings

- AP/M Permaform
- Associated Fiberglass Enterprises
- GU Florida

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- LF Manufacturing Co. Inc.

Manhole Pipe Connection (Boot)

- Kor-N-Seal –Neoprene Boot with Stainless Steel Accessories
- PBX (Press Seal Gasket Corp)

Manhole Watertight Rain Guard Boot

- LF Manufacturing Co. Inc.
- Parson Environmental Products

Mechanical Joint Restraints

- EBAA –Megalugs and Bell Restraints
- SIGMA Corp
- Star Pipe Products
- U.S. Pipe – Field Lock Gaskets

Meter Boxes

Polymer Concrete & Fiberglass sizes 11”X18”, 13”X24”, 17”X30”, 24”X36”

- CDR Systems Corp.
- GlasMasters, Pre-Plumbed Box
- Hubbell

Meters for Sewer Force Mains and Reuse Mains

- Mag-Meter (on a case by case basis)
- The Abb Group/Fisher Porter

PE Pipe & Tubing

3/4”to 2” SDR 9 CTS
3” to 48” DR11 DIPS

- Chevron-Phillips
- Flying W Plastics Inc.
- JM Eagle
- Municiplex
- Polypipe

Plug Valves

- Clow Valve Co
- DeZurik-Series 100
- Henry Pratt Co.
- Kennedy Valve
- M&H Valve Co.
- Val-Matic-Series 1500

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PVC Pipe & Fittings

Water/Force Main - DR18 C900/C909 (for Fittings, see Ductile Iron Fittings on Page 18-2)
Sewer - SDR 26 3034 (for Fittings, see Sewer Fittings ASTM D-3034 on Page 18-7)

- Diamond Plastics
- ETI Pipe and Supply
- Freedom Plastics
- J-M Manufacturing Co. Inc.
- National Pipe and Plastic
- North American Pipe Corp.

Reduce Pressure Backflow Preventer Assembly

- AMES Fire and Waterworks - 400SS & 4000SS
- Wilkins –Part No. 975
- FEBCO- Part No. LF825Y
- Watts – Part No. LF909

Remote Telemetry Unit

- DataFlow Systems Inc. - Model TAC II telemetry unit, complete with Model PCU-001 pump control module, BPR backpack radio/TAC pack, power supply with battery backup, Model RTU-03 enclosure, cable and antenna

Resilient Seat Gate Valves

- American Flow Control
- Clow Valve Co.
- Kennedy Valve
- M&H Valve Co.
- Mueller Co.

Service Saddles-Stainless Steel Straps

- The Ford Meter Box Co.
- JCM Industries
- Romac Industries Inc.

Sewer Fittings ASTM D-3034

- The Harrington Corp./HARCO
- Multi Fittings
- Royal Building Products

Sleeve Type Couplings

- The Ford Meter Box Co.
- Smith-Blair - Style 413
- JCM Industries

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Tapping Sleeves- Stainless Steel

- The Ford Meter Box Co. – Style FTSS
- JCM Industries- Model 432
- Smith-Blair – Style 663
- Romac Industries Inc.

Tie Rods

All tie rods shall be stainless steel all-thread rods

Trace Wire Covering

- King Innovation –Dryconn Weatherproof Connectors
- SKRINK WRAP
 - a) 3M-ScotchKote Weatherproofing Compound
 - b) 3M- Scotch 33 tape

Trace Wire Port

- Snake Pit (Cast Iron Cover)

Valve Boxes (Domestic Heavy Duty)

- East Jordan Iron Works – Long Throat Lid General Foundries Inc
- Russell
- Star Pipe Products
- Tyler Union
- U. S. Foundry

Valve Name Plate

- LF Mfg. Co
- Shiedow Bronze Corp.
- Wager Co.

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ADDENDUM #3

SECTION – 1050 TO 1080 – WATERMAIN RELOCATION

The work specified in these items shall conform to Indian River County Department of Utility Services Standards and Specifications.

Item of Payment

Payment for the work specified in this item shall be made under:

Bid Item No. 1050-11-425A – Furnish and Install 20” DIP Water Main – Per Linear Foot

Bid Item No. 1050-42-224A – Furnish and Install 24” HDPE HDD – Per Linear Foot

Bid Item No. 1055-11-4A – Furnish and Install Fitting and Appurtenances – Per Ton

Bid Item No. 1080-11-404A – Furnish, Install and Remove 12” Bypass Assembly – Per Lump Sum

Bid Item No. 1080-11-506A – Furnish and Install Air Relief Valve and Vault – Per Each

Bid Item No. 1080-11-512A – Sample Points – Per Each

Bid Item No. 1080-11-512B – Pigging and Flushing – Per Lump Sum

Bid Item No. 1080-11-512C – Disinfection and Testing – Per Lump Sum

Bid Item No. 1080-23-120A – Furnish and Install 20” X 12” Wet Tap Assembly – Per Each

Bid Item No. 1080-24-112A – Furnish and Install 12” Gate Valve – Per Each

Bid Item No. 1080-24-120A – Furnish and Install 20” Gate Valve – Per Each

Bid Item No. 1080-27-120A – Furnish and Install 20” Line Stop – Per Each

+++END OF SECTION+++