SECTION 01090

REFERENCES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Reference Abbreviations

B. Abbreviations

C. Reference Standards

D. Definitions

1.2 RELATED SECTIONS

A. Information provided in this section is used where applicable in individual Specification Sections, Divisions 2 through 16.

1.3 REFERENCE ABBREVIATIONS

A. Reference to a technical society, trade association or standards setting organization, may be made in the Specifications by abbreviations in accordance with the following list:

AABC	Associated Air Balance Council
AAMA	Architectural Aluminum Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists
ACI	American Concrete Institute
ADC	Air Diffusion Council
AFBMA	Anti-friction Bearing Manufacturers Association
AGA	American Gas Association
AGMA	American Gear Manufacturers Association
AHA	Association of Home Appliance Manufacturers
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AMCA	Air Movement and Control Association, Inc.
ANSI	American National Standards Institute
APA	American Plywood Association
ARI	American Refrigeration Institute
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers

ASSE	American Society of Sanitary Engineers
ASTM	American Society for Testing and Materials
AWI	Architectural Woodwork Institute
AWPA	American Wood Preservers Association
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders' Hardware Manufacturers Association
BIA	Brick Institute of American
CABO	Council of American Building Officials
CAGI	Compressed Air and Gas Institute
CISPI	Cast Iron Soil Pipe Institute
CMAA	Crane Manufacturers Association of America
CRD	U.S. Corps of Engineers Specifications
CRSI	Concrete Reinforcing Steel Institute
CTI	Cooling Tower Institute
DHI	Door and Hardware Institute
DOH	Department of Health
DOT	Department of Transportation
Fed. Spec.	Federal Specifications
FGMA	Flat Glass Marketing Association
FM	Factory Mutual
HMI	Hoist Manufacturing Institute
HPMA	See HPVA
HPVA	Hardwood Plywood Veneer Association
ICEA	Insulated Cable Engineers Association
IEEE	Institute of Electrical and Electronics Engineers
IFI	Industrial Fasteners Institute
MIL	Military Specifications
MSS	Manufacturer's Standardization Society
NAAMM	National Association of Architectural Metal Manufacturers
NACM	National Association of Chain Manufacturers
NBS	National Bureau of Standards, See NIST
NEBB	National Environmental Balancing Bureau
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NETA	National Electrical Testing Association
NFPA	National Fire Protection Association
NFPA	National Forest Products Association
NFPA	National Fluid Power Association
NIST	National Institute of Standards and Technology
NLMA	National Lumber Manufacturers Association
NSF	National Sanitation Foundation
OSHA	Occupational Safety and Health Act
PCI	Prestressed Concrete Institute
PDI	Plumbing and Drainage Institute
SAE	Society of Automotive Engineers
SCPRF	Structural Clay Products Research Foundation
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SPI	Society of the Plastics Industry

SSPC	Steel Structures Painting Council
STI	Steel Tank Institute
TCA	Tile Council of American
TIMA	Thermal Insulation Manufacturers' Association
UL	Underwriters' Laboratories, Inc.
USBR	U. S. Bureau of Reclamation
USBS	U. S. Bureau of Standards, See NIST

1.4 ABBREVIATIONS

A. Abbreviations which may be used in individual Specification Sections Divisions 1 through 16 are as follows:

alternating current ..... ac
American wire gauge ..... AWG
ampere(s) ..... amp
ampere-hour(s) ..... AH
annual ..... ann
Ampere Interrupting Capacity ..... AIC
atmosphere(s) ..... atm
average ..... avg

biochemical oxygen demand ..... BOD
Board Foot ..... FBM
brake horsepower ..... bhp
Brinell Hardness ..... BH
British thermal unit(s) ..... Btu

calorie (s) ..... cal
carbonaceous biochemical oxygen demand ..... CBOD
Celsius (centigrade) C
Center to Center ..... C to C
centimeter(s) ..... cm
chemical oxygen demand ..... COD
coefficient, valve flow ..... C_v
condensate return ..... CR
cubic ..... cu
cubic centimeter(s) cc
cubic feet per day ..... cfd
cubic feet per hour ..... cfh
cubic feet per minute ..... cfm
cubic feet per minute, standard conditions ..... scfm
cubic feet per second ..... cfs
cubic foot (feet) ..... cu ft
cubic inch(es) ..... cu in
cubic yard(s) ..... cu yd

decibels ..... dB
decibels (A scale) ..... dBa
degree(s) ..... deg
dewpoint temperature ..... dpt
diameter ..... dia
direct current ..... dc
dissolved oxygen ..... DO
dissolved solids ..... DS
dry-bulb temperature ..... dbt

efficiency ..... eff
elevation ..... el
engineer of record ..... EOR
entering water temperature ..... ewt
entering air temperature ..... eat
equivalent direct radiation ..... edr

face area ..... fa
face to face ..... f to f
Fahrenheit ..... F
feet per day ..... fpd
feet per hour ..... fph
feet per minute ..... fpm
feet per second ..... fps
foot (feet) ..... ft
foot-candle ..... fc
foot-pound ..... ft-lb
foot-pounds per minute ..... ft-lb/min
foot-pounds per second ..... ft-lb/sec
formazin turbidity unit(s) ..... FTU
frequency ..... freq
fuel oil ..... FO
fuel oil supply ..... FOS

fuel oil return ..... FOR

gallon(s) ..... gal
gallons per day ..... gpd
gallons per day per cubic foot ..... gpd/cu ft
gallons per day per square foot ..... gpd/sq ft
gallons per hour ..... gph
gallons per minute ..... gpm
gallons per second ..... gps
gas chromatography and mass spectrometry ..... GC-MS
gauge ..... ga
grain(s) ..... gr
gram(s) ..... g
grams per cubic centimeter ..... gm/cc
Heat Transfer Coefficient ..... U
height ..... hgt
Hertz ..... Hz
horsepower ..... hp
horsepower-hour ..... hp-hr
hour(s) ..... hr
humidity, relative ..... rh
hydrogen ion concentration ..... pH

inch(es) ..... in
inches per second ..... ips
inside diameter ..... ID

Jackson turbidity unit(s) ..... JTU

kelvin ..... K
kiloamperes ..... kA
kilogram(s) ..... kg
kilometer(s) ..... km
kilovar (kilovolt-amperes reactive) ..... kvar
kilovolt(s) ..... kV
kilovolt-ampere(s) ..... kVA
kilowatt(s) ..... kW
kilowatt-hour(s) ..... kWh

linear foot (feet) ..... lin ft
liter(s) L

megavolt-ampere(s) ..... MVA
meter(s) ..... m
micrograms per liter ..... ug/L
miles per hour ..... mph
milliampere(s) ..... mA
milligram(s) ..... mg
milligrams per liter ..... mg/L
milliliter(s) ..... mL
millimeter(s) ..... mm
million gallons ..... MG
million gallons per day ..... mgd
millisecond(s) ..... ms
millivolt(s) ..... mV
minute(s) ..... min
mixed liquor suspended solids ..... MLSS
nephelometric turbidity unit ..... NTU
net positive suction head ..... NPSH
noise criteria ..... nc
noise reduction coefficient ..... NRC
number ..... no

ounce(s) ..... oz
outside air ..... oa
outside diameter ..... OD

parts per billion ..... ppb
parts per million ..... ppm
percent ..... pct
phase (electrical) .... ph
pound(s) ..... lb
pounds per cubic foot ..... pcf
pounds per cubic foot per hour ..... pcf/hr
pounds per day ..... lbs/day
pounds per day per cubic foot ..... lbs/day/cu ft
pounds per day per square foot ..... lbs/day/sq ft
pounds per square foot ..... psf
pounds per square foot per hour ..... psf/hr
pounds per square inch ..... psi

pounds per square inch absolute ..... psia
pounds per square inch gauge ..... psig
power factor ..... PF
pressure drop or difference ..... dp

pressure, dynamic (velocity) ..... vp
pressure, vapor ..... vap pr

quart(s) ..... qt

Rankine ..... R
relative humidity ..... rh
resistance ..... res
return air ..... ra
revolution(s) ..... rev
revolutions per minute ..... rpm
revolutions per second ..... rps
Right of Way ..... ROW
root mean squared ..... rms

safety factor ..... sf
second(s) ..... sec
shading coefficient ..... SC
sludge density index ..... SDI

Sound Transmission Coefficient ..... STC
specific gravity ..... sp gr
specific volume ..... Sp Vol
sp ht at constant pressure ..... Cp
square ..... sq
square centimeter(s) ..... sq cm
square foot (feet) ..... sq ft
square inch (es) ..... sq in
square meter(s) ..... sq m
square yard(s) ..... sq yd
standard ..... std
static pressure ..... st pr
supply air .... sa
suspended solids ..... SS

temperature ..... temp
temperature difference ..... TD
temperature entering ..... TE
temperature leaving ..... TL
thousand Btu per hour ..... Mbh
thousand circular mils ..... kcmil
thousand cubic feet ..... Mcf
threshold limit value ..... TLV
tons of refrigeration ..... tons
torque ..... TRQ
total dissolved solids ..... TDS
total dynamic head ..... TDH
total kjeldahl nitrogen ..... TKN
total oxygen demand ..... TOD
total pressure ..... TP
total solids ..... TS
total suspended solids ..... TSS
total volatile solids ..... TVS
vacuum ..... vac
viscosity ..... visc
volatile organic chemical ..... VOC
volatile solids ..... VS
volatile suspended solids ..... VSS
volt(s) V
volts-ampere(s) ..... VA
volume ..... vol
watt(s) ..... W
watthour(s) ..... Wh
watt-hour demand ..... WHD
watt-hour demand meter ..... WHDM
week(s) ..... wk
weight ..... wt
wet-bulb ..... WB
wet bulb temperature ..... WBT

yard(s) ..... yd
year(s) ..... yr

1.5 REFERENCE PUBLICATIONS

The following publications are incorporated into this Manual and are made a part of this Manual as is set out verbatim in this Manual. Violations of any provision of every such publication, latest revision, shall be a violation of City Ordinance.

A. Water Environment Federation, Manual of Practice No. 8, Wastewater Treatment Plant Design, W.E.F., 601 Wythe Street, Alexandria, VA, 22314-1994.

B. Water Environment Federation, Manual of Practice No. 9, Design and Construction of Sanitary and Storm Sewers, W.E.F., 601 Wythe Street, Alexandria, VA, 22314-1994.

C. Great Lakes/Upper Mississippi River Board of State Sanitary Engineers. Recommended Standards for Sewage Works, Health Education Service, Inc., P.O. Box 7283, Albany, New York, 12224.

D. Great Lakes/Upper Mississippi River Board of State Sanitary Engineers. Recommended Standards for Water Works, Health Education Service, Inc., P.O. Box 7283, Albany, New York, 12224.

E. Florida Department of Environmental Protection for Water, Wastewater, and Reclaimed Water Systems, latest revisions of F.A.C. Chapters 62-550, 62-555, 62-600, 62-604, 62-610, 64E-6, and 64E-8, 3900 Commonwealth Boulevard M.S. 49, Tallahassee, Florida, 32399.

F. American Water Works Association, Inc., Water Treatment Plant Design, 6666 West Quincy Avenue, Denver, Colorado, 80235.

G. American Water Works Association, Inc., Water Treatment Plant Design, AWWA Standards and Applicable Manuals, 6666 West Quincy Avenue, Denver, Colorado, 80235.

H. Ductile Iron Pipe Research Association, Handbook, Ductile Iron Pipe/Cast Iron Pipe, Ductile Iron Pipe Research Association, 245 Riverchase Parkway East, Birmingham, Alabama, 35244.

I. Uni-Bell Plastic Pipe Association, Handbook of PVC Pipe, Uni-Bell Plastic Pipe Association, 2655 Villa Creek Drive, Suite 164, Dallas, Texas, 75234.

J. American National Standards Institute, latest revisions of applicable standards, 1819 L Street NW, Suite 600, Washington, D.C., 20036.

K. American Society for Testing and Materials, latest revisions of applicable standards, ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, Pennsylvania, 19428-2959.

L. National Water Research Institute, Treatment Technologies for Removal of MTBE. NWRI, 10500 Ellis Ave., P.O. Box 20865, Fountain Valley, CA, 92728.

M. National Water Research Institute, Valuing Ground Water: Economic Concepts/Approaches. NWRI, 10500 Ellis Ave., P.O. Box 20865, Fountain Valley, CA, 92728.7.3.14.

N. U.S. Environmental Protection Agency, Design Criteria for Mechanical, Electric, and Fluid System and Component Reliability, Supplement to the Federal Guidelines for Design, Operation, and Maintenance of Wastewater Treatment Facilities, Technical Bulletin EPA-430-99-74-001, U.S. EPA, Office of Water Program Operations.

O. Florida Department of Transportation, Standard Specifications for Road and Bridge Construction, Maps & Publications Sales, Mail Station 12, 605 Suwannee Street, Tallahassee, Florida 32399-0450.

P. Plastics Pipe Institute, Handbook of Polyethylene Pipe, 1825 Connecticut Ave., NW, Suite 680, Washington, DC 20009.

Q. National Fire Protection Association, 1995 Edition of NFPA 24 – Standard for the Installation of Private Fire Service Mains and Their Appurtenances, 1 Batterymarch Park, Quincy, MA 02169.

R. City of Naples Utilities Standards and Specifications Manual.

S. National Electrical Code, latest revisions of applicable requirements.

T. Metcalf and Eddy, Wastewater Engineering Treatment and Reuse, 4th Edition, McGraw-Hill, 2002.

U. Water Environment Federation, Manual of Practice No. 11, Operation of Municipal Wastewater Treatment Plants, 601 Wythe Street, Alexandria, VA 22314-1994.

V. American Petroleum Institute, 1801 K Street NW, Washington, DC 20006.

W. American Welding Society, 2501 NW 7th St, Miami, FL 33125

X. Factory Mutual Research, 1151 Boston-Providence Turnpike, Norwood, MA 02062

Y. National Association of Corrosion Engineers, P.O. Box 218340, Houston, TX 77218.

Z. National Electrical Manufacturer's Association, 155 East 44th St., NY, NY 10017.

AA. Occupational Safety and Health Act, U.S. Dept. of Labor, Occupational Safety and Health Administration, 299E. Broward Blvd. – Rm 302, Ft. Lauderdale, FL 33301.

BB. Society of Automotive Engineers, 2 Pennsylvania Plaza, NY, NY 10001.

CC. Steel Structures Painting Council, 4400 Fifth Ave., Pittsburgh, PA 15213.

DD. Standard Specification for Public Works, Construction Building News, Inc., 3055 Overland Ave., Los Angeles, CA 90034.

EE. Uniform Building Code, published by ICBO.

FF. Underwriters Laboratories, Inc., 207 East Ohio Street, Chicago, IL 60611.

1.6 REFERENCE STANDARDS

A. Latest Edition: Construe references to furnishing materials or testing, which conform to the standards of a particular technical society, organization, or body, to mean the latest standard, code, or specification of that body, adopted and published as of the date of bidding this Contract. Standards referred to herein are made a part of these Specifications to the extent that is indicated or intended.

B. Precedence: The duties and responsibilities of the CITY, CONTRACTOR or ENGINEER, or any of their consultants, agents or employees are set forth in the Contract Documents, and are not changed or altered by any provision of any referenced standard specifications, manuals or code, whether such standard manual or code is or is not specifically incorporated by reference in the Contract Documents. Any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority, to undertake responsibility contrary to the powers of the ENGINEER as set forth in the Contract Documents cannot be assigned to the ENGINEER or any of the ENGINEER's consultants, agents or employees.

1.7 DEFINITIONS

A. In these Contract Documents the words furnish, install, and provide are defined as follows:

1. Furnish (Materials): to supply and deliver to the project ready for installation and in operable condition.

2. Install (services or labor): to place in final position, complete, anchored, connected in operable condition.

3. Provide: to furnish and install complete. Includes the supply of specified services. When neither furnish, install, or provide is stated, provided is implied.

4. CITY or City: City Council, Naples, Florida , or authorized staff or representatives.

5. ENGINEER: The terms Design Professional, Design Engineer, Engineer, and Engineer of Record are interchangeably used throughout the Contract Documents.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01400

QUALITY CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Submittals

B. Inspection Services

C. Inspection of Materials

D. Quality Control

E. Costs of Inspection

F. Acceptance Tests

G. Failure to Comply with Contract

1.2 SUBMITTALS

A. General: Provide all submittals, including the following, as specified in Division 1 and the individual material sections. Submit manufacturer's Certificates of Inspection, descriptive literature, catalog data, illustrations, principle dimensions, materials of construction, specifications, installation instructions, and related information. See Section 01730 for operation manual submittal information.

B. Certificate Submittals: Furnish the ENGINEER authoritative evidence in the form of Certificates of Manufacture that the materials and equipment to be used in the Work have been manufactured and tested in conformity with the Contract Documents and this Manual and Specifications. Include copies of the results of physical tests and chemical analyses, where necessary, that have been made directly on the product or on similar products of the manufacturer.

1.3 TESTS AND INSPECTIONS

A. City's Access: At all times during the progress of the Work, and until the date of final completion, afford the City Manager or designee and ENGINEER every reasonable, safe, and proper facility for inspecting the Work at the site. The observation and inspection of any work will not relieve the CONTRACTOR of any obligations to perform proper and satisfactory work as specified. Replace work rejected due to faulty design, inferior, or defective materials, poor workmanship, improper installation, excessive wear, or nonconformity with the requirements of the Contract Documents, with satisfactory work at no additional cost to the City. Replace as directed, finished or unfinished work found not to be in strict

accordance with the Contract, even though such work may have been previously approved and payment made therefor.

The City of Naples, its respective representatives, agents and employees, and governmental agencies with jurisdiction over the Project shall have access at all time to Work, whether the Work is being performed on or off the Project site, for their observation, inspection and testing. Contractor shall provide proper, safe conditions for such access. Contractor shall provide Engineer with timely notice of readiness of the Work for all required inspections, tests or approvals.

If the Contract Documents or any codes, laws, ordinances, rules or regulations of any public authority having jurisdiction over the Project requires any portion of the Work to be specifically inspected, tested or approved, Contractor shall assume full responsibility therefore, pay all costs in connection therewith and furnish Engineer the required certificates of inspection, testing or approval. All inspections, tests or approvals shall be performed in a manner and by organizations acceptable to the Engineer and The City of Naples.

If any Work that is to be inspected, tested or approved is covered without written concurrence from the Engineer, such work must, if requested by Engineer, be uncovered for observation. Such uncovering shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness to respond to such notice. If any Work is covered contrary to written directions from Engineer, such Work must, if requested by Engineer, be uncovered for Engineer's observation and be replaced at Contractor's sole expense.

The City shall charge to Contractor and may deduct from any payments due Contractor all engineering and inspection expenses incurred by the City in connection with any overtime work. Such overtime work consisting of any work during the construction period beyond the regular eight (8) hour day and for any work performed on Saturday, Sunday or holidays.

Neither observations nor other actions by the Engineer nor inspections, tests or approvals by others shall relieve Contractor from Contractor's obligations to perform the Work in accordance with the Contract Documents.

B. Rejection: The City's Manager or designee has the right to reject materials and workmanship which are defective or require correction. Promptly remove rejected work and materials from the site.

C. Inferior Work Discoveries: Failure or neglect on the part of the City Manager or designee to condemn or reject bad or inferior work or materials does not imply an acceptance of such work or materials. Neither is it to be construed as barring the City Manager or designee at any subsequent time from recovering damages or a sum of money needed to build anew all portions of the Work in which inferior work or improper materials were used.

Work not conforming to the requirements of the Contract Documents shall be deemed defective Work. If required by Engineer, Contractor shall as directed, either correct all defective Work, whether or not fabricated, installed or completed, or if the defective Work has been rejected by Engineer, remove it from the site and replace it with undefective Work. Contractor shall bear all direct, indirect and consequential costs of such correction or removal (including, but not limited to fees and charges of engineers, architects, attorneys and other professionals) made necessary thereby, and shall hold the City harmless for same.

If any portion of the Work is defective, or Contractor fails to supply sufficient skilled workers with suitable materials or equipment, or fails to finish or perform the Work in such a way that the completed Work will conform to the Contract Documents, Engineer may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of the Engineer to stop the Work shall not give rise to any duty on the part of the City or Engineer to exercise this right for the benefit of Contractor or any other party.

Should the City determine, at its sole opinion, it is in the City's best interest to accept defective Work, the City may do so. Contractor shall bear all direct, indirect and consequential costs attributable to the City's evaluation of and determination to accept defective Work. If such determination is rendered prior to final payment, a Change Order shall be executed evidencing such acceptance of such defective Work, incorporating the necessary revisions in the Contract Documents and reflecting an appropriate decrease in the Contract Amount. If the City accepts such defective Work after final payment, Contractor shall promptly pay the City an appropriate amount to adequately compensate the City for its acceptance of the defective Work.

If Contractor fails, within a reasonable time after the written notice from the City or Engineer, to correct defective Work or to remove and replace rejected defective Work as required by Engineer, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any of the provisions of the Contract Documents, the City may, after seven (7) days written notice to Contract, correct and remedy any such deficiency. To the extent necessary to complete corrective and remedial action, the City may exclude Contractor from any or all of the Project site, take possession of all or any part of the Work, and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Project site and incorporate in the Work all materials and equipment stored at the Project site or for which the City has paid Contractor but which are stored elsewhere. Contractor shall allow the City and it's respective representatives, agents, and employees such access to the Project site as may be necessary to enable the City to exercise the rights and remedies under the paragraph. All direct, indirect and consequential costs of the City in exercising such rights and remedies shall be charged against Contractor, and al Change Order shall be issued, incorporating the necessary revisions to the Contract Documents, including an appropriate decrease to the Contract Amount. Such direct, indirect and consequential costs shall include, but not be limited to, fees and charges of engineers, architects, attorneys, and other professionals, all court costs and all

costs of repair and replacement or work of others destroyed or damaged by Contractor shall not be allowed an extension of the Contract Time because of any delay in performance of the Work attributable to the exercise by the City of The City's rights and remedies hereunder.

D. Removal for Examination: Should it be considered necessary or advisable by the City Manager or designee, at any time before final acceptance of the Work, to make examinations of portions of the Work already completed, by removing or tearing out such portions, promptly furnish all necessary facilities, labor, and material, to make such an examination. If such Work is found to be defective in any respect, defray all expenses of such examination and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the Contract, the cost of examination and restoration of the Work will be considered a change in the Work to be paid for in accordance with applicable provisions of the Contract.

If the City or Engineer consider it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at the City's or Engineer's request, shall uncover, expose or otherwise make available for observation, inspection or tests as the Engineer may require, that portion of the Work in question, furnishing all necessary labor, material and equipment. If it is found that such Work is defective, Contractor shall bear all direct, indirect and consequential costs of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction (including, but not limited to, fees and charges of engineers, architects, attorneys and other professionals), and the City shall be entitled to an appropriate decrease in the Contract Amount. If, however, such Work is not found to be defective, Contractor shall be allowed an increase in the Contract Amount and/or an extension to the Contract Time, directly attributable to such uncovering, exposure, observation, inspection, testing and reconstruction.

E. Operation Responsibility: Assume full responsibility for the proper operation of equipment during tests and instruction periods. Make no claim, other than provided in the Contract Documents, for damage that may occur to equipment prior to the time when the City Manager or designee accepts the Work.

F. Rejection Prior to Warranty Expiration: If at anytime prior to the expiration of any applicable warranties or guarantees, defective equipment is rejected by the City Manager or designee, repay to the CITY all sums of money received for the rejected equipment on progress certificates or otherwise on account of the Contract lump sum prices, and upon the receipt of the sum of money, City Manager or designee will execute and deliver a bill of sale of all its rights, title, and interest in and to the rejected equipment. Do not remove the equipment from the premises of the CITY until the City Manager or designee obtains from other sources, equipment to take the place of that rejected. The City Manager or designee hereby agrees to obtain other equipment within a reasonable time and the CONTRACTOR agrees that the CITY may use the equipment furnished by the CONTRACTOR without rental or other charge until the other new equipment is obtained.

1.4 INSPECTION OF MATERIALS

A. Premanufacture Notification: Give notice in writing to the ENGINEER sufficiently in advance of the commencement of manufacture or preparation of materials especially manufactured or prepared for use in or as part of the permanent construction. When required, notice to include a request for inspection, the date of commencement, and the expected date of completion of the manufacture or preparation of materials. Upon receipt of such notice, ENGINEER will arrange to have a representative present at such times during the manufacture or testing as may be necessary to inspect the materials, or will notify CONTRACTOR that the inspection will be made at a point other than the point of manufacture or testing, or that the inspection will be waived. Comply with these provisions before shipping any materials. Such inspection will not constitute a release from the responsibility for furnishing materials meeting the requirements of the Contract Documents.

B. Testing Standards: Conduct tests of electrical and mechanical equipment and appliances in accordance with recognized, applicable test codes.

1.5 QUALITY CONTROL

A. Testing

1. Field and Laboratory

a. Provide personnel to assist the ENGINEER in performing the following periodic observation and associated services.

(1) Soils: Observe and test excavations, placement and compaction of soils. Determine suitability of excavated material. Observe subgrade soils and foundations.

(2) Concrete: Observe forms and reinforcement; observe concrete placement; witness air entrainment tests, facilitate concrete cylinder preparation and assist with other tests performed by ENGINEER.

(3) Masonry: Sample and test mortar, bricks, blocks and grout; inspect brick and block samples and sample panels; inspect placement of reinforcement and grouting.

(4) Structural Steel: Verify that all welders are certified; visually inspect all structural steel welds; mechanically test high-tensile bolted connections.

b. When specified in Divisions 2 through 16 of the Contract Documents, provide an independent laboratory testing facility to perform required testing. Qualify the laboratory as having performed previous satisfactory work. Prior to use, submit to the ENGINEER for approval.

c. Cooperate with the ENGINEER and laboratory testing representatives. Provide at least 24 hours notice prior to when specified testing is required. Provide labor and materials, and necessary facilities at the site as required by the ENGINEER and the testing laboratory.

d. When an independent electrical testing agency is specified in the Contract Documents, provide a member of the National Electrical Testing Association to perform inspections and tests.

2. Equipment: Coordinate and demonstrate test procedures as specified in the Contract Documents and as required during the formal tests.

3. Pipeline and Other Testing: Conform to test procedures and requirements specified in the appropriate Specification Section.

4. Testing of Gravity Sanitary Sewer Lines

a. Watertight Construction: It is imperative that all sewers and force mains, manholes, and service connections be built watertight and that the CONTRACTOR adhere rigidly to the specifications for material and workmanship. Since all of the water and sewage in the lines will be treated at the treatment plant, special care and attention must be given to securing watertight construction. After completion, the sewers or sections thereof will be tested and gauged. If infiltration or exfiltration is above the limits specified, the sewer construction work will be rejected.

b. Cleaning: Exercise care during construction of the manhole to see that materials do not enter the sewer line. Keep the invert and shelf of the manhole clean of all mortar, broken brick, sand, or any other materials falling into the manhole. Immediately remove such material. Maintain this condition until final acceptance of the work. Prior to testing of gravity sanitary sewer lines, clean the lines using appropriate tools.

c. Gravity Sewers - Visual Inspections: On completion of each block or section of sewer, or at such other times as the City Manger or designee may direct, the block or section of sewer is to be cleaned, tested and inspected. Each section of the sewer is to show, on examination from either end, a full circle of light between manholes. Each manhole, or other appurtenance to the system, shall be of the specified size and form, be watertight, neatly and substantially constructed, with the rim set permanently to design position and grade. All repairs shown necessary by the inspection are to be made; broken or cracked pipe replaced, all deposits removed and the sewers left true to line and grade, entirely clean and ready for use.

d. Infiltration Limits: Provide the equipment necessary to check the lines for infiltration or exfiltration as directed by the City Manager or designee, before they are put in service. Infiltration in excess of fifty (50) gallons per day inch-mile of sewer will result in having the CONTRACTOR go over the lines, ascertain where the leakage exists, and repair the lines to the extent necessary to bring the infiltration down within acceptable limits. Observable inflow is not permitted.

e. Exfiltration Limits: The length of sewer subject to an exfiltration test shall be the distance between two (2) adjacent manholes. Close the inlets of the upstream and downstream manholes with watertight plugs and the test section filled with water until the elevation of the water in the upstream manhole is two (2) feet above the crown of the pipe in the line being tested, or two (2) feet above the existing groundwater in the trench, whichever is higher. A standpipe may be used instead of the upstream manhole for providing the pressure head when approved by the City Manager or designee. Measure exfiltration by determining the amount of water required to maintain the initial water elevation for one (1) hour period from the start of the test. The maximum allowable leakage, including manholes, shall be 50 gallon per inch for diameter per mile of pipe per day.

f. Air Testing: Air testing shall be required if, in the opinion of the City Manager or designee, conditions are such that infiltration measurements may be inconclusive. Conduct the test in the presence of the City Manager or designee and conform to the following requirements:

(a) Test pressure shall be 3.5 psi increased by the groundwater pressure above the top of the sewer.

(b) Pressure loss from shall not exceed 0.5 psi during the required testing time.

(c) Testing time in minutes shall be calculated as 0.625 x nominal pipe size (inches).

B. Reports

1. Certified Test Reports: Where transcripts or certified test reports are required by the Contract Documents, meet the following requirements:

a. Before delivery of materials or equipment submit and obtain approval of the ENGINEER for all required transcripts, certified test reports, certified copies of the reports of all tests required in referenced specifications or specified in the Contract Documents. Perform all testing in an approved independent laboratory or the manufacturer's laboratory. Submit for approval reports of shop equipment tests within thirty days of testing. Transcripts or test reports are to be

accompanied by a notarized certificate in the form of a letter from the manufacturer or supplier certifying that tested material or equipment meets the specified requirements and the same type, quality, manufacture and make as specified. The certificate shall be signed by an officer of the manufacturer or the manufacturer's plant manager.

2. Certificate of Compliance: At the option of the ENGINEER, submit for approval a notarized Certificate of Compliance. The Certificates may be in the form of a letter stating the following:

   a. Manufacturer has performed all required tests

   b. Materials to be supplied meet all test requirements

   c. Tests were performed not more than one year prior to submittal of the certificate

   d. Materials and equipment subjected to the tests are of the same quality, manufacture and make as those specified

   e. Identification of the materials

1.6 COSTS OF INSPECTION

A. CITY's Obligation: Initial inspection and testing of materials furnished under this Contract will be performed by the City Manager or designee, or inspection bureaus without cost to the CONTRACTOR, unless otherwise expressly specified. If subsequent testing is necessary due to failure of the initial tests or because of rejection for noncompliance, reimburse the CITY for expenditures incurred in making such tests.

B. CONTRACTOR's Obligation: Include in the Contract Price, the cost of all shop and field tests of equipment and other tests specifically called for in the Contract Documents, except those tests described above under “CITY’s Obligation”. The City Manager or designee may perform tests on any material or equipment furnished under this Contract at any time during the Contract. If tests performed by the City Manager or designee result in failure or rejection for noncompliance, reimburse the CITY for expenditures incurred in making such tests. Tests performed by the City Manager or designee shall prevail in determining compliance with Contract requirements.

C. Reimbursements to the CITY:

1. Materials and equipment submitted by the CONTRACTOR as the equivalent to those specifically named in the Contract may be tested by the City Manager or designee for compliance. Reimburse the CITY for expenditures incurred in making such tests on materials and equipment that are rejected for noncompliance.

2. Reimburse the CITY for all costs associated with Witness Tests that exceed 5 Calendar Days per kind of equipment.

1.7 ACCEPTANCE TESTS

A. Preliminary Field Tests: As soon as conditions permit, furnish all labor and materials and services to perform preliminary field tests of all equipment provided under this Contract. If the preliminary field tests disclose that any equipment furnished and installed under this Contract does not meet the requirements of the Contract Documents, make all changes, adjustments and replacements required prior to the acceptance tests.

B. Final Field Tests: Upon completion of the Work and prior to final payment, subject all equipment, piping and appliances installed under this Contract to specified acceptance tests to demonstrate compliance with the Contract Documents.

1. Furnish all labor, fuel, energy, water and other materials, equipment, instruments and services necessary for all acceptance tests.

2. Conduct field tests in the presence of the ENGINEER. Perform the field tests to demonstrate that under all conditions of operation each equipment item:

a. Has not been damaged by transportation or installation

b. Has been properly installed

c. Has been properly lubricated

d. Has no electrical or mechanical defects

e. Is in proper alignment

f. Has been properly connected

g. Is free of overheating of any parts
h. Is free of all objectionable vibration

i. Is free of overloading of any parts

j. Operates as intended

3. Operate work or portions of work for a minimum of 100 hours or 14 days continuous service, whichever comes first. For those items of equipment that would normally operate on wastewater or sludge, plant effluent may be used if available when authorized by ENGINEER. If water cannot properly exercise equipment, conduct 100-hour test after plant startup. Conduct test on those systems that require load produced by weather (heating or cooling) exercise only when weather will produce proper load.

C. Failure of Tests: If the acceptance tests reveal defects in material or equipment, or if the material or equipment in any way fails to comply with the requirements of the Contract Documents, then promptly correct such deficiencies. Failure or refusal to correct the deficiencies, or if the improved materials or equipment, when tested again, fail to meet the guarantees or specified requirements, the City Manager or designee, notwithstanding its partial payment for work and materials or equipment, may reject said materials or equipment and may order the CONTRACTOR to remove the defective work from the site at no addition to the Contract Price, and replace it with material or equipment which meets the Contract Documents.

1.8 FAILURE TO COMPLY WITH CONTRACT

A. Unacceptable Materials: If it is ascertained by testing or inspection that the material or equipment does not comply with the Contract, do not deliver said material or equipment, or if delivered remove it promptly from the site or from the Work and replace it with acceptable material without additional cost to the CITY. Fulfill all obligations under the terms and conditions of the Contract even though the City Manager or designee fail to ascertain noncompliance or notify the CONTRACTOR of noncompliance.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. General Requirements

B. Related Sections

C. Temporary Utilities

D. Temporary Construction

E. Barricades and Enclosures

F. Fences

G. Security

H. Temporary Controls

I. Traffic Regulation

J. Field Offices and Sheds

1.2 RELATED SECTIONS

A. Section 01010 - Summary of Work

B. Section 01045 – Connection to Existing Systems

C. Section 01570 – Traffic Regulations and Public Safety

D. Section 02530 – Groundwater Control for Open Cut Excavation

E. Section 02575 - Pavement Repair and Restoration

F. Section 02650 –Laying and Jointing Buried Pipelines

1.3 GENERAL REQUIREMENTS

A. Plant and Facilities: Furnish, install, maintain and remove all false work, scaffolding, ladders, hoistways, braces, pumping plants, shields, trestles, roadways, sheeting, centering forms, barricades, drains, flumes, and the like, any of which may be needed in the construction of any part of the Work and which are

not herein described or specified in detail. Accept responsibility for the safety and efficiency of such works and for any damage that may result from their failure or from their improper construction, maintenance or operation.

B. First Aid: Maintain a readily accessible, completely equipped first aid kit at each location where work is in progress.

C. Safety Responsibility: Accept sole responsibility for safety and security at the site. Indemnify and hold harmless the CITY and the City's Manager or designee, including the ENGINEER, for any safety violation, or noncompliance with governing bodies and their regulations, and for accidents, deaths, injuries, or damage at the site during occupancy or partial occupancy of the site by CONTRACTOR's forces while performing any part of the Work.

D. Hazard Communication: Furnish two copies of the CONTRACTOR's Hazard Communication Program required under OSHA regulations before beginning on site activities. Furnish two copies of amendments to Hazard Communications Program as they are prepared.

1.4 TEMPORARY UTILITIES

A. Water: Provide all necessary and required water without additional cost, unless otherwise specified. If necessary, provide and lay water lines to the place of use; secure all necessary permits; pay for all taps to water mains and hydrants and for all water used at the established rates.

B. Light and Power: Provide without additional cost to the CITY temporary lighting and power facilities required for the proper construction and inspection of the Work. If, in the ENGINEER's opinion, these facilities are inadequate, do NOT proceed with any portion of the Work affected thereby. Maintain temporary lighting and power until the Work is accepted.

C. Heat: Provide temporary heat, whenever required, for work being performed during cold weather to prevent freezing of concrete, water pipes, and other damage to the Work or existing facilities.

D. Sanitary Facilities: Provide sufficient sanitary facilities for construction personnel. Prohibit and prevent nuisances on the site of the Work or on adjoining property. Discharge any employee who violates this rule. Abide by all environmental regulations or laws applicable to the Work.

1.5 TEMPORARY CONSTRUCTION

A. Bridges: Design and place suitable temporary bridges where necessary for the maintenance of vehicular and pedestrian traffic. Assume responsibility for the sufficiency and safety of all such temporary work or bridges and for any damage that may result from their failure or their improper construction, maintenance, or operation. Indemnify and save harmless the CITY and the CITY's representatives from all claims, suits or actions, and damages or costs of every description arising by reason of failure to comply with the above provisions.

1.6 BARRICADES, LIGHTS AND ENCLOSURES

A. Protection of Workmen and Public: Effect and maintain at all times during the prosecution of the Work, barriers, lights and enclosures necessary for the protection of workmen and the public. Perform all work within the City right-of-way in strict accordance with the CITY Maintenance of Traffic Policy and other applicable statutory requirements.

B. Provide suitable barricades, lights, signs and watchmen at excavation sites and all other places where the Work causes obstructions to normal traffic or constitutes in any way a hazard to the public.

1.7 FENCES

A. Existing Fences: Obtain written permission from property owner(s) prior to relocating or dismantling fences that interfere with construction operations. Reach agreements with the fence owner as to the period the fence may be left relocated or dismantled. Install adequate gates where fencing must be maintained. Keep gates closed and locked at all times when not in use.

B. Restoration: Restore all fences to their original or better condition and to their original location on completion of the Work.

1.8 SECURITY

A. Preservation of Property:

1. Preserve from damage, all property along the line of the Work, in the vicinity of or in any way affected by the Work, the removal or destruction of which is not called for by the Drawings. Preserve from damage, public utilities, trees, lawn areas, building monuments, fences, pipe and underground structures, and public streets. Note: Normal wear and tear of streets resulting from legitimate use by the CONTRACTOR are not considered as damage. Whenever damages occur to such property, immediately restore to its original condition. Costs for such repairs are incidental to the Contract.

2. In case of failure on the part of the CONTRACTOR to restore property or make good on damage or injury, the City Manager or designee may, upon 24 hours written notice, proceed to repair, rebuild, or otherwise restore such property as may be deemed necessary, and the cost thereof will be deducted from any moneys due or which may become due the CONTRACTOR under this Contract. If removal, repair or replacement of public or private property is made necessary by alteration of grade or alignment authorized by the City Manager or designee and not contemplated by the Contract Documents, the CONTRACTOR will be compensated, in accordance with the General Conditions, provided that such property has not been damaged through fault of the CONTRACTOR or the CONTRACTOR's employees.

B. Public Utility Installations and Structures:

1. Public utility installations and structures include all poles, tracks, pipes, wires, conduits, vaults, valves, hydrants, manholes, and other appurtenances and facilities, whether owned or controlled by public bodies or privately owned individuals, firms or corporations, used to serve the public with transportation, gas, electricity, telephone, storm and sanitary sewers, water, or other public or private utility services. Facilities appurtenant to public or private property that may be affected by the Work are deemed included hereunder.

2. The Contract Documents contain data relative to existing public utility installations and structures above and below the ground surface. Existing public utility installations and structures are indicated on the Drawings only to the extent such information was made available to, or found by, the ENGINEER in preparing the Drawings. These data are not guaranteed for completeness or accuracy, and the CONTRACTOR is responsible for making necessary investigations to become fully informed as to the character, condition, and extent of all public utility installations and structures that may be encountered and that may affect the construction operations.

3. Before starting construction, identify and mark all existing valves and maintain access to the valves at all times during construction.

4. Contact utility locating service sufficiently in advance of the start of construction to avoid damage to the utilities and delays to the completion date. See Section 01045, 1.3.F for additional information.

5. If existing utilities are damaged during the Work, immediately notify the owner of the affected utility. In coordination with or as directed by the owner, remove, replace, relocate, repair, rebuild, and secure any public utility installations and structures damaged as a direct or indirect result of the Work under this Contract. Costs for such work are incidental to the Contract. Be responsible and liable for any consequential damages done to or suffered by any public utility installations or structures. Assume and accept responsibility for any injury, damage, or loss that may result from or be consequent to interference with, or interruption or discontinuance of, any public utility service. See Section 01045, 1.3.F for additional information.

6. At all times in the performance of Work, employ proven methods and exercise reasonable care and skill to avoid unnecessary delay, injury, damage, or destruction to public utility installations and structures. Avoid unnecessary interference with, or interruption of, public utility services. Cooperate fully with the owners thereof to that end.

7. Provide notice to the City Manager or designee of any proposed connections to existing utilities, interruptions of service or shutdowns in accordance with Section 01045. Give written notice to the owners of all public utility installations and structures affected by proposed construction operations

sufficiently in advance of breaking ground in any area or on any unit of the Work, to obtain their permission before disrupting the lines and to allow them to take measures necessary to protect their interests. Advise the Stormwater, Streets and Traffic Department and Police and Emergency Services Department of any excavation in public streets or the temporary shut-off of any water main. Provide at least 24 hours notice to all affected property owners whenever service connections are taken out of service.

C. Work on Private Property: Work on this project will require operations on private property, rights of way or easements. The City Manager or designee has secured the appropriate easements or rights of entry from the affected property owners. Comply with all easement or rights of entry provisions. Conduct operations along rights-of-way and easements through private property to avoid damage to the property and to minimize interference with its ordinary use. Upon completion of the Work through such property, restore the surface and all fences or other structures disturbed by the construction as nearly as possible to the preconstruction conditions. Do not remove any material from private property without the consent of the property owner or responsible party in charge of such property. Hold the CITY harmless from any claim or damage arising out of or in connection with the performance of work across and through private property.

D. Miscellaneous Structures: Assume and accept responsibility for all injuries or damage to culverts, building foundations and walls, retaining walls, or other structures of any kind met with during the prosecution of the Work. Assume and accept liability for damages to public or private property resulting therefrom. Adequately protect against freezing all pipes carrying liquid.

E. Protection of Trees and Lawn Areas:

1. Protect with boxes, trees and shrubs, except those ordered to be removed. Do not place excavated material so as to cause injury to such trees or shrubs. Replace trees or shrubs destroyed by accident or negligence of the CONTRACTOR or CONTRACTOR's employees with new stock of similar size and age, at the proper season, at no additional cost to the CITY. If required by Contract Documents, provide preconstruction audio-video recording of project in accordance with the Technical Specifications.

2. Leave lawn areas in as good condition as before the start of the Work. Restore areas where sod has been removed by seeding or sodding.

1.9 TEMPORARY CONTROLS

A. During Construction:

1. Keep the site of the Work and adjacent premises free from construction materials, debris, and rubbish. Remove this material from any portion of the site if such material, debris, or rubbish constitutes a nuisance or is objectionable.

2. Remove from the site all surplus materials and temporary structures when they are no longer needed.

3. Neatly stack construction materials such as concrete forms and scaffolding when not in use. Store pipe to be incorporated into the Work in accordance with AWWA standards. Promptly remove splattered concrete, asphalt, oil, paint, corrosive liquids, and cleaning solutions from surfaces to prevent marring or other damage.

4. Properly store volatile wastes in covered metal containers and remove from the site daily.

5. Do not bury or burn on the site or dispose of into storm drains, sanitary sewers, streams, or waterways, any waste material. Remove all wastes from the site and dispose of in a manner complying with applicable ordinances and laws.

B. Smoke Prevention:

1. Strictly observe all air pollution control regulations.

2. Open fires will be allowed only if permitted under current ordinances.

C. Noises:

1. In accordance with the CITY's or COUNTY's Noise Ordinance, maintain acceptable noise levels in the vicinity of the Work. Limit noise production to acceptable levels by using special mufflers, barriers, enclosures, equipment positioning, and other approved methods.

2. Supply written notification to the City Manager or designee sufficiently in advance of the start of any work that violates this provision. Proceed only when all applicable authorizations and variances have been obtained in writing.

D. Hours of Operation:

1. Operation of construction equipment is only permitted Monday through Saturday, 7:00 AM to 7:00 PM. Obtain written consent from the City Manager or designee for operation of construction equipment during any other period.

2. Do not carry out non-emergency work, including equipment moves, on Sundays without prior written authorization by the City Manager or designee.

E. Dust Control:

1. Take measures to prevent unnecessary dust. Keep earth surfaces exposed to dusting moist with water or a chemical dust suppressant. Cover materials in piles or while in transit to prevent blowing or spreading dust.

2. Adequately protect buildings or operating facilities that may be affected adversely by dust. Protect machinery, motors, instrument panels, or similar equipment by suitable dust screens. Include proper ventilation with dust screens.

F. Temporary Drainage Provisions:

1. Provide for the drainage of stormwater and any water applied or discharged on the site in performance of the Work. Provide adequate drainage facilities to prevent damage to the Work, the site, and adjacent property.

2. Supplement existing drainage channels and conduits as necessary to carry all increased runoff from construction operations. Construct dikes as necessary to divert increased runoff from entering adjacent property (except in natural channels), to protect the CITY's facilities and the Work, and to direct water to drainage channels or conduits. Provide ponding as necessary to prevent downstream flooding.

3. Maintain excavations free of water. Provide, operate, and maintain pumping equipment. Dewater trenches in accordance with Sections 02350 and 02650.

G. Pollution: Prevent the pollution of drains and watercourses by sanitary wastes, sediment, debris, and other substances resulting from construction activities. Do not permit sanitary wastes to enter any drain or watercourse other than sanitary sewers. Do not permit sediment, debris, or other substances to enter sanitary sewers. Take reasonable measures to prevent such materials from entering any drain or watercourse.

1.10 TRAFFIC REGULATION

A. Parking: Provide and maintain suitable parking areas for the use of all construction workers and others performing work or furnishing services in connection with the Contract, to avoid any need for parking personal vehicles where they may interfere with public traffic or construction activities.

B. Access: Conduct Work to interfere as little as possible with public travel, whether vehicular or pedestrian. Provide and maintain suitable and safe bridges, detours, or other temporary expedients for the accommodation of public and private travel. Whenever it is necessary to cross, obstruct, or close roads, driveways, and walks, whether public or private, give reasonable notice to owners of private drives before interfering with them. Such maintenance of traffic will not be required when the CONTRACTOR has obtained permission from the owner or tenant of private property, or from the authority having jurisdiction over the public property involved,

to obstruct traffic at the designated point. The Contractor may be allowed to restrict traffic for short periods of time provided that he first contacts the City Stormwater, Streets and Traffic Department, County, and/or Florida DOT for their restrictions and also provided that adequate traffic control devices are placed in accordance with applicable City, County, and/or State Ordinances.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01570

TRAFFIC REGULATION AND PUBLIC SAFETY

PART 1 GENERAL

1.1 SECTION INCLUDES:

A. General Requirements

B. Traffic Control

C. Public Safety

1.2 RELATED SECTIONS

A. Section 01500 – Construction Facilities and Temporary Controls

B. Section 02230 – Roadway Crossings by Open Cut

C. Section 02575 – Pavement Repair and Restoration

1.3 GENERAL REQUIREMENTS

A. Perform all work within CITY rights-of-way in strict accordance with the City's Maintenance of Traffic Policy and other applicable statutory requirements to protect the public safety. The Maintenance of Traffic Plan shall include but not be limited to: placement of signs, timing of phases, transition lengths, hours of traffic interference, and contact person (24 hour availability).

B. Be responsible for providing safe and expeditious movement of traffic through construction zones. A construction zone is defined as the immediate areas of actual construction and all abutting areas which are used by the CONTRACTOR and which interfere with the driving or walking public.

C. Remove temporary equipment and facilities when no longer required. Restore grounds to original or specified conditions.

D. The requirements specified herein are in addition to the plan for Maintenance of Traffic as specified in Section 02230.

1.4 TRAFFIC CONTROL

A. Include as necessary precautions, not to be limited to, such items as proper construction warning signs, signals, lighting devices, marking, barricades, channelization, flares, and hand signaling devices. Be responsible for installation and maintenance of all devices and requirements for the duration of the Construction period. All 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 shall be as specified in the State of Florida, Manual of Traffic and Highway Construction, Maintenance and Utility Operations. The standards established in the aforementioned Manual constitute the minimum requirements for normal conditions. Additional traffic control devices, warning devices, barriers, or other safety devices shall be required where unusual, complex, or particularly hazardous conditions exist.

B. Provide notice, at least five (5) working days prior to construction, to the State or City Stormwater, Streets and Traffic Department of the necessity to close any portion of a roadway carrying vehicles or pedestrians so that the final approval of such closings can be obtained at least 48 hours in advance. At no time will more than one (1) lane of roadway be closed to vehicles and pedestrians. With any such closings make adequate provision for the safe expeditious movement of each.

C. Be responsible for notifying the Stormwater, Streets and Traffic Department, and Police, Fire, and other Emergency Departments at least 48 hours prior to construction whenever construction is within roadways and of the alternate routes.

D. Be responsible for removal, relocation, or replacement of any traffic control device in the construction area that exists as part of the normal pre-construction traffic control scheme.

E. Immediately notify the City Manager or designee of any vehicular or pedestrian safety or efficiency problems incurred as a result of the construction of the project.

F. Be responsible for notifying all residents of any road construction and limited access at least 72 hours in advance.

1.5 PUBLIC SAFETY (DURING CONSTRUCTION, ALTERATION OR REPAIR)

A. In areas of high vehicular traffic, provide a safe walkway around the work area.

B. Use barricades or other barriers to prevent any possibility of injury to the public caused by the CONTRACTOR's work.

C. Keep walk areas around the work areas clean of sand, stones, and any other material that could cause a pedestrian accident.

D. Barricade work areas left overnight. Install flashing warning lights in areas required by the CITY.

E. Unless an approved detour is provided at any open cut crossings, a minimum of one-way traffic will be maintained during the daylight hours and two-way traffic at night. All traffic detours will be restricted to limits of the Right-of-Way with necessary flagmen and/or marking devices. These detours shall be approved by the CITY. Detour of traffic outside of the Right-of-Way will be

considered with the approval of local governmental agencies and private concerns involved.

F. Crossing and Intersections: Do not isolate residences and places of business. Provide access to all residences and places of business whenever construction interferes with existing means of access. Maintain access at all times. If pavement is disturbed, a cold mix must be applied at the end of the day.

G. Detours

1. Construct and maintain detour facilities wherever it becomes necessary to divert traffic from any existing roadway or bridge, or wherever construction operations block the flow of traffic. The location of all detours will require prior approval of the CITY.

2. Furnishing of Devices and Barriers: Furnish all traffic control devices (including signs), warning devices and barriers. Costs of such devices shall be incidental to construction and included in unit prices bid.

3. Maintenance of Devices and Barriers: Keep traffic control devices, warning devices and barriers in the correct position, properly directed, clearly visible and clean, at all times. Immediately repair replace or clean damaged, defaced or dirty devices or barriers as necessary.

H. Flagmen: Provide certified flagmen (flaggers) to direct traffic where one-way operation in a single lane is in effect, and in other situations as may be required. Radios may be required if flagmen cannot maintain contact with each other.

I. Utilize all necessary signs, flagmen, and other safety devices during construction.

J. Perform all work with the requirements set forth by the Occupational Safety Health Administration.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

SECTION 01600

MATERIAL AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Description

B. Substitutions

C. Manufacturer's Written Instructions

D. Transportation and Handling

E. Storage, Protection and Maintenance

F. Manufacturer's Field Quality Control Services

G. Post Startup Services

H. Special Tools and Lubricating Equipment

I. Lubrication

1.2 DESCRIPTION

A. Proposed Manufacturers List: Within 15 calendar days of the date of the Notice to Proceed, submit to the ENGINEER a list of the names of proposed manufacturers, material men, suppliers and subcontractors, obtain approval of this list by the City Manager or designee prior to submission of any working drawings. Upon request submit evidence to ENGINEER that each proposed manufacturer has manufactured a similar product to the one specified and that it has previously been used for a like purpose for a sufficient length of time to demonstrate its satisfactory performance.

B. All material and equipment designed or used in connection with a potable (drinking) water system shall conform to the requirements of the National Sanitation Foundation (NSF) Standard 61, “Drinking Water System Components – Health Effects.”

C. Furnish and install Material and Equipment which meets the following:

1. Conforms to applicable specifications and standards.

2. Complies with size, make, type, and quality specified or as specifically approved, in writing, by ENGINEER.

3. Will fit into the space provided with sufficient room for operation and maintenance access and for properly connecting piping, ducts and services, as applicable. Make the clear spaces that will be available for operation and maintenance access and connections equal to or greater than those shown and meeting all the manufacturers' requirements. If adequate space is not available, the CONTRACTOR shall advise the ENGINEER for resolution.

4. Manufactured and fabricated in accordance with the following:

   a. Design, fabricate, and assemble in accordance with best engineering and shop practices.

   b. Manufacture like parts of duplicate units to standard sizes and gauges, to be interchangeable.

   c. Provide two or more items of same kind identical, by same manufacturer.

   d. Provide materials and equipment suitable for service conditions.

   e. Adhere to equipment capabilities, sizes, and dimensions shown or specified unless variations are specifically approved, in writing, in accordance with the Contract Documents.

   f. Adapt equipment to best economy in power consumption and maintenance. Proportion parts and components for stresses that may occur during continuous or intermittent operation, and for any additional stresses that may occur during fabrication or installation.

   g. Working parts are readily accessible for inspection and repair, easily duplicated and replaced.

5. Use material or equipment only for the purpose for which it is designed or specified.

1.3 SUBSTITUTIONS

A. Substitutions:

1. Make any CONTRACTOR's requests for changes in equipment and materials from those required by the Contract Documents in writing, for approval by the Engineer of Record. Such requests are considered requests for substitutions and are subject to CONTRACTOR's representations and review provisions of the Contract Documents when one of following conditions are satisfied:

   a. Where request is directly related to a “Engineer of Record approved equal” or "City approved equal" clause or other language of same effect in Specifications.

b. Where required equipment or material cannot be provided within Contract Time, but not as result of CONTRACTOR's failure to pursue Work promptly or to coordinate various activities properly.

c. Where required equipment or material cannot be provided in manner compatible with other materials of Work, or cannot be properly coordinated therewith.

2. CONTRACTOR'S Options:

a. Where more than one choice is available as options for CONTRACTOR's selection of equipment or material, select option compatible with other equipment and materials already selected (which may have been from among options for other equipment and materials).

b. Where compliance with specified standard, code or regulation is required, select from among products that comply with requirements of those standards, codes, and regulations.

c. Or City approved Equal: For equipment or materials specified by naming one or more equipment manufacturer(s) as "or City approved equal", submit request for substitution for any equipment or manufacturer not specifically named to the Engineer of Record.

B. Conditions Which are Not Substitution:

1. Requirements for substitutions do not apply to CONTRACTOR options on materials and equipment provided for in the Specifications.

2. Revisions to Contract Documents, where requested by the City Manager or designee or ENGINEER, are "changes" not "substitutions".

3. CONTRACTOR's determination of and compliance with governing regulations and orders issued by governing authorities do not constitute substitutions and do not constitute basis for a Change Order, except as provided for in Contract Documents.

1.4 MANUFACTURER'S WRITTEN INSTRUCTIONS

A. Instruction Distribution: When the Contract Documents require that installation, storage, maintenance and handling of equipment and materials comply with manufacturer's written instructions, obtain and distribute printed copies of such instructions to parties involved in installation, including six copies to ENGINEER.

1. Maintain one set of complete instructions at jobsite during storage and installation, and until completion of work.

B. Manufacturer's Requirements: Store, maintain, handle, install, connect, clean, condition, and adjust products in accordance with manufacturer's written instructions and in conformity with Specifications.

1. Should job conditions or specified requirements conflict with manufacturer's instructions, consult ENGINEER for further instructions.

2. Do not proceed with work without written instructions.

C. Performance Procedures: Perform work in accordance with manufacturer's written instructions. Do not omit preparatory steps or installation procedures, unless specifically modified or exempted by Contract Documents.

1.5 TRANSPORTATION AND HANDLING

A. Coordination with Schedule: Arrange deliveries of materials and equipment in accordance with Construction Progress Schedules. Coordinate to avoid conflict with work and conditions at site.

1. Deliver materials and equipment in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible. Keep product free of dirt and debris.

2. Protect bright machined surfaces, such as shafts and valve faces, with a heavy coat of grease prior to shipment.

3. Immediately upon delivery, inspect shipments to determine compliance with requirements of Contract Documents and approved submittals and that material and equipment are protected and undamaged.

B. Handling: Provide equipment and personnel to handle material and equipment by methods recommended by manufacturer to prevent soiling or damage to materials and equipment or packaging.

1.6 STORAGE, PROTECTION, AND MAINTENANCE

A. On-site storage areas and buildings:

1. Conform storage buildings to requirements of Section 01500.

2. Coordinate location of storage areas with ENGINEER and the CITY.

3. Arrange on site storage areas for proper protection and segregation of stored materials and equipment with proper drainage. Provide for safe travel around storage areas and safe access to stored materials and equipment.

4. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter.

5. Store materials such as pipe, reinforcing and structural steel, and equipment on pallets, blocks or racks, off ground.

6. PVC Pipe may be damaged by prolonged exposure to direct sunlight, take necessary precautions during storage and installation to avoid this damage. Store pipe under cover, and install with sufficient backfill to shield it from the sun.

7. Store fabricated materials and equipment above ground, on blocking or skids, to prevent soiling or staining. Cover materials and equipment that are subject to deterioration with impervious sheet coverings; provide adequate ventilation to avoid condensation.

B. Interior Storage:

1. Store materials and equipment in accordance with manufacturer's instructions, with seals and labels intact and legible.

2. Store materials and equipment, subject to damage by elements, in weathertight enclosures.

3. Maintain temperature and humidity within ranges required by manufacturer's instructions.

C. Accessible Storage: Arrange storage in a manner to provide easy access for inspection and inventory. Make periodic inspections of stored materials or equipment to assure that materials or equipment are maintained under specified conditions and free from damage or deterioration.

1. Perform maintenance on stored materials of equipment in accordance with manufacturer's instructions, in presence of the City Manager or designee or ENGINEER.

2. Submit a report of completed maintenance to ENGINEER with each Application for Payment.

3. Failure to perform maintenance, to notify ENGINEER of intent to perform maintenance or to submit maintenance report may result in rejection of material or equipment.

D. CITY's Responsibility: The CITY assumes no responsibility for materials or equipment stored in buildings or on-site. CONTRACTOR assumes full responsibility for damage due to storage of materials or equipment.

E. CONTRACTOR's Responsibility: For CITY Capital Improvement Projects, the CONTRACTOR assumes full responsibility for protection of completed construction until facilities (or portions of facilities) are accepted for operation and placed in service. Repair and restore damage to completed Work equal to its original condition.

F. Special Equipment: Use only rubber tired wheelbarrows, buggies, trucks, or dollies to wheel loads over finished floors, regardless if the floor has been protected or not. This applies to finished floors and to exposed concrete floors as well as those covered with composition tile or other applied surfacing.

G. Surface Damage: Where structural concrete is also the finished surface, take care to avoid marking or damaging surface.

1.7 MANUFACTURER'S FIELD QUALITY CONTROL SERVICES

A. General:

1. Provide manufacturer's field services in accordance with this subsection for those tasks specified in other sections.

2. Include and pay all costs for suppliers' and manufacturers' services, including, but not limited to, those specified.

B. Installation Instruction: Provide instruction by competent and experienced technical representatives of equipment manufacturers or system suppliers as necessary to resolve assembly or installation procedures that are attributable to, or associated with, the equipment furnished.

C. Installation Inspection, Adjustments and Startup Participation:

1. Provide competent and experienced technical representatives of equipment manufacturers or system suppliers to inspect the completed installation as follows.

a. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or for other conditions that may cause damage.

b. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

c. Verify that wiring and support components for equipment are complete.

d. Verify that equipment or system is installed in accordance with the manufacturer's recommendations, approved shop drawings and the Contract Documents.

e. Verify that nothing in the installation voids any warranty.

2. Provide manufacturer's representatives to perform initial equipment and system adjustment and calibration conforming to the manufacturer's

recommendations and instructions, approved shop drawings and the Contract Documents.

3. Start-up of Equipment: Provide prior written notice of proposed start-up to the City Manager or designee and ENGINEER. Obtain ENGINEER's approval before start-up of equipment. CITY's departmental representative must be on-site during start-up. Execute start-up under supervision of applicable manufacturer's representative in accordance with manufacturers' instructions.

4. Furnish ENGINEER with three copies of the following. When training is specified, furnish the copies at least 48 hours prior to training.

   a. "Certificate of Installation, Inspection and Start-up Services" by manufacturers' representatives for each piece of equipment and each system specified, certifying:

      (1) That equipment is installed in accordance with the manufacturers' recommendations, approved shop drawings and the Contract Documents.

      (2) That nothing in the installation voids any warranty.

      (3) That equipment has been operated in the presence of the manufacturer's representative.

      (4) That equipment, as installed, is ready to be operated by others.

   b. Detailed report by manufacturers' representatives, for review by ENGINEER of the installation, inspection and start-up services performed, including:

      (1) Description of calibration and adjustments if made; if not in Operation and Maintenance Manuals, attach copy.

      (2) Description of any parts replaced and why replaced.

      (3) Type, brand name, and quantity of lubrication used, if any.

      (4) General condition of equipment.

      (5) Description of problems encountered, and corrective action taken.

      (6) Any special instructions left with CONTRACTOR or ENGINEER.

D. Field Test Participation: Provide competent and experienced technical representatives of all equipment manufacturers and system suppliers as

necessary to participate in field testing of the equipment specified in Section 01400.

E. Trouble-Free Operation: Provide competent and experienced technical representatives of all equipment manufacturers and system suppliers as necessary to place the equipment in trouble-free operation after completion of start-up and field tests.

1.8 SPECIAL TOOLS AND LUBRICATING EQUIPMENT

A. General: Furnish, per manufacturer's recommendations, special tools required for checking, testing, parts replacement, and maintenance. (Special tools are those which have been specially designed or adapted for use on parts of the equipment, and which are not customarily and routinely carried by maintenance mechanics.)

B. Time of Delivery: Deliver special tools and lubricating equipment to the CITY when unit is placed into operation and after operating personnel have been properly instructed in operation, repair, and maintenance of equipment.

C. Quality: Provide tools and lubricating equipment of a quality meeting equipment manufacturer's requirements.

1.9 LUBRICATION

A. General: Where lubrication is required for proper operation of equipment, incorporate in the equipment the necessary and proper provisions in accordance with manufacturer's requirements. Where possible, make lubrication automated and positive.

B. Oil Reservoirs: Where oil is used, supply reservoir of sufficient capacity to lubricate unit for a 24-hour period.

1.10 WARRANTY

A. Provide copies of any warranties of materials or equipment to the City Manager or designee with documentation showing compliance with warranty requirements.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

CERTIFICATE OF INSTALLATION, INSPECTION AND START-UP SERVICES

Project

_____

Equipment

_____

Specification Section

_____

Contract

_____

I hereby certify that the named equipment has been inspected, adjusted and operated by the Manufacturers' Representative and further certify:

1. That the equipment is installed in accordance with the manufacturer's recommendations, approved shop drawings and the Contract Documents.
2. That nothing in the installation voids any warranty.
3. That equipment has been operated in the presence of the manufacturer's representative.
4. That equipment, as installed, is ready to be operated by others.

MANUFACTURERS' REPRESENTATIVE

Signature _____ Date _____

Name (print) _____

Title _____

Representing _____

CONTRACTOR

Signature _____ Date _____

Name (print) _____

Title _____

Attach the detailed report called for by Specification Section 01600.

Complete and submit three copies of this form with the detailed report to ENGINEER as specified.

CERTIFICATE OF POST START-UP SERVICES

Project _____

Equipment

_____

Specification Section

_____

Contract _____

I hereby certify the Manufacturers' Representative has inspected this equipment, made adjustments and calibrations, and that it is operating in conformance with the design, specifications, and manufacturer's requirements. Detailed notation of improper operation with corresponding recommendations, if any, are made and attached to this form.

MANUFACTURERS' REPRESENTATIVE

Signature _____ Date _____

Name (print) _____

Title_____

Representing_____

CONTRACTOR

Signature _____ Date _____

Name (print) _____

Title_____

ENGINEER

Signature _____ Date _____

Name (print) _____

Title_____

Complete and submit three copies of this form to the City Manager or designee upon completion of 6 to 11 months reinspection as required by Specification Section 01600.

END OF SECTION

SECTION 01710

CLEANING

PART 1 GENERAL

1.1 SECTION INCLUDES:

A. General Requirements

B. Disposal Requirements

1.2 GENERAL REQUIREMENTS

A. Execute cleaning during progress of the work and at completion of the work.

1.3 DISPOSAL REQUIREMENTS

A. Conduct cleaning and disposal operations to comply with codes, ordinances, regulations, and anti-pollution laws.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.1 DURING CONSTRUCTION

A. Execute daily cleaning to keep the work, the site, and adjacent properties free from accumulations of waste materials, rubbish, and windblown debris, resulting from construction operations.

B. Provide onsite containers for the collection of waste materials, debris and rubbish. All waste materials including containers, food debris and other miscellaneous materials must be disposed of daily in onsite containers.

C. Remove waste materials, debris and rubbish from the site periodically and dispose of at legal disposal areas away from the site.

3.2 FINAL CLEANING

A. Requirements: At the completion of work and immediately prior to final inspection, clean the entire project as follows:

1. Thoroughly clean, sweep, wash, and polish all work and equipment provided under the Contract, including finishes. Leave the structures and site in a complete and finished condition to the satisfaction of the ENGINEER.

2. Direct all subcontractors to similarly perform, at the same time, an equivalent thorough cleaning of all work and equipment provided under their contracts.

3. Remove all temporary structures and all debris, including dirt, sand, gravel, rubbish and waste material.

4. Should the CONTRACTOR not remove rubbish or debris or not clean the buildings and site as specified above, the OWNER reserves the right to have the cleaning done at the expense of the CONTRACTOR.

B. Employ experienced workers, or professional cleaners, for final cleaning.

C. Use only cleaning materials recommended by manufacturer of surface to be cleaned.

D. In preparation for substantial completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces, and of concealed spaces.

E. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from sight-exposed interior and exterior finished surfaces. Polish surfaces so designated to shine finish.

F. Repair, patch, and touch up marred surfaces to specified finish, to match adjacent surfaces.

G. Replace air-handling filters if units were operated during construction.

H. Clean ducts, blowers, and coils, if air-handling units were operated without filters during construction.

I. Vacuum clean all interior spaces, including inside cabinets.

J. Handle materials in a controlled manner with as few handlings as possible. Do not drop or throw materials from heights.

K. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly-painted surfaces.

L. Clean interior of all panel cabinets, pull boxes, and other equipment enclosures.

M. Wash and wipe clean all lighting fixtures, lamps, and other electrical equipment that may have become soiled during installation.

N. Perform touch-up painting.

O. Broom clean exterior paved surfaces; rake clean other surfaces of the grounds.

P. Remove erection plant, tools, temporary structures and other materials.

Q. Remove and dispose of all water, dirt, rubbish or any other foreign substances.

3.3 FINAL INSPECTION

A. After cleaning is complete the final inspection may be scheduled. The inspection will be done with the OWNER and ENGINEER.

END OF SECTION

SECTION 02050

DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: All work necessary for the removal and disposal of structures, foundations, piping, equipment and roadways, or any part thereof including masonry, steel, reinforced concrete, plain concrete, electrical facilities, and any other material or equipment shown or specified to be removed.

B. Basic Procedures and Schedule: Carry out demolition so that adjacent structures, which are to remain, are not endangered. Schedule the work so as not to interfere with the day-to-day operation of the existing facilities. Do not block doorways or passageways in existing facilities.

C. Additional Requirements: Provide dust control and make provisions for safety.

D. Related Work Specified in Other Sections Includes:

1. Section 01045 – Connection to Existing Systems

2. Section 02110 – Site Clearing

1.2 SUBMITTALS

A. Provide all submittals, including the following, as specified in Division 1.

B. Site Inspection: Visit the site and inspect all existing structures. Observe and record any defects that may exist in buildings or structures adjacent to but not directly affected by the demolition work. Provide the City Manager or designee with a copy of this inspection record and obtain the ENGINEER's and the City's Manager or designee approval prior to commencing the demolition.

1.3 QUALITY ASSURANCE

A. Limits: Exercise care to break concrete well for removal in reasonably small masses. Where only parts of a structure are to be removed, cut the concrete along limiting lines with a suitable saw so that damage to the remaining structure is held to a minimum.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 EXAMINATION OF EXISTING DRAWINGS

A. Available drawings of existing structures and equipment will be available for inspection at the office of the ENGINEER.

3.2 PROTECTION

A. General Safety: Provide warning signs, protective barriers, and warning lights as necessary adjacent to the work as approved or required. Maintain these items during the demolition period.

B. Existing Services: Undertake no demolition work until all mechanical and electrical services affected by the work have been properly disconnected. Cap, reroute or reconnect interconnecting piping or electrical services that are to remain in service either permanently or temporarily in a manner that will not interfere with the operation of the remaining facilities.

C. Hazards: Perform testing and air purging where the presence of hazardous chemicals, gases, flammable materials or other dangerous substances is apparent or suspected, and eliminate the hazard before demolition is started.

3.3 DEMOLITION REQUIREMENTS

A. Explosives: The use of explosives will not be permitted.

B. Protection: Carefully protect all mechanical and electrical equipment against dust and debris.

C. Removal: Remove all debris from the structures during demolition and do not allow debris to accumulate in piles.

D. Abandoned Pipelines: Fill all abandoned pipelines using grout in accordance with Section 03310.

E. Access: Provide safe access to and egress from all working areas at all times with adequate protection from falling material.

F. Protection: Provide adequate scaffolding, shoring, bracing railings, toe boards and protective covering during demolition to protect personnel and equipment against injury or damage. Cover floor openings not used for material drops with material substantial enough to support any loads placed on it. Properly secure the covers to prevent accidental movement.

G. Lighting: Provide adequate lighting at all times during demolition.

H. Closed Areas: Close areas below demolition work to anyone while removal is in progress.

I. Material Drops: Do not drop any material to any point lying outside the exterior walls of the structure unless the area is effectively protected.

J. Chemicals: All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant or of other classification must show approval of either EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with manufacturer's instructions or government regulations as applicable.

3.4 ASBESTOS-CONCRETE (AC) PIPE

A. If existing asbestos-cement pipe is encountered during the course of construction, remove the AC pipe and replace it with C900 PVC pipe having a pressure rating as required elsewhere in these specifications. Replace the AC pipe with PVC pipe for a distance of 10 feet each way from the centerline of the pipe under construction or 5 feet beyond the length of AC pipe exposed by trench excavation, whichever is greater. A change order will be issued for required replacement of AC pipe not shown on the drawings.

B. Coordinate the shutdown of the AC pipeline with the City Manager or designee in accordance with Section 01045, including proper notice to the City Manager or designee and any customers that may be affected by the shutdown as required by these specifications and/or current Water Department policy. In the event of an unanticipated encounter with AC pipe, immediately recover and protect the pipe and notify the CITY Water Department.

C. Perform cutting of AC pipe by means of cutting wheels mounted in a chain wrapped around the pipe barrel. Do not use power driven saws with abrasive discs or any other means that produce concentrations of airborne asbestos dust.

3.5 DISPOSAL OF MATERIALS

A. Final Removal: Dispose of AC pipe in accordance with CITY special handling requirements and coordination with City Solid Waste Management Department. Remove all other debris, rubbish, scrap pieces, equipment, and materials resulting from the demolition. Take title to all demolished materials and remove such items from the site.

END OF SECTION

SECTION 02110

SITE CLEARING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Requirements for clearing of all areas within the Contract limits and other areas shown, including work designated in permits and other agreements, in accordance with the requirements of Division 1.

B. Related Work Specified in Other Sections Includes:

1. Section 02050 – Demolition

2. Section 02222 - Excavation - Earth and Rock

3. Section 02223 – Backfilling

4. Section 02400 – Restoration by Sodding or Seeding

1.2 DEFINITIONS

A. Clearing: Clearing is the removal from the ground surface and disposal, within the designated areas, of trees, brush, shrubs, down timber, decayed wood, other vegetation, rubbish and debris as well as the removal of fences.

B. Grubbing: Grubbing is the removal and disposal of all stumps, buried logs, roots larger than 1-1/2 inches, matted roots and organic materials.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 PROTECTION OF EXISTING UTILITIES

A. Prior to site clearing, locate and mark all existing utilities in coordination with the CITY and other affected owners. Protect all existing utilities and markings from damage. In case of damage to existing utilities caused by construction activities, contact the owner of the utility or appropriate CITY department (Water or Wastewater) immediately. Repair any damage to existing utilities or markings caused by construction activities in coordination with or as directed by the owner of the utility.

3.2 TREE REMOVAL

A. Tree Removal Within Right-of-Way Limits: Remove trees and shrubs within the right-of-way unless otherwise indicated.

1. Remove trees and shrubs to avoid damage to trees and shrubs designated to remain.

2. Grub and remove tree stumps and shrubs felled within the right-of-way to an authorized disposal site. Fill depressions created by such removal with material suitable for backfill as specified in Section 02223.

B. Tree Removal Outside Right-of-Way Limits: Do not cut or damage trees outside the right-of-way unless plans show trees to be removed or unless written permission has been obtained from the property owner. Furnish three copies of the written permission before removal operations commence.

C. If the landowner desires the timber or small trees, cut and neatly pile it in 4 ft. lengths for removal by the owner; otherwise, dispose of it by hauling it away from the project site. If hauled timber is of merchantable quality, credit shall accrue to the CONTRACTOR.

3.3 TREES AND SHRUBS TO BE SAVED

A. Protection: Protect trees and shrubs within the work limits that are so delineated or are marked in the field to be saved from defacement, injury and destruction.

1. Work within the limits of the tree drip line with extreme care using either hand tools or equipment that will not cause damage to trees.

a. Do not disturb or cut roots unnecessarily. Do not cut roots 1-1/2 inches and larger unless approved.

b. Immediately backfill around tree roots after completion of construction in the vicinity of trees.

c. Do not operate any wheeled or tracked equipment within drip line.

2. Protect vegetation from damage caused by emissions from engine-powered equipment.

3. During working operations, protect the trunk, foliage and root system of all trees to be saved with boards or other guards placed as shown and as required to prevent damage, injury and defacement.

a. Do not pile excavated materials within the drip line or adjacent to the trunk of trees.

b. Do not allow runoff to accumulate around trunk of trees.

c. Do not fasten or attach ropes, cables, or guy wires to trees without permission. When such permission is granted, protect the tree before making fastening or attachments by providing burlap wrapping and softwood cleats.

d. The use of axes or climbing spurs for trimming will not be permitted.

e. Provide climbing ropes during trimming.

4. Remove shrubs to be saved, taking a sufficient earth ball with the roots to maintain the shrub.

a. Temporarily replant if required, and replace at the completion of construction in a condition equaling that which existed prior to removal.

b. Replace in kind if the transplant fails.

5. Have any tree and shrub repair performed by a tree surgeon properly licensed by the State of Florida and within 24 hours after damage occurred.

3.4 CLEARING AND GRUBBING

A. Clearing: Clear all items specified to the limits shown and remove cleared and grubbed materials from the site.

1. Do not start earthwork operations in areas where clearing and grubbing is not complete, except that stumps and large roots may be removed concurrent with excavation.

2. Comply with erosion, sediment control and storm management measures as specified in Division 1.

B. Grubbing: Clear and grub areas to be excavated, areas receiving less than 3 feet of fill and areas upon which structures are to be constructed.

1. Remove stumps and root mats in these areas to a depth of not less than 18 inches below the subgrade of sloped surfaces.

2. Fill all depressions made by the removal of stumps or roots with material suitable for backfill as specified in Section 02223.

C. Limited Clearing: Clear areas receiving more than 3 feet of fill by cutting trees and shrubs as close as practical to the existing ground. Grubbing will not be required.

D. Dispose of all material and debris from the clearing and grubbing operation by hauling such material and debris away to an approved dump. The cost of disposal (including hauling) of cleared and grubbed material and debris shall be considered

a subsidiary obligation of the CONTRACTOR; include the cost in the bid for the various classes of work.

3.5 TOPSOIL

A. Stripping: Strip existing topsoil from areas that will be excavated or graded prior to commencement of excavating or grading and place in well-drained stockpiles in approved locations.

END OF SECTION

SECTION 02151

SHORING, SHEETING AND BRACING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Work required for protection of an excavation or structure through shoring, sheeting, and bracing.

B. Related Work Specified In Other Sections Includes:

1. Section 02222 - Excavation - Earth and Rock

2. Section 02223 - Backfilling

1.2 SUBMITTALS

A. General: Provide all submittals, including the following, as specified in Division 1.

B. CONTRACTOR's Submittals: All sheeting and bracing shall be the responsibility of the CONTRACTOR to retain qualified design services for these systems, and to be completed with strict adherence to OSHA Regulations. Submit complete design calculations and working drawings of proposed shoring, sheeting and bracing which have been prepared, signed and sealed by a Licensed Professional Engineer experienced in Structural Engineering and registered in the State of Florida, before starting excavation for jacking pits and structures. Use the soil pressure diagram shown for shoring, sheeting and bracing design. ENGINEER's review of calculations and working drawings will be limited to confirming that the design was prepared by a licensed professional engineer and that the soil pressure diagram shown was used.

1.3 REFERENCES

A. Design: Comply with all Federal and State laws and regulations applying to the design and construction of shoring, sheeting and bracing.

B. N.B.S. Building Science Series 127 "Recommended Technical Provisions for Construction Practice in Shoring and Sloping Trenches and Excavations.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements: Do work in accordance with the U.S. Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety Act of 1970 (PL 91-596) and under Section 107 of the Contract Work Hours and Safety Standards Act (PL 91-54), and the Florida

Trench Safety Act. Observe 29 CFR 1910.46 OSHA regulations for Confined Space Entry.

PART 2 PRODUCTS

2.1 MANUFACTURERS AND MATERIALS

A. Material Recommendations: Use manufacturers and materials for shoring, sheeting and bracing as recommended by the Licensed Professional Engineer who designed the shoring, sheeting, and bracing.

1. Wood Materials: Oak, or treated fir or pine for wood lagging.

PART 3 EXECUTION

3.1 SHORING, SHEETING AND BRACING INSTALLATION

A. General: Provide safe working conditions, to prevent shifting of material, to prevent damage to structures or other work, to avoid delay to the work, all in accordance with applicable safety and health regulations. Properly shore, sheet, and brace all excavations which are not cut back to the proper slope and where shown. Meet the general trenching requirements of the applicable safety and health regulations for the minimum shoring, sheeting and bracing for trench excavations.

1. CONTRACTOR's Responsibility: Sole responsibility for the design, methods of installation, and adequacy of the shoring, sheeting and bracing.

B. Arrange shoring, sheeting and bracing so as not to place any strain on portions of completed work until the general construction has proceeded far enough to provide ample strength.

C. If ENGINEER is of the opinion that at any point the shoring, sheeting or bracing are inadequate or unsuited for the purpose, resubmission of design calculations and working drawings for that point may be ordered, taking into consideration the observed field conditions. If the new calculations show the need for additional shoring, sheeting and bracing, it should be installed immediately.

D. Monitoring: Periodically monitor horizontal and vertical deflections of sheeting. Submit these measurements for review.

E. Accurately locate all underground utilities and take the required measures necessary to protect them from damage. Keep all underground utilities in service at all times as specified in Division 1.

F. Driven Sheeting: Drive tight sheet piling in that portion of any excavation in paved or surface streets City collector and arterial streets and in State, County, and City

highways below the intersection of a one-on-one slope line from the nearest face of the excavation to the edge of the existing pavement or surface.

G. Sheeting Depth: In general drive or place sheeting for pipelines to a depth at elevation equal to the top of the pipe as approved.

1. If it is necessary to drive sheeting below that elevation in order to obtain a dry trench or satisfactory working conditions, cut the sheeting off at the top of the pipe and leave in place sheeting below the top of the pipe.

2. Do not cut the sheeting until backfill has been placed and compacted to the top of the pipe.

H. Sheeting Removal: In general, remove sheeting and bracing above the top of the pipe as the excavation is refilled in a manner to avoid the caving in of the bank or disturbance to adjacent areas or structures. Remove sheeting as backfilling progresses so that the sides are always supported or when removal would not endanger the construction of adjacent structures. When required to eliminate excessive trench width or other damages, shoring or bracing shall be left in place and the top cut off at an elevation 2.5 feet below finished grade, unless otherwise directed.

1. Carefully fill voids left by the withdrawal of the sheeting by jetting, ramming or otherwise.

2. No separate payment will be made for filling of such voids.

END OF SECTION

SECTION 02210

PIPE REMOVAL AND ABANDONMENT

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Removal and abandonment of piping and appurtenances, wholly or in part, as required to complete Work as shown on the Drawings and specified in this Section.

B. Work on and/or removal of asbestos cementitious pipe shall be performed per OSHA, EPA, NESHAPS, and State regulations and must be supervised by a person that has satisfactorily completed an Asbestos Abatement Project Supervisor course.

C. Related Work Specified in other Sections Includes:

1. Section 01045 – Connection to Existing Systems

2. Section 02222 – Excavation – Earth and Rock

3. Section 02223 – Backfilling

4. Section 03310 – Concrete, Masonry Mortar and Grout

1.2 SUBMITTALS

A. General: Provide all submittals, including the following, as specified in Division 1.

B. Submit the following:

1. Proposed methods for pipe removal and abandonment;
2. Equipment proposed to be used to do pipe removal and abandonment work;
3. Resume of pipe grouting subcontractor;
4. Pipe removal and abandonment schedule/sequence.

C. If a detour is required, submit a traffic control plan for approval to City Manager or designee and/or the Florida Department of Transportation as described in Section 01570.

1.3 SITE CONDITIONS

A. General

1. Prior to any work, a proper and approved maintenance of traffic plan (MOT) shall be submitted to the engineer and the City.

2. Execute pipe removal and abandonment so that there is no injury to persons or damage to adjacent buildings, structures, equipment, materials, piping, wiring, pavement, fences, trees, guardrails, and other adjacent improvements. Execute demolition and abandonment so that access to facilities that are in operation and to residences and businesses is free and safe.

3. Execute pipe removal and abandonment so that interference to vehicular traffic and personnel traffic does not exceed scheduled interference. Do not place rubble, excavation, piping, or other materials removed on roadways, drives, or sidewalks that are to remain in service.

PART 2 - PRODUCTS

2.1 TEMPORARY MATERIALS

A. Provide temporary fencing, barricades, barriers, piping, valves, pumps, power and controls, and water necessary to meet the requirements of this Section.

B. Temporary fencing, barricades, barriers, and enclosures shall be suitable to the purpose intended.

2.2 REPAIR AND REPLACEMENT MATERIALS

For repair or replacement of existing facilities or improvements to remain, use materials identical to, or equal to, materials used in existing work when new.

PART 3 – EXECUTION

3.1 GENERAL

A. Conduct pipe removal and abandonment as shown and specified in the Contract Documents.

B. Conduct pipe removal and abandonment so that existing equipment, piping, wiring, structures, and other improvements to remain are not damaged. Repair or replace equipment, piping, wiring, structures, and other improvements damaged at no additional cost to the City.

C. Do not remove equipment, piping, wiring, structures, or other improvements not shown or specified to be removed. If equipment, piping, wiring, structures, or other improvements not shown or specified to be removed is removed, replace equipment, piping, wiring, structures, or other improvements at no additional cost to the City.

3.2 DISCONNECTIONS

A. Prior to starting pipe removal or abandonment, check underground and exposed existing utilities, piping, and equipment within the limits of pipe removal or abandonment. Prior to starting, check underground and exposed existing utilities, piping connected to and associated with existing pipe to be removed or abandoned. Verify the following:

1. Piping is inactive (abandoned);

2. Other utilities which may be in conflict have been permanently or temporarily disconnected, if required:

B. Do not proceed with salvage or demolition if piping is active or utilities have not been disconnected.

3.3 ABANDONMENT

A. The Contractor shall, as described on the Drawings and as may be directed by the City, abandon in place the following existing utility improvements:

1. All water mains, reuse water mains and raw water mains that are designated to be abandoned shall be filled with grout. Refer to Section 03310 – Concrete, Masonry Mortar and Grout.

2. All sewer lines, force mains, laterals and services that are designated to be abandoned shall be flushed clean and filled with grout. Prior to grout fill, sewer lines, force mains, laterals and services to be abandoned shall be flushed clean to remove wastewater and solids. Contractor is responsible for securing and providing flushing water, collection of flush water/wastewater, and disposal. The cleaning of these piping systems shall comply with all local and DEP requirements.

3. Sewer manholes designated to be abandoned shall have the top two feet removed. The remainder of each manhole shall be abandoned and filled with grout or flowable fill. The excavation or pit shall be backfilled with select fill and compacted in accordance with Section 02223 – Backfilling and the trenching details on the Drawings.

B. Appurtenances: All water hydrants, ARV valves and other appurtenances on abandoned lines shall be removed to the main and the fitting at the main shall be capped or plugged. All valves shall have the valve box, pad and operator removed, with the valve left in the open position unless specifically noted otherwise.

C. Preparation:

1. The City shall be notified at least 72 hours in advance of grouting operations.

2. Bulkheads shall be spaced at intervals of not more than 1,000 feet. If the line to be abandoned is longer, bulkheads shall be inserted in the pipe to maintain the required maximum spacing between bulkheads.

3. Temporary vents shall be installed in the line to be filled at a maximum spacing of 150 ft. The vents shall be capable of being capped to allow further grouting operations.

D. Equipment:

1. The materials shall be mixed or delivered in equipment of sufficient size and capacity to provide the desired amount of grout material for each stage in a single operation. The equipment shall be capable of mixing the grout at densities required for the approved procedure and shall also be capable of changing density as dictated by field conditions any time during the grouting operation.

2. Mixers and Pumps - The grout shall be delivered to the injection point at a steady pressure with a non-pulsating centrifugal or triplex pump. Means shall be provided to increase or decrease the water-cement ratio. The system shall mix the grout to a homogeneous consistency. Means of accurately measuring grout component quantities, pumping pressures, and volumes pumped shall be provided.

3. Pressure Gauges - CONTRACTOR shall provide one pressure gauge at the point of injection and one pressure gauge at the grout pump. Grouting shall not proceed without appropriate calibrated gauges in place and in working order. Pressure gauges shall be equipped with diaphragm seals, have a working range between 1.5 to 2.0 times the design grout pressure, and have an accuracy within 0.5 percent of full range. Pressure gauges shall be instrument oil filled and attached to a saddle-type diaphragm seal to prevent clogging with grout.

E. Grouting:

Once grouting operations begin, grouting shall proceed uninterrupted from bulkhead to bulkhead. Grout placement shall not be terminated until both of the following conditions have been met, unless otherwise approved by the City: a) The estimated volume of grout to fill the line has been injected; and, b) grout has been expelled from the furthest vent or bulkhead. Bulkheads and temporary vents shall not be removed until the grout has set.

F. Testing and Sampling:

1. Take four test specimens for each 50 cubic yards of grout or for each four hours of placing.

2. Test in accordance with ASTM C109 except:

a. The specimens shall be 3 inch by 6 inch cylinders covered after casting to prevent damage and loss of moisture. Moist cure specimens for a period up to 7 days prior to a 28-day compressive strength test.

b. Do not oven dry specimens that are load tested. Specimens may be tested at any age to monitor compressive strength. The material may require special handling and testing techniques.

G. The CONTRACTOR may remove the pipe in accordance with the Paragraph 3.04 in lieu of abandonment if acceptable to the City. Such removal, however, will be paid at the same price for pipe abandonment.

H. All work under this Section shall comply with City, City, State and Federal regulations.

3.4 REMOVAL AND DISPOSAL

A. The Contractor shall, as described on the Drawings and as may be directed by the City, remove the following existing utility improvements:

1. All water mains, reuse water mains and raw water mains that are designated to be removed.

2. All sewer lines, sewer manholes, force mains, laterals and services that are designated to be removed shall be flushed clean with water prior to removal. Contractor is responsible for securing and providing flushing water, collection of flush water/wastewater, and disposal. The cleaning of these piping systems shall comply with all local and DEP requirements.

B. The pipe removal and disposal shall include all valves, fittings and appurtenances.

3.5 SALVAGE OF EQUIPMENT, PIPING, AND MATERIALS

A. Remove items identified on the drawings or specified to remain the property of the City. Do not damage equipment, piping, and materials to be salvaged.

B. Following removal or equipment, piping, and materials to be salvaged, place equipment, piping, and materials in a location within the City limits as designated by the City.

3.6 REPAIRS

Repair structural elements, equipment, piping, conduit, and other improvements to remain that are damaged during demolition. Use workers specifically qualified in trade, or trades, involved to repair damaged work.

3.7 DISPOSAL

A. Remove and dispose of all equipment, piping, and materials from the jobsite not specifically designated to be retained by the City.

B. Contractor shall not accumulate or store debris from demolition on the project site.

C. The disposal of the piping, manholes and appurtenances shall be in accordance with City, State and Federal laws.

3.8 BACKFILLING

A. Backfill excavations, trenches, and pits resulting from abandonment and removal according to Section 02223 – Backfilling.

B. Backfill of the pipe trenches shall be according to the City details for pipe trench backfill. Pipe trenches for removed pipes that were within 3 horizontal feet of the edge of pavement shall be backfilled according to the detail for the type of roadway.

3.9 CLEANUP AND CLOSURE

A. Following pipe abandonment or removal, clean-up areas where other work is to be done as specified in this Section, or Sections applicable to work to be done.

B. Following pipe abandonment or removal, clean-up areas where no other work is to be done under this Contract. Remove debris and rubbish, temporary facilities, and equipment. Level surface irregularities to eliminate depressions. Leave work in a neat and presentable condition.

C. In locations where a pipe to be abandoned or removed connects to a pipe that remains in service, the Contractor shall install a suitable cap or plug on the end of the active pipe.

END OF SECTION

SECTION 02222

EXCAVATION - EARTH AND ROCK

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Requirements for performing opencut excavations to the widths and depths necessary for constructing structures and pipelines, including excavation of any material necessary for any purpose pertinent to the construction of the Work.

B. Related Work Specified In Other Sections Includes:

1. Section 02110 - Site Clearing

2. Section 02151 - Shoring, Sheeting and Bracing

3. Section 02223 – Backfilling

4. Section 02530 – Groundwater Control for Open Cut Excavation

5. Section 03310 – Concrete, Masonry, Mortar and Grout

1.2 DEFINITIONS

A. Earth: "Earth" includes all materials which, in the opinion of the ENGINEER, do not require blasting, barring, wedging or special impact tools for their removal from their original beds, and removal of which can be completed using standard excavating equipment. Specifically excluded are all ledge and bedrock and boulders or pieces of masonry larger than one cubic yard in volume.

B. Rock: "Rock" includes all materials which, in the opinion of the ENGINEER, require blasting, barring, wedging and/or special impact tools such as jack hammers, sledges, chisels, or similar devices specifically designed for use in cutting or breaking rock for removal from their original beds and which have compressive strengths in their natural undisturbed state in excess of 300 psi. Boulders or masonry larger than one cubic yard in volume are classed as rock excavation.

1.3 SUBMITTALS

A. General: Provide all submittals, including the following, as specified in Division 1.

B. Engage the services of a Professional Engineer who is registered in the State of Florida to design all cofferdam and sheeting and bracing systems which the CONTRACTOR feels necessary for the execution of his work. Submit to the

ENGINEER a signed statement that he has been employed by the CONTRACTOR to design all sheeting and bracing systems. After the systems have been installed, furnish to the ENGINEER an additional signed statement that the cofferdams and sheeting and bracing systems have been installed in accordance with his design.

C. If a detour is required, submit a traffic control plan for approval to City Manager or designee and/or the Florida Department of Transportation as described in Section 01570.

1.4 SITE CONDITIONS

A. Geotechnical Investigation: A geotechnical investigation may have been prepared by the CITY and ENGINEER in preparing the Contract Documents.

1. The geotechnical investigation report may be examined for what ever value it may be considered to be worth. However, this information is not guaranteed as to its accuracy or completeness.

2. The geotechnical investigation report is not part of the Contract Documents.

B. Actual Conditions: Make any geotechnical investigations deemed necessary to determine actual site conditions.

C. Underground Utilities: Locate and identify all existing underground utilities prior to the commencement of Work.

D. Quality and Quantity: Make any other investigations and determinations necessary to determine the quality and quantities of earth and rock and the methods to be used to excavate these materials.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 GENERAL

A. Clearing: Clear opencut excavation sites of obstructions preparatory to excavation. Clearing in accordance with Section 02110, includes removal and disposal of vegetation, trees, stumps, roots and bushes, except those specified to be protected during trench excavation.

B. Banks: Shore or slope banks to the angle of repose to prevent slides or cave-ins in accordance with Section 02151.

C. Safety: Whenever an excavation site or trench is left unattended by the CONTRACTOR or when an area is not within 100 feet of observation by the CONTRACTOR, the excavation site or trench shall be filled and/or, at the City Manager's or designee discretion, protected by other means to prevent accidental or unauthorized entry. Include barricades and other protection devices requested by the ENGINEER or City Manager or designee, including temporary fencing, snow fencing, or temporary "structure" tape. Such safety items shall not relieve the CONTRACTOR of any site safety requirements or liabilities established by Federal, State and local laws and agencies, including OSHA, but is intended as additional safety measures to protect the general public.

D. Hazardous Materials: If encountered, take care of hazardous materials not specifically shown or noted in accordance with Section 01500.

E. During excavation and any site work, take storm water pollution prevention measures to ensure that water quality criteria are not violated in the receiving water body and all state and local regulatory requirements are met.

3.2 STRUCTURE EXCAVATION

A. Excavation Size: Provide excavations of sufficient size and only of sufficient size to permit the Work to be economically and properly constructed in the manner and of the size specified.

B. Excavation Shape: Shape and dimension the bottom of the excavation in earth or rock to the shape and dimensions of the underside of the structure or drainage blanket wherever the nature of the excavated material permits.

C. Compaction: Before placing foundation slabs, footings or backfill, proof roll the bottom of the excavations to detect soft spots.

1. For accessible areas, proof roll with a ten wheel tandem axle dump truck loaded to at least 15 tons or similarly loaded construction equipment.

2. For small areas, proof roll with a smooth-faced steel roller filled with water or sand, or compact with a mechanical tamper.

3. Make one complete coverage, with overlap, of the area.

4. Overexcavate soft zones and replace with compacted select fill.

3.3 TRENCH EXCAVATION

A. Preparation: Properly brace and protect trees, shrubs, poles and other structures which are to be preserved. Unless shown or specified otherwise, preserve all trees and large shrubs. Hold damage to the root structure to a minimum. Small shrubs may be preserved or replaced with equivalent specimens.

B. Adequate Space: Keep the width of trenches to a minimum, however provide adequate space for workers to place, joint and backfill the pipe properly and safely.

1. The minimum width of the trench shall be equal to at least 3.5 feet or the outside diameter of the pipe at the joint plus 8-inches for unsheeted trench or 12 inches for sheeted trench, whichever is greater. Conform the trench walls to OSHA Regulations.

2. In sheeted trenches, measure the clear width of the trench at the level of the top of the pipe to the inside of the sheeting.

C. Depth:

1. Excavate trenches to a minimum depth of 8 inches, but not more than 12 inches, below the bottom of the pipe so that bedding material can be placed in the bottom of the trench and shaped to provide a continuous, firm bearing for pipe barrels and bells.

2. Standard trench grade shall be defined as the bottom surface of the utility to be constructed or placed within the trench. Trench grade for utilities in rock or other non-cushioning material shall be defined as additional undercuts backfilled with crushed stone compacted in 6-inch lifts, below the standard 8-inches minimum trench undercut. Backfill excavation below trench grade not ordered in writing by the ENGINEER with acceptable USCS Class I, II or III (see Section 02223, 2.1.C) embedment material to trench grade and compact to density equal to native soil.

3. In stable trenches, where the soil is neither wet, yielding, nor mucky, trench bottom may be either native undisturbed soils of USCS Class II, III, or IV, or thoroughly compacted USCS Class I, II, or III material from three inches (3”) to six inches (6”) depth to provide a stable, continuous support for the pipe bedding system. In USCS Class V soil areas, foundation bedding is required. All foundation bedding shall be USCS Class I material. In no case shall pipe be bedded on solid rock. See Section 02223, subsections 3.2 and 2.4 for more information on bedding.

D. Unstable or Unsuitable Materials: If unstable or unsuitable material is exposed at the level of the bottom of the trench excavation, excavate the material in accordance with the subsection headed "Authorized Additional Excavation".

1. Remove material for the full width of the trench and to the depth required to reach suitable foundation material.

2. When in the judgment of the ENGINEER the unstable or unsuitable material extends to an excessive depth, the ENGINEER may advise, in writing, the need for stabilization of the trench bottom with additional select fill material, crushed stone, washed shell, gravel mat or the need to provide firm support for the pipe or electrical duct by other suitable methods.

3. Crushed stone, washed shell and gravel shall be as specified in Section 02223.

4. Payment for such trench stabilization will be made under the appropriate Contract Items or where no such items exist, as a change in the Work.

E. Length of Excavation: Keep the open excavated trench preceding the pipe laying operation and the unfilled trench, with pipe in place, to a minimum length which causes the least disturbance. Provide ladders for a means of exit from the trench as required by applicable safety and health regulations.

F. Excavated Material: Neatly deposit excavated material to be used for backfill at the sides of the trenches where space is available. Where stockpiling of excavated material is required, obtain the sites to be used and maintain operations to provide for natural drainage and not present an unsightly appearance.

G. Water: Allow no water to rise in the trench excavation until sufficient backfill has been placed to prevent pipe flotation. Provide trench dewatering in accordance with Section 02530.

3.4 EXCAVATION FOR JACKING AND AUGERING

A. Jacking and Augering Requirements: Allow adequate length in jacking pits to provide room for the jacking frame, the jacking head, the reaction blocks, the jacks, auger rig, and the jacking pipe. Provide sufficient pit width to allow ample working space on each side of the jacking frame. Allow sufficient pit depth such that the invert of the pipe, when placed on the guide frame, will be at the elevation desired for the completed line. Tightly sheet the pit and keep it dry at all times.

3.5 ROCK EXCAVATION

A. Rock Excavation: Excavate rock within the boundary lines and grades as shown, specified or required. Use of explosives will not be permitted unless written approval is obtained from the Engineer of Record.

1. Rock removed from the excavation becomes the property of the CONTRACTOR. Transport and dispose of excavated rock at an off site disposal location. Obtain the off site disposal location.

2. Remove all shattered rock and loose pieces.

B. Structure Depths: For cast-in-place structures, excavate the rock only to the bottom of the structure, foundation slab, or drainage blanket.

C. Trench Width: Maintain a minimum clear width of the trench at the level of the top of the pipe of the outside diameter of the pipe barrel plus 2 feet, unless otherwise approved.

D. Trench Depth: For trench excavation in which pipelines are to be placed, excavate the rock to a minimum depth of 8 inches below the bottom of the pipe or duct encasement. Provide a cushion of sand or suitable crushed rock. Refill the excavated space with pipe bedding material in accordance with Section 02223. Include placing, compacting and shaping pipe bedding material in the appropriate Contract Items.

E. Manhole Depths: For manhole excavation, excavate the rock to a minimum depth of 8 inches below the bottom of the manhole base for pipelines 24 inches in diameter and larger and 6 inches below the bottom manhole base for pipelines less than 24 inches in diameter. Refill the excavated space with pipe bedding material in accordance with Section 02223. Include placing, compacting and shaping pipe bedding material for manhole bases in the appropriate Contract Items.

F. Over-excavated Space: Refill the excavated space in rock below structures, pipelines, conduits and manholes, which exceeds the specified depths with 2,500 psi concrete, crushed stone, washed shell, or other material as directed. Include refilling of over-excavated space in rock as part of the rock excavation.

G. Other Requirements: Follow, where applicable, the requirements of the subsections on "Trench Excavation" and "Structure Excavation".

H. Payment: Rock excavation, including placing, compacting and shaping of the select fill material, will be paid for under the appropriate Contract Items or where no such items exist, as a change in the Work.

3.6 FINISHED EXCAVATION

A. Finish: Provide a reasonably smooth finished surface for all excavations, which is uniformly compacted and free from irregular surface changes.

B. Finish Methods: Provide a degree of finish that is ordinarily obtainable from blade-grade operations and in accordance with Section 02223.

3.7 PROTECTION

A. Traffic and Erosion: Protect newly graded areas from traffic and from erosion.

B. Repair: Repair any settlement or washing away that may occur from any cause, prior to acceptance. Re-establish grades to the required elevations and slopes.

C. It shall be the CONTRACTOR’s responsibility to acquaint himself with all existing conditions and to locate all structures and utilities along the proposed utility alignment in order to avoid conflicts. Where actual conflicts are unavoidable, coordinate work with the facility owner and perform work so as to cause as little interference as possible with the service rendered by the facility disturbed in accordance with Section 1045. Repair and/or replace facilities or structures damaged in the prosecution of the work immediately, in conformance with current

standard practices of the industry, or according to the direction of the owner of such facility, at the CONTRACTOR's expense.

D. Other Requirements: Conduct all Work in accordance with the environmental protection requirements specified in Division 1.

3.8 AUTHORIZED ADDITIONAL EXCAVATION

A. Additional Excavation: Carry the excavation to such additional depth and width as authorized in writing, for the following reasons:

1. In case the materials encountered at the elevations shown are not suitable.

2. In case it is found desirable or necessary to go to an additional depth, or to an additional depth and width.

B. Refill Materials: Refill such excavated space with either authorized 2500 psi concrete or compacted select fill material, in compliance with the applicable provisions of Section 02223.

C. Compaction: Compact fill materials to avoid future settlement. As a minimum, backfill layers shall not exceed 6-inches in thickness for the full trench width and compaction shall equal 95% of maximum density, or 98% if under paved area of roadway, as determined by using ASTM D 1557. Perform compaction density tests at all such backfill areas with spacing not to exceed 100 feet apart and on each 6-inch compacted layer.

D. Payment: Additional earth excavations so authorized and concrete or select fill materials authorized for filling such additional excavation and compaction of select fill materials will be paid for under the appropriate Contract Items or where no such items exist, as a change in the Work.

3.9 UNAUTHORIZED EXCAVATION

A. Stability: Refill any excavation carried beyond or below the lines and grades shown, except as specified in the subsection headed "Authorized Additional Excavation", with such material and in such manner as may be approved in order to provide for the stability of the various structures.

B. Refill Materials: Refill spaces beneath all manholes, structures, pipelines, or conduits excavated without authority with 2500 psi concrete or compacted select fill material, as approved.

C. Payment: Refill for unauthorized excavation will not be measured and no payment will be made therefor.

3.10 SEGREGATION STORAGE AND DISPOSAL OF MATERIAL

A. Stockpiling Suitable Materials: Stockpile topsoil suitable for final grading and landscaping and excavated material suitable for backfilling or embankments separately on the site in approved locations.

B. Stockpile Locations: Store excavated and other material a sufficient distance away from the edge of any excavation to prevent its falling or sliding back into the excavation and to prevent collapse of the wall of the excavation. Provide not less than 2 feet clear space between the top of any stockpile and other material and the edge of any excavation.

C. Excess Materials: Be responsible for transport and disposal of surplus excavated material and excavated material unsuitable for backfilling or embankments at an off site disposal location secured by the CONTRACTOR. Contractor shall be responsible for the proper disposal of all AC pipe/couplings and shall comply with all Federal, State, and local regulatory agencies accordingly.

3.11 REMOVAL OF WATER

A. Water Removal: At all times during the excavation period and until completion and acceptance of the WORK at final inspection, provide ample means and equipment with which to remove promptly and dispose of properly all water entering any excavation or other parts of the WORK.

B. Dry Excavations: Keep the excavation dry, in accordance with Section 02530.

C. Water Contact: Allow no water to rise over or come in contact with masonry and concrete until the concrete and mortar have attained a set and, in any event, not sooner than 12 hours after placing the masonry or concrete.

D. Discharge of Water: Dispose of water pumped or drained from the Work in a safe and suitable manner without damage to adjacent property or streets or to other work under construction.

E. Protection: Provide adequate protection for water discharged onto streets. Protect the street surface at the point of discharge.

F. Sanitary Sewers: Discharge no water into sanitary sewers.

G. Storm Sewers: Discharge no water containing settleable solids into storm sewers.

H. Repair: Promptly repair any and all damage caused by dewatering the Work.

END OF SECTION

SECTION 02223

BEDDING AND BACKFILLING

PART 1 GENERAL

1.1 SUMMARY

A. General Requirements: Backfill all excavation to the original surface of the ground or to such other grades as may be shown or required. For areas to be covered by topsoil, leave or stop backfill (12) inches below the finished grade. Obtain approval for the time elapsing before backfilling against masonry structures. Remove from all backfill, any compressible, putrescible or destructible rubbish and refuse and all lumber and braces from the excavated space before backfilling is started. Leave sheeting and bracing in place or remove as the work progresses.

B. Equipment Limitations: Do not permit construction equipment used to backfill to travel against and over cast-in-place concrete structures until the specified concrete strength has been obtained, as verified by concrete test cylinders. In special cases where conditions warrant, the above restriction may be modified providing the concrete has gained sufficient strength, as determined from test cylinders, to satisfy design requirements for the removal of forms and the application of load.

C. Related Work Specified In Other Sections Includes:

1. Section 02110 - Site Clearing

2. Section 02222 – Excavation – Earth and Rock

1.2 REFERENCES

A. Codes and standards referred to in this Section are:

1. ASTM D 1557 - Standard Test Methods for Moisture-Density Relations of Soil and Soil-Aggregate Mixtures Using 10 lb Rammer and 18 in Drop

PART 2 PRODUCTS

2.1 BACKFILL MATERIAL - GENERAL

A. General: Whenever trenches are in or across driveways, paved areas or streets, the Contractor shall be responsible for any settlement which occurs within one (1) year of preliminary acceptance. Backfill with sound materials, free from waste, organic matter, rubbish, boggy or other unsuitable materials. Acceptable backfill shall not contain rocks or stones larger than 2 inches in size.

B. General Materials Requirements: Conform materials used for backfilling to the requirements specified. Follow common fill requirements whenever drainage or select fill is not specified. Determine and obtain the approval of the appropriate test method where more than one compaction test method is specified.

C. Classification of Approved Embedment Materials: Embedment materials listed here include a number of processed materials plus the soil types defined according to the Unified Soil Classification System (USCS) in ASTM D2487. These materials are grouped into 5 broad categories according to their suitability for this application.

1. Class I: Angular, 0.25 inch to 1.5 inch (6 to 40 mm) graded stone, including a number of fill materials that have regional significance such as coral, slag, cinders, crushed shells and crushed stone. (Note: The size range and resulting high void ratio of Class I material makes it suitable for use to dewater trenches during pipe installation. This permeable characteristic dictates that its use be limited to locations where pipe support will not be lost by migration of fine grained natural material from the trench walls and bottom or migration of other embedment materials into the Class I material. When such migration is possible, the material's minimum size range should be reduced to finer than 0.25 inch (6 mm) and the gradation properly designed to limit the size of the voids. An alternative to modifying the gradation is to use a geotextile fabric as a barrier to migration to fines.)

2. Class II: Coarse sands and gravels with maximum particle size of 1.5 inches (40 mm), including variously graded sands and gravels containing small percentages of fines, generally granular and non-cohesive, either wet or dry. Soil Types GW, GP, SW and SP are included in this class. (Note: Sands and gravels, which are clean or borderline between clean and with fines, should be included. Coarse-grained soils with less than 12 percent, but more than 5 percent fines are neglected in ASTM D2487 and the USCS, but should be included. The gradation of Class II material influences its density and pipe support strength when loosely placed. The gradation of Class II material may be critical to the pipe support and stability of the foundation and embedment, if the material is imported and is not native to the trench excavation. A gradation other than well graded, such as uniformly graded or gap graded, may permit loss of support by migration into void spaces of a finer grained natural material from the trench wall and bottom. An alternative to modifying the gradation is to use a geotextile fabric as a barrier to migration of fines.)

3. Class III: Fine sand and clayey (clay filled) gravels, including fine sands, sand-clay mixtures and gravel-clay mixtures. Soil Types GM, GC, SM and SC are included in this class.

4. Class IV: Silt, silty clays and clays, including inorganic clays and silts of medium to high plasticity and liquid limits. Soil Types MH, ML, CH and CL are included in this class. (Note: Use caution in the design and selection of the degree and method of compaction for Class IV soils because of the

difficulty in properly controlling the moisture content under field conditions. Some Class IV soils with medium to high plasticity and with liquid limits greater than 50 percent (CH, MH, CH-MH) exhibit reduced strength when wet and should only be used for bedding, haunching and initial backfill in arid locations where the pipe embedment will not be saturated by groundwater, rainfall or exfiltration from the pipe. Class IV soils with low to medium plasticity and with liquid limits lower than 50 percent (CL, ML, CL-ML) also require careful consideration in design and installation to control moisture content, but need not be restricted in use to arid locations.)

5. Class V: This class includes the organic soils OL, OH and PT as well as soils containing frozen earth, debris, rocks larger than 1.5 inches (40 mm) in diameter and other foreign materials. Do not use these materials for bedding, haunching or backfill.

2.2 SELECT BACKFILL

A. Materials for Select Backfill: Use clean gravel, crushed stone, washed shell, or other granular or similar material as approved which can be readily and thoroughly compacted to 95 percent of the maximum dry density obtainable by ASTM D 1557.

1. Allowed Materials: Grade select backfill between the following limits:

U.S. Standard Sieve	Percent Passing By Weight
2 inch	100
1-1/2 inch	90-100
1 inch	75-95
1/2 inch	45-70
#4	25-50
#10	15-40
#200	5-15

2. Unallowed Materials: Very fine sand, uniformly graded sands and gravels, sand and silt, soft earth, or other materials that have a tendency to flow under pressure when wet are unacceptable as select backfill.

2.3 COMMON ON-SITE BACKFILL

A. Materials for Common Backfill: Material from on-site excavation may be used as common backfill (fill) provided that it can be readily compacted to 90 percent of the maximum dry density obtainable by ASTM D 1557, and does not contain unsuitable material. Select fill may be used as common fill at no change in the Contract Price.

B. Granular Materials On-Site: Granular on-site material, which is fairly well graded between the following limits may be used as granular common fill:

U.S. Standard Sieve	Percent Passing by Weight
2 inch	100
#10	50-100
#60	20-90
#200	0-20

C. Cohesive Materials On-Site: Cohesive site material may be used as common fill.

1. The gradation requirements do not apply to cohesive common fill.

2. Use material having a liquid limit less than or equal to 40 and a plasticity index less than or equal to 20.

D. Material Approval: All material used as common fill is subject to approval. If there is insufficient on-site material, import whatever additional off-site material is required which conforms to the specifications and at no additional cost.

2.4 UTILITY PIPE BEDDING

A. Gradation for all Piping: Bedding material shall be FDOT No. 57 stone if below the seasonal low groundwater table; or FDOT No. 89 stone, FDOT No. 131 screenings, or No. 132 screenings if above the seasonal low groundwater table. Provide a minimum of 6 inches of bedding material under all piping.

B. Gradation for ductile iron (DIP) piping: For DIP piping provide bedding material up to the bottom of the pipe.

C. Gradation for polyvinyl chloride (PVC) piping: For PVC piping provide bedding material up to the centerline (haunch/springline) of the pipe.

PART 3 EXECUTION

3.1 PRECAST MANHOLE BEDDING

A. Bedding Compaction: Bed all precast manholes in well graded, compacted 12-inch layer of crushed stone. Compact bedding thickness no less than 6 inches for precast concrete manhole bases.

B. Concrete Work Mats: Cast cast-in-place manhole bases and other foundations for structures against a 2500 psi concrete work mat in clean and dry excavations.

C. Bedding Placement: Place select fill used for bedding beneath precast manhole bases, in uniform layers not greater than 9 inches in loose thickness. Thoroughly compact in place with suitable mechanical or pneumatic tools to not less than 95 percent of the maximum dry density as determined by ASTM D 1557.

D. Use of Select Fill: Bed existing underground structures, tunnels, conduits and pipes crossing the excavation with compacted select fill material. Place bedding material under and around each existing underground structure, tunnel, conduit or pipe and extend underneath and on each side to a distance equal to the depth of the trench below the structure, tunnel, conduit or pipe.

3.2 PIPE BEDDING AND INITIAL BACKFILL

A. Placement: Place backfill for initial pipe backfill from top of bedding to 1 foot over top of pipes in uniform layers not greater than 8 inches in loose thickness. Tamp under pipe haunches and thoroughly compact in place the backfill with suitable mechanical or pneumatic tools to not less than 98 percent of the maximum dry density as determined by ASTM D 1557.

B. Foundation Bedding: Place bedding, to a depth specified by the City Manager or designee, as a foundation in wet, yielding or mucky locations. Construct foundation bedding by removal of the wet, yielding or mucky material and replacement with sufficient Class I material to correct soil instability.

C. Stone Placement: Do not place large stone fragments in the pipe bedding or backfill within 2 feet over or around pipelines, or nearer than 2 feet at any point from any casing pipe, conduit or concrete wall.

D. Machine Compaction: Machine Compaction of initial backfill is prohibited unless adequate cover as deemed by the City Manager or designee is provided. In no case shall adequate cover be less than 12 inches.

E. Unallowed Materials: Pipe bedding containing very fine sand, uniformly graded sands and gravels, sand and silt, soft earth, or other materials that have a tendency to flow under pressure when wet is unacceptable.

3.3 TRENCH BACKFILL

A. General: Backfill trenches from 1 foot over the top of the pipe, from the top of electrical duct bedding or as shown to the bottom of pavement base course, subgrade for lawns or lawn replacement, to the top of the existing ground surface or to such other grades as may be shown or required.

B. Materials: All backfill material shall be acceptable dry materials, and shall be free from cinders, ashes, refuse, vegetable or organic material, boulders, rocks, or stones, or other deleterious material which in the opinion of the City Manager or designee is unsuitable.

C. Depth of Placement - Place trench backfill in uniform layers not greater than 12 inches in loose thickness and that can be thoroughly compacted in place using

suitable mechanical or pneumatic equipment to not less than 98 percent of the maximum dry density as determined by ASTM D 1557.

D. Depth of Placement - Undeveloped Areas: In nondeveloped areas and where select fill material or hand-placed backfill are not specified or required, place suitable job-excavated material or other approved backfill in lifts not exceeding 12 inches in loose thickness. Lifts of greater thickness may be permitted by the City Manager or designee if the CONTRACTOR demonstrates compliance with required densities. When the trench is full, consolidate the backfill by jetting, spading, or tamping to ensure complete filling of the excavation. Mound the top of the trench approximately 12 inches to allow for consolidation of backfill.

E. Compaction: Compact backfill as a percentage of the maximum density at optimum moisture content as determined by the standard proctor test, ASTM D698 as demonstrated in the following table:

Area	(Mod.) ASTM D1557
Around and 1' (Min) above top of pipe	98
Remaining Trench	98
Pavement Sub-Grade and Shoulders (Last 3' of Fill)	98
Base Material and Pavement	98
Adjacent to Structures (Areas not Paved)	98
Under Structures	98
Sub-Base	98

F. Density Tests: Density tests will be made at the request of the City Manager or designee. Deficiencies will be corrected at the expense of the CONTRACTOR.

G. Dropping of Material on Work: Do trench backfilling work in such a way as to prevent dropping material directly on top of any conduit or pipe through any great vertical distance.

H. Distribution of Large Materials: Break lumps up and distribute any stones, pieces of crushed rock or lumps which cannot be readily broken up, throughout the mass so that all interstices are solidly filled with fine material.

3.4 STRUCTURE BACKFILL

A. Use crushed stone underneath all structures, and adjacent to structures where pipes, connections and structural foundations are to be located within this fill. Use crushed stone beneath all pavements, walkways, and railroad tracks, and extend to the bottom of pavement base course or ballast.

1. Place backfill in uniform layers not greater than 8 inches in loose thickness and thoroughly compact in place with suitable approved mechanical or pneumatic equipment.

2. Compact backfill to not less than 95 percent of the maximum dry density as determined by ASTM D 1557.

B. Use of Common Fill: Use common granular fill adjacent to structures in all areas not specified above. Select fill may be used in place of common granular fill at no additional cost.

1. Extend such backfill from the bottom of the excavation or top of bedding to the bottom of subgrade for lawns or lawn replacement, the top of previously existing ground surface or to such other grades as may be shown or required.

2. Place backfill in uniform layers not greater than 8 inches in loose thickness and thoroughly compact in place with suitable equipment, as specified above.

3. Compact backfill to not less than 90 percent of the maximum dry density as determined by ASTM D 1557.

3.5 COMPACTION EQUIPMENT

A. Equipment and Methods: Carry out all compaction with suitable approved equipment and methods.

1. Compact clay and other cohesive material with sheep's-foot rollers or similar equipment where practicable. Use hand held pneumatic tampers elsewhere for compaction of cohesive fill material.

2. Compact low cohesive soils with pneumatic-tire rollers or large vibratory equipment where practicable. Use small vibratory equipment elsewhere for compaction of cohesionless fill material.

3. Do not use heavy compaction equipment over pipelines or other structures, unless the depth of fill is sufficient to adequately distribute the load.

3.6 FINISH GRADING

A. Final Contours: Perform finish grading in accordance with the completed contour elevations and grades shown and blend into conformation with remaining natural ground surfaces.

1. Leave all finished grading surfaces smooth and firm to drain.

2. Bring finish grades to elevations within plus or minus 0.10 foot of elevations or contours shown.

B. Surface Drainage: Perform grading outside of building or structure lines in a manner to prevent accumulation of water within the area. Where necessary or

where shown, extend finish grading to ensure that water will be carried to drainage ditches, and the site area left smooth and free from depressions holding water.

3.7 RESPONSIBILITY FOR AFTERSETTLEMENT

A. Aftersettlement Responsibility: Take responsibility for correcting any depression which may develop in backfilled areas from settlement within one year after the work is fully completed. Provide, as needed, backfill material, pavement base replacement, permanent pavement, sidewalk, curb and driveway repair or replacement, and lawn replacement, and perform the necessary reconditioning and restoration work to bring such depressed areas to proper grade as approved.

3.8 INSPECTION AND TESTING OF BACKFILLING

A. Sampling and Testing: Provide sampling, testing, and laboratory methods in accordance with the appropriate ASTM Standard Specification. Subject all backfill to these tests.

B. Correction of Work: Correct any areas of unsatisfactory compaction by removal and replacement, or by scarifying, aerating or sprinkling as needed and recompaction in place prior to placement of a new lift.

C. Testing Schedule:

1. Compaction Schedule

2. Optimum Moisture Content (Proctor Test)

END OF SECTION

SECTION 02276

EROSION AND SEDIMENTATION CONTROL

PART 1 GENERAL

1.1 DESCRIPTION

A. The work specified in this Section consists of designing, providing, maintaining and removing temporary erosion and sedimentation controls as necessary. The Contractor shall exercise extreme care to minimize contamination of rainfall run-off from the site. All necessary provisions and care shall be taken to insure compliance with the Water Quality Standards of the State of Florida, more particularly the South Florida Water Management District (SFWMD). The Contractor shall make himself familiar with Chapter 17-3, "Water Quality Standards," of the Florida Administrative Code (F.A.C.). Compliance for protection of State Waters and/or jurisdictional areas require the use of hay bales, temporary swales, settling ponds, silt screens, and other appropriate methods as necessary to prevent soils and sediment from entering such areas. Prior to commencement of work , the Contractor shall submit a plan of action and a list of materials he plans to use for sedimentation/erosion control to the City for approval.

B. Temporary erosion controls include, but are not limited to rip rap channels, road stabilization, grassing, mulching, setting, watering, and reseeding onsite surfaces and spoil and borrow area surfaces and providing interceptor ditches at ends of berms and at those locations which will ensure that erosion during construction will be either eliminated or maintained within acceptable limits as established by the CITY.

C. Temporary sedimentation controls include, but are not limited to, silt dams, traps, barriers, public and private on- and off-site storm sewer inlets protectors, and appurtenances at the foot of sloped surfaces which will ensure that sedimentation pollution will be either eliminated or maintained within acceptable limits as established by the CITY.

D. If required by regulation or CITY, CONTRACTOR is responsible for providing an approved Erosion Control Plan for effective temporary erosion and sediment control measures during construction or until final controls become effective.

1.2 REFERENCE DOCUMENTS

A. South Florida Building Code and Standard Building Code.

PART 2 PRODUCTS

2.1 EROSION CONTROL

A. Sodding and Seeding is specified in Section 02400.

B. Rip Rap Channel.

C. Road Stabilization.

D. Netting - fabricated of material acceptable to the City Manager or designee.

2.2 SEDIMENTATION CONTROL

A. Temporary Sediment Trap.

B. Sediment Fence.

C. Bales - clean, seed free pine needle or cereal hay type.

D. Netting - fabricated of material acceptable to the City Manager or designee.

E. Filter Stone - crushed stone conforming to Florida Department of Transportation specifications.

F. Concrete Block - hollow, non-load-bearing type.

G. Concrete - exterior grade not less than one inch thick.

PART 3 EXECUTION

3.1 EROSION CONTROL

A. Minimum procedures for grassing are:

1. Scarify slopes to a depth of not less than six inches and remove large clods, rock, stumps, roots larger than 1/2 inch in diameter and debris.

2. Sow seed within twenty-four (24) hours after the ground is scarified with either mechanical seed drills or rotary hand seeders.

3. Apply mulch loosely and to a thickness of between 3/4 inch and 1-1/2 inches.

4. Apply netting over mulched areas on sloped surfaces.

5. Roll and water seeded areas in a manner which will encourage sprouting of seeds and growing of grass. Reseed areas that exhibit unsatisfactory growth (less than 70 percent coverage). Backfill and seed eroded areas, removing eroded material from effected drainage facilities.

B. Minimum procedures for rip rap channel are:

1. Clear the foundation of all trees, stumps, and roots.

2. Excavate the bottom and sides of the channel 30 inches below grade at all points to allow for the placement of riprap as shown in the typical cross-section in the Standard Details.

3. Install extra strength filter fabric on the bottom and sides of the channel foundation, placing the upstream fabric over the downstream fabric with at least a 1 foot overlap on all joints. The fabric is to be securely held in place with metal pins.

4. Place riprap evenly to the lines and grades shown on the drawings and staked in the field. Place riprap immediately following the installation of the filter fabric.

5. Riprap shall meet the specification for F.D.O.T. Class 2 Riprap.

6. Restore all disturbed areas in accordance with a vegetation plan submitted in advance and approved by the City Manager or designee.

C. Minimum Procedures for road stabilization are:

1. Clear roadbed and parking areas of all vegetation, roots and other objectionable material.

2. Provide surface drainage.

3. Spread 6 inch course of lime rock evenly over the full width of road and parking area and smooth to avoid depressions.

4. After grading, seed or resod all disturbed areas adjoining roads and parking areas conforming to existing conditions prior to construction.

3.2 SEDIMENTATION CONTROL

A. Install and maintain silt dams, traps, barriers, and appurtenances as required. Replace deteriorated hay bales and dislodged filter stone.

B. Minimum requirements for sediment trap:

1. Clear, grub and strip the area under the embankment of all vegetation and root mat.

2. Clear retention area to elevation as approved by the City Manager or designee.

3. Use fill material free of roots, woody vegetation and organic matter. Place fill in lifts not to exceed 9 inches and machine compact.

4. Construct dam and stone spillway to dimensions, slopes and elevations shown.

5. Ensure that the spillway crest is level and at least 18 inches below the top of the dam at all points.

6. Stone used for spillway section - Class "B" erosion control stone.

7. Stone used on inside spillway face to control drainage - #67 washed stone.

8. Extend stone outlet section to vegetated road ditch on zero grade with top elevation of stone level with bottom of drain.

9. Ensure that the top of the dam at all points is 6 inches above natural surrounding ground.

10. Stabilize the embankment and all disturbed area above the sediment pools as shown in the vegetation plan.

C. Minimum requirements for sediment fence:

1. Construct sediment fence on low side of topsoil stockpile to prevent sediment from being washed into the drainage system. Fence to extend around approximately 70 percent of the perimeter of the stockpile. Fence must be unobstructed so as to maintain a minimum of 75 percent of its design flow rate.

2. Locate posts down slope of fabric to help support fencing.

3. Bury toe of fence approximately 8 inches deep to prevent undercutting.

4. When joints are necessary, securely fasten the fabric at a support post with overlap to the next post.

5. Filter fabric shall be of nylon, polyester, propylene or ethylene yarn with extra strength – 50 pounds per linear inch (minimum) - and with a flow rate of at least 0.30 gallons per foot per minute. Fabric should contain ultraviolet ray inhibitors and stabilizers.

6. Post to be 4-inch diameter pine with a minimum length of 4 feet.

D. Minimum Requirement for stormwater facilities protection

1. Public and private stormsewer facilities, both on and offsite, shall be protected at all inlets affected by construction. Stormsewer facilities include streets, inlets, pipes, ditches, swales, canals, culverts, control structures, and detention/retention areas.
2. Grated drop inlets shall be rapped with filter fabric in a manner that allows removal of accumulated sediment from the fabric before removing the grate.
3. Curb inlets shall be protected from sediment, turbid water from stormwater or dewatering activities; also construction debris, concrete mix and rinsate, and any other pollution.
4. Stormwater runoff entering such stormsewer inlets and stormwater detention/retention facilities with a turbidity greater than 50 NTU shall be considered to be in non-compliance with these regulations.

3.3 PERFORMANCE

A. Should any of the temporary erosion and sediment control measures employed fail to produce results which comply with the requirements of the State of Florida, immediately take steps necessary to correct the deficiency at no expense to the CITY. Sedimentation or turbid water violations to stormwater facilities on or offsite shall require the contractor to remove all sediment from the affected facilities.

END OF SECTION

SECTION 02530

GROUNDWATER CONTROL FOR OPEN CUT EXCAVATION

PART 1 GENERAL

1.1 DESCRIPTION OF REQUIREMENTS

A. This section provides for furnishing all permits, labor, materials, equipment, power and incidentals for performing all operations necessary to dewater, depressurize, drain and maintain excavations as described herein and as necessary for installation of pipeline and appurtenances. Included are installing, maintaining, operating and removing dewatering systems and other approved devices for the control of surface and groundwater during the construction of pipelines and appurtenances, open cut excavations, directional drilling. Included also are protecting work against rising waters and repair of any resulting damage.

1.2 CONTRACTOR'S RESPONSIBILITY

A. It is the sole responsibility of the CONTRACTOR to identify groundwater conditions and to provide any and all labor, material, equipment, techniques and methods to lower, control and handle the groundwater as necessary for his construction methods and to monitor the effectiveness of this installed system and its effect on adjacent facilities.

B. Operate, maintain and modify the system(s) as required to conform to these Specifications. Upon completion of the Construction, remove the system(s). The development, drilling and abandonment of all wells used in the dewatering system shall comply with regulations of the Florida Department of Environmental Protection and the governing Water Management District.

C. Assume sole responsibility for dewatering systems and for all loss or damage resulting from partial or complete failure of protective measures and any settlement or resultant damage caused by the dewatering operation.

1.3 PLANS AND OTHER DATA TO BE SUBMITTED

A. Prior to commencement of work, submit complete drawings, details and layouts showing the proposed dewatering plans in sufficient detail (i.e., general arrangements, procedures to be used, etc.) so as to allow the ENGINEER to evaluate the proposed dewatering systems. Include the following, as required by the CONTRACTOR's proposed operation:

1. Names of equipment suppliers.

2. Names of installation subcontractors.

3. Plan for dewatering at access shafts and control of surface drainage.

4. Plan for dewatering for cut-and-cover excavations, or otherwise controlling groundwater.

5. Eductor system layout and details.

6. Deep well locations and details.

7. Well point system layout and details.

8. Installation reports for eductors, deep wells and well points.

9. Water level readings from piezometers or observation wells, and method of maintenance.

10. As part of his request for approval of a dewatering system, demonstrate the adequacy of the proposed system and well point filler sand by means of a test installation.

PART 2 PRODUCTS

A. Select equipment including but not limited to pumps, eductors, well points and piping and other material desired.

PART 3 EXECUTION

3.1 DEWATERING EXCAVATIONS

A. Obtain all permits necessary for dewatering operations and file a copy of all such permits with the City Manager or designee and ENGINEER.

B. Furnish, install, operate and maintain all necessary equipment for dewatering the various parts of the Work and for maintaining free of water the excavations and such other parts of the Work as required for Construction operations. Dewatering system should provide for continuous operation including nights, weekends, holidays, etc. Provide appropriate backup if electrical power is primary energy source for dewatering system.

C. Continue dewatering in all required areas, until the involved work is completed, including the placing and compaction of backfill materials.

D. Provide a uniform diameter for each pipe drain run constructed for dewatering. Remove the pipe drain when it has served its purpose. If removal of the pipe is impractical, provide grout connections at 50-foot intervals, and fill the pipe with clay grout or cement and sand grout when the pipe has served its purpose.

3.2 DEWATERING TRENCH

A. Dewatering Excavation Plan: Develop an excavation dewatering plan that considers site ground and groundwater conditions, the type and arrangement of the equipment to be used and the proper method of groundwater disposal. Prepare the dewatering plan before beginning excavations below groundwater. Maintain one copy of the dewatering plan at the project site to be available for inspection while all dewatering operations are underway.

B. Do not lay any pipeline in a trench in the presence of water. Remove all water from the trench sufficiently ahead of the pipeline placing operation. The ENGINEER shall have full and final authority to require dewatering of the trench to ensure a dry, firm bed on which to place the pipeline. As a minimum, maintain water levels at least 6 inches below the bottom of the trench. Continue to dewater trench until trench backfilling operations have been completed.

1. If a dry trench bottom has not been obtained with usual methods of trench dewatering, then the order to excavate below grade and place sufficient select fill material, crushed stone, or 2500 psi concrete over the trench bottom may be given.

2. If all efforts fail to obtain a stable dry trench bottom, and it is determined that the trench bottom is unsuitable for pipe foundation, present an alternate system for stabilization to the Engineer of Record for approval by the City Manager or designee on a case-by-case basis.

C. Removal of water may be accomplished by pumping in connection with well point installation as the particular situation may warrant.

D. If the soils encountered at the trench grade are suitable for the passage of water, without destroying the sides or utility foundation of the trench, sumps may be provided at intervals at the side of the main trench excavation. Use pumps to lower the water level by taking their suction from said sumps.

3.3 REQUIREMENTS FOR EDUCTOR, WELL POINTS OR DEEP WELLS

A. Eductor, well points or deep wells, where used, must be furnished, installed and operated by a reputable CONTRACTOR regularly engaged in this business, and approved.

3.4 DURATION OF DRAINAGE

A. In areas where concrete is to be placed, carry out the foundation drainage so that the required lowering of the water table will be effected prior to placing reinforcing steel. Keep foundation beds free from water to the same levels for 3 days after placing concrete.

3.5 PROTECTION OF STRUCTURES

A. Provide adequate protection for all structures to avoid damage to concrete.

B. Operate construction equipment over completed concrete slabs or structures only with approval. Rubber tire equipment heavier than 5 tons and crawlers heavier than 7 tons will require adequate load spreading by sand fill or other means.

3.6 DISCHARGE OF WATER

A. Do not discharge pumped drainage water into the sanitary sewer system or inhibit pedestrian or vehicular traffic with the groundwater control system.

B. Discharge pumped drainage water into the storm sewer system or drainage ditch by direct means (i.e., discharge hose to inlet, burying header, etc.). Monitor the discharged water to determine that soil particles are not being removed.

C. Conform all discharge to current South Florida Water Management District and City Department of Stormwater, Streets and Traffic rules, regulations, procedures and regulatory permits and if discharged into receiving waters, shall not exceed 29 N.T.U.'s above background.

3.7 REPAIR OF DAMAGE

A. Assume full responsibility for all loss and damage due to flooding, rising water or seepage resulting from dewatering operations in any part of the work. Repair any damage to partially completed work from these or other causes, including the removal of slides, repair of foundation beds and performance of any other work necessitated by lack of adequate dewatering or drainage facilities.

END OF SECTION

SECTION 02575

REPAIR AND RESTORATION OF PAVEMENT, SIDEWALK, ETC.

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Furnish all labor, materials, equipment, and incidentals required and remove and replace pavements over trenches excavated for installation of pipelines as shown on the drawings and/or specified herein.

1.2 GENERAL

A. Repair all damage, as a result of work under this project, done to existing pavement, driveways, paved areas, curbs and gutters, sidewalks, shrubbery, grass, trees, fences, utility poles, utility pipe lines, conduits, drains, catch basins, or stabilized areas or driveways and including all obstructions not specifically named herein, in a manner satisfactory to the ENGINEER. Include in the bid price, the furnishing of all labor, materials, equipment, and incidentals necessary for the cutting, repair, and restoration of the damaged areas unless pay items for specific types of repair are included in the Bid Form.

B. Keep the surface of the backfilled area of excavation in a safe condition and level with the remaining pavement until the pavement is restored in the manner specified herein. All surface irregularities that are dangerous or obstructive to traffic are to be removed. Conform the repair to applicable CITY or State requirements for pavement repair and as described herein.

C. The CITY reserves the right to require soil bearing or loading tests or materials tests, should the adequacy of the foundation or the quality of materials used be questionable. Costs of these tests shall be the responsibility of the CITY, if found acceptable; the costs of all failed tests shall be the responsibility of the CONTRACTOR.

D. Make all street and road repair in accordance with the details indicated on the drawings and in accordance with the applicable requirements of these Specifications and meeting the permit requirements and approval of the governing Department of Transportation agencies.

E. Replace pavement or roadway surfaces cut or damaged in equal or better condition than the original, including stabilization, base course, surface course, curb and gutter or other appurtenances. Obtain the necessary permits prior to any roadway work. Provide advance notice to the appropriate authority, as required, prior to construction operations.

1. Roadway Restoration (within City Department of Transportation & Engineering jurisdiction): Perform restoration in accordance with the

requirements set forth in the "Right-of-Way Utility Construction Activities Policy" and these Standards. Obtain prior approval from the City Stormwater, Streets and Traffic Department for the materials of construction and method of installation, along with the proposed restoration design for items not referred or specified herein.

a. Where existing pavement is to be removed, mechanical saw cut the surface prior to trench excavation, leaving a uniform and straight edge parallel or perpendicular to the roadway centerline with minimum disturbance to the remaining adjacent surfacing. Provide minimal width of cut for this phase of existing pavement removal. Limerock from a FDOT approved pit shall be on the job site during open cutting. When the specified compacted limerock base is greater than six inches (6"), the base shall be constructed in two (2) or more lifts.

b. Immediately following the specified backfilling and compaction, apply a temporary sand seal coat surface to the cut areas. For this temporary surfacing, provide a smooth traffic surface with the existing roadway and maintain until final restoration. Ensure that surfacing remains for a minimum of ten (10) days in order to assure the stability of the backfill under normal traffic conditions. Thirty (30) days following this period and prior to sixty (60) days after application: remove the temporary surfacing and perform final roadway surface restoration.

c. In advance of final restoration, remove the temporary surfacing and mechanically saw the existing pavement straight and clean to the stipulated dimensions, if needed. Following the above operation, proceed immediately with final pavement restoration in accordance with the requirements set forth by the City.

d. No layer shall be greater than two inches (2") when compacted. Where a surface course is constructed to a thickness greater than two inches (2"), construct it in approximately equal layers, each not exceeding two inches (2").

e. Where necessitated by traffic conditions, lay mixture in strips in such manner as to provide for the passage of traffic. Where the road is closed to traffic, mixture may be laid to the full width, by machines traveling in parallel.

2. Roadway Restoration (outside City jurisdiction) – Conform work within the rights-of-way of public thoroughfares which are not under jurisdiction of City to the requirements of the Governmental agency having jurisdiction or the Florida Department of Transportation, if no governmental agencies have jurisdiction. Work within State Highway right-of-way shall be in full compliance with all requirements of the permit drawings, and to the satisfaction of the Florida Department of Transportation.

1.3 QUALITY ASSURANCE

A. Applicable provisions of the latest version of the Florida Department of Transportation "Standard Specifications for Road and Bridge Construction", and Supplemental Specifications hereunder govern the work under this Section. The Florida Department of Transportation will hereafter be referred to as FDOT.

PART 2 PRODUCTS

2.1 MATERIALS

A. Use materials for flexible base pavement and base course as specified in the latest version of the Florida Department of Transportation "Standard Specifications for Road and Bridge Construction".

PART 3 EXECUTION

3.1 CUTTING PAVEMENT

A. Cut and remove pavement to straight edges, 6 inches outside each edge of proposed trench to avoid pavement damage during installation of the new pipelines and appurtenances and for making connections to existing pipelines.

B. Before removing pavement, mark the pavement for cuts nearly paralleling pipelines and existing street lines. Cut asphalt pavement along the markings with a jackhammer, rotary saw, or other suitable tool.

C. No pavement shall be machine pulled until completely broken and separated along the marked cuts.

D. The pavement adjacent to pipeline trenches shall neither be disturbed nor damaged. If the adjacent pavement is disturbed or damaged, irrespective of cause, remove the damaged pavement replace it at CONTRACTOR’s expense.

3.2 GENERAL RESTORATION

A. Restore, replace or rebuild existing street paving, driveways, sidewalks, etc., using the same type of construction as was in the original. Be responsible for restoring all such work, including sub-grade and base courses where present. Obtain and pay for such local or other governmental permits as may be necessary for the opening of streets. Meet any requirements other than those herein set forth which may affect the type, quality and manner of carrying on the restoration of surfaces by reason of jurisdiction of such governmental bodies.

B. In all cases, maintain, without additional compensation, all permanent replacement of street paving, done by him under this Contract until accepted by the City Manager or designee, including the removal and replacement of such

work wherever surface depressions or underlying cavities result from settlement of trench backfill.

C. Complete all the final resurfacing or re-paving of streets or roads, over the excavations and relay paving surfaces of roadbed that have failed or been damaged prior to acceptance by the City Manager or designee. Conform backfilling of trenches and the preparation of sub-grades to the requirements of Section 02223.

D. Do all re-paving or resurfacing in accordance with Florida Department of Transportation Specifications, to which the following requirement of trench backfill will be added: Where pipeline construction crosses paved areas such as streets, backfill the top 24 inches of trench below the road bases or concrete slabs with compacted A-4 or better material that will provide a bearing value of not less than 75 when tested by the Florida Department of Transportation Soil Bearing Test Methods. All open cuts through paved areas shall be repaved within 48 hours at least with cold patch.

3.3 PRIME AND TACK COATS

A. Apply bituminous prime and tack coats on the previously prepared base course in accordance with Section 300 of the FDOT Specifications.

3.4 WEARING COURSE

A. Use plant-mixed hot bituminous pavement to the thickness indicated in the drawings conforming to Type III asphaltic concrete in accordance with Section 333 of the FDOT Specifications. The requirements for plant and equipment are specified in Section 320 and the general construction requirements for asphaltic concrete pavement are contained in Section 330 of the FDOT specifications.

3.5 TESTING

A. Perform all field-testing at an independent laboratory employed by the CITY. Test and certify all materials by the producer. Repeat tests of sub-grade or base not meeting specified compaction at the CONTRACTOR's expense.

3.6 MISCELLANEOUS RESTORATION

A. Restore sidewalks, cut or damaged by construction, in full sections or blocks to a minimum thickness of four inches. Restore concrete curb or curb gutter to the existing height and cross section in full sections or lengths between joints. Concrete shall be as specified on the drawings. Restore grassed yards, shoulders and parkways to match the existing sections with grass seed or sod of a type matching the existing grass.

3.7 CLEANUP

A. After all repair and restoration or paving has been completed, remove all excess asphalt, dirt, and other debris from the roadways. Check and clean all existing storm sewers and inlets of any construction debris.

END OF SECTION

SECTION 02999

RESTORATION AND MISCELLANEOUS WORK AND CLEANUP

PART 1 GENERAL

1.1 SCOPE OF WORK

A. This Section includes operations that cannot be specified in detail as separate items but can be sufficiently described as to the kind and extent of work involved. Furnish all labor, materials, equipment and incidentals to complete the work under this Section.

B. The work of this Section includes, but is not limited to, the following:

1. Restoring of sidewalks, driveways, curbing and gutters.

2. Crossing utilities.

3. Relocation of existing water lines, low pressure, gas lines, telephone lines, electric lines, cable TV lines and storm drains as necessary, all as shown on the drawings.

4. Restoring easements and rights-of-ways.

5. Cleaning up.

6. Incidental work.

1.2 WORK SPECIFIED UNDER OTHER SECTIONS

A. Complete all work in a workmanlike manner by competent workmen in full compliance with all applicable sections of these Specifications.

PART 2 PRODUCTS

2.1 MATERIALS

A. Materials required for this Section shall be of at least the same type and quality as materials that are to be restored. Where possible, reuse existing materials that are removed and then replaced, with the exception of paving.

PART 3 EXECUTION

3.1 RESTORING OF CURBING, FENCES, AND GUARD RAILS

A. Protect existing curbing. If necessary, remove curbing from joint to joint and replace after backfilling. Replace curbing that is damaged during construction with curbing of equal quality and dimension.

3.2 CROSSING UTILITIES

A. This item shall include any extra work required in crossing culverts, water courses, drains, water mains, and other utilities, including all sheeting and bracing, extra excavation and backfill, or any other work required for the crossing, whether or not shown on the drawings.

3.3 RELOCATIONS OR REPLACEMENT OF EXISTING GAS LINES, TELEPHONE LINES, ELECTRIC LINES, CABLE TV LINES AND DRAINAGE CULVERT

A. Notify the proper authority of the utility involved when relocation or replacement of these lines is required. Coordinate all work by the utility so that the progress of construction will not be hampered.

B. Reference all side drains, side ditches, swales, and storm sewers as to grade and location prior to construction, maintain them during construction, and repair them as necessary after construction. Where drainage structures are disturbed and must be replaced, the minimum size replacement shall be twelve inches (12"). All drainage culverts installed shall have mitered ends in conformance with the City Standard Details. Place the culvert to the specified elevations and regrade or reshape the swale and road shoulders that have been disturbed or damaged during construction.

3.4 PROTECTION AND RESTORATION OF PROPERTY

A. Protection and Restoration of Property: During the course of construction, take special care and provide adequate protection in order to minimize damage to vegetation, surfaced areas, fences, and structures within the construction right-of-way, easement or site, and take full responsibility for the replacement or repair thereof. Immediately repair any damage to private property created by encroachment thereon. Should the removal or trimming of valuable trees, shrubs, or grass be required to facilitate the installation within the designated construction area, this work shall be done in cooperation with the City and/or local communities which the work takes place. Said valuable vegetation, removed or damaged, shall be replanted, if possible, or replaced by items of equal quality, and maintained until growth is re-established. Tree limbs which interfere with equipment operation and are approved for pruning shall be neatly trimmed and the tree cut coated with a tree paint. Topsoil damaged in the course of work shall be replaced in kind with suitable material, graded to match existing grade. Following construction completion, the work area along the route of the installation shall be finish grade to elevations compatible with the adjacent surface, with grassing or hand raking required within developed areas.

B. Existing lawn surfaces damaged by construction shall be re-graded and re-sodded or re-seeded. These areas shall be maintained until all work under this Contract has been completed and accepted.

3.5 CLEANING UP

A. Remove all construction material, excess excavation, buildings, equipment and other debris remaining on the job as a result of construction operations and shall render the site of the work in a neat and orderly condition.

B. Work site clean-up shall follow construction operations without delay and in accordance with Section 01710.

3.6 INCIDENTAL WORK

A. Do all incidental work not otherwise specified, but obviously necessary for the proper completion of the Contract as specified and as shown on the drawings.

END OF SECTION

SECTION 01010
SUMMARY OF WORK

REPLACE THE CITY'S TECHNICAL SPECIFICATIONS FOR SUMMARY OF WORK WITH THE FOLLOWING:

PART 1 GENERAL

1.1. SECTION INCLUDES

A. Description of Work

B. CONTRACTOR's Use of Site

C. Work Sequence

D. City Occupancy

E. Protection of Existing Utilities

F. Contractor Qualifications

G. Execution

1.2. DESCRIPTION OF WORK

A. Project Location: The project area is located the City of Naples. The project site is located at the intersection of the Gulf of Mexico and 3rd Ave North, Naples, FL 34102.

B. Overview: Erickson Consulting Engineers, Inc. (ECE) was contracted to develop plans and specifications for the Project consisting of:

1. Two offshore discharge lines (30" nominal FPVC) to be installed by Horizontal Directional Drill (HDD) approximately 1,000 ft each into the Gulf of Mexico.

2. The pipelines will be connected to a pump station (east) and diffuser system (west) under separate future contract.

C. General: The Work to be done under this Contract is shown on the drawings and specified in Contract Documents.

D. The City anticipates issuance of a Notice to Proceed on or about October 17, 2021. All construction activities shall be substantially complete within ninety days (90) days of the issuance of the Notice to Proceed. Final completion shall be within one hundred and twenty days (120 days). The Contractor must have sufficient manpower and equipment available to ensure project completion by this date.

E. A second directional drill project is currently under design for a location approximately 1 mile north of this project location. The second project consists of 2 HDPE pipes each approximately 1,500 LF and 30" in diameter. The City intends on completing the design concurrently with this work and reserving the unit pricing of this bid to be applied to the second project.

F. The Work includes:

1. Furnishing of all labor, material, superintendence, plant, power, light, heat, fuel, water, tools, appliances, equipment, supplies, services, and other means of construction necessary or proper for performing and completing the Work.

2. Sole responsibility for adequacy of plant and equipment.

3. Maintaining the Work area and site in a clean and acceptable manner.

4. Maintaining existing facilities in service at all times.

5. Protection of finished and unfinished Work.

6. Repair and restoration of Work or existing facilities damaged during construction.

7. Furnishing as necessary proper equipment and machinery, of a sufficient capacity, to facilitate the Work and to handle all emergencies normally encountered in Work of this character.

8. Furnishing, installing, and protecting all necessary guides, track rails, bearing plates, anchor and attachment bolts, and all other appurtenances needed for the installation of the devices included in the equipment specified. Make

anchor bolts of appropriate size, strength and material for the purpose intended. Furnish substantial templates and shop drawings for installation.

G. Implied and Normally Required Work: It is the intent of these Specifications to provide the City with complete operable systems, subsystems, and other items of Work. Any part or item of Work, which is reasonably implied or normally required to make each installation satisfactorily and completely operable, is deemed to be included in the Work and the Contract Amount. All miscellaneous appurtenances and other items of Work incidental to meeting the intent of these Specifications are included in the Work and the Contract Amount even though these appurtenances may not be specifically called for in these Specifications.

H. Quality of Work: Regard the apparent silence of the Contract Documents as to any detail, or the apparent omission from them of a detailed description concerning any Work to be done and materials to be furnished as meaning that only the best general practice is to prevail and that only materials and workmanship of the best quality are to be used. Interpretation of these specifications will be made upon this basis.

I. The several parts of the Contract that are intended to be complimentary in describing the Work and the responsibilities of the Contractor and the City and any requirements stipulated in one part of the Contract Documents is binding on the parties as though occurring in all. In the event there are any conflicting provisions or requirements among the Contract Documents, the most stringent provision shall apply.

1.3. CONTRACTOR'S USE OF SITE

A. In addition to the requirements of the Supplemental Terms and Conditions, limit use of site and premises for work and storage to allow for the following:

1. Coordination of the Work under this CONTRACT with the work of the other contractors where Work under this CONTRACT encroaches on the Work of other contractors.

2. City occupancy and access to operate existing facilities.

3. Coordination of site use with ENGINEER.

4. Responsibility for protection and safekeeping of products under this CONTRACT.

5. Providing additional off-site storage at no additional cost to the City as needed.

B. Use of Premises: Contractor shall confine all construction equipment, the storage of materials and equipment and the operations of workers to the Project Site and land and areas identified in and permitted by the Contract Documents and other lands and areas permitted by law, rights of way, permits and easements, and shall not unreasonably encumber the Project site with construction equipment or other material or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or any land or areas contiguous thereto, resulting from the performance of the Work.

1.4. WORK SEQUENCE

A. Construct Work in stages to accommodate the City's use of premises during construction period and in accordance with the limitations on the sequence of construction specified. Coordinate construction schedules and operations with ENGINEER. The Contractor shall not open work to conflict with work already in progress. The Engineer may, however, require the Contractor to finish a section on which work is in progress prior to starting another section.

B. Coordinate Work of all subcontractors.

C. The Contractor shall propose the plan of Work including construction sequence, equipment and marine vessels, and the staging areas to the Engineer and Owner within fifteen (15) days of the Notice of Award. The final Work Plan and staging areas will be negotiated with the Engineer and Owner prior to commencement of the Work.

1.5. CITY OCCUPANCY

A. The City will permit the closure of the 3rd Ave N beach end for the duration of construction. The Contractor shall be responsible for the security and protection of the worksite from the public. The Contractor shall maintain a walking path from Gulf Shore Blvd to the beach within the ROW.

B. Cooperate with the City's Manager or designee in all construction operations to minimize conflict, and to facilitate City usage.

C. Conduct operations with the least inconvenience to the general public.

1.6. PROTECTION OF EXISTING UTILITIES

A. In case of damage to existing utilities caused by construction activities, contact the owner of the utility or appropriate City department (Water or Wastewater) immediately. Repair any damage to existing utilities caused by construction activities in coordination with or as directed by the owner of the utility.

Contractor shall locate all existing roadways, railways, drainage facilities and utility services above, upon, or under the Project site, said roadways, railways, drainage facilities and utilities being referred to in this Section as the “utilities”. Contractor shall contact the owners of all Utilities to determine the necessity for relocating or temporarily interrupting any Utilities during the construction of the Project. Contractor shall schedule and coordinate its Work around any such relocation or temporary service interruption. Contractor shall be responsible for properly shoring, supporting, and protecting all Utilities at all times during the course of the Work. The Contractor shall conduct his work at all times such that adequate drainage is provided and shall not interfere with or block existing drainage facilities such as gutters, ditches, storm drains, or other drainage appurtenances. Existing fire hydrants adjacent to the project shall be kept accessible for fire apparatus at all times and no material or equipment shall be placed within 25 feet of any hydrant.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 STARTING WORK

Execute Work at such items and in or on such parts of the project, and with such forces, material and equipment, as to complete the Work in the time established by the Contract. At all times, schedule and direct the Work so that it provides an orderly progression to completion within the specified time for completion. The Contractor shall obtain all

necessary building permits prior to commencement of work. The Contractor shall become totally familiar with the requirements of all permits prior to start of work.

3.2 INTENT OF CONTRACT DOCUMENTS

It is the intent of the Contract Documents to describe a functionally complete project (or portion thereof) to be constructed in accordance with the Contract Documents. Any work, materials or equipment that may reasonably be inferred from the Contract Documents as being required to produce the intended result shall be supplied whether or not specifically called for. When words which have a well known technical or trade meaning are used to describe work, materials or equipment, such works shall be interpreted in accordance with that meaning. Reference to standards specifications, manuals or codes of any technical society, organization or association or to the laws or regulations of any governmental authority having jurisdiction over the Project, whether such reference be specific or by implication, shall mean the latest standard specification, manual, code, law or regulation in affect at the time the Work is performed, except as may be otherwise specifically stated herein.

If before or during the performance of the Work Contractor discovers a conflict, error or discrepancy in the Contract Documents, Contractor immediately shall report same to the Engineer in writing and before proceeding with the Work affected thereby shall obtain a written interpretation or clarification from the Engineer. Contractor shall take field measurements and verify field conditions and shall carefully compare such field measurements and conditions and other information known to Contractor with the Contract Documents before commencing any portion of the Work.

Drawings are intended to show general arrangements, design and extent of work and are not intended to serve as shop drawings. Specifications are separated into divisions for convenience of reference only and shall not be interpreted as establishing divisions for the Work, trades, subcontracts, or extent of any part of the Work. In the event of a discrepancy between or among the drawings, specifications or other Contract Document provisions, Contractor shall be required to comply with the provision which is the more restrictive or stringent requirement upon the Contractor, as determined by the Engineer. Unless otherwise specifically mentioned, all anchors, bolts, screws, fittings, fillers, hardware, accessories, trim and other parts required in connection with any portion of the Work to make a complete, serviceable, finished and first quality installation shall be furnished and installed as part of the Work, whether or not called for by the Contract Documents.

3.3 INVESTIGATION AND UTILITIES

A. Contractor shall have the sole responsibility of satisfying itself concerning the nature and location of the Work and the general and local conditions, and particularly, but without limitation, with respect to the following: those affecting transportation, access, disposal, handling and storage of materials; availability and quality of labor; water and electric power; availability and condition of roads; work area; living facilities; climatic conditions and seasons; physical conditions at the work-site and the project area as a whole; topography and ground surface conditions; nature and quantity of the surface materials to be encountered; subsurface conditions; equipment and facilities needed preliminary to and during performance of the Work; and all other costs associated with such performance. The failure of Contractor to acquaint itself with any applicable conditions shall not relieve Contractor from any of its responsibilities to perform under the Contract Documents, nor shall it be considered the basis for any claim for additional time or compensation.

B. The indications of physical conditions on the Construction Drawings and in the Subsurface Soil Investigations are the result of site investigations by topographic and hydrographic surveys (2017 and 2019) and by core borings (2017 and 2019). When the indicated physical conditions are the result of site investigations by core borings, the locations thereof are shown on the Construction Drawings. While the Engineer's core borings results may be considered *representative* of subsurface conditions at their respective locations and vertical reaches, local variations of subsurface materials in this region are to be expected. The confirmation of all geotechnical, topographic, and hydrographic conditions shall be the responsibility of the Contractor. Data and information furnished or referred within the Contract Documents for the Contractor's information. The City and Engineer shall not be responsible for any interpretation of, or conclusion drawn from the data or information by the Contractor.

3.4 SCHEDULE

The Contractor, within ten (10) calendar days after receipt of the Notice of Award, shall prepare and submit to the Engineer, for review and approval, a progress schedule for the Project (herein "Progress Schedule"). The Progress Schedule shall relate to all Work required by the Contract Documents and shall provide for expeditious and practicable execution of the Work within the Contract Time. The Progress Schedule shall indicate the dates for starting and completing the various stages of theWork.

The Progress Schedule shall be updated monthly by the Contractor. All monthly updates to the Progress Schedule shall be subject to the Engineer's review and approval.

Contractor shall submit the updates to the Progress Schedule with its monthly Applications for Payment noted below. The Engineer's review and approval of the submitted Progress Schedule updates shall be a condition precedent to the City's obligation to pay Contractor.

3.5 SUBMITTALS AND SUBSTITUTIONS

Contractor shall carefully examine the Contract Documents for all requirements for approval of materials to be submitted such as shop drawings, data, test results, schedules and samples. Contractor shall submit all such materials at its own expense and in such form as required by the Contract Documents in sufficient time to prevent any delay in the delivery of such materials and the installation thereof.

Whenever materials or equipment are specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular supplier, the naming of the item is intended to establish the type, function and quality required. Unless the name is followed by words indicating that no substitution is permitted, materials or equipment of other suppliers may be accepted by the City if sufficient information is submitted by Contractor to allow the City to determine that the material or equipment proposed is equivalent or equal to that named. Requests for review of substitute items of material and equipment will not be accepted by the City from anyone other than Contractor and all such request must be submitted by Contractor to the Engineer within thirty (30) calendar days after Notice of Award is received by Contractor.

If Contractor wishes to furnish or use a substitute item of material or equipment, Contractor shall make application to the Engineer for acceptance thereof, certifying that the proposed substitute shall perform adequately the functions and achieve the results called for by the general design, be similar and of equal substance to that specified and be suited to the same use as that specified. If a specific means, method, technique, sequence, or procedure of construction is indicated in or required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, sequence, technique or procedure of construction acceptable to the Engineer, if Contractor submits sufficient information to allow the Engineer to determine that the substitute proposed is equivalent to that indicated or required by the Contract Documents. The procedures for submission to and review by the Engineer shall be the same as those provided herein for substitute materials and equipment.

The Engineer shall be allowed a reasonable time within which to evaluate each proposed substitute. The Engineer shall be the sole judge of acceptability, and no substitute will be ordered, installed, or utilized without the Engineer's and the City's prior written acceptance which shall be evidenced by either a Change Order or an approved Shop Drawing. The City may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

3.6 DAILY REPORTS, AS-BUILTS AND MEETINGS

Unless waived in writing, the Contractor shall complete and submit to the Engineer on a weekly basis a daily log of the Contractors work for the preceding week in a format approved by the Engineer. The daily log shall document all activities of Contractor at the Project site including, but not limited to, the following:

A. Weather conditions showing the high and low temperatures during work hours, the amount of precipitation received on the Project site, and any other weather conditions which adversely affect the Work;
B. Soil conditions which adversely affect the Work;
C. The hours of operation by Contractor's and subcontractor's personnel;
D. The number of Contractor's and subcontractor's personnel present and working at the Project site, by subcontract and trade;
E. All equipment present at the Project site, description of equipment use and designation of time equipment was used (specifically indicating any down time);
F. Description of Work being performed at the Project site;
G. Any unusual or special occurrences at the Project site;
H. Materials received at the Project site;
I. A list of all visitors to the Project site; and
J. Any problems that might impact either the cost or quality of the Work or the time of performance.

The daily log shall not constitute nor take the place of any notice required to be given by Contractor to the City pursuant to the Contract Documents.

Contractor shall maintain in a safe place at the Project site one record copy of the Contract Documents, including, but not limited to, all drawings, specifications, addenda, amendments, Change Orders, Work Directive Changes and Field Orders, as well as all written interpretations and clarifications issued by the Engineer, in good order and annotated to show all changes made during construction. The annotated drawings shall be continuously updated by the Contractor throughout the prosecution of the Work to

accurately reflect all field changes that are made to adapt the Work to field conditions, changes resulting from Change Orders, Work Directive Changes and Field Orders, and all concealed and buried installations of piping, conduit, and utility services. All buried and concealed items, both inside and outside the Project site, shall be accurately located on the annotated drawings as to depth and in relationship to not less than two (2) permanent features (e.g. interior or exterior wall faces). The annotated drawings shall be clean, and all changes, corrections and dimensions shall be given in a neat and legible manner in a contrasting color. The "As-Built" record documents, together with all approved samples and a counterpart of all approved shop drawings shall be available to the Engineer for reference. Upon completion of the Work and as a condition precedent to the Contractor's entitlement to final payment, these "As-Built" record documents, samples and shop drawings shall be delivered to the Engineer by Contractor.

Contractor shall keep all records and supporting documentation which concern or relate to the Work hereunder for a minimum of five (5) years from the date of termination of this Agreement or the date the Project is completed, whichever is later. The City, or any duly authorized agents or representatives of the City, shall have the right to audit, inspect and copy all such records and documentation as often as they deem necessary during the period of this Agreement and during the five (5) year period noted above; provided, however, such activity shall be conducted only during normal business hours.

The as-built drawings shall be submitted on a single 24x34 inch sheets to a scale approved by the Engineer. The Contractor shall be required to submit two certified hard-copies of the as-built drawing in addition to the electronic CAD file in .dwg format.

The following additional as-built record data is required from the CONTRACTOR:

A. Table of pilot hole coordinates
B. Approved data logger device reports
C. Fusion joint documentation containing the following information:
D. Pipe Size and Thickness
E. Machine Size
F. Fusion Technician Identification
G. Job Identification
H. Fusion Joint Number
I. Fusion, Heating, and Drag Pressure Settings
J. Heat Plate Temperature
K. Time Stamp
L. Heating and Cool Down Time of Fusion

M. Ambient Temperature

Final payment shall not be made to the Contractor until these drawings and record data are turned over to the Engineer and City.

3.7 CONTRACT TIME AND TIME EXTENSIONS

Should Contractor be obstructed or delayed in the prosecution of or completion of the Work as a result of unforeseeable causes beyond the control of the Contractor, and not due to its fault or neglect, including but not restricted to acts of God or of the public enemy, acts of government, fires, floods, epidemics, quarantine regulation, strikes or lockouts, Contractor shall notify the City in writing within forty-eight (48) hours after the commencement of such delay, stating the cause or causes thereof, or be deemed to have waived any right which Contractor may have had to request a time extension.

No interruption, interference, inefficiency, suspension or delay in the commencement or progress of the Work from any cause whole or in part, shall relieve Contractor of his duty to perform or give rise to any right to damages or additional compensation from the City. Contractor expressly acknowledges and agrees that it shall receive no damages for delay. Contractor's sole remedy, if any, against the City will be the right to seek an extension to the Contract Time; provided, however, the granting of any such time extension shall not be a condition precedent to the aforementioned "No Damage For Delay" provision. This paragraph shall expressly apply to claims for early completion, as well as to claims based on late completion.

3.8 CHANGES IN WORK

The City shall have the right at any time during the progress of the Work to increase or decrease the Work. Promptly after being notified of a change, Contractor shall submit an itemized estimate of any cost or time increases or savings it foresees as a result of the change. Except in an emergency endangering life or property, or as expressly set forth herein, no addition or changes to the Work shall be made except upon written order of the City, and the City shall not be liable to the Contractor for any increased compensation without such written order.

3.9 CLAIMS AND DISPUTES

A claim is a demand or assertion by one of the parties seeking an adjustment or interpretation of the terms of the Contract Documents, payment of money, extension of

time or other relief with respect to the terms of the Contract Documents. The term "Claim" also includes other disputes and matters in question between the City and Contractor arising out of or relating to the Contract Documents.

The responsibility to substantiate a Claim shall rest with the party making the Claim.

Claims by the Contractor shall be made in writing to the City within forty-eight (48) hours after the first day of the event giving rise to such Claim or else the Contractor shall be deemed to have waived the Claim. Written supporting data shall be submitted to the City within fifteen (15) calendar days after the occurrence of the event, unless the City grants additional time in writing, or else the Contractor shall be deemed to have waived the Claim.

The Contractor shall proceed diligently with its performance as directed by the City, regardless of any pending claim, action, suit or administrative proceeding, unless otherwise agreed to by the City in writing. The City shall continue to make payments in accordance with the Contract Documents during the pendency of any Claim.

3.10 OTHER WORK

The City may perform other work related to the Project at the site by the City's own forces, have other work performed by utility owners or let other direct contracts. If the fact that such other work is to be performed is not noted in the Contract Documents, written notice thereof will be given to Contractor prior to starting any such other work. If Contractor believes that such performance will involve additional expense to Contractor or require additional time, Contractor shall send written notice of that fact to the City within forty-eight (48) hours of being notified of the other work. If the Contractor fails to send the above required forty-eight (48) hour notice, the Contractor will be deemed to have waived any rights it otherwise may have had to seek an extension to the Contract Time or adjustment to the Contract Amount.

Contractor shall afford each utility owner and other contractor who is a party to such a direct contract (or the City, if the City is performing the additional work with the City's employees) proper and safe access to the site and a reasonable opportunity for execution of such work and shall properly connect and coordinate its Work with theirs. Contractor shall do all cutting, fitting and patching of the Work that may be required to make its several parts come together properly and integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating or otherwise altering their work and will only cut or alter their work with the written consent of the Engineer and the

others whose work will be affected. The duties and responsibilities of Contractor under this paragraph are for the benefit of such utility owners and other Contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between the City and such utility owners and other contractors.

If any part of Contractor's Work depends for proper execution or results upon the work of any other contractor or utility owner (or the City), Contractor shall inspect and promptly report to the Engineer in writing any delays, defects or deficiencies in such work that render it unavailable or unsuitable for such proper execution and results.. Contractor's failure to report will constitute an acceptance of the other work as fit and proper for integration with Contractor's Work.

3.11 COMPLIANCE WITH LAWS

Contractor agrees to comply, at its own expense, with all federal, state and local laws, codes, statutes, ordinances, rules, regulations and requirements applicable to the Project, including but not limited to those dealing with taxation, worker's compensation, equal employment and safety (including, but not limited to, the Trench Safety Act, Chapter 553, Florida Statutes). If Contractor observes that the Contract Documents are at variance therewith, it shall promptly notify the Engineer in writing.

3.12 ASSIGNMENT

Contractor shall not assign this Agreement or any part thereof, without the prior consent in writing of the City. If Contractor does, with approval, assign this Agreement or any part thereof, it shall require that its assignee be bound to it and to assume toward Contractor all of the obligations and responsibilities that Contractor has assumed toward the City.

3.13 PERMITS, LICENSES AND TAXES

Pursuant to Section 218.80, F.S., the City will pay for all permits and fees, including license fees, permit fees, impact fees or inspection fees applicable to the work through an internal budget transfer(s). Contractor is not responsible for paying for permits issued by The City of Naples, but is responsible for acquiring all permits.

All permits, fees and licenses necessary for the prosecution of the Work which are not issued by the City shall be acquired and paid for by the Contractor unless otherwise noted.

3.14 TERMINATION FOR DEFAULT

Contractor shall be considered in material default of the Agreement and such default shall be considered cause for the City to terminate the Agreement, in whole or in part, as further set forth in this Section, if Contractor: (1) fails to begin the Work under the Contract Documents within the time specified herein; or (2) fails to properly and timely perform the Work as directed by the Engineer or as provided for in the approved Progress Schedule; or (3) performs the Work unsuitably or neglects or refuses to remove material or to correct or replace such Work as may be rejected as unacceptable or unsuitable; or (4) discontinues the prosecution of the Work; or (5) fails to resume Work which has been suspended within a reasonable time after being notified to do so; or (6) becomes insolvent or is declared bankrupt, or commits any act of bankruptcy; or (7) allows any final judgment to stand against it unsatisfied for more than ten 910) days; or (8) makes an assignment for the benefit of creditors; or (9) fails to obey any applicable codes, laws, ordinances, rules or regulations with respect to the Work; or (10) materially breaches any other provision of the Contract Documents.

The City shall notify Contractor in writing of Contractor's default(s). If the City determines that Contractor has not remedied and cured the default(s) within seven (7) calendar days following receipt by Contractor of said written notice, then the City, at its option, without releasing or waiving its rights and remedies against the Contractor's sureties and without prejudice to any other right or remedy it may be entitled to hereunder or by law, may terminate Contractor's right to proceed under the Agreement, in whole or in part, and take possession of all or any portion of the Work and any materials, tools, equipment, and appliances of Contractor, take assignments of any of Contractor's subcontracts and purchase orders, and complete all or any portion of Contractor's Work by whatever means, method or agency which the City, in its sole discretion, may choose.

If the City deems any of the foregoing remedies necessary, Contractor agrees that it shall not be entitled to receive any further payments hereunder until after the Project is completed. All monies expended and all of the costs, losses, damages and extra expenses (including Engineer and attorney's fees) or damages incurred by The City incident to such completion, shall be deducted from the Contract Amount, Contractor agrees to pay promptly to the City on demand the full amount (including appeals) and interest thereon at the maximum legal rate of interest until paid. If the unpaid balance of the Contract Amount exceeds all such costs, expenditures and damages incurred by the City to complete the Work, such excess shall be paid to the Contractor. The amount to be paid to the Contractor shall be approved by the Engineer, upon application, and this obligation for payment shall survive termination of the Agreement.

The liability of Contractor hereunder shall extend to and include the full amount of any and all sums paid, expenses and losses incurred, damages sustained, and obligations assumed by The City in good faith under the belief that such payments or assumptions were necessary or required, in completing the Work and providing labor, materials, equipment, supplies, and other items therefore or re-letting the Work, and in settlement, discharge or compromise of any claims, demands suits, and judgments pertaining to or arising out of the work hereunder.

If, after notice of termination of contractor's right to proceed pursuant to this Section, it is determined for any reason that Contractor was not in default, or that its default was excusable, or that the City is not entitled to the remedies against Contractor provided herein, then Contractor's remedies against the City shall be the same as and limited to those afforded Contractor under "Completion" section below.

3.15 TERMINATION FOR CONVENIENCE AND RIGHT OF SUSPENSION

The City shall have the right to terminate this Agreement without cause upon seven (7) calendar days written notice to Contractor. In the event of such termination for convenience, Contractor's recovery against the City shall be limited to that portion of the Contract Amount earned through the date of termination, together with any retainage withheld and reasonable termination expenses incurred, but Contractor shall not be entitled to any other or further recovery against the City, including, but not limited to, damages or any anticipated profit on portions of the Work not performed.

The City shall have the right to suspend all or any portions of the Work upon giving Contractor not less than two (2) calendar days' prior written notice of such suspension. If all or any portion of the Work is so suspended, Contractor's sole and exclusive remedy shall be to seek an extension of time to its schedule in accordance with the procedures set forth in the Contract Documents. In no event shall the Contractor be entitled to any additional compensation or damages. Provided, however, if the ordered suspension exceeds six (6) months, the Contractor shall have the right to terminate the Agreement with respect to that portion of the Work which is subject to the ordered suspension.

3.16 COMPLETION

When the entire Work (or any portion thereof designated in writing by the City) is ready for its intended use, Contractor shall notify the Engineer in writing that the entire Work (or such designated portion) is substantially complete and request that the Engineer issue a Certificate of Substantial completion (or Certificate of Partial Substantial Completion).

Within a reasonable time thereafter, the City, Contractor and Engineer shall inspect the Work (or designated portion thereof) to determine the status of completion.

If the City and Engineer do not consider the Work (or designated portion) substantially complete, the Engineer shall notify Contractor in writing giving the reasons therefore. If the City and Engineer consider the Work (or designated portion) substantially complete, the Engineer shall prepare and deliver to Contractor a Certificate of Substantial Completion (or Certificate of Partial Substantial Completion) which shall fix the date of Substantial Completion for the entire Work (or designated portion thereof) and include a tentative punchlist of items to be completed or corrected by Contractor before final payment. The City shall have the right to exclude Contractor from the Work and Project site (or designated portion thereof) after the date of Substantial Completion, but the City shall allow Contractor reasonable access to complete or correct items on the tentative punchlist.

Upon receipt of written certification by Contractor that the Work is completed in accordance with the Contract Documents and is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Engineer will make such inspection and, if he finds the Work acceptable and fully performed under the Contract Documents, he shall promptly issue a final Certificate for Payment, recommending that, on the basis of his observations and inspection, and the Contractor's certification that the Work has been completed in accordance with the terms and conditions of the Contract Documents, that the entire balance found to be due Contractor is due and payable. Neither the final payment nor the retainage shall become due and payable until Contractor submits: all data establishing payment or satisfaction of al obligations, such as receipts, releases and waivers of liens, arising out of the Contract Documents, to the extent and in such form as may be designated by the City. The City reserves the right to inspect the Work and make an independent determination as to the Work's acceptability, even though the Engineer may have issued his recommendations. Unless and until the City is completely satisfied, neither the final payment nor the retainage shall become due and payable.

3.17 WARRANTY

Contractor shall obtain and assign to the City all express warranties given to Contractor or any subcontractors by any materialmen supplying materials, equipment or fixtures to be incorporated into the project. Contractor warrants to the City that any materials and equipment furnished under the Contract Documents shall be new unless otherwise specified, and that all Work shall be of good quality, free from all defects and in

conformance with the Contract Documents. Contractor further warrants to the City that all materials and equipment furnished under the Contract Documents shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the instructions of the applicable manufacturers, fabricators, suppliers or processors except as otherwise provided for in the Contract Documents. If, within one (1) year after final completion, any Work is found to be defective or not in conformance with the Contract Documents, Contractor shall correct it promptly after receipt of written notice from the City. Contractor shall also be responsible for and pay for replacement or repair of adjacent materials or Work which may be damaged as a result of such replacement or repair. These warranties are in addition to those implied warranties to which the City is entitled as a matter of law.

3.18 SUPERVISION AND SUPERINTENDENTS

Contractor shall plan, organize, supervise, schedule, monitor, direct and control the work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the work in accordance with the contract documents. Contractor shall be responsible to see that the finished work complies accurately with the Contract Documents. Contractor shall keep on the Work at all times during its progress a competent resident superintendent, who shall not be replaced without prior written notice to the Engineer except under extraordinary circumstances. The superintendent shall be Contractor's representative at the Project site and shall have authority to act on behalf of Contractor. All communications given to the superintendent shall be as binding as if given to the Contractor. The City shall have the right to direct Contractor to remove and replace its Project superintendent, with or without cause. The Contractor's superintendent shall be present at the site of the work at all times while work is in progress and shall be available by phone for emergencies 24 hours per day, 7 days per week.

3.19 PROTECTION OF WORK

Contractor shall fully protect the Work from loss or damage and shall bear the cost of any such loss or damage until final payment has been made. If Contractor or any one for whom Contractor is legally liable for is responsible for any loss or damage to the Work, or other work or materials of the City or the City's separate contractors, Contractor shall be charged with the same, and any monies necessary to replace such loss or damage shall be deducted from any amounts due Contractor.

Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

Contractor shall not disturb any benchmark established by the Engineer with respect to the Project. If Contractor, or its subcontractors, agents or anyone for whom Contractor is legally liable, disturbs the Engineer's benchmark, Contractor shall immediately notify The City and Engineer. The Engineer shall reestablish the benchmark and Contractor shall be liable for all costs incurred by The City associated therewith.

3.20 EMERGENCIES

In the event of an emergency affecting the safety or protection of persons or Work or property at the Project site of adjacent thereto, Contractor, without special instructions or authorization from the City or Engineer is obligated to act to prevent threatened damage, injury or loss. Contractor shall give Engineer written notice within forty-eight (48) hours after the occurrence of the emergency, if Contractor believes that after the occurrence of the emergency, if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby. If the Engineer determines that a change in the Contract Documents is required because of the action taken in response to an emergency, a Change Order shall be issued to document the consequences of the changes or variations. If Contractor fails to provide the forty-eight (48) hour written notice noted above, the Contractor shall be deemed to have waived any right it otherwise may have had to seek an adjustment to the Contract Amount or an extension to the Contract Time.

3.21 PROJECT MEETINGS

Prior to the commencement of Work, the Contractor shall attend a preconstruction conference with the Engineer and others as appropriate to discuss the Progress Schedule, procedures for handling shop drawings and other submittals, and for processing Applications for Payment, and to establish a working understanding among the parties as to the Work. During the prosecution of the Work, the Contractor shall attend any and all meetings convened by the Engineer or the City with respect to the Project, when directed to do so. Contractor shall have its subcontractors and suppliers attend all such meetings (including the preconstruction conference) as may be directed by the City or Engineer. At a minimum, Progress meetings will be scheduled on a weekly basis during construction. The Contractor's Superintendent, major Sub-Contractors, City and Engineer shall be required to attend these meetings.

3.22 TRAFFIC CONTROL PLAN

A traffic control plan to support the Contractor's operations shall be submitted at least 72 hours prior to commencing work that shall conform to the Florida Department of Transportation's "Manual on Traffic Control and Safe Practices" which shall be obtained by the Contractor at his expense.

3.23 HOURS OF WORK

Work within the travelled way of the project shall commence no earlier than 7:00 a.m. local time and be completed no later than 6:00 p.m. local time. Hours of work may be altered at any time at the discretion of the City. All working hours shall be in accordance with the City of Naples Municipal Code.

3.24 TAX EXEMPTION

The City of Naples is exempt from the payment of sales or use tax. The tax exemption certificate number is: 85-8012621645C-0.

3.25 WEATHER CONDITIONS

A. The City of Naples is subject to severe weather conditions such as hurricanes, tropical storms, tornados, strong winds, heavy rains, lighting, and the like. It is the Contractor's responsibility at all times to: (1) monitoring current and developing weather conditions; and (2) to develop and implement appropriate contingency plans to ensure proper storage of materials, supplies, and equipment, and to secure the Project site so as not to endanger public health and safety, environmental resources or public and private property.

B. If the Project is to be constructed between June 1 and October 31, the Contractor shall submit a Hurricane and Severe Storm Plan for review and acceptance. This plan shall include but not be limited to the following:

1. Types of storms anticipated (winter storm, hurricane, and tornado);
2. Time intervals before storms when action will be taken and details of the actions taken;
3. List of the equipment to be used on the job and its ability to handle adverse weather;
4. Methods of securing equipment not to be removed; and
5. Plan of evacuation to include interim measures, (i.e. immediate reaction plans to be taken for all storm occurrences, particularly sudden/flash storms).

3.26 ENGINEER'S STATUS DURING CONSTRUCTION

A. A Project Representative employed by the Engineer/City shall be authorized to observe all Work done and all material furnished. Such observation may extend to all or any part of the Work and to the preparation, fabrication, or manufacture of the materials to be used. A Project Representative is not authorized to revoke, alter, or waive any provision of the Contract. The Project Representative is not authorized to issue instructions contrary to the Construction Drawings and Specifications or to act as foreman for the Contractor.

B. The Engineer may direct the maintenance of gages, ranges, location, baseline monumentation, marks and limit marks in proper order and position, but the presence of the Engineer/City shall not relieve the Contractor of the responsibility for the proper execution of the Work in accordance with the Contract. The Engineer/City shall have unlimited access to the plant.

C. The Engineer/City shall be permitted to provide inspections for key milestones during the execution of the work. The Contractor shall provide the City and Engineer with a minimum of 48 hours advance notice prior to requesting an inspection for each milestone. At a minimum, the Engineer/City shall perform an inspection following the completion of major milestones prior to commencing work on subsequent tasks. These major milestones include:

1. Site preparation and clearing
2. Installation of silt fencing, turbidity barriers and other erosion control measures.
3. Installation of upland dewatering system, if any.
4. Inspection of upland trench and pipe, before pipe burial.
5. Laydown and fusing of HDPE or FPVC pipe
6. Set up of HDD equipment prior to commencement of pilot bore.
7. Inspection of pipeline upon emergence.
8. Inspection of stabilization measure(s) at bore hole/seabed interface.
9. Assembly of outfall diffusers.
10. Connection of outfall diffusers.
11. Hydrostatic and leakage pressure test.
12. Installation of anchoring system and strapping.
13. Anchor load tests.

The Contractor shall not be permitted to commence construction activities on a subsequent task until receipt of written approval from the City and Engineer approving the preceding task.

PART 4 - SAFETY

4.1 Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

A. All employees on the Work and other persons and/or organizations who may be affected thereby;

B. All the Work and materials and equipment to be incorporated therein, whether in storage on or off the Project site; and

C. Other property on Project site or adjacent thereto, including trees, shrubs, walks, pavements, roadways, structures, utilities and any underground structures or improvements not designated for removal, relocation or replacement in the Contract Documents.

4.2 Contractor shall comply with all applicable codes, laws, ordinances, rules and regulations of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss. Contractor shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of underground structures and improvements and utility-owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation or replacement of their property. Contractor's duties and responsibilities for the safety and protection of the Work shall continue until such time as the Work is completed and final acceptance of same by The City has occurred.

4.3 Contractor shall designate a responsible representative at the Project site whose duty shall be the prevention of accidents. This person shall be Contractor's superintendent unless otherwise designated in writing by Contractor to The City.

PART 5 - CONTRACTOR QUALIFICATIONS

5.1 HDD SYSTEM EQUIPMENT

A. The directional drilling equipment, as a minimum, shall consist of a directional drilling rig of sufficient capacity to perform the bore(s) and pull-back of the pipe(s), a drilling fluid mixing and delivery system of sufficient capacity to successfully complete the crossing, a guidance system to accurately guide boring operations, and trained and competent personnel to operate the system. All equipment shall be in good, safe operating condition with sufficient supplies, materials and spare parts on hand to maintain the system in good working order for the duration of this project. All required equipment shall be included in the emergency and contingency plan as submitted per these specifications. A letter from the drill rig manufacturer certifying the equipment is capable of completing the Work is required. At a minimum, the drill rig shall have a minimum thrust/pullback capacity of 500,000 lbs, a drill length capacity of 1,500 ft, and a pipeline capacity (OD) of 32”.

B. The directional drilling machine shall consist of a hydraulically powered system to rotate, push and pull drill pipe while delivering a pressurized fluid mixture to a drill head. The machine shall be anchored to withstand the pulling, pushing and rotating forces required to complete the project.

C. The drilling rig hydraulic system shall be of sufficient pressure and volume to power drilling operations. The hydraulic system shall be free from leaks.

D. The drilling rig shall have a system to monitor pull-back hydraulic pressure during pull-back operations.

E. The horizontal directional drilling equipment shall produce a stable fluid lined tunnel with the use of a steer-able drill head and any subsequent pre-reaming heads.

F. The system must be able to control the depth and direction of the drilling operation.

G. Drill head shall contain all necessary cutters and fluid jets for the operation, and shall be of the appropriate design for the ground medium to be drilled.

5.2 CONSTRUCTION EXPERIENCE CRITERIA

A. Contractors' qualifications for bidding as a HDD Contractor for the Project is based on the following criteria:

1. The contractor must have completed horizontal directional drill (HDD) projects for stormwater, water or wastewater pressure pipe projects within the last 10 years that meet the following criteria:

a. A total of three (3) similar projects completed that demonstrate successful experience with long, single-pull HDD using nominal 24-inch diameter or larger fusible polyvinyl chloride (FPVC) or high density polyethylene (HDPE) pipe. Each similar project shall be at least 1,000-feet long.

b. Of the three similar projects, at least one HDD project with a minimum single pull length of 2,000-feet.

c. Of the three similar projects, at least one HDD project must include a horizontal curve.

d. Of the three similar projects, at least one HDD project must be in Florida.

e. Of the three similar projects, at least one HDD project must be subaqueous. Preference is given to Projects with an ocean surfacing endpoint.

f. Of the three similar projects, at least one HDD project shall have a construction cost of $1,500,000 for the directional drill portion of the project. Construction cost shall be the actual amount paid to the subcontractor performing the HDD work.

5.3 Personnel Experience Criteria

A. Contractors' were pre-qualified for bidding based on the following criteria for personal:

1. The HDD Contractor shall provide a Project Site Supervisor meeting all of the following criteria:

a. At least ten (10) years of experience managing HDD projects. Preference is given to the Project Site Supervisor having five years or more experience with the submitting firm.

b. Managed at least one (1) HDD project in Florida (may be waived if the Superintendent meets this criteria).

c. Managed the construction of at least one HDD project with a construction cost of at least $1.5 million. Construction cost shall be the actual amount paid to the contractor performing the HDD work.

The HDD Contractor shall provide a **Superintendent** meeting all of the following criteria:

a. At least ten (10) years of experience supervising HDD projects. Preference is given to Superintendent's having five years or more experience with the submitting firm.

b. Supervised at least one (1) HDD project in Florida Florida (may be waived if the Project Manager meets this criteria).

c. Supervised the construction of at least one directional drill project with a construction cost of at least $1.5 million. Construction cost shall be the actual amount paid to the contractor performing the HDD work.

5.4 General and Administrative Criteria

A. The Prime Contractor must provide written statements addressing each of the following criteria for general and administrative criteria:

a. The HDD Contractor has access to adequate equipment to complete the project. Provide the make, model and year of manufacture of the drill rig proposed to be used to perform the work on this project and indicate whether it is owned, leased or rented. List all other major equipment intended to be used for this Project and indicate whether it is owned, leased or rented.

b. The HDD Contractor has a history of completing projects consistently on time and within the bid amount. Provide a statement that the applicant

has not been in involved in liquidated damages within the past five years or has served an Owner or General Contractor with a claim for additional compensation prepared by an attorney or a claims consultant, excluding routine change order requests. If this is not the case, provide an explanation.

c. The Prime Contractor has a history of not being involved in litigation against Owners, General Contractors or Engineering Firms. The Prime Contractor shall provide a statement that it has not been involved in litigation as a plaintiff against the Owner or Engineering firm within the past five years. If this is not the case, provide an explanation.

d. The HDD Contractor shall provide a statement that it has not had legal actions or lawsuits within the last ten years against the City. If this is not the case, provide an explanation. The HDD Contractor shall provide a statement that its license has not been revoked by the State of Florida or other local jurisdictions within the last 7 years. If this is not the case, provide an explanation.

e. The HDD Contractor shall provide a statement that its surety firm has not completed a contract on behalf of the HDD Contractor because the HDD Contractor was in default or was terminated by the project owner within the last 7 years.

5.5 Bonding Capacity

A. Contractors' were pre-qualified for bidding based on the following criteria for bonding capacity.

1. The HDD Contractor shall provide a letter from its bonding company stating that the HDD Contractor will be able to provide a performance bond in the amount of their bid.

PART 6 – MOBILIZATION/DEMOBILIZATION

6.1 SCOPE

Mobilization and Demobilization is described as the transport of required equipment, materials and personnel to and from the jobsite to complete the work as well as the preparation and maintenance of the staging and access areas.

6.2 RELATED SECTIONS:

TS-01500 Construction Facilities and Temporary Controls
TS-01600 Material and Equipment
TS-02050 Demolition
TS-02110 Site Clearing

6.3 SITE ACCESS

The Contractor shall provide a site access plan that identifies how the Contractor will access the site to perform the required work. The site access plan will be submitted to the Engineer and City for review and approval prior to commencement of construction. The site access plan will identify site access routes as well as all areas to be disturbed (i.e., pavement, vegetation, sidewalks, barriers, fences, utilities, etc.). The Contractor will be responsible for obtaining all necessary permits and approvals associated with the site access as well as restoration of all disturbed areas within the site access area.

6.4 CONSTRUCTION ENTRANCE

A stabilized construction entrance in accordance with FDOT shall be installed and maintained for the duration of construction.

6.5 SITE PREPARATION:

Site preparation activities include the removal of curbing and pavement within the work area as required to construct drill pit as shown on the Construction Drawings. Site Preparation also includes but is not limited to incidentals such as the protection of existing trees and vegetation outside of the work area, installation of a soil tracking entrance, debris disposal, installation of turbidity barriers, silt fencing and installation of site security measures.

6.6 PRESERVATION OF VEGETATION

The Contractor shall stake the limits of the vegetation to be cleared, if any, and receive approval from the Engineer and City prior to the commencement of clearing activities.

The Contractor shall provide and maintain a functional barrier around the vegetation to be preserved during construction. No material or equipment shall enter or be placed in the areas protected by barricades without prior approval. In the event vegetation denoted as "to be preserved" is damaged, it shall be replaced immediately following construction at a 1:1 damaged:replaced ratio within the pre-construction vegetation footprint or as approved by the Engineer and City.

6.7 DISPOSAL

Items to be removed or cleared shall be removed from the Project site and disposed of in a lawful manner subject to approval by the Engineer/City. On-site burying of removed or cleared items shall be prohibited. As clearing is completed, Contractor shall immediately remove and dispose of all cleared materials and shall keep the site free, clear and in good order.

6.8 STAGING AND STORAGE

The Contractor shall propose in the plan of work the use of access and staging areas to the City and Engineer within ten (10) days of the Notice of Award. The plan shall include a description of the routes and areas he intends to use to transport and store material and equipment during construction. The plan shall also describe how the Contractor intends to access the project site and work areas as well as measures for debris and dust control. All transport routes, storage areas, and access areas are subject to the approval of the City and Engineer. The final work plan and staging areas shall be negotiated with the City prior to commencement of the Work.

PART 7 - SURVEYING, LAYOUT AND AS-BUILT DRAWINGS

7.1 SCOPE

The construction surveys cost represents the combined costs incurred by the contractor associated with directional drilling survey control, layout and post-construction (as-built) surveys and drawings.

7.2 RELATED SECTIONS:

STS-01051 Alignments and Grades

STS-02300 Horizontal Directional Drilling

PART 8 - MAINTENANCE OF TRAFFIC

8.1 SCOPE

The HDD portion of work will require limited Maintenance of Traffic (MOT), which is expected to include intersection closure at 3rd Ave N and Gulf Shore Blvd for the pipe pull.

In addition, the MOT is expected to include one lane closure for two blocks east on 3rd Ave N for pipe staging and fusing.

8.2 RELATED SECTIONS:

TS-01570 Traffic Regulation and Safety

PART 9 - INLET PROTECTION SYSTEM

9.1 SCOPE

There are four existing inlets to be protected at 3rd Ave N during the HDD work.

9.2 RELATED SECTIONS:

TS-02276 Erosion and Sediment Control

PART 10 - ENVIRONMENTAL COMPLIANCE, TESTING AND CONTROL

10.1 SCOPE

The contractor shall install and maintain BMPs for erosion and turbidity control to maintain compliance with State water quality standards and specific environmental permit conditions. In addition, turbidity monitoring during the seaward pipe emergence is required, estimated at one day for each pipeline.

10.2 RELATED SECTIONS:

TS-02276 Erosion and Sediment Control

TS-02530 Groundwater Control for Open Excavations

Environmental Specifications

PART 11 – FURNISH AND DELIVERY FPVC PIPE AND HORIZONTAL DIRECTIONAL DRILL

11.1 SCOPE

The Contractor shall install two-30” FPVC DR21 pipelines by directional drill, approximately 1,000 ft each, into the Gulf of Mexico. The HDD activities include furnishing and delivering all materials and equipment to complete the installation, execution of work, and hydrostatic and leakage testing following installation.

11.2 RELATED SECTIONS:

STS-02300 Horizontal Directional Drilling

STS-02600 Fusible PVC Pipe for Installation by Horizontal Directional Drill

STS-02676 Pressure and Leakage Tests

PART 12 - SITE TURNOVER & SITE RESTORATION

12.1 SCOPE

The Contractor is required to provide temporary shoring to protect the landward end of pipe until the site is turned over to the prime contractor performing the balance of the project work (e.g. stormwater and roadway). The estimated duration for this site protection is estimated at 30 days. During this time, the Contractor shall provide adequate fencing and site security for the site encompassing the 3rd Ave N beach end as described in the City's Municipal Code and approved by the City/Engineer.

Beyond cleaning up equipment, temporary facilities and solid waste, the contractor will not be required to restore the site within the 3rd Ave N (i.e. pavement restoration, vegetation, etc.) within the provided staging and work areas prior to turnover of the site to the prime contractor. Any damage outside of the approved work limits must be rectified to the satisfaction of the City prior to site turnover.

12.2 RELATED SECTIONS:

TS-01500 Construction Facilities and Temporary Controls
TS-02151 Shoring, Sheeting and Bracing
TS-01570 Traffic Regulation and Public Safety
TS-02999 Restoration and Miscellaneous Work and Cleanup
Section 16-291 Construction Site Management, Code of Ordinances, City of Naples, FL

END OF SECTION

SECTION 01026
MEASUREMENT AND PAYMENT

REPLACE THE CITY'S TECHNICAL SPECIFICATIONS FOR MEASUREMENT AND PAYMENT WITH THE FOLLOWING:

PART 1 GENERAL

1.1. SECTION INCLUDES

A. Explanation and Definitions

B. Measurement

C. Payment

D. Schedule of Values

1.2. EXPLANATION AND DEFINITIONS

The following explanation of the Measurement and Payment for the Bid Schedule items is made for information and guidance. The omission of reference to any item in this description shall not, however, alter the intent of the Bid Schedule or relieve the CONTRACTOR of the necessity of furnishing such as a part of the Contract. Measurement and payment for all Contract Items shall made be in accordance with this section or as modified by the Supplemental Terms and Conditions.

1.3. MEASUREMENT

The quantities set forth in the Bid Schedule are approximate and are given to establish a uniform basis for the comparison of bids. The CITY reserves the right to increase or decrease the quantity of any class or portion of the work during the progress of construction in accord with the terms of the Contract.

1.4. PAYMENT

A. Make payment for the items listed on the Bid Schedule on the basis of the work actually performed and completed, such work including but not limited to, the furnishing of all necessary labor, materials, equipment, transportation, clean up, restoration of disturbed areas, and all other appurtenances to complete the construction and installation of the work as shown on the drawings and described in the specifications.

B. Unit prices are used as a means of computing the final figures for bid and Contract purposes, for periodic payments for work performed, for determining value of additions or deletions and wherever else reasonable.

1.5. SCHEDULE OF VALUES

A. Approval of Schedule: Submit for approval a preliminary schedule of values, in duplicate, for all of the Work. Prepare preliminary schedule in accordance with the Supplemental Terms and Conditions. Submit preliminary schedule of values within 10 calendar days after the Effective Date of the Agreement. Submit final schedule of values in accordance with the Supplemental Terms and Conditions.

B. Format: Utilize a format similar to the Table of Contents of the Project Specifications. Identify each line item with number and title of the major specification items. Identify site mobilization, bonds and insurance. Include within each line item, a direct proportional amount of CONTRACTOR's overhead profit.

C. Revisions: With each Application for Payment, revise schedule to list approved Change Orders.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 MEASUREMENT AND PAYMENT

A. Make payment on the basis of work actually performed completing each item in the Bid, such work including, but not limited to, the furnishing of all necessary labor, materials, equipment, transportation, cleanup, and all other appurtenances to complete the construction and installation of the work to the configuration and extent as shown on the drawings and described in the specifications. Payment for each item includes compensation for cleanup and restorations. Cost of cleanup and surface restorations (including pavement replacement) will be considered as the percentage retained in accordance with the Contract Documents, and complete payment will not be made until cleanup, restorations and as-builts are completed.

B. Progress Payments to the Contractor shall be based upon percent completion. Actual completed quantities will be computed and applications for final payment verified by the City and Engineer.

1. Mobilization and Demobilization:
   a. All costs connected with the mobilization and demobilization of all of the Contractor's plant and equipment shall be paid for at the lump sum price for this item. This includes the mobilization and demobilization of equipment and personnel.

   b. Sixty percent (60%) of the lump sum price less retainage shall be paid to the Contractor upon completion of the Contractor's mobilization at the Work site as evidenced by the setup of the HDD equipment and initiation of the drilling pilot bore hole using HDD methods. The remaining forty percent (40%) shall be paid to the Contractor upon completion of demobilization.

   c. In the event the City considers that the amount in this item, sixty percent (60%) which represents mobilization and forty percent (40%) which represents demobilization, does not bear a reasonable relation to the cost of the Work in this Contract, the City may require the Contractor to produce data to justify the cost. Failure to justify such cost to the satisfaction of the City shall result in payment of actual mobilization costs, as determined by the City/Engineer at the completion of mobilization, and actual demobilization costs, as determined by the City at the completion of demobilization, and payment of the remainder of this item in the final payment under this Contract.

   d. Site Preparation and restoration is considered incidental to mobilization/demobilization.

2. Survey Layout and As-Builts:
   Shall be paid for at the lump sum cost upon completion of all work and transmittal of the signed/sealed as-built drawings with the final payment.

3. Maintenance of Traffic:
   Payment of the lump sum amount for MOT shall be prorated by dividing the

lump sum price by the total number of contract days, times the number of days in a particular pay request. The first payment for MOT will not be made until the contractor has mobilized as verified by the City and Engineer.

4. Inlet Protection System:
   Shall be paid for at the lump sum cost upon completion of all work and transmittal of the signed/sealed as-built drawings with the final payment.

5. Environmental Compliance, Turbidity Control and Testing
   Payment of the lump sum amount for Environmental Compliance, Turbidity Control and Testing shall be prorated by dividing the lump sum price by the total number of contract days, times the number of days in a particular pay request. The first payment for MOT will not be made until the contractor has mobilized as verified by the City and Engineer.

6. Furnish and Deliver 30" FPVC DR21 Pipe:
   a. Forty percent (40%) of the material and delivery costs for the pipeline shall be paid to the Contractor upon approval of the Work Plan and shop drawings; the remaining sixty percent (60%) less retainage shall be paid to the Contractor upon delivery of the materials to the site and fused as verified by the City and Engineer. Excess and/or damaged materials will not be paid for. Such excess and/or damaged materials shall be removed from the site by the Contractor.

   b. In the event the Engineer considers that the amount in this item, which represents the material and delivery costs, does not bear a reasonable relation to the cost of the Work in this Contract, the Engineer may require the Contractor to produce data to justify the cost. Failure to justify such cost to the satisfaction of the Engineer shall result in payment of actual material and delivery costs, as determined by the Engineer upon delivery with the payment of the remainder of this item in the final payment under this Contract.

7. Horizontal Directional Drill (HDD):
   a. Payment for Horizontal Directional Drill (HDD) shall be made at the Contract lump sum price. Seventy-five percent (75%) shall be paid upon successful installation of the pipeline with the remaining twenty-

five percent (25%) paid after successful hydrostatic and leakage testing.

b. The quantities of offshore pipeline shall be computed from linear ft of pipeline measured in plan view from point HDD Entry to HDD Exit as verified by the City and Engineer. No additions or deductions will be made for variations in either the vertical or horizontal directions based on the Contractors preferred installation means and methods. The Contractor shall propose the temporary excess pipe length and elevations at each end until the future connections occur, the costs of which is considered incidental to the Work.

8. Hydrostatic and Leakage Testing:
   Shall be paid for at the lump sum cost paid upon successful hydrostatic and leakage testing.

9. Temporary Shoring and Fencing:
   Sixty percent (60%) of the lump sum cost shall be paid to the Contractor upon installation of temporary shoring, fencing and related site protection as verified by the City and Engineer. The remaining forty percent (40%) shall be paid upon completion of all work with the final payment.

C. Prior to submitting first monthly Application for Payment, Contractor shall submit to Engineer, for review and approval, a schedule of values based upon the Contract Price, listing the major elements of the Work and the dollar value for each element. After its approval by the Engineer, this schedule of values shall be used as the basis for the Contractor's monthly Applications for Payment.

D. Prior to submitting first monthly Application for Payment, Contractor shall submit to The City a complete list of all its proposed subcontractors and suppliers, showing the work and materials involved and the dollar amount of each proposed subcontract and purchase order. The first Application for Payment shall be submitted no earlier than thirty (30) days after the Commencement Date.

E. If payment is requested on the basis of materials and equipment not incorporated into the Project, but delivered and suitably stored at the site or at another location agreed to by the City in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice or other documentation warranting that the City has received

the materials and equipment free and clear of all liens, charges, security interests and encumbrances, together with evidence that the materials and equipment are covered by appropriate property insurance and other arrangements to protect the City's interest therein, all of which shall be subject to the City's satisfaction.

F. Contractor shall electronically submit its monthly Application for Payment to the Engineer and City on or before the 25th day of each month for work performed during the previous month. Invoices received after the 25th day of each month shall be considered for payment as part of the next month's application. Within ten (10) calendar days after receipt of each Application for Payment, the Engineer shall either:
   1. indicate his approval of the requested payment;
   2. indicate his approval of only a portion of the requested payment, stating in writing his reasons therefore; or
   3. return the Application for Payment to the Contractor indicating, in writing, the reason for refusing to approve payment.

   In the event of a total denial and return of the Application for Payment by the Engineer, the Contractor may make the necessary corrections and resubmit the Application for Payment. The City shall, within thirty (30) calendar days after the Engineer's approval of an Application for Payment, pay the Contractor the amounts so approved. Provided, however, in no event shall the City be obligated to pay any amount greater than that portion of the Application for Payment approved by the Engineer.

G. The City shall retain ten (10%) of the gross amount of each monthly payment request or ten percent (10%) of the portion thereof approved by the Engineer for payment, whichever is less. Such sum shall be accumulated and not released to the Contractor until final payment is due.

H. Monthly payments to Contractor shall in no way imply approval or acceptance of Contractor's work.

I. Contractor agrees and understands that funding limitations exist and that the expenditure of funds must be spread over the duration of the Project at regular intervals based on the Contract Amount and Progress Schedule. Accordingly, prior to submitting its first monthly Application for Payment, Contractor shall prepare and submit for the Engineers review and approval, a detailed Project Funding Schedule, which shall be updated as necessary and approved by the City to reflect approved

adjustments to the Contract Amount and Contract Time. No voluntary acceleration or early completion of the Work shall modify the time of payments to Contractor as set forth in the approved Project Funding Schedule.

1.6. PAYMENTS WITHHELD

A. The Engineer may decline to approve any Application for Payment, or portions thereof, because of subsequently discovered evidence or subsequent inspections. The Engineer may nullify the whole or any part of any approval for payment previously issued and the City may withhold any agreement between the City and Contractor, to such an extent as may be necessary in the City's opinion to protect it from loss because of:

1. Defective Work not remedied;

B. Third party claims filed or reasonable evidence indicating probable filing of such claims

C. Failure of Contractor to make payment properly to subcontractors or for labor, materials or equipment;

D. Reasonable doubt that the Work can be completed for the unpaid balance of the Contract Amount;

E. Reasonable indication that the Work will not be completed within the Contract Time;

F. Unsatisfactory prosecution of the Work by the Contractor; or

G. Any other material breach of the Contract Documents.

H. If these conditions in Subsection 5.1 are not remedied or removed, the City may, after three (3) days written notice, rectify the same at Contractor's expense. The City also may offset against any sums due Contractor the amount of any liquidated or unliquidated obligations of Contractor whether relating to or arising out of this Agreement or any other agreement between Contractor and the Engineer.

1.7. FINAL PAYMENT

A. The City shall make final payment to Contractor within thirty (30) calendar days after the Work is finally inspected and accepted by both the City and the Engineer in

accordance with Section 20.1 herein provided that Contractor first, and as an explicit condition precedent to the accrual of Contractor's right to final payment, shall have furnished the City with any and all documentation that may be required by the Contract Documents and the City.

B. Contractor's acceptance of final payment shall constitute a full waiver of any and all claims by Contractor against the City arising out of this Agreement or otherwise relating to the Project, except those previously made in writing and identified by Contractor as unsettled at the time of the final Application for Payment. Neither the acceptance of the Work nor payment by the City shall be deemed to be a waiver of the City's right to enforce any obligations of Contractor hereunder or to the recovery of damages for defective Work not discovered by the Engineer at the time of final inspection.

END OF SECTION

SECTION 01051
ALIGNMENT AND GRADES

REPLACE THE CITY'S TECHNICAL SPECIFICATIONS FOR ALIGNMENT AND GRADES WITH THE FOLLOWING:

PART 1 GENERAL

1.1. SECTION INCLUDES

A. General

B. Surveys

C. Datum Plane

D. Protection of Survey Data

1.2. GENERAL

A. Construct all work in accordance with the lines and grades shown on the Drawings. Assume full responsibility for keeping all alignment and grade.

1.3. SURVEYS

A. Reference Points: The CITY will provide reference points for the work as described in the General Conditions. Construction baseline stations have been established by the Engineer as shown on the Construction Drawings with a table to identify the coordinates and elevation of each control point. Perform all additional survey, layout, and measurement work.

B. Keep ENGINEER informed, sufficiently in advance, of the times and places at which work is to be performed so that base horizontal and vertical control points may be established and any checking deemed necessary by ENGINEER may be done, with minimum inconvenience to the ENGINEER and at no delay to CONTRACTOR. It is the intention not to impede the Work for the establishment of control points and the checking of lines and grades set by the CONTRACTOR. When necessary, however, suspend working operations for such reasonable time as the ENGINEER may require

for this purpose. Costs associated with such suspension are deemed to be included in the Contract Price, and no time extension or additional costs will be allowed.

C. Provide an experienced survey crew, including a Professional Land Surveyor, an instrument operator, competent assistants, and any instruments, tools, stakes, and other materials required to complete the survey, layout, and measurement of work performed by the CONTRACTOR.

D. The Contractor shall verify the horizontal and vertical control for the project benchmarks using a minimum of two 2nd Order or lower control monuments. The Contractor shall immediately contact the Engineer if any discrepancies are discovered in any of the information presented concerning all control monumentation. If the Contractor does not contact the Engineer, it is understood that the Contractor agrees with all information presented in the Construction Drawings related to monumentation elevation and control information.

E. From these benchmarks, the Contractor shall establish any intermediate benchmarks and additional horizontal and vertical control required for the completion of the Work. The Contractor shall provide benchmark locations, coordinates and elevations in plans to be delivered to the Engineer prior to commencement of construction.

F. From the benchmarks, control data and elevations established by the Owner and Contractor, the Contractor shall complete the layout of Work and shall be responsible for all measurements that may be required for the execution of the Work, subject to modifications that the Engineer may require to meet changes in conditions at the Work site.

G. The Contractor shall furnish, at his own expense, such stakes, templates, buoys, platforms, equipment, tools and material, and all labor as may be required in laying out any part of the Work from the benchmarks, control data, and elevations established by the Owner. All temporary markers and stakes placed by the Contractor must be removed upon completion of the project.

1.4. DATUM

A. All horizontal datum indicated or specified refer to the North American Datum 1983/1990 (NAD83/90 datum), Florida State Plane, East Zone, 2011 adjustment of the United States Coast and Geodetic Survey.

B. All vertical datum indicated or specified refer to the North American Vertical Datum of 1988 (NAVD88).

C. All data is expressed in US feet and decimal parts thereof, or in feet and inches.

1.5. PROTECTION OF SURVEY DATA

A. General: Safeguard all points, stakes, grade marks, known property corners, monuments, and benchmarks made or established for the Work. Reestablish them if disturbed, and bear the entire expense of checking reestablished marks and rectifying work improperly installed.

B. Records: Keep neat and legible notes of measurements and calculations made in connection with the layout of the Work. Furnish copies of such data to the ENGINEER for use in checking the CONTRACTOR's layout. Data considered of value to the City Manager or designee will be transmitted to the City Manager or designee by the ENGINEER with other records on completion of the Work.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 02300
HORIZONTAL DIRECTIONAL DRILLING

REPLACE THE CITY'S STANDARD REQUIREMENTS FOR HORIZONTAL DIRECTIONAL DRILLING WITH THE FOLLOWING:

PART 1 GENERAL

1.1 DESCRIPTION OF REQUIREMENTS

A. Provide all necessary tools, materials, labor, supervision and equipment to successfully complete the installation of directionally drilled piping as specified herein.

B. Furnish all items necessary to perform the horizontal directional drilling operation and construct the pipe to the lines and grade shown on the drawings.

C. Use techniques of creating or directing a borehole along a predetermined path to a specified target location. Use mechanical and hydraulic deviation equipment to change the boring course and use instrumentation to monitor the location and orientation of the boring head assembly along a predetermined course.

D. Accomplish drilling with fluid-assist mechanical cutting. Use a mixture of bentonite and water or polymers and additives. Use bentonite sealants and water to lubricate and seal the mini-tunnel. Use minimum pressures and flow rates during drilling operation as not to fracture the sub-grade material around and or above the bore.

E. Utilize small diameter fluid jets to fracture and mechanical cutters to cut and excavate the soil as the head advances forward.

F. Install an offset section of drill stem that causes the cutter head to turn eccentrically about its centerline when it is rotating for steering. When steering adjustments are required, rotate the cutter head offset section toward the desired direction of travel and advance the drill stem forward without rotation.

G. Drill a pilot hole using the mobile drilling system launched from the surface at an inclined angle. Enlarge the pilot hole with reamers as required.

1.2 REFERENCE STANDARDS

A. See Section 02623 for Fusible Polyvinyl Chloride Pipe (FPVC) requirements.

B. American Association of State Highway and Transportation Officials (AASHTO).

C. Occupational Safety and Health Administration (OSHA).

D. Florida Department of Transportation Standard Specifications for Road and Bridge Construction, 2020 Edition (FDOT 2020).

1.3 DEFINITIONS

A. CONTRACTOR's Construction Drawings shall be defined as drawings by which the CONTRACTOR proposes to construct, operate, build, etc., the referenced item. Submit Construction Drawings for the sole purpose of providing the sufficient details to verify that the CONTRACTOR's work in progress is in accordance with the intent of the design.

1.4 CONTRACTOR WORK PLAN & SUBMITTALS

A. The Contractor shall prepare and submit a final Construction Work Plan within ten (10) calendar days after the contract award. The Work Plan is subject to approval by the Engineer and City. The Work Plan shall include at a minimum:

1. Letter appointing the project superintendent
2. List of Equipment (including size and production rates)
3. List of Sub-Contractors
4. Critical Path Schedule
5. Specific installation procedures for each of the system components (tooling, drilling, pipe ballasting, pipe pull, etc)
6. Construction sequencing
7. Written discussion and shop drawings describing the geometry, orientation, methods for transport and placement of material and installation methods and sequence. The drawings shall show complete dimensioned layout of all components of the system.
8. Material and equipment delivery schedules
9. Site Access and Staging Plan
10. Dewatering and Erosion Control Plan (if applicable)
11. Drilling Fluids Container and Cleanup Plan

12. Pipeline Fusing Plan
13. Details of the Contractor's Quality Control Plan for furnishing and installation of the system (i.e. guidance system) including surveys, testing and tolerance control.
14. All manufacturer's shop drawings, product literature and specifications for material(s) utilized. Shop drawings shall give complete information necessary for fabrication of component parts of the system including the complete dimensioned layout of the system.
15. Proposed contingency plans for critical phases and areas of directional drilling, including repair of any existing utilities damaged during construction.

B. Site Access & Staging

The Site Access and Staging Plan shall include at a minimum:

1. Identification of all proposed site access routes and staging areas
2. Areas to be disturbed by site access and staging (i.e., vegetation, driveways, barriers, fences, utilities, etc.)

C. Construction Sequencing

The construction sequencing plan shall describe the sequence of each major work component as it relates to the Critical Path Schedule. The Contractor's sequencing plan is subject to approval by the City and Engineer.

D. Dewatering and Turbidity Control (if applicable)

The Contractor shall prepare and submit a Dewatering and Erosion Control Plan (if applicable) for review and approval by Engineer and City to remove and dispose of standing water that would interfere with the work. The Contractor shall devise a dewatering and turbidity control plan based on his investigations of the site and proposed construction means, methods and sequencing to meet the permit and Contract Document requirements, if dewatering is required. The methods of excavation, lining, and groundwater control shall be compatible.

E. Materials

The Contractor shall submit a notarized certification from the manufacturer(s) indicating that the material(s) utilized meet the project specifications for review and approval by the Engineer. Materials shall be ordered only after the required submittals and shop drawings have been received and approved. All materials proposed by the Contractor are subject to approval by the Engineer. Approval by the

Engineer shall not relieve the Contractor from the responsibility of procuring the appropriate materials to meet these design and performance intent of these Contract Documents. Submit hazardous chemical list as well as all MSDS and technical data sheets.

F. Shop Drawings

The Contractor shall submit the shop drawings to Engineer for approval. The Engineer shall be allowed ten (10) working days for review and approval.

G. The ENGINEER will base the review of submitted details and data on the requirements of the completed work, safety of the work in regards to the public, potential for damage to public or private utilities and other existing structures and facilities, and the potential for unnecessary delay in the execution of the Work. Such review shall not be construed to relieve the CONTRACTOR in any way of his responsibilities under the contract. Do not commence work on any items requiring CONTRACTOR's Shop Drawings or other submittals until the drawings and submittals are reviewed and accepted by the ENGINEER.

H. Any error or omission on the Contractor's drawings and submittals, even though approved, shall not relieve the Contractor from the responsibility of performing the work in accordance with the specifications.

I. QA/QC

The Contractor shall prepare and submit a Quality Assurance and Quality Control (QA/QC) Plan including the site layout, positioning control, progress survey schedule and required testing. Records of verification, testing, inspections and the survey data shall be provided as scheduled and specified. Inspection of the work to ensure conformance with the contract documents shall at a minimum include:

1. system installation procedures, quantities, staking and surveys
2. procedures for controlling and checking line and grade.
3. construction to required elevations and dimensions
4. performance and submittal of required quality control testing
5. testing of the system
6. removal of all stakes, buoys, alignment ropes and equipment employed during the work
7. field forms for establishing and checking line and grade.

J. Hurricane and Severe Storm Planning

1. The project area is subject to tropical storms and hurricanes from June through November and to windy and rainy weather, including severe electrical storms and other sudden and locally severe meteorological occurrences during any time of the year. The Contractor shall maintain full-time monitoring of the available local marine weather broadcasts and avail themselves of such other local and international weather forecasting services as may be available. It shall be the Contractor's responsibility to obtain information concerning rain, wind and wave conditions that could influence operations.

2. The Contractor shall submit a written Hurricane and Severe Storm Plan to the Engineer and City.

K. Environmental Protection

1. The Contractor shall submit a written Environmental Protection Plan to the Engineer. The Environmental Protection Plan shall include but not be limited to the following:
    a. Oil Spill Contingency and Disaster Mitigation Plan
    b. Environmental monitoring procedures for the protection water, land and air resources
    c. Procedures to be implemented in order to provide environmental protection and to comply with applicable laws and regulations.

2. The Contractor shall provide written assurance that immediate action will be taken to correct pollution of the environment due to accident, natural causes or failure to follow the procedures set out in the Environmental Protection Plan.

3. The Contractor shall identify the person responsible for implementing the Environmental Protection Plan. The Contractor's responsible person shall have the responsibility and authority to act for the Contractor in all environmental protection matters and shall report directly to the Contractor's top management.

L. Diving Plan (if applicable).
All diving performed under this contract shall be in strict accordance with the rules and regulations prescribed by the U.S. Navy Diving Manual: 0910-LP-708-8000; 29 CFR Part 1910, Subpart T; 29 CFR Part 1915; the EM 385-1-1, Section 30; and ER 385-1-86. The Contractor shall submit a Dive Plan if underwater divers are to be utilized in the execution of the Work. The Dive Plan shall include, at a minimum, the equipment, work methods and safety procedures to be used.

M. Safety.
Submit procedures including, but not limited to, monitoring for gases encountered.

N. Hazardous Materials.
Submit hazardous chemical list as well as all MSDS and technical data sheets.

1.5 DESIGN CRITERIA

A. The Contractor shall submit the proposed the HDD drill path and calculations for the HDD geometry and design, pipe stress, pull load, pipe layout, pipe pullback, separation between the two bore holes, geotechnical considerations, steering tolerance, etc for the Work to the Engineer and City.

B. The proposed drill path shall meet the entry and exist points as shown in the Plans and stay within the submerged lands easement.

1.6 JOB CONDITIONS

A. Safety Requirements

1. Perform work in a manner to maximize safety and reduce exposure of men and equipment to hazardous and potentially hazardous conditions, in accordance with applicable safety standards.

2. Whenever there is an emergency or stoppage of work which is likely to endanger the excavation or adjacent structures, operate a full work force for 24 hours a day, including weekends and holidays, without intermission until the emergency or hazardous conditions no longer jeopardize the stability and safety of the work.

B. Air Quality.
   1. Conduct directional drilling operations by methods and with equipment, which will positively control dust, fumes, vapors, gases or other atmospheric impurities in accordance with applicable safety requirements.

1.7 PERMITS

A. The Owner has procured the following permits. The Contractor shall comply with all conditions stipulated in the project permits. The Project permits include:
   1. Florida Department of Environmental Protection (FDEP) Exemption Notice No. CO-1063;
   2. FDEP Coastal Construction Control Line (CCCL) Permit No. CO-1063;
   3. USACE Permit No. SAJ-2018-03052;
   4. South Florida Water Management District (SFWMD) Environmental Resource Permit (ERP) Permit No. 11-100825-P;
   5. SFWMD Water Use Permit No. 11-04010-W;
   6. FDEP Generic Permit for Discharge of Groundwater from Dewatering Operations (Facility ID FLG072306);
   7. City of Naples Coastal Construction Setback Line (CCSL) Permit No. 187011, and
   8. State of Florida Sovereignty Submerged Lands Easement (Easement No. 42246).

B. CONTRACTOR shall obtain any and all other permits required for prosecution of the work.

C. The Contractor is responsible for any arrangements and fees for the use of vessel docking facilities at no additional cost to the City for offshore work.

D. All marine equipment shall be capable of operating in the sea-state conditions of the Gulf of Mexico. The Contractor shall have all appropriate U.S. Coast Guard (USCG) certifications for the equipment to be used and all USCG regulations must be strictly adhered to. The Contractor is responsible for issuing a Notice to Mariners and coordinating appropriately with the USCG prior to mobilization for water based activities.

PART 2 PRODUCTS

2.1 GENERAL

A. See Section 02623 for Fusible Polyvinyl Chloride Pipe (FPVC).

PART 3 EXECUTION

3.1 GENERAL

A. The CONTRACTOR shall be responsible for his means and methods of directional drilling construction and shall ensure the safety of the work, the CONTRACTOR's employees, the public, and adjacent property, whether public or private.

B. Obtain locations of all existing utilities within the horizontal directional drilling project area, whether shown on the plans or not, in coordination with the owners of such utilities. Be responsible for protection of such utilities from damage, and repair of any utilities damaged during or as a result of construction.

C. All existing lines and underground utilities shall be positively identified, including exposing those facilities that are located within an envelope of possible impact of HDD installation as determined for the project specific site conditions. It is the Contractor and HDD system operator's responsibility to determine this envelope of safe offset from existing utilities. This will include, but is not limited to, soil conditions and layering, utility proximity and material, HDD system and equipment, and foreign subsurface material.

D. Comply with all local, state and federal laws, rules and regulations at all times to prevent pollution of the air, ground and water.

E. HDD installation of pipeline shall at a minimum be in accordance with Section 555 (FDOT).

F. Bore path and alignment are as indicated in the contract documents. The path of the bore may be modified based on field and equipment conditions. Entry and exit locations and control-point elevations shall be maintained as indicated in the contract documents. Bend radii shown in the contract documents are minimum allowable radii and shall not be reduced.

3.2 EQUIPMENT

A. Diesel, electrical, or air-powered equipment will be acceptable, subject to applicable federal and state regulations.

B. Any method or equipment that the CONTRACTOR can demonstrate will produce the specified results will be considered.

C. Employ equipment that will be capable of handling the various anticipated ground conditions. In addition, the equipment shall:

1. Be capable of minimizing loss of ground ahead of and around the machine and providing satisfactory support of the excavated face at all times.

2. Provide a system to indicate whether the amount of earth material removed is equivalent to that displaced by the advance of the machine such that the advance rate may be controlled accordingly.

D. Provide adequate secondary containment for any and all portable storage tanks.

3.3 DIRECTIONAL DRILLING DATA

A. Daily drill logs shall be maintained by the Contractor and submitted with the Daily Quality Control Report. The daily log shall include the following:

1. Location and elevation of significant soil strata boundaries and brief soil descriptions.
2. Jacking pressures and torsional forces, if applicable

3. Drill lengths
4. Location of drill head
5. Drilling fluid pressure and flow rates

6. Drilling fluid losses
7. Inadvertent returns
8. Drilling times required for each pipe joint
9. Any instance of retraction and re-drilling of the pilot bore or segments thereof
10. Any other relevant observations, including any observed settlement, heave, frac-outs or surface spills
11. The downhole annular drilling fluid pressures shall be measured and recorded throughout the pilot hole drilling and provided on the Daily QA/QC Report. Further, the position of the drill head shall be continuously tracked with the records provided daily to the Engineer/City with the Daily QA/QC Report.

3.4 DRILLING CONTROL SYSTEM

A. Establish and be fully responsible for the accuracy of control for the construction of the pipeline to be installed, including structures, tunnel line and grade.

B. Establish control points sufficiently far from the tunnel operation so as not to be affected by construction operations.

C. Maintain daily records of alignment and grade and submit copies to the ENGINEER on a daily basis. However, the CONTRACTOR remains fully responsible for the accuracy of his work and the correction of it, as required.

D. Check control for the bore alignment against an above ground undisturbed reference at least once each hour and once for each 50 feet of tunnel constructed, or more often as needed or directed by the ENGINEER.

E. Pipe shall be installed with wire tracer or other Engineer/City approved drilling control system suitable for water crossings.

F. Calibration of the electronic detection and control system shall be verified prior to the start of the bore.

G. The drilling head shall be remotely steer-able by means of an electronic or magnetic detection system. The drilling head location shall be monitored in three dimensions:
   1. Offset from the baseline,
   2. Distance along the baseline, and
   3. Depth of cover.

H. Point of rotation of the head shall also be monitored.

I. The method of locating and tracking the horizontal and vertical position of the directional drill head during work shall be submitted to the Engineer/City with the required Work Plan. The Plan shall include instrumentation and methods to accurately locate the drill head during installation including calibration. The location and tracking system must provide, at a minimum, the following information: clock and pitch information, depth, transmitter temperature, battery status, position (xyz), azimuth, etc. The instrumentation and methods for locating the drill head are subject to approval by the Engineer/City.

3.5 INSTALLATION OF TRACKING/LOCATING WIRE

A. Install all facilities such that their location can be readily determined by electronic designation after installation. For non-conductive installations, attach a minimum of two (2) separate and continuous conductive tracking (tone wire) materials, either externally, internally or integral with the product. Use either a continuous green-sheathed solid conductor copper wire line (minimum #12 AWG for external placement or minimum #14 AWG for internal placement in the conduit/casing) or a coated conductive tape. Conductors must be located on opposite sides when installed externally. Connect any break in the conductor line before construction with an electrical clamp, or solder, and coat the connection with a rubber or plastic insulator to maintain the integrity of the connection from corrosion. Clamp connections must be made of brass or copper and of the butt end type with wires secured by compression. Soldered connections must be made by tight spiral winding of each wire around the other with a finished length minimum of three (3) inches overlap. Tracking conductors must extend two (2) feet beyond the bore terminal points. Test conductors for continuity. Each conductor that passes must be identified as such by removing the last six (6) inches of the sheath. No deductions are allowed for failed tracking conductors. Conductor ends must be wound into a small coil and left for future attachment to isolation valve boxes.

3.5 DISPOSAL OF EXCESS MATERIAL

A. Where such effort is necessary, cost for groundwater control during the course of the tunnel work shall be included in the unit contract price for the work.

B. Dewatering required during the course of the project to lower water table, to remove standing water, surface drainage seepage, or to protect ongoing work against rising waters or floods shall be considered incidental to the work being performed.

3.6 LAYOUT OF WORK

A. The Construction Drawings identify the HDD entry and exit points as well as the State of Florida Submerged Lands Lease.

B. The drill path shall be accurately surveyed with entry and exit areas placed in the appropriate locations within the areas indicated on drawings.

C. Instrumentation shall be provided and maintained at all times that accurately locates the pilot hole, measures drill-string axial and torsional loads and measures drilling fluid discharge rate and pressure.

D. Entry and exit areas shall be drilled so as not to exceed the bending limitations of the pipe as recommended by the pipe supplier.

3.7 DRILLING OPERATIONS

A. GENERAL

1. Bore path and alignment are as indicated in the contract documents. The path of the bore may be modified based on field and equipment conditions. Entry and exit locations and control-point elevations shall be maintained as indicated in the contract documents.

2. The fusible polyvinylchloride pipe will be installed in a manner so as not to exceed the bending radius as recommended by the pipe supplier.

3. Bend radii shown in the contract documents are minimum allowable radii and shall not be reduced.

4. Installation guidelines from the pipe supplier shall be followed for all installations.

5. Where fusible polyvinylchloride pipe is installed by pulling in tension, the recommended Safe Pulling Force, according to the pipe supplier, will not be exceeded.

3.8 LOCATION AND PROTECTION OF UNDERGROUND UTILITIES

A. Correct location of all underground utilities that may impact the HDD installation is the responsibility of the Contractor, regardless of any locations shown on the drawings or previous surveys completed.

B. Utility location and notification services shall be contacted by the Contractor prior to the start of construction.

C. All existing lines and underground utilities shall be positively identified, including exposing those facilities that are located within an envelope of possible impact of HDD installation as determined for the project specific site conditions. It is the Contractor and HDD system operator's responsibility to determine this envelope of safe offset from existing utilities. This will include, but is not limited to, soil conditions and layering, utility proximity and material, HDD system and equipment, and foreign subsurface material.

3.9 SITE LOCATION PREPARATION

1. Work site as indicated on drawings shall be graded or filled to provide a level working area. No alterations beyond what is required for operations are to be made.

2. Contractor shall confine all activities to designated work areas.

3. Areas of demolition and clearing (e.g. removal of pavement, trees, etc) shall be approved by the City/Engineer for approval.

3.10 STAGING

A 50 ft by 240 ft staging area for directional drilling is provided to the Contractor at the 3rd Ave North Beach end as shown on the Construction Drawings. Additional work space and access may be acquired by the Contractor only with approval of the City. The expense of acquiring additional work space shall be borne by the Contractor.

3.11 PILOT BORE HOLE

A. Pilot hole shall be drilled along bore paths. In the event that the pilot bore deviates from the bore path, Contractor may be required to pull-back and re-drill from the location along bore path before the deviation.

B. The Contractor shall limit curvature in any direction to reduce force on the pipe during pull-back. The minimum radius of curvature shall be no less than that specified by the pipe supplier and as indicated on the drawings.

C. A table of pilot hole bore coordinates shall be provided to the City and Engineer.

D. The Engineer/City will be given 24 hours notice prior to emergency at the seabed.

3.12 REAMING

A. After successfully completing the pilot hole, the bore hole shall be reamed to a diameter of at least 1.5 times the nominal pipe diameter. The following table is offered as an estimated guide:

Nominal Pipe Diameter	**Bore Hole Diameter**
< 8 inches	Pipe Dia. + 4 inches
8 inches to 24 inches	Pipe Dia. X 1.5
> 24 inches	Pipe Dia. + 12 inches

B. Multiple reaming passes shall be used at the discretion of the Contractor and shall conform to this specification.

C. In the event of a drilling fluid fracture, returns loss or other loss of drilling fluid, the Contractor shall be responsible for restoring any damaged property to original condition and cleaning up the area in the vicinity of the damage or loss.

3.13 PIPE PULLBACK AND INSERTION

A. Pipe shall be fused prior to insertion, if the site and conditions allow, into one continuous length. Intermediate fusing may be required due to tight work space.

B. Contractor shall handle the pipe in a manner that will not over-stress the pipe prior to insertion. Vertical and horizontal curves shall be limited so that the pipe does not bend past the pipe supplier's minimum allowable bend radius, buckle, or otherwise become damaged. Damaged portions of the pipe shall be removed and replaced.

C. The pipe shall be guided into the bore hole to avoid deformation of, or damage to, the pipe.

D. Once pull-back operations have commenced, the operation shall continue without interruption until the pipe is completely pulled through the bore hole.

E. The pipe shall be installed in a manner that does not cause upheaval, settlement, cracking, or movement and distortion of surface features. Any damages caused by the Contractor's operations shall be corrected by the Contractor.

D. The pipe entry area shall be graded as needed to provide support for the pipe and to allow free movement into the bore hole.

E. The pipe may be continuously or partially supported on rollers or other Engineer approved friction decreasing implement during joining and insertion, as long as the pipe is not over-stressed or critically abraded prior to, or during installation.

F. A swivel shall be used between the reaming head and pipe to minimize torsion stress on the pipe assembly.

G. Buoyancy modification shall be utilized by the Contractor so as to minimize the pull force of the pipe. Damage caused by buoyancy modifications shall be the responsibility of the Contractor.

3.14 DRILLING FLUID SYSTEM

A. Drilling fluid shall be composed of clean water and the appropriate additive(s) for the fluid to be used. Water shall be from a clean source and shall meet the mixing requirements of the mixture manufacturer(s). Drilling fluid composition shall meet permit and environmental regulations. The Contractor shall submit a Drilling Fluids Plan to the Engineer for approval.

B. The water and additives shall be mixed thoroughly to assure the absence of any clumps or clods. No hazardous additives may be used.

C. Drilling fluid shall be maintained at a viscosity sufficient to suspend cuttings and maintain the integrity of bore wall(s).

D. Drilling fluid shall be disposed of off-site in accordance with local, state and federal requirements and/or permit conditions.

E. No additional chemicals or polymer surfactants shall be allowed to be added to the drilling fluid unless approved in writing by the Engineer/City.

F. A drilling fluid mixing system shall be of sufficient size to mix and deliver drilling fluid for the project. The mixing system shall be able to ensure thorough mixing of the drilling fluid. The drilling fluid reservoir tank shall be sized for adequate storage of the fluid. The mixing system shall continually agitate the drilling fluid during drilling operations.

G. The drilling fluid pumping system shall have a minimum capacity to supply drilling fluid in accordance with the drilling equipment pull-back rating at a constant required pressure.

H. The delivery system shall have filters or other appropriate in-line equipment to prevent solids from being pumped into the drill pipe.

I. Used drilling fluid and drilling fluid spilled during drilling operations shall be contained and properly disposed of. The use of spill containment measures shall be maintained around drill rigs, drilling fluid mixing system, entry and exit pits and drilling fluid recycling system (if used) to prevent spills into the surrounding environment. Pumps, vacuum truck(s), and/or storage of sufficient size shall be in place to contain excess drilling fluid.

J. A closed-loop drilling fluid system and a drilling fluid cleaning system should be used to whatever extent practical, depending upon project size and conditions. Under no circumstances shall drilling fluid that has escaped containment be reused in the drilling system.

K. The Contractor shall employ his best efforts to minimize excess drilling fluid by re-circulating surface returns. This shall include, but not be limited to, provision of a solids control system sized and configured to remove spoil from drilling fluid surface returns so that fluid may be returned to the active system without hindering the drilling progress.

L. The Contractor shall employ his best efforts to maintain full annular circulation of drilling fluids. Drilling fluid returns at locations other than entry and exit points shall be minimized. In the event that annular circulation is lost, the Contractor shall take

steps to restore circulation in accordance with all permit requirements and best management practices.

M. Disposal of excess drilling fluids and spoil shall be the responsibility of the Contractor and shall be conducted in compliance with environmental regulations, right-of-way and workplace restrictions and permit requirements.

N. The CONTRACTOR is required to minimize the potential for discharge of bentonite drilling fluids/slurry into the Gulf of Mexico. This shall be accomplished through the use of either Gulf "seawater" or a biodegradble drilling mud (e.g. BioBore), for the last 50 ft of drilling prior to daylighting on the seafloor.

3.15 PIPE PULL HEADS

A. Pipe pull heads shall be utilized that employ a positive through-bolt design assuring a smooth wall against the pipe cross-section at all times.

B. Pipe pull heads shall be specifically designed for use with fusible polyvinylchloride pipe, if applicable, and shall be as recommended by the pipe supplier.

3.16 PIPE ROLLERS

A. Pipe rollers, if required, shall be of sufficient size to fully support the weight of the pipe during handling and pullback operations.

B. A sufficient quantity of rollers and spacing, per the pipe supplier's guidelines shall be used to assure adequate support and excessive sagging of the product pipe.

3.17 HDD EXIT / SEAWARD EMERGENCE

The location of pipeline emergence on the seabed shall be marked by a minimum of four (4) fixed markers to provide reference points demarking the underwater construction work area. Vertical and horizontal positioning for these reference points shall be provided by the Contractor's surveyor. Engineer shall inspect and approve the location of work area.

3.18 END CAPS

Prior to hydrostatic and leakage testing of the pipelines, the Contractor shall cap the ends of the pipeline for future connection of the pump station (landward end) and offshore structure with diffusers and anchoring system (seaward end). The Contractor shall

propose the materials and methods for the end cap installations for approval by the City and Engineer. The Contractor shall propose the temporary excess pipe length and elevations at each end until the future connections occur.

3.19 TOLERANCES

The horizontal tolerance for pipeline installed by HDD shall be ±1 foot. The upper vertical tolerance for the pipeline is as shown on the Construction Drawings and represents the maximum pipeline elevation. There is no minimum tolerance; however, payment will be made based on the linear foot of pipeline along the surface from Point A to Point B as shown and quantified on the Construction Drawings.

3.20 INSTALLATION CLEANUP

Following the installation, the project site shall be returned to a condition equal to or better than the pre-construction condition of the site. All excavations will be backfilled and compacted per the construction documents and jurisdictional standards. All pavement and hardscape shall be repaired per applicable jurisdictional standards, excess materials shall be removed from the site, and disturbed areas shall be re-landscaped. All drilling fluid shall be properly disposed of per these specifications and all applicable jurisdictional laws.

H. Contractor shall verify that all utilities, structures, and surface features in the project area are sound.

END OF SECTION

SECTION 02600

FUSIBLE POLYVINYLCHLORIDE PIPE FOR HORIZONTAL DIRECTIONAL DRILL (HDD)

REPLACE THE CITY'S STANDARD REQUIREMENTS FOR FUSIBLE POLYVINYL CHLORIDE PIPE FOR INSTALLATION BY HORIZONTAL DIRECTIONAL DRILL (HDD) WITH THE FOLLOWING:

PART 1 –GENERAL

1.1. DESCRIPTION

A. SCOPE

This section specifies fusible polyvinylchloride pipe, including standards for dimensionality, testing, quality, acceptable fusion practice, safe handling, storage and installation of the pipe by horizontal directional drilling, directional boring, or guided boring.

B. REQUIREMENTS

1. Contractor shall provide fusible polyvinylchloride pipe conforming to all standards and procedures, and meeting all testing and material properties as described in this specification for installation by horizontal directional drilling.

2. Contractor shall be responsible for all installation processes and procedures associated with the installation by horizontal directional drilling in accordance with this specification.

C. PIPE DESCRIPTION

1. Pipe Supplier shall furnish fusible polyvinylchloride pipe conforming to all standards and procedures, and meeting all testing and material properties as described in this specification.

2. Pipe shall conform to the following dimensionality and general characteristics table:

Pipe Description	Nominal Diameter (in)	DR	Color	Pressure Class (psi)	Required Inner Diameter (in)
FPVC-DR21 (DIPS)	30	21	White	200	28.77

3. The pipe sizes listed in the plans are nominal diameters. The pressure rating specified for the pipe characteristics given above shall be considered a minimum. The Contractor shall provide a higher class of pipe if required by the loads imposed by the pulling operations.

4. The Contractor shall use pipeline conforming to all standards and procedures and meet all testing and material properties for installation by Horizontal Directional Drilling (HDD).

5. No pipe shall be ordered until after the required submittals and shop drawings have been received and approved.

1.2 QUALITY ASSURANCE

A. REFERENCES

1. This section contains references to the following documents. They are a part of this section as specified and modified. Where a referenced document contains references to other standards, those other standards are included as references under this section as if referenced directly. In the event of a conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

2. Unless otherwise specified, references to documents shall mean the documents in effect at the time of construction. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued.

3. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued or replaced.

Reference	Title
AWWA C605	Standard for Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water
AWWA C905	Standard for Polyvinyl Chloride (PVC Pressure Pipe and Fabricated Fittings, 14 in. through 48 in. (350mm-1200mm), for Water Distribution
AWWA M23	AWWA Manual of Supply Practices PVC Pipe—Design and Installation, Second Edition
ASTM C923	Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals
ASTM D1784	Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
ASTM D1785	Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
	Test Method for Degree of Fusion of Extruded
ASTM D2152	Poly(Vinyl Chloride) (PVC) Pipe and Molded Fittings by Acetone Immersion
ASTM D2241	Poly (Vinyl Chloride) (PVC) Plastic Pipe (SDR-PR)
ASTM D2665	Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings
ASTM D3034	Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM F477	Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F679	Standard Specification for Poly(Vinyl Chloride) (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings
ASTM F1057	Standard Practice for Estimating the Quality of Extruded Poly (Vinyl Chloride) (PVC) Pipe by the Heat Reversion Technique
ASTM F1417	Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air
UNI-PUB-6	Recommended Practice for Low-Pressure Air Testing of Installed Sewer Pipe
UNI-PUB-8	Recommended Practice for the Direct Tapping of Polyvinyl Chloride (PVC) Pressure Water Pipe (Nominal Diameters 6-12 Inch)
NSF-14	Plastics Piping System Components and Related Materials
PPI TR-2	PVC Range Composition Listing of Qualified Ingredients

D. MANUFACTURER REQUIREMENTS

Fusible polyvinylchloride pipe shall be tested at the extrusion facility for properties required to meet all applicable parameters as outlined in either AWWA C900, AWWA C905, applicable sections of ASTM 1784, ASTM 1785, ASTM D2241, ASTM D3034, ASTM F679, ASTM F477, or ASTM F1057. Testing priority shall be in conformance with AWWA C900 and AWWA C905, except for pipe made to the ASTM D3034 or ASTM F679 standards, which shall be tested to those standards. All piping shall be made from a PVC compound conforming to cell classification 12454 per ASTM D1784.

E. FUSION TECHNICIAN REQUIREMENTS

Fusion Technician shall be fully qualified by the pipe supplier to install fusible polyvinylchloride pipe of the type(s) and size(s) being used. Qualification shall be current as of the actual date of fusion performance on the project.

F. SPECIFIED PIPE SUPPLIERS

Fusible polyvinylchloride pipe shall be used as manufactured under the trade names Fusible C-900®, Fusible C-905®, and FPVC™, for Underground Solutions, Inc., Poway, CA, (858) 679-9551. Fusion process shall be as patented by Underground Solutions, Inc., Poway, CA, Patent No. 6,982,051. Owner and engineer are aware of no other supplier or fusible polyvinylchloride pipe that is an equal to this specified pipe supplier and product.

G. WARRANTY

1. The pipe shall be warranted for one year per the pipe supplier's standard terms.

2. In addition to the standard pipe warranty, the fusion services shall be warranted for one year per the fusion service provider's standard terms.

H. PRE-CONSTRUCTION SUBMITTALS

1. The following PRODUCT DATA is required from the pipe supplier and/or fusion provider:
    a. Pipe Size
    b. Dimensionality
    c. Pressure Class per applicable standard
    d. Color
    e. Recommended Minimum Bending Radius
    f. Recommended Maximum Safe Pull Force

g. Pipe and fusion services warranty information.
h. Written procedural documentation for piping products including proper handling and storage, installation, tapping, and testing.
i. Fusion technician qualification indicating conformance with this specification.

2. The pipeline product data sheets from the manufacturer shall be submitted by the Contractor to the Engineer for approval no later than 10 days following the Notice of Award.

3. No pipe shall be ordered until after the required submittals and shop drawings have been received and approved.

I. POST-CONSTRUCTION SUBMITTALS

1. The following AS-RECORDED DATA is required from the contractor and/or fusion provider to the Owner or pipe supplier upon request:
   a. Fusion report for each fusion joint performed on the project, including joints that were rejected. Specific requirements of the Fusion Technician's joint report shall include:

      1. Pipe Size and Thickness
      2. Machine Size
      3. Fusion Technician Identification
      4. Job Identification
      5. Fusion Joint Number
      6. Fusion, Heating, and Drag Pressure Settings
      7. Heat Plate Temperature
      8. Time Stamp
      9. Heating and Cool Down Time of Fusion
      10. Ambient Temperature

2. As-recorded Information
   a. The as-recorded plan and profile will reflect the actual installed alignment, and reflect the horizontal offset from the baseline and depth of cover.
   b. All fittings, valves, or other appurtenances will also be referenced and shown.
   c. c) A daily project log, along with tracking log sheets, should they be

used, shall be provided. Tracking log sheet data, should it be employed, shall include any and all that apply, including inclination, depth, azimuth,and hydraulic pull-back and rotational force measured.

PART 2 – PRODUCTS

2.1 FUSIBLE POLYVINYLCHLORIDE PRESSURE PIPE FOR POTABLEWATER

A. NOT USED

2.2 FUSIBLE POLYVINYLCHLORIDE PRESSURE PIPE FOR NON-POTABLE WATER

A. NOT USED

2.3 FUSIBLE POLYVINYLCHLORIDE PRESSURE PIPE FORWASTEWATER

A. NOT USED.

2.4 FUSIBLE POLYVINYLCHLORIDE PRESSURE PIPE FOR STORMWATER

A. Fusible polyvinylchloride pipe shall conform to ASTM D3034 or ASTM F679.

B. Fusible polyvinylchloride pipe may instead conform to AWWA C900 or AWWA C905, and/or ASTM D2241 or ASTM D1785 for IPS standard dimensionality, if applicable. Testing shall be in accordance with AWWA standards for any of these pipe types.

C. Rework material shall be allowed per ASTM D3034, ASTM F679, AWWA C900 or AWWA C905 standards.

D. Fusible polyvinylchloride pipe shall be extruded with plain ends. The ends shall be square to the pipe and free of any bevel or chamfer. There shall be no bell or gasket of any kind incorporated into the pipe.

E. Fusible polyvinylchloride pipe shall be manufactured in a standard 40 or 45 ft nominal length.

F. Fusible polyvinylchloride pipe shall be white in color for surface or storm water use.

G. Pipe generally shall be marked per AWWA C900 or AWWA C905, and shall include as a minimum:

1. Nominal pipe size
2. PVC
3. Dimension Ratio, Standard Dimension Ratio or Schedule (omit for ASTM D3034 or ASTM F679 pipe)
4. Pipe legend or stiffness designation, or AWWA pressure class, or standard pressure rating for non-AWWA pipe
5. AWWA Standard designation number or pipe type for non-AWWA pipe (omit for ASTM D3034 or ASTM F679 pipe)
6. Extrusion production-record code
7. Trademark or trade name
8. Cell Classification 12454 and/or PVC material code 1120 may also be included.

H. Pipe shall be homogeneous throughout and be free of visible cracks, holes, foreign material, blisters, or other visible deleterious faults.

2.5 FUSION JOINTS

A. Unless otherwise specified, fusible polyvinylchloride pipe lengths shall be assembled in the field with butt-fused joints. The Contractor shall follow the pipe supplier's written guidelines for this procedure.

B. The Contractor shall provide a Fusing Plan in accordance with the manufacturer's recommendations for approval by the Engineer. This plan shall include at a minimum the fusing equipment to be used, personnel, methods, data logging and manufacturer standards. Only appropriately sized and outfitted fusion machines that have been approved by the pipe supplier shall be used for the fusion process. The Fusing Plan shall be included in the Work Plan submittal.

2.6 CONNECTIONS AND FITTINGS FOR PRESSURE APPLICATIONS

A. Connections shall be defined in conjunction with the coupling of project piping, as well as the tie-ins to other piping systems.

B. DUCTILE IRON MECHANICAL AND FLANGED FITTINGS

Acceptable fittings for use with fusible polyvinylchloride pipe shall include standard ductile iron fittings conforming to AWWA/ANSI C110/A21.10 and AWWA/ANSI C111/A21.11.

1. Connections to fusible polyvinylchloride pipe may be made using a restrained or non-restrained retainer gland product for PVC pipe, as well as for MJ or flanged fittings.

2. Bends, tees and other ductile iron fittings shall be restrained with the use of thrust blocking or other means as indicated in the construction documents.
3. Ductile iron fittings and glands must be installed per the manufacturer's guidelines.

C. PVC GASKETED, PUSH-ON FITTINGS

Acceptable fittings for use with fusible polyvinylchloride pipe shall include standard PVC pressure fittings conforming to AWWA C900 or AWWA C905.

1. Acceptable fittings for use joining fusible polyvinylchloride pipe other sections of fusible polyvinylchloride pipe or other sections of PVC pipe shall include gasketed PVC, push-on type couplings and fittings, including bends, tees, and couplings as shown in the drawings.

2. Bends, tees and other PVC fittings shall be restrained with the use of thrust blocking or other restraint products as indicated in the construction documents.

3. PVC gasketed, push-on fittings and mechanical restraints, if used, must be installed per the manufacturer's guidelines.

D. FUSIBLE POLYVINYL CHLORIDE SWEEPS OR BENDS

1. Fusible polyvinyl chloride sweeps or bends shall conform to the same sizing convention, diameter, dimensional tolerances and pressure class of the pipe that they are joining together.

2. Fusible polyvinyl chloride sweeps or bends shall be manufactured from the same fusible polyvinyl chloride pipe being used for the installation, and shall have at least 2 feet of straight section on either end of the sweep or bend to allow for fusion of the sweep to the pipe installation.

3. Standard fusible polyvinyl chloride sweep or bend angles shall not be greater than 22.5 degrees, and shall be used in nominal diameters ranging from 4 inch through 16 inch.

E. SLEEVE-TYPE COUPLINGS

1. Sleeve-type mechanical couplings shall be manufactured for use with PVC pressure pipe, and may be restrained or unrestrained as indicated in the construction documents.

2. Sleeve-type couplings shall be rated at the same or greater pressure carrying capacity as the pipe itself.

F. EXPANSION AND FLEXIBLE COUPLINGS

1. Expansion-type mechanical couplings shall be manufactured for use with PVC pipe, and may be restrained or unrestrained as indicated in the construction documents.

2. Expansion-type mechanical couplings shall be rated at the same or greater pressure carrying capacity as the pipe itself.

G. CONNECTION HARDWARE

Bolts and nuts for buried service shall be made of non-corrosive, high- strength, low-alloy steel having the characteristics specified in ANSI/AWWA C111/A21.11, regardless of any other protective coating.

2.7 CONNECTIONS FOR GRAVITY SANITARY SEWER AND NON-PRESSURE APPLICATIONS

NOT USED.

2.8 DRILLING SYSTEM EQUIPMENT A GENERAL

A. The directional drilling equipment, as a minimum, shall consist of a directional drilling rig of sufficient capacity to perform the bore(s) and pull- back of the pipe(s), a drilling fluid mixing & delivery system of sufficient capacity to successfully complete the crossing, a guidance system to accurately guide boring operations, and trained and competent personnel to operate the system. All equipment shall be in good, safe operating condition with sufficient supplies, materials and spare parts on hand to maintain the system in good working order for the duration of this project. All required equipment shall be included in the emergency and contingency plan as submitted per these specifications.

B. DRILLING RIG

1. The directional drilling machine shall consist of a hydraulically powered system to rotate, push and pull drill pipe while delivering a pressurized fluid mixture to a drill head. The machine shall be anchored to withstand the pulling, pushing and rotating forces required to complete the project.

2. The drilling rig hydraulic system shall be of sufficient pressure and volume to

power drilling operations. The hydraulic system shall be free from leaks.

3. The drilling rig shall have a system to monitor pull-back hydraulic pressure during pull-back operations.

C. DRILL HEAD

1. The horizontal directional drilling equipment shall produce a stable fluid lined tunnel with the use of a steer-able drill head and any subsequent pre-reaming heads.

2. The system must be able to control the depth and direction of the drilling operation.

3. Drill head shall contain all necessary cutters and fluid jets.

D. DRILLING FLUID SYSTEM

1. DRILLING FLUID (DRILLING MUD)

   a. Drilling fluid shall be composed of clean water and the appropriate additive(s) for the fluid to be used. Water shall be from a clean source and shall meet the mixing requirements of the mixture manufacturer(s).

   b. The water and additives shall be mixed thoroughly to assure the absence of any clumps or clods. No hazardous additives may be used.

   c. Drilling fluid shall be maintained at a viscosity sufficient to suspend cuttings and maintain the integrity of bore wall(s).

   d. Drilling fluid shall be disposed of off-site in accordance with local, state and federal requirements and/or permit conditions.

   e. No additional chemicals or polymer surfactants shall be allowed to be added to the drilling fluid unless they have been submitted per this specification.

2. MIXING SYSTEM

   a. A drilling fluid mixing system shall be of sufficient size to mix and deliver drilling fluid for the project.

   b. The mixing system shall be able to ensure thorough mixing of the drilling

fluid. The drilling fluid reservoir tank shall be sized for adequate storage of the fluid.

c. The mixing system shall continually agitate the drilling fluid during drilling operations.

3. DRILLING FLUID DELIVERY AND RECOVERY SYSTEM
   a. The drilling fluid pumping system shall have a minimum capacity to supply drilling fluid in accordance with the drilling equipment pull- back rating at a constant required pressure.

   b. The delivery system shall have filters or other appropriate in-line equipment to prevent solids from being pumped into the drill pipe.

   c. Used drilling fluid and drilling fluid spilled during drilling operations shall be contained and properly disposed of. The use of spill containment measures shall be maintained around drill rigs, drilling fluid mixing system, entry and exit pits and drilling fluid recycling system (if used) to prevent spills into the surrounding environment. Pumps, vacuum truck(s), and/or storage of sufficient size shall be in place to contain excess drilling fluid.

   d. A closed-loop drilling fluid system and a drilling fluid cleaning system should be used.

E. DRILLING CONTROL SYSTEM
   1. Calibration of the electronic detection and control system shall be verified prior to the start of the bore.

   2. The drilling head shall be remotely steer-able by means of an electronic or magnetic detection system. The drilling head location shall be monitored in three dimensions:
      a. Offset from the baseline,
      b. Distance along the baseline, and
      c. Depth of cover.

   3. Point of rotation of the head shall also be monitored.
   4. For gravity application and on-grade drilling, sonde/beacon or approved equipment applicable for grade increments of $1/10^{th}$ of one percent shall be

used.

F. PIPE PULL HEADS

1. Pipe pull heads shall be utilized that employ a positive through-bolt design assuring a smooth wall against the pipe cross-section at all times.

2. Pipe pull heads shall be specifically designed for use with fusible polyvinylchloride pipe, and shall be as recommended by the pipe supplier.

G. PIPE ROLLERS

1. Pipe rollers, if required, shall be of sufficient size to fully support the weight of the pipe during handling and pullback operations.

2. A sufficient quantity of rollers and spacing, per the pipe supplier's guidelines shall be used to assure adequate support and excessive sagging of the product pipe.

PART 3 - EXECUTION

3.1 DELIVERY AND OFF-LOADING

A. Materials shall be delivered to the Project site in a protective wrap or cover and shall not be removed until installation. The pipe shall be clearly labeled with the manufacturer's name, type, nominal size, pressure class, etc. for easy identification. Pipe materials damaged during of delivery, storage, or handling shall be repaired or replaced, as directed, at no additional cost to the City. Materials delivered to the site that do not meet the specifications outlined herein must also be replaced by the Contractor at his/her expense.

B. All pipe shall be bundled or packaged in such a manner as to provide adequate protection of the ends during transportation to the site. Any pipe damaged in shipment shall be replaced as directed by the City or Engineer.

C. Each pipe shipment should be inspected prior to unloading to see if the load has shifted or otherwise been damaged. Notify owner or engineer immediately if more than immaterial damage is found. Each pipe shipment should be checked for quantity and proper pipe size, color and type.

D. Pipe should be loaded, off-loaded, and otherwise handled in accordance with AWWA M23, and all of the pipe supplier's guidelines shall be followed.

E. Off-loading devices such as chains, wire rope, chokers, or other pipe handling implements that may scratch, nick, cut, or gouge the pipe are strictly prohibited.
F. During removal and handling, be sure that the pipe does not strike anything.

G. Significant impact could cause damage, particularly during cold weather.

H. If appropriate unloading equipment is not available, pipe may be unloaded by removing individual pieces. Care should be taken to insure that pipe is not dropped or damaged. Pipe should be carefully lowered, not dropped, from trucks.

3.2 HANDLING AND STORAGE

A. Product handling and storage shall be in accordance with manufacturer recommendations.

B. Any length of pipe showing a crack or which has received a blow that may have caused an incident fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work. Damaged areas, or possible areas of damage may be removed by cutting out and removing the suspected incident fracture area. Limits of the acceptable length of pipe shall be determined by the owner or engineer.

C. Any scratch or gouge greater than 10% of the wall thickness will be considered significant and can be rejected unless determined acceptable by the owner or engineer.

D. Pipe lengths should be stored and placed on level ground. Pipe should be stored at the job site in the unit packaging provided by the manufacturer.

E. Caution should be exercised to avoid compression, damage, or deformation to the ends of the pipe. The interior of the pipe, as well as all end surfaces, should be kept free from dirt and foreign matter.

F. Pipe shall be handled and supported with the use of woven fiber pipe slings or approved equal. Care shall be exercised when handling the pipe to not cut, gouge, scratch or otherwise abrade the piping in anyway.

G. If pipe is to be stored for periods of 1 year or longer, the pipe should be shaded or otherwise shielded from direct sunlight. Covering of the pipe which allows for temperature build-up is strictly prohibited. Pipe should be covered with an opaque

material while permitting adequate air circulation above and around the pipe as required to prevent excess heat accumulation.

H. Pipe shall be stored and stacked per the pipe supplier's guidelines.

3.3 FUSION PROCESS

A. GENERAL

1. Fusible polyvinylchloride pipe will be handled in a safe and non- destructive manner before, during, and after the fusion process and in accordance with this specification and pipe supplier's guidelines.

2. Fusible polyvinylchloride pipe will be fused by qualified fusion technicians, as documented by the pipe supplier.

3. Each fusion joint shall be recorded and logged by an electronic monitoring device (data logger) affixed to the fusion machine.

4. Only appropriately sized and outfitted fusion machines that have been approved by the pipe supplier shall be used for the fusion process. Fusion machines must incorporate the following properties, including the following elements:

   a. HEAT PLATE - Heat plates shall be in good condition with no deep gouges or scratches. Plates shall be clean and free of any debris or contamination. Heater controls shall function properly, cord and plug shall be in good condition. The appropriately sized heat plate shall be capable of maintaining a uniform and consistent heat profile and temperature for the size of pipe being fused, per the pipe supplier's guidelines.

   b. CARRIAGE – Carriage shall travel smoothly with no binding at less than 50 psi. Jaws shall be in good condition with proper inserts for the pipe size being fused. Insert pins shall be installed with no interference to carriage travel.

   c. GENERAL MACHINE - Overview of machine body shall yield no obvious defects, missing parts, or potential safety issues during fusion.

   d. DATA LOGGING DEVICE - The current version of the pipe supplier's recommended and compatible software shall be used. Datalogging device operations and maintenance manual shall be with the unit at all

times. If fusing for extended periods of time, an independent 110V power source shall be available to extend battery life.

5. Other equipment specifically required for the fusion process shall include the following:
    a. Pipe rollers shall be used for support of pipe to either side of the machine

    b. A weather protection canopy that allows full machine motion of the heat plate, fusion assembly and carriage shall be provided for fusion in inclement and /or windy weather.

    c. Fusion machine operations and maintenance manual shall be kept with the fusion machine at all times.

    d. Facing blades specifically designed for cutting fusible polyvinylchloride pipe shall be used.

I. JOINT RECORDING

Each fusion joint shall be recorded and logged by an electronic monitoring device (data logger) connected to the fusion machine. The fusion data logging and joint report shall be generated by software developed specifically for the butt-fusion of thermoplastic pipe. The software shall register and/or record the parameters required by the pipe supplier and these specifications. Data not logged by the data logger shall be logged manually and be included in the Fusion Technician's joint report.

5.6 PREPARATION PRIOR TO MAKING CONNECTIONS INTO EXISTING PIPING SYSTEMS

A. Approximate locations for existing piping systems are shown in the construction documents. Prior to making connections into existing piping systems, the Contractor shall:
    1. Field verify location, size, piping material and piping system of the existing pipe.

    2. Obtain all required fittings, which may include saddles, sleeve type couplings, flanges, tees, or others as shown in the construction documents.
    3. Have installed all temporary pumps and/or pipes in accordance with established connection plans.

B. Unless otherwise approved, new piping systems shall be completely assembled and successfully tested prior to making connections into existing pipe systems.

3.8 PIPE SYSTEM CONNECTIONS

Pipe connections shall be installed per applicable standards and regulations, as well as per the connection manufacturer's guidelines and as indicated in the construction documents. Pipe connections to structures shall be installed per applicable standards and regulations, as well as per the connection manufacturer's guidelines.

3.9 TAPPING FOR POTABLE AND NON-POTABLE WATER APPLICATIONS

NOT USED.

3.10 TESTING

A. Testing shall comply with all applicable jurisdictional building codes, statutes, standards, regulations and laws.

B. HYDROSTATIC TESTING AND LEAKAGE TESTING FOR PRESSURE PIPING

1. Hydrostatic and leakage testing for piping systems that contain mechanical jointing as well as fused PVC jointing shall comply with AWWA C605.

2. Unless agreed to or otherwise designated by the City or Engineer, for a simultaneous hydrostatic and leakage test following installation, a pressure equal to 150% of working pressure at point of test, but not less than 125% of normal working pressure at highest elevation shall be applied. The duration of the pressure test shall be for two (2) hours.

3. If hydrostatic testing and leakage testing are performed at separate times, follow procedures as outlined in AWWA C605.

4. In preparation for pressure testing the following parameters must be followed:
    a. All air must be vented from the pipeline prior to pressurization. This may be accomplished with the use of the air relief valves or corporation stop valves, vent piping in the testing hardware or end caps, or any other method which adequately allows air to escape the pipeline at all high points. Venting may also be accomplished by 'flushing' the pipeline in accordance with the parameters and procedures as described in AWWA C605.

    b. The pipeline must be fully restrained prior to pressurization. This

includes complete installation of all mechanical restraints per the restraint manufacturer's guidelines, whether permanent or temporary to the final installation. This also includes the installation and curing of any and all required thrust blocking. All appurtenances included in the pressure test, including valves, blow-offs, and air-relief valves shall be checked for proper installation and restraint prior to the beginning of the test.

c. Temporary pipeline alignments that are being tested, such as those that are partially installed in their permanent location shall be configured to minimize the amount of potentially trapped air in the pipeline.

C. LEAKAGE TESTING FOR NON-PRESSURE PIPING

NOT USED.

D. DEFLECTION TESTING FOR NON-PRESSURE PIPING

NOT USED.

E. DISINFECTION OF THE PIPELINE FOR POTABLE WATER PIPING

NOT USED.

F. PARTIAL TESTING

1. Segments of the pipe may be tested separately in accordance with standard testing procedure, as approved by the City and Engineer.

END OF SECTION