SECTION 4 - GENERAL SPECIFICATIONS

4.01 APPLICABLE CODES:

A. GENERAL:

All construction and materials shall conform to the Standards and Specifications of the City of Lauderhill, ~~Broward County Department of Natural Resource Protection (BCDNRP)~~ ~~Broward County~~ Broward County Environmental Engineering and Permitting (BCEPD) ~~Envir~~, Broward County Health Department (BCHD), Broward County Traffic Engineering Division (BCTED), South Florida Water Management District (SFWMD), and all other local and national codes where applicable.

B. CONSTRUCTION SAFETY:

All construction shall be performed in a safe manner, specifically, the rules and regulations of the Occupational Safety and Health Administration (OSHA) and the Manual of Uniform Traffic Control Devices (MUTCD) shall be strictly observed.

C. SURVEY DATA:

Elevations on the plans or referenced in the specifications are based on North American Vertical Datum of 1988 (NAVD 88)~~National Geodetic Vertical Datum of 1929 (NGVD).~~.

4.02. PRECONSTRUCTION RESPONSIBILITIES:

A. Upon receipt of Notice of Award, the Contractor shall arrange a Preconstruction Conference to include the City of Lauderhill Utilities Division, the Owner, the City Engineer, the Engineer of Record and after obtaining an engineering construction permit from the Engineering Division.

B. The Contractor shall obtain a "SUNSHINE One Call" Certification number at least 48 hours prior to beginning any excavation.

C. Prior to beginning construction, the Contractor shall verify the size, location, elevation, and material of all existing utilities within the area of construction.

D. The Contractor shall be responsible for damage to any existing utilities for which he/she fails to request locations from the City of Lauderhill Utilities Division. The Contractor is responsible as well for damage to any existing utilities which are properly located.

E. If upon excavation, an existing utility is found to be in conflict with the proposed construction or to be of a size or material different from that shown on the plans, the Contractor shall immediately notify the Engineer of Record, who will in turn notify the City of Lauderhill Utilities and Engineering Divisions.

4.03. INSPECTIONS:

The Contractor shall notify the City of Lauderhill ~~Utilities and~~ Engineering Divisions and the Engineer of Record at least ~~24~~ 48 hours prior to beginning construction and prior to the inspection of the storm drainage, paving, sanitary sewer and water system.

4.04. SHOP DRAWINGS:

A. Prior to issuance of an engineering construction permit, shop drawings shall be submitted to and reviewed by the Engineer of Record and the City of Lauderhill Utilities and Engineering Divisions for sanitary manholes, fire hydrants, valves, piping, lift stations and other accessories. Catalogue literature shall be submitted for water and sewer pipes, fittings and appurtenances.

B. Individual shop drawings for all precast structures are required. Catalogue literature will not be accepted for precast structures.

4.05. TEMPORARY FACILITIES:

A. TEMPORARY UTILITIES:

1. It shall be the Contractor's responsibility to arrange for or supply temporary water service, sanitary facilities and electricity to his employees and subcontractors for their use during construction.

2. Obtain construction meter with double CV assembly for all water used on job. All water used for cleaning, testing, etc. will be paid for by the Contractor. If water cannot be metered then it will be calculated.

B. TRAFFIC REGULATION:

1. Maintenance of traffic in the public right-of-way shall be in accordance with the MUTCD and BCTED.

2. All open trenches and holes adjacent to roadways or walkways shall be properly marked and barricaded to assure the safety of both vehicular and pedestrian traffic.

3. No trenches or holes near walkways or in roadways or their shoulders are to be left open during nighttime hours ~~without express permission from the Director of Environmental and Engineering Services of the City of Lauderhill~~.

4.06. PROJECT CLOSEOUT:

A. CLEANING UP:

1. During construction, the project site and all adjacent areas shall be maintained in a neat and clean manner. Upon final clean up, the project site shall be left clear of all surplus material or trash. The paved areas shall be swept broom clean.

2. The Contractor shall restore or replace, when and as directed by the Engineer or the City of Lauderhill, any public or private property damaged by the work, equipment, employees or subcontractors to a condition at least equal to that existing immediately prior to the beginning of operations. To this end, the Contractor shall do as required, all necessary highway or driveway, sidewalk and landscaping work. Suitable materials and methods shall be used for such restoration.

3. Where material or debris has washed or flowed into or been placed in water courses, gravity sewer, ditches, drains, catch basins, or elsewhere as a result of the Contractor's operations, such material or debris shall be removed and satisfactorily disposed of during progress of the work, and the area kept in a clean and neat condition.

4. When working in and around existing drainage canals, appropriate silt barriers shall be installed as required by the BCDNRP.

B. PROJECT RECORD DOCUMENTS:

1. The Contractor shall maintain accurate and complete records of work items completed.

2. All "as-built" information submitted to the Engineer of Record and the City Engineer shall be sufficiently accurate, clear and legible to satisfy the Engineer that the information provides a true representation of the improvements constructed.

3. Upon completion of construction, the Contractor shall submit to the Engineer of Record one complete set of "as-built" construction drawings. These drawings shall be marked to show "as-built" construction changes and dimensioned locations and elevations of all improvements and shall be signed by the Contractor.

4. All "as-built" information on elevations of sanitary sewage, paving and drainage shall be certified by a registered land surveyor.

5. As-built information on the water system shall include, but not limited to, locations of all valves, fittings, fire hydrants and water services and top-of-pipe elevation on 100-foot intervals at a minimum.

6. Prior to a final inspection by the City of Lauderhill, the Engineer shall submit two (2) sets of blueprints of "As-Built" construction drawings.

7. Upon a final inspection by the City of Lauderhill, the Engineer shall submit to the City one (1) complete set of reproducible mylars, five (5) sets of blue prints of "as-built" construction drawings, two of which are to be forwarded to the Community Development Department, that have been certified by a registered land surveyor and the Engineer of Record and computer files of "as-built" construction drawings on 3 1/2" floppy disks in AutoCADD release 13 format or latest revision.

4.07. EARTHWORK AND COMPACTION

A. All organic and other unsuitable material shall be removed and properly disposed under those areas to be paved and for the full width of the right-of-way.

B. Suitable backfill shall be used and compacted as directed by the Engineer of Record.

4.08 PAVING

A. GENERAL

1. All underground utilities shall be completed prior to construction of limerock base.

2. All existing pavement, cut or damaged by construction, shall be properly restored at the Contractor's expense.

3. Where any proposed pavement is to be connected to existing pavement, the existing edge of pavement shall be saw cut.

B. MATERIALS

1. Base course shall be crushed limerock ~~Miami Oolite~~ with a minimum of 60% carbonates of calcium and magnesium and a minimum Limerock Bearing Ratio (LBR) of 100.

2. Asphalt surfaces shall be ~~S-1~~SP-12.5 modified asphaltic concrete unless otherwise specified on the plans.

3. Reinforced concrete slabs shall be constructed of class 1 concrete with a minimum strength of 3,000 psi and shall be reinforced with a 6 x 6 No. 6 gauge wire mesh for all driveways within the right-of-way.

4. All driveways will be restored from edge of road to edge of sidewalk and graded to prevent standing water.

5. All grass swales shall be regraded to allow stormwater to drain from impervious surface to and stored in center of swale.

6. All sod will be restored from edge of road to edge of sidewalk.

C. INSTALLATION

1. Subgrade for roadway shall be compacted to a minimum of 98% of the maximum density (AASHTO T-180-74).

2. Base course material for paved areas shall be a minimum thickness of 8" placed on a single layer for streets (6 inches for driveways, and designated parking areas).

3. Base course shall be compacted to 98% of the maximum density as per AASHTO T-180-74.

4. Installation of the wearing surface shall conform with the requirements of the D.O.T. standard specifications for ~~type 1~~ asphaltic concrete or the latest revision for the approved Broward County mix.

D. TESTING

1. The finished surface of the base course and that of the wearing surface shall not vary more than ¼" from the template. Any irregularities exceeding this limit shall be corrected.

2. Density tests shall be taken by an independent testing laboratory, certified by the State of Florida where directed by the Engineer of Record or City Engineer.

3. All testing costs (paving) shall be paid for by the Owner except those tests failing to meet the specified requirements which are to be paid by the Contractor.

4. LBR test results and Maximum Dry density test results shall be approved by the Engineer of Records prior to installation of the base and subbase material.

4.09 WATER DISTRIBUTION AND/OR SEWAGE FORCE MAIN SYSTEM:

A. GENERAL

1. The Contractor shall notify the City of Lauderhill Utilities and Engineering Divisions and the Engineer of Record no later than

24 hours prior to making connections to existing systems. A City of Lauderhill Utility Division representative and the Engineer of record must be present.

2. No connections to the existing lines shall be made until pressure tests, for the water mains and sewer force mains, and bacteriological tests have been performed and the system is acceptable to the City of Lauderhill and the Broward County Public Health Unit.

3. Cleaning of newly installed piping systems shall be accomplished using pipe pigging methods. Open flushing shall not be allowed without prior approval of the Utilities Division. All water will be accounted for.

4. All efforts shall be made so that water and force mains cross above drainage lines with adequate cover and separation. If this is not possible, it shall be indicated on the plans.

5. A minimum of three (3) foot lateral separation (5 feet preferred) shall be maintained between water/sewer lines and below grade obstructions (ie., catch basins, electrical conduits~~concrete poles~~, storm sewers etc.). A minimum of seven feet 6 inches (7.5') lateral separation shall be maintained between water/sewer lines and above grade obstructions (ie., light poles, concrete poles, street signs, etc.). ~~five (5) feet from trees~~. A minimum vertical clearance of 13 feet 6 inches (13.5') between final grade and any overhead obstruction must be maintained. A minimum one (1) foot vertical clearance shall be maintained between water/sewer lines and all below grade obstructions.

6. No trees will be allowed with 5' of water/sewer lines in public R/W. No trees will be allowed in Broward County Water and Wastewater easements located within private property.

~~7~~6. Metallic indicator tape shall be place over all other utilities where crossing City of Lauderhill potable water and sanitary sewer infrastructure.

B. MATERIALS:

1. Pipe:

The water main and/or sewage force main shall be either polyvinyl chloride (PVC) or Ductile Iron Pipe (D.I.P.) and shall be designed for a minimum working pressure of 150 psi. –PVC pipe is only permitted within swale areas.

a. PVC pipe shall be ASTM 1120 pressure pipe with iron O.D., Class 150 (DR 18), conforming to ANSI/AWWA C900-89 or C905-88 or latest revision and shall have push on rubber gasket joints.

b. D.I.P. shall be Class 350 wall thickness (up to 12"), Class 300 (14"-18"), Class 250 (20" or greater) with interior cement lining conforming to ANSI/AWWA C151/A21.51-91, or latest revision. Sewage pipe shall be either double cement conforming to ANSI/AWWA C104/A21.4-90 or latest revision, or polyethylene lined conforming to ANSI/AWWA C105/A21.5-88 or latest revision, or approved equal. The pipe shall withstand a working pressure of 350 psi. The joints shall be bell and spigot push on type, mechanical joint or flanged. Flanged pipe shall conform with the physical and chemical requirements as set forth in the Handbook of Ductile Iron Pipe of the Cast Iron Pipe Research Association.

2. Fittings:

Fittings shall be ductile iron compact mechanical joint type and shall be class 350 through 24" conforming to ANSI/AWWA C153/A21.53-94, or latest revision, and class 250 in sizes 24" and larger, conforming to ANSI/AWWA C110/A21.10-93, or latest revision, complete with glands, gaskets, bolts and nuts.

All fittings shall be cement lined and seal coated with the same as pipe.

3. Valves:

a. Valves shall be gate valves for water (4"-12" in size), butterfly valves for water (16" and up in size), or plug or gate valves for sewer (all sizes) as approved by utility. A 6" thick concrete collar with a 12" radius shall be placed around all valves. Concrete collar shall support a minimum design strength of 3,000 psi.

1) Gate valves shall be iron body, fully resilient seat, bronze mounted non-rising stem, double disc, rated at 200 psi and conforming to ANSI/AWWA C509-94 or latest revision. Exposed valves shall be outside screw and yoke type. Gate valves shall be American Flow Control AFC-2500 or approved equal.

2) Butterfly valves and operators shall conform to ANSI/AWWA C504-94 or latest revision standard for rubber-seated butterfly valves. Valves shall be class 150 A or B and shall be Mueller, Pratt or approved equal.

3) Plug valves shall be semi-steel body, non-lubricated, eccentric type, with resilient faced plugs, and capable of drip-tight shut off at the rated pressure if applied at either port. Valves are to be equipped with actuating nuts, cast iron handwheels or chain operators, with galvanized steel chains, as appropriate for the installation and type of operator. Valves shall be DeZurik Corp. Series 100, Clow Ful-Flow Model F5413 or approved equal.

4) Insertion valves can be considered by the utility for valves sizes up to 12". The ductile iron body, bonnet and wedge provide strength and a pressure rating that meets or exceeds the

requirements of AWWA C515. Insert Valve shall be ductile iron construtcoin meeting ASTM A536 Grade 65-45-12 and shall meet AWWA material specification of C509-09 for resilient seal valves suitable for potable water. 250 psi maximum working pressure shall be cast into the body of the insert valve.

b. Air Release Valves

1) Sewer Force Main Air Release Valves - System shall be a combination of one sewage air release valve and one sewage air/vacuum valve with dual isolation plug valves. Both valve bodies and covers shall be of cast iron construction, ASTM A126-B. All internal parts shall be of stainless steel, ASTM A240 - Type 304 and ASTM A276 - Type 303. The venting orifice shall be 5/16" in diameter with stainless steel seat. The inlet openings shall be a minimum of 2" NPT screwed connection for both valves. The valves shall be fully capable of operation in sewage force main. Both valves shall include a back-flushing feature for periodic cleaning of the internal mechanism. The overall height shall not exceed 22 1/2 inches. Valves shall be manufactured by Val-Matic Corporation, model numbers 48S/301S BW, or approved equal.

2) Water Main Air Release Valves - Valve body and cover shall be of cast iron construction, ASTM A126-B. All internal parts shall be of stainless steel, ASTM A240 - Type 304 for the float and ASTM A296 - Type 316 for the linkage. The venting orifice shall be 3/16" in diameter with brass seat. The inlet opening shall be a 2" NPT screwed connection. The overall height shall not exceed 13 inches. Valves shall be manufactured

by Valve and Primer Corporation, model number APCO 200A, or approved equal.

c. A reflective pavement marker shall be installed in the center of the nearest lane of road pavement adjacent to all valve locations outside the road pavement. Water markers shall be white, sewer markers shall be green.

4. Fire Hydrants:

a. Fire hydrants shall have a minimum 5 1/4" valve opening and shall open against the pressure and closing with the flow. Hydrants shall be Mueller Centurion, model number A-423 or equal. Hydrants shall meet or exceed ANSI/AWWA C502-85, C503-88 or latest revision, and shall comply with Factory Mutual Research Corporation and Underwriters Laboratories UL246 Standard.

b. A blue reflective pavement marker shall be provided in the center of the nearest lanes of road pavement adjacent to all fire hydrant locations.

c. Hydrants shall be painted with a reflective type yellow paint (OSHA Yellow or approved equal). Fire Hydrant tops and caps shall be painted per NFPA 291 to indicate the available GPM.

d. 6" ~~4"~~ bollards shall be placed around fire hydrants. The bollards shall be painted OSHA yellow.

e. A blue reflective pavement marking shall be placed in the center of the outermost adjacent line.

5. Detector Tape:

a. Detector tape shall be 3" wide blue tape for water main and brown tape for force main with a metallized foil core laminated between 2 layers of plastic film. The words "CAUTION WATER LINE BURIED BELOW" or "CAUTION FORCE MAIN BURIED BELOW" shall be printed at 30" intervals along the tape. Tape shall be placed 18" below grade above all PVC mains and services or as

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recommended by manufacturer. Non-metallic tape shall be used above ductile iron pipe.

b. Metallic indicator tape shall be place over all other utilities where crossing City of Lauderhill potable water and sanitary sewer infrastructure.

6. Service Connections:
   a. Service saddles shall be Ductile Iron epoxy or nylon coated with double STAINLESS steel straps or single wide strap. Saddles shall conform to ANSI/AWWA C111/21.11-90 and ASTM A 588 or latest revision.
   b. Service lines shall be polyethylene (PE) tubing as described in ANSI/AWWA C901-96, or latest revision with a working pressure of 200 psi (DR 9). Pipe joints shall be of the compression type totally confined grip seal and coupling nut. Polyethylene shall be extruded from PE 3408 high molecular weight materials and must conform to ASTM D2737.
   c. Corporation stops shall be manufactured of brass alloy in accordance with ASTM B62 with threaded ends and shall be Mueller, Ford or approved equal.
   d. Meter stops shall be the 90 degree lockwing type and shall be of bronze construction in accordance with ASTM B62. Meter stops shall be closed button design and resilient "O" ring sealed against external leakage at the top. Stops shall be equipped with a meter coupling nut on the outlet sides, as manufactured by Mueller, Ford or approved equal.
   e. All meters and meter boxes are supplied and installed by the City of Lauderhill at the owner's expense.

7. Tapping Sleeves:
   Tapping sleeves shall be cast iron, mechanical joint, Clow Model F5207, or approved equal.

8. Valve Boxes:
   a. Valve boxes for water mains and sewer force mains shall be U.S. Foundry Model 7630 ~~7500~~, marked "Water" or "Sewer", or approved equal.
   b. Valve boxes for blow-off assembly shall be U.S. Foundry Model 7630 (No. 3) or approved equal.

9. Retainer Glands:
   Retainer glands shall conform to ANSI/AWWA C111/A21.11-90 or latest revision. All glands shall be manufactured from ductile iron as listed by Underwriters Laboratories for 250 psi minimum water pressure rating. Clow Corporation, Tyler, EBAA Iron, or approved equal.

10. Double check valve backflow prevention assembly:
    The assembly shall conform to ANSI/AWWA C510-92 or latest revision and be capable of withstanding a working pressure of at least 150 psi without damage to working parts or impairment of function. It shall consist of two internally loaded, independently operating check valves, located between two tightly closing resilient-seated shut off valves, with four properly placed resilient-seated test cocks.

C. INSTALLATION:

1. General:
   Connection of all new systems to existing mains shall be done using one of the three following methods:
   a. Method A per Broward County Health Department Standards, which involves a reduced size temporary connection between the existing main and the new main.
   b. Method B per Broward County Health Department Standards, which involves a direct connection between

the new and existing mains using two gate valves separated by a sleeve with a vent pipe.

c. Method C approved by the Broward County Health Department, which involves a tap with one gate valve requiring disinfection of the new system prior to conducting the pressure test.

2. Bedding:

Bedding and initial backfill (12 inches above pipe) for all pipe shall be sand with no rock larger than 1" in diameter. Pearock or 3/4" washed rock will be used in water or where unsuitable bedding exists at the discretion of the City of Lauderhill. All other fill shall not have rock larger than 6" in diameter. Refer to typically bedding details for PVC and DIP minimum bedding requirements.

3. PVC Pipe:

a. PVC pipe, where approved by the City Engineer, shall be installed in accordance with the Uni-Bell Plastic Pipe Association's Guide for Installation of PVC Pressure Pipe for Municipal Water Distribution Systems.

b. PVC pipe shall be installed with a minimum of 36" cover.

c. Detector tape shall be installed the full length of all PVC mains approximately 18" below grade, color side up.

4. Ductile Iron Pipe:

a. D.I.P. shall be installed in accordance with ANSI/AWWA C600 or latest revision.

b. D.I.P. shall be installed with a minimum of ~~30~~36" cover.

c. Identification tape shall be installed the full length of all D.I.P. mains approximately 18" above the main, color side up.

5. Valves:

a. All valves shall be installed with adjustable cast iron valve boxes with the word "WATER" or "SEWER" cast in the cover.

b. Main valves shall be located on an extension of the right-of-way line unless dimensioned otherwise.

c. Main valves shall be installed away from parking areas. If this is unavoidable, proper measures shall be taken to avoid the parking of vehicles over the valves. Hydrant valves shall be installed as close to the main as possible. Valves located in non-paved areas or in parking stalls require a reflective pavement marker on the center of the nearest lane of road pavement. ~~White~~ Blue reflectors for water main valves, green reflectors for force main valves.

d. The distance from the top of the valve actuator nut to final grade shall be a minimum of 12 inches and a maximum of 18 inches.

e. All valves placed within a landscaped area shall have a 6" thick concrete collar around the valve box. The collar shall extend a minimum 6" outside of the valve box and shall be a minimum 3" above the surrounding grade.

6. Service:

a. Cover over service lines shall be 18" minimum, 24" maximum below finished grade and 24" under pavement.

b. Polyethylene shall be bedded in backfill of sand with no rock greater than 1" in diameter.

c. Meter stops shall have 8" to 10" cover or as required for proper meter/box installation.

d. Water services under pavement shall be encased in a Schedule 80 PVC sleeve for the full length of the pavement and for 2' beyond the edge.

e. The end of each service connection shall be marked with a 2"x4" treated stake, painted blue, extending 18" (minimum) above grade unless indicated otherwise.

D. TESTING:

1. The physical connection of the new system to the existing system shall be done in accordance with Section C.1. above which will dictate the order of the pressure testing and disinfection.

2. The complete water system shall be pressure tested and disinfected. The pressure test shall be for two hours at 150 psi minimum test pressure in accordance with ANSI/AWWA C600 or latest revision. The pressure test shall not vary more than ±5 psi during the test. Leakage allowances will not be made for fittings or valves.

3. Allowable leakage shall not exceed the formula of:

$$L \text{ (gallons per hour)} = \frac{SD(P)^{0.5}}{\text{~~133,200~~}148{,}000}$$

L = allowable leakage in gals/hr (no allowable leakage for valves)
S = length of pipe tested in feet
D = nominal diameter of pipe in inches
P = average test pressure during test in lbs/sq. in.

4. The pressure test shall be witnessed by a representative of the City of Lauderhill Utilities Division and the Engineer of Record.

5. Sampling points shall be provided at the locations shown on the plans or as directed by the Broward County Health Department. If not specified, sampling points shall be provided at intervals of 1500' maximum for lines greater than 1500' in

length. Provide a minimum of two sampling points for all other test segments.

6. Before acceptance for operation, the water system shall be disinfected in accordance with ANSI/AWWA C651-92 or latest revision with approved bacteriological samples and proper documentation by the County Health Department. Collection of samples is the Contractor's responsibility and will be witnessed by a City of Lauderhill representative.

7. All fire flow test shall be conducted on all proposed fire hydrants or as directed by the City Engineer in accordance with NFPA requirements. Results of the fire flow test shall be included with the final certification package to the City of Lauderhill.

4.10. GRAVITY SEWAGE COLLECTION SYSTEM:

A. MATERIALS:

1. Sewer Pipe and Fittings:
   a. PVC sewer pipe and fittings shall be non-pressure polyvinyl chloride pipe conforming to ASTM D3034, SDR 35, with push-on rubber gasket joints unless otherwise noted.
   b. Ductile Iron Pipe (D.I.P.) shall be double cement lined, conforming to ANSI/AWWA C104/A21.4-90 or latest revision, minimum pressure Class 350 (unless otherwise specified).
   c. All fittings and accessories shall be as manufactured or supplied by the pipe manufacturer.

2. Manholes:
   a. Manholes shall be precast per ASTM C478 Type 2 with 4000 psi concrete and grade 60 steel. Monolithically poured bases only.

b. Manhole openings are to be sealed with anti-hydro cement or approved equal. No molding plaster will be allowed.

c. Manhole joints shall be sealed with "Ramnek" gaskets or approved equal and with anti-hydro cement on the inside and outside.

d. The rim elevation of all sanitary manholes located in a landscaped area shall be 8" above the surrounding grade elevation.

B. INSTALLATION

1. Pipe and Fittings:

a. Sewer pipe shall be installed in accordance with ASTM D2321.

b. D.I.P. shall be installed in accordance with ANSI/AWWA C600 or latest revision.

c. Bedding and initial backfill (12 inches) over sewer mains and services shall be sand with no rock larger than 1" in diameter. Pearock or 3/4" washed rock will be used in water or where unsuitable bedding exists at the discretion of the City of Lauderhill. All other fill shall not have rock larger than 6" in diameter.

d. Pipe connection into manhole wall shall be ductile iron pipe grouted in-place or cast-in neoprene rubber boot, or equal as approved by the City of Lauderhill.

e. No sewer shall be in the back yard of a residential lot.

f. Gravity lines between manholes shall be 8-inch minimum diameter.

2. Manholes:

a. Manholes shall be set plumb to line and grade on firm clean subgrade providing uniform bearing under the base.

b. All openings and joints shall be sealed water-tight.

c. The entire inside of the manholes shall be painted with two coats (8 mils each, dry) of Bitumastic coating or approved equal; first coat red, second coat black. The outside of each manhole requires only one coat (8 mils, dry) of the same type of coating.

d. Manholes shall be installed away from parking areas on the centerline of the roadway. If this is unavoidable, proper measures shall be taken to prohibit the parking of vehicles over manholes.

e. Orange reflective pavement markers shall be provided on the center of the nearest lane of road pavement adjacent to all manhole locations outside the road pavement.

f. All lids shall be provided with a polyethylene watertight manhole insert, as manufactured by Southwestern packing & Seals, "Rainstopper" model, or approved equal to reduce stormwater inflow.

g. Manholes shall be set at a maximum spacing of 400 feet.

h. All manholes shall be accessible to a vac truck via an asphaltic road and be encompassed by that asphalt road.

i. Certain uses may require a private sanitary manhole immediately upstream of the public gravity sanitary sewer system equipped with a trash basket/strainer. The trash basket shall be maintained by the owner. The City Engineer shall determine which uses may require an upstream trash basket prior to discharge to the into the public gravity sewer system.

3. Service:

a. Minimum slope of all service lines shall be as indicated in the ~~South~~ Florida Building Code ~~– Broward County Edition~~.

b. Service laterals shall terminate at a depth 30" below finished grade.

c. Each service connection shall be plugged water-tight with an approved plug.

d. The end of each service connection shall be marked with a 2"x4" treated stake painted red, extending 18" (min.) above grade.

e. Contractor shall rough in riser to 1 foot above finished grade and plug. At project completion, cut back to finished grade.

f. Connection of services to building's plumbing shall be coordinated with the City's Building and Zoning Division, Plumbing Section.

g. When a proposed sanitary lateral connection is made to an existing vitrified clay pipe (VCP) by a proposed development, the entire VCP pipe run (from manhole to manhole) shall be televised to confirm existing conditions of the VCP pipe prior to any excavation for the proposed connection. The inspection report shall be provided the Utilities Department prior to making the proposed connection. If it is determined the existing pipe condition is unsatisfactory the existing pipe segments shall be replaced as directed by the City of Lauderhill. The VCP pipe shall be televised after the connection is made and properly backfilled to ensure no pipe segments were damaged during the back fill operations. The inspection report shall be provided to the Utilities Department prior to final restoration for approval.

C. TESTING:

1. After construction of the sewer system, the entire system shall be lamped. Sewer lamping shall be witnessed by the Engineer of Record and a representative from the City of Lauderhill.

2. After construction of the sewer system, the City of Lauderhill or the Engineer of Record may require a visual infiltration and/or

exfiltration test to be performed on the entire system or any part thereof.

~~3. An air test may be substituted for the water exfiltration test, upon approval of the City of Lauderhill.~~

~~4~~3. Manhole exfiltration leakage shall not exceed 4 gallons per day per unit.

~~5~~4. Sewer pipe exfiltration leakage shall not exceed 10 gallons per day per inch diameter per mile in a two hour test period for any section tested. A minium of 2 feet of positive head shall be maintained on the system during the duration of the test.

~~6~~5. Visible manhole and sewer pipe infiltration leakage shall not be permitted.

~~7~~6. Sanitary sewer shall be televised, at Developer's expense, prior to final approval of construction. Video tape and report shall be examined by the City of Lauderhill Utility Division. Owner/Contractor shall be responsible for correcting any deficiencies prior to the City's certification of completion to any agency.

4.11. WASTEWATER PUMPING STATION

A. GENERAL

1. Scope of Work

Furnish all labor, materials, equipment and incidentals required and install, place in operation, and field test a wet well ~~mounted~~ submersible wastewater pumping station. The station shall be complete with pumps, motors, piping, valves, electrical work (including motor controls), structures, connection and appurtenances, tested and ready for service. Refer to drawings for other site features.

2. Description of System

a. The Contractor shall furnish and install one factory built, ~~automatic~~ submersible explosion proof pumping station as manufactured by Flygt (Xylem Inc.) ~~Smith & Loveless, Inc., Lenexa, Kansas~~. The station shall be complete with all needed equipment, factory-installed on a welded steel base with fiberglass cover.

b. The principal items of equipment shall include two vertical, ~~close coupled,~~ motor driven, ~~vacuum primed~~submersible, non-clog sewage pumps; valves; internal piping; central control panel with circuit breakers; motor starters and automatic pumping level controls; ~~heater,~~ ventilating blower; ~~priming pumps and appurtenances;~~ and all internal wiring.

c. Refer to plans for a complete list of operating conditions.

d. The pumping station shall pump raw, unscreened, domestic wastewater into a force main which is pumped to a local manhole, or transmission system.

e. The pumping station shall be include back up power connection during the event of a power outage.

f. Preferred voltage for any size motor is 480V, 3 phase.

g. The pumping station shall have a visual and audable alarm at the pump station when the high water float is triggered.

h. The pumping station shall be equipped with a fully function SCADA communications system.

i. The pumping station shall be equipped with an odor control device attached to the wet well venting pipe. The odor control device shall consist of a carbon filter or approved equal odor control device.

3. Qualifications

To assure unity of responsibility, the motors and control system shall be furnished and coordinated by the local pump manufacturers representative. The Contractor and pump manufacturer shall assume responsibility for the satisfactory

installation and operation of the entire pumping system including pumps, motors, and controls as specified.

4. Submittals

a. Copies of all materials required to establish compliance with the specifications shall be submitted in accordance with the provisions of the general conditions. Submittals shall include at least the following:

1) Shop erection drawings showing all important details of construction, dimensions and anchor bolt locations.

2) Descriptive literature, bulletins and catalogs of the equipment.

3) Data on the characteristics and performance of each pump, data shall include a certified performance test, based on actual shop tests of the sale units, which show that they meet the specified requirements for head, capacity, efficiency, and horsepower. Curves shall be submitted on 8 1/2 inch by 11 inch sheets at as large a scale as practical. Curves shall be plotted from no flow at shut off head to pump capacity at minimum specified total dynamic head. Catalog sheets showing a family of curves will not be acceptable.

4) Complete master wiring diagrams, elementary or control schematics, including coordination with other electrical control devices operating in conjunction with the pump control system and suitable outline drawings shall be furnished for approval before proceeding with manufacturer, standard pre-printed sheets or drawings simply marked to indicate applicability to this contract will not be acceptable.

5) A drawing showing the layout of the pump control panel shall be furnished, the layout shall indicate

every device mounted on the door with complete identification.

6) The total weight of the equipment including the weight of the single largest item.

7) A complete total bill of materials of all equipment.

8) A list of the manufacturer's recommended spare parts to be supplied in addition to those specified in paragraph 6.a. with the manufacturer's current price for each item. Include gaskets, seals, etc. on the list. List bearing by the bearing manufacturer's numbers only.

9) All submittal dates required by the general conditions.

10) Complete motor data.

b. In the event that it is impossible to conform with certain details of the specifications due to different manufacturing techniques, describe completely all non-conforming aspects.

c. Upon receipt of approval of submitted material, provide five prints.

5. Operating Instructions

a. At least three (3) copies of operating and maintenance manuals shall be furnished which will include parts lists of components and complete service procedures and trouble shooting guide. The manuals shall be prepared specifically for the installation and shall include all required cuts, drawings, equipment lists, description, etc. that are required to instruct operating and maintenance personnel unfamiliar with such equipment.

b. A factory trained representative of all major component manufacturers, who has complete knowledge of proper operation and maintenance, shall be provided for one (1) day at the station, to instruct representatives of the City and the Engineer on proper operation and maintenance and to perform initial start-up of the pump station. With

permission of the City, this work may be conducted in conjunction with the inspection of the installation and test run. If there are difficulties in operation of the equipment due to the manufacturer's design or fabrication, additional service shall be provided at no cost to the Owner.

6. Spare Parts
   a. A complete replacement pump shaft seal assembly shall be furnished with each pump station. The spare seal shall be packed in a suitable container and shall include complete installation instructions. In addition, a spare seal gasket shall be provided.
   b. Spare parts shall be properly bound and labeled for each identification without opening the packaging and suitably protected for long term storage.
7. Warranty
   a. The manufacturer of the lift station shall warranty the structure and all equipment to be free from defects in materials and workmanship for a period of up to one year from date of ~~start up~~acceptance, not to exceed 18 months from the date of shipment.
   b. Warranties by the suppliers of various components in lieu of single-source responsibility by the station manufacturer will not be accepted. The station manufacturer shall be solely responsible for the warranty of the station and all its components.
   c. The repair or replacement of those items normally consumed in service, such as seals, grease, light bulbs, etc., shall be considered as part of routine maintenance and upkeep.

B. EXECUTION

1. Installation

a. Installation shall be in strict accordance with the manufacturer's instructions and recommendations in the locations shown on the drawings. Installation shall include furnishing the required oil and grease for initial operation. The grades of oil and grease shall be in accordance with the manufacturer's recommendations. Anchor bolts shall be set in accordance with the manufacturer's recommendations.

b. The Contractor shall submit a certificate from the equipment manufacturer stating that the installation of the equipment is satisfactory, that the equipment is ready for operation, and that the operating personnel have been suitably instructed in the operation, lubrication and care of each unit.

c. Installation of the ~~pump chamber~~wet well shall be done in accordance with the written instructions provided by the manufacturer.

2. Shop Painting

a. Before exposure to weather and prior to shop painting, all surfaces shall be thoroughly cleaned, dry and free from all mill-scale, rust, grease, dirt and other foreign matter.

b. All pumps and motors shall be shop coated, with manufacturer's standard coating.

c. All nameplates shall be properly protected during painting.

d. Gears, bearing surfaces and other similar surfaces obviously not to be painted shall be given a heavy shop coat of grease or other suitable rust-resistant coating. This coating shall be maintained as necessary to prevent corrosion during periods of storage and erection and shall be satisfactory to the engineer up to the time of the final acceptance test.

3. Inspection and Testing

a. General

1) The engineer shall have the right to inspect, test or witness test of all materials or equipment to be furnished under these specifications, prior to their shipment from the point of manufacture.

2) The engineer shall be notified in writing prior to initial shipment, in ample time so that arrangements can be made for inspection by the engineer.

3) The engineer or his representative shall be furnished all facilities, including labor, and shall be allowed proper time inspection and testing of material and equipment.

4) Materials and equipment shall be tested or inspected as required by the engineer, and the cost of such work shall be included in the cost of the equipment. The Contractor shall anticipate that delays may be caused because of the necessity of inspection, testing and accepting materials and equipment before their use is approved.

5) The services of a factory representative shall be furnished for one (1) day, for the station, and shall have complete knowledge of proper operation and maintenance to inspect the final installation and supervise the test run of the equipment.

6) Field tests shall not be conducted until such time that the entire installation is complete and ready for testing, including permanent electrical power.

7) All components of the pump station shall be given an operational test at the pump station manufacturer's facility to check for excessive vibration, for leaks in the pumping or seals and correct operation of the automatic control ~~and vacuum priming systems~~ and all auxiliary equipment. Installed pumps shall ~~take suction~~

~~from a deep wet well, simulating~~ simulate actual service conditions. The control panel shall undergo both a dry logic test and a full operational test with all systems operating.

8) Factory test instrumentation must include flow measuring with indicator; ~~compound suction gauge~~; bourdon tube type discharge pressure gauge; electrical meters to measure amperes, volts, kilowatts and power factor; speed indicator and a vibrometer capable of measuring both amplitude and frequency.

9) An operation and maintenance manual shall be provided to the City of Lauderhill's representative prior to startup testing.

10) The as-builts shall be geo-referenced in Florida State Plane.

b. Pumps

1) After all pumps have been completely installed, and working under the direction of the manufacturer, conduct in the presence of the engineer of record and a City of Lauderhill representative, such tests as are necessary to indicate that pumps conform to the specifications. Field tests shall include all pumps included under this section. Supply all electrical power, water or wastewater labor, equipment and incidentals required to complete the field tests.

2) If the pump performance does not meet the specifications, corrective measures shall be taken or pumps shall be removed and replaced with pumps which satisfy the conditions specified.

c. Motors

1) The Contractor shall check all motors for correct clearance and alignment and for correct lubrication in accordance with manufacturer's instructions. The Contractor shall check direction

of rotation of all motors and reverse connections if necessary.

4.12 STORM DRAINAGE

A. GENERAL

1. Catch basin grates and rim elevations as shown on plans may be adjusted to conform to new or existing grades after approval from Engineer of Record is obtained.

2. Distances and lengths shown on plans and profile drawings shall be referenced to the center of structures.

3. All catch basin grates shall be oriented to align with centerline of drive.

4. Minimum pipe size shall be 18". A 15" pipe shall only be approved at the upstream most pipe segment serving a completely pervious area.

B. MATERIALS

1. Reinforced concrete pipe (RCP) for storm sewer shall conform to ASTM L70-79, Table III, Wall B, or latest revision. All pipes shall have modified tongue and groovejoints, and have rubber gaskets, unless otherwise specified.

2. High Density Polyethylene Pipe (HDPE) for storm sewer shall conform to ASTM F2648. Pipe shall be joined using a bell and spigot meeting ASTM F2648 and the joints shall be watertight according to the requirements of ASTM D3212. Gaskets shall

meet the requirements of ASTM F477. All fittings shall conform to ASTM F2306. The installation shall be in accordance with ASTM D2321 or as per manufactures recommendations. The maximum HDPE shall be 60".

~~3~~2. Corrugated aluminum pipe (CAP) shall be helical type, manufactured in conformance with ASTM B-209 and AASHTO M-193, as manufactured by Kaiser Aluminum, Inc., or approved equal. The corrugation pattern and gauge shall be as follows:

DIAMETER	CORRUGATION	GAUGE
12" x 21"	2 2/3" x 1/2"	16
24" x 27"	2 2/3" x 1/2"	16
30"	2 2/3" x 1 1/2"	14
36" x 54"	3" x 1"	14
60" x 72"	3" x 1"	12

Pipe couplings for CAP shall be 12" wide (minimum), 24" for 60" diameter or larger. Split bands of the same alloy as the pipe, and may be one gauge lighter than the pipe. Polyurethane or other manufacturer supplied sealant shall be used with the couplings.

~~3~~4. The rip rap headwalls shall be constructed of sand/cement with a minimum 2000 psi compressive strength to meet FDOT standards. The bags shall be permeable burlap, cloth or paper. A concrete cap shall be poured on top of sand/cement rip rap bags with a minimum 3000 psi compression strength.

~~4~~5. All drainage structures shall be precast concrete as manufactured by U.S. Precast Corporation, or approved equal. Block catch basins will be allowed only with approval of the Engineer. The minimum wall and slab thickness shall be 8 inches and the minimum reinforcing shall be No. 4 bars at 12

inches each way, unless otherwise indicated. Concrete shall be minimum of fc = 3750 psi at 28 days.

C. INSTALLATION:

1. Pipe shall be placed on stable granular material, free of rock formation, other foreign formations, and constructed to uniform grade and line.

2. Backfill material shall be well graded granular material, well tamped in layers, not to exceed six inches (6").

3. Provide a minimum protective cover of 18 inches over storm sewer and avoid unnecessary crossing by heavy construction vehicles during construction.

4. The contractor shall notify the local water control district at least 24 hours prior to the start of the construction and inspection.

D. STORM DRAINAGE PRE-TREATMENT/EXFILTRATION SYSTEM

1. Any conflict with existing or proposed utilities shall immediately be brought to the attention of the Engineer. Any impermeable material encountered in the excavation for the drainfield shall be removed as directed by the Engineer.

2. The trench liner shall be Typar spunbonded Polypropylene filter fabric as manufactured by the Dupont Company, or approved equal. It shall be used on the sides and top of drainfield ditch. The top section of the material shall be lapped a minimum of 24 inches and the Contractor shall take extreme care in backfilling to avoid bunching of the fabric.

3. Perforated pipe within the drainfield shall have 3/8 inch perforations 360° around the pipe with approximately 120 perforations per foot of pipe.

4. Perforated pipe shall terminate five feet (5′) from the drainage structure. The remaining five feet (5′) shall be non-perforated pipe.

5. Pipes shall terminate two feet (2′) from the end of the trench or connect to additional catch basins.