

Lakeland Water Utilities

Wastewater Operations

**Policies, Standards
And Specifications**

**Subdivisions and
Commercial Developments**

**Section 4.0
Of
City of Lakeland
Engineering Standards Manual**

July 10, 2026

WASTEWATER OPERATIONS
POLICIES, STANDARDS, AND SPECIFICATIONS
FOR SUBDIVISION AND COMMERCIAL DEVELOPMENT

This information is provided as part of the Engineering Standards Manual referenced by Ordinance 3175, Passed and Certified February 5, 1990. Chapter 102 (Utilities) shall be included in this specification by reference.

Wastewater Operations has updated this information for the use of engineers and developers, and customers of the City of Lakeland's Water Utilities. As Director, it is my goal that this information will assist each user to formalize their request and facilitate faster service from Wastewater Operations.

Future revisions may be required and will be available. I would encourage the user to maintain the following revision log, so that Wastewater Engineering will be able to adequately address any concerns.

Please use this information and call Water Utilities Engineering if you need additional information or clarification.

Approved by:

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5	6/1/04	11/14/05	10/15/07	5/5/15			
6	6/1/04	11/14/05	10/15/07	5/5/15			
7	6/1/04	11/14/05	10/15/07	5/5/15	5/18/22	9/7/23	7/10/26
8	6/1/04	11/14/05	10/15/07	5/5/15	5/18/22		7/10/26
9	6/1/04	11/14/05	10/15/07	5/5/15	5/18/22		7/10/26
10	6/1/04	11/14/05	10/15/07	5/5/15			
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1 INTRODUCTION

1.1 Scope

- 1.1.1 The purpose and intent of these Standards and the accompanying Standard Details is to provide information for the design and construction of wastewater systems. All wastewater facilities shall be in conformance with the Standards herein. Any modifications shall require the City's approval. The City or Department of Water Utilities shall mean the Director of Water Utilities or his designated representative. Details referenced herein refer to the City of Lakeland Standard Details for Wastewater Systems Construction.
- 1.1.2 A determination of whether the City has permitted capacity or if the City's wastewater service may be supplied to any development or area will be based on the adequacy of the existing system to meet projected needs while maintaining acceptable service to existing customers, and the ability to provide the additional capacity without creating financial burden to existing customers or the City of Lakeland. All capacity shall be approved by the Capacity Review Committee. No addition or modification to the wastewater system will be accepted that does not meet these criteria.
- 1.1.3 Initial acceptance of a design by Water Utilities Engineering does not imply that the design has been reviewed in full detail or has been reviewed for constructability or regulatory requirements. Should it be determined that changes are required at some time during the project due to changes to the enclosed guidelines, regulatory requirements, or other reasons after the initial project submittal, but prior to final acceptance, the changes must be made for the project to continue or to be accepted. The City of Lakeland reserves the right to refuse acceptance of any project or the granting of wastewater service until complete compliance with all requirements, both written and verbal, are met.
- 1.1.4 Wastewater facilities constructed within City jurisdiction shall comply with the Florida Administrative Code (FAC). This includes facilities intended for private maintenance.
- 1.1.5 These standards are not intended to conflict with other local, County, State, or Federal regulations. In the event that other jurisdictional standards exist, the most stringent shall apply.
- 1.1.6 The specification of particular products, model numbers, and detailed specifications have been eliminated from this standard due to inevitable product changes, advances, and unavailability. A separate document, City of Lakeland Wastewater Construction Materials Specification (hereinafter Wastewater Materials Specification) is available from the Department. Listed are approved products and detailed specifications, which shall serve as an addendum to this standard by general reference.

1.2 Definitions

- 1.2.1 Approved Equal – The utility requires installation of specified materials. If these are not available, “approved equals” will be considered. Water Utilities Engineering will consider the request and must provide written approval before the item(s) are purchased.
- 1.2.2 Backflow Prevention – Provision of apparatus and procedures to preclude return flow of water from beyond a point of connection into the distribution system.

- 1.2.3 DEP – Department of Environmental Protection used interchangeably with FDEP.
- 1.2.4 Department – The City of Lakeland’s Department of Water Utilities.
- 1.2.5 Director – The City of Lakeland’s Director of Water Utilities, or his designated agent.
- 1.2.6 EPA – the Federal Environmental Protection Agency.
- 1.2.7 Easement – A recordable document, allowing the City (or others) access to private property for the purpose of installing, maintaining, repairing, or replacing a utility facility.
- 1.2.8 Existing Force Main – Any force main already placed in service.
- 1.2.9 FAC – Florida Administrative Code, as existing at the time of approval of this document and modified by the State of Florida subsequently. It is the intent that renumbering of sections shall not change the meaning of this document.
- 1.2.10 FDEP – The Florida Department of Environmental Protection used interchangeably with DEP.
- 1.2.11 Force Main – Any sewer designed to convey wastewater, wholly or in part, under the power provided by some mechanical device. Force mains are typically pressurized.
- 1.2.12 Gravity Sewer – Any sewer designed to convey wastewater powered only by the force of gravity. Gravity sewers are typically not pressurized.
- 1.2.13 Manufacturer – That person or company who produces a device or material for an intended purpose.
- 1.2.14 OSHA – the Federal Occupational Safety and Health Administration.
- 1.2.15 Private Maintenance – a wastewater facility held in private ownership and maintained by the private party. The FDEP permit application will list an individual or corporation as the responsible party for maintenance.
- 1.2.16 Public Maintenance – a wastewater facility conveyed to ownership by the City and maintained by forces of the City. The FDEP permit application will list the City as responsible party for maintenance.
- 1.2.17 Service Lateral Connection – the pipe(s) serving an individual customer, extending from the City’s sewer main to the point of responsibility (POR). The point of responsibility is typically located at the right of way or easement line. If there is no easement line, the POR shall be 5 feet from the City’s sewer main.
- 1.2.18 Tracer Wire – an insulated conductor attached to a force main for the purpose of locating the pipe after construction. Typically, an electrical signal is applied to the wire at an accessible point and then followed with a detection device.

2 AS-BUILT

2.1 As-Built Drawings

"As-built" or "record drawings" shall have the title "RECORD DRAWING" positioned next to the title block. The record drawings submitted are to be in conformance with City of Lakeland requirements and must be substantially complete in accordance with the approved plans and details. Any notation that renders the engineer's certification ineffective shall not be accepted. When information notated on the as-built drawings is provided by another licensed professional within the State of Florida, that professional must also sign and seal the information provided, with a statement of the work that was provided. In no way will the Engineer of Record (EOR) disclaim work on the plans. Each licensed professional may only claim the work they provided. Reference the City of Lakeland, Water Utilities As-Built/Record Drawing Checklist for requirements. The as-built drawings shall only show final constructed conditions, in bold lettering, with all proposed work removed.

Final as-built drawings may be provided in either electronic or paper format, but whichever format is provided must be able to comply with the above requirements.

2.2 As-Built Drawings Shall Include

Two sets of paper hardcopies, stamped "record drawings" and signed and sealed by the engineer of record and one electronic copy in .pdf format shall be submitted to Water Utilities Engineering once preliminary as-built drawings have been approved by the City. The record drawings submitted are to be in conformance with City of Lakeland as-built requirements and must be substantially complete in accordance with the approved plans and details, and any deviations noted on those plans. Any notation that renders the engineer's certification ineffective shall not be accepted.

The City of Lakeland Department of Water Utilities defines "as-built" drawings as follows: A complete and accurate visual representation of the exact location of any and all facilities installed for use by the City of Lakeland, Department of Water Utilities. The visual representation shall be in the form of bluelines and reproducible mylars as indicated by the City's project manager and shall include, but not be limited to the following.

- 2.2.1** All dimensions necessary to easily locate all facilities. Measurements shall be from a permanent, above ground structure to the City's facility or a point above ground directly adjacent to the City's facility. All valves, wyes, services, meters, manholes, elbows, and pipelines shall be indicated by accurate dimensions.
- 2.2.2** For underground facilities, the depth below grade or other fixed reference shall be shown. Any depths greater than the standard three (3) feet should be shown in detail. Fittings, changes in depth, changes in grade, high and low points, and changes in direction, etc., shall be clearly indicated. Depths shall be referenced from final grade and elevation references shall include reference to N.G.V.D. datum upon which the elevations are based.

- 2.2.3 Location dimensions on pipe runs shall be indicated as necessary to accurately define the permanent location, size, material, connections, termination, and points of deflection (vertical or horizontal).
- 2.2.4 Sanitary sewer utility systems shall be located, and the locations shall be depicted and noted on the record drawings by GPS coordinates including point number (ID#), Northing, Easting, Elevation, and a point name (NAD 1983 State Plane Florida West FIPS 0902 West). GPS coordinates shall also be provided electronically on an excel or .csv sheet.
- 2.2.5 The engineer of record's certification may be based upon any information that he has acquired and deems of sufficient accuracy to satisfy his professional standards, the requirements of this document, and of any submittals unto which it is attached. No certification shall include a blanket disclaimer on the accuracy or source of the information submitted.
- 2.2.6 The signature and seal of the engineer of record shall be both clearly and legibly imprinted on the document. The engineer shall also provide typed or clearly printed name, firm, and address.

3 WASTEWATER POLICIES OF THE CITY

3.1 Requests for Service

All requests for service shall be initially directed to Water Utilities Engineering. The engineering staff will evaluate technical feasibility and calculate charges for connection to the system. Where appropriate, the requests will also be evaluated by the Office of Community Development for Annexation and Zoning before plans are approved.

3.1.1 Master Utility Plan

Projects greater than the equivalent of 150 single family connections (39,000 gpd), having multiple phases, or with extended construction schedules should contact Water Utilities Engineering to determine if a Master Utility Plan must be submitted prior to design.

3.1.2 Inside the City Limits

Where the property in question is already incorporated into the City of Lakeland, upon determination of the availability and cost of connection, only Water Utilities Engineering shall review the connection for approval.

3.1.3 Outside (Contiguous) City Limits

If the property in question is contiguous to the City of Lakeland, a petition for voluntary annexation and a wastewater service agreement are required. The connection request shall be reviewed by the director for approval. As the property is contiguous, the City Commission may elect to annex the property without delay and a petition for annexation will be required. Should the Commission elect to postpone action; the voluntary annexation and a wastewater service agreement(s) will be recorded on the deed(s).

3.1.4 Non-Contiguous Unincorporated Properties

Where the property is not incorporated and is not contiguous, a wastewater service agreement and a petition for voluntary annexation shall be required. The application for service shall be reviewed by the City Commission for approval. The annexation agreement will be recorded on the deed(s). The City will execute the agreement at such time as it desires and it is legal and appropriate to do so.

3.1.5 Properties within other Municipalities

Should the City be requested to directly serve any customer within the corporate limits of any other municipality, the City will first ascertain if there are extraordinary circumstances indicating this is an appropriate action to undertake. Where the other municipality has reasonable ability and desire to provide the service directly, the City of Lakeland shall decline to serve.

3.1.6 Properties Outside Polk County

The City's service area abuts Hillsborough County along County Line Road. The City of Lakeland will not ordinarily consider requests to permanently serve individual entities outside of Polk County. Where extraordinary circumstances and opportunities for the City coexist, an exception may be possible. This will require, at minimum, approval by both the City of Lakeland Commission and the Hillsborough County Commission of a service area within Hillsborough County.

3.1.7 Where a request for a temporary service is made, the City will consider the request under the following conditions:

- Capacity requested shall not inhibit a similar request in the wastewater service territory in Polk County.
- Neither Hillsborough County nor any other municipality nor any established private provider is reasonably able and willing to provide the service.
- A contract stating the anticipated length of service and allowing for conversion to local providers (as they become available) will be required.
- Payment in full of City of Lakeland fees will be required. These fees are non-refundable upon conversion to local providers.
- No City of Lakeland funds will be expended to provide temporary wastewater infrastructure outside Polk County.

3.2 Service Agreements

An executed copy of the current City of Lakeland Wastewater Service Agreement(s) must be submitted with the application for service by any customer to be located outside the Corporate Limits of the City. The agreement will be specific to either residential use or commercial/industrial use of the property. Where a development has both uses, separate agreements will be provided for the separate uses. A current copy of the standard Agreement(s) can be obtained from the Department. For complex or unusual projects, specific terms of these agreements may be negotiated.

3.3 Gravity Sewer Policy

Copies of the current version of this policy may be obtained from the Department.

3.4 Lift Station Policy

Copies of the current version of this policy may be obtained from the Department.

3.5 Personal Grinder Station Policy

Copies of the current version of this policy may be obtained from the Department.

3.6 Line Extension Policy

The current line extension policy can be found in the City Administrative Policy Manual.

3.7 Construction in Easement

In order to reduce future operating costs for relocation, the City desires to avoid placing structures within City, State, County or Federal collector road rights-of-way. Construction in the rights-of-way will be permitted only after all reasonable efforts to obtain sufficient easements have been made.

At its discretion, the City may elect to facilitate obtaining these easements.

Understanding that in some cases the easements required may be unobtainable or prohibitively expensive, the City will allow construction in a right-of-way if either of these situations occur. Waiver of this requirement is not automatic. The developer must demonstrate evidence of a good faith attempt to obtain the desired easements before the waiver request.

3.8 Wholesale Wastewater Service

The City does not desire to provide wholesale wastewater treatment services for private utilities. This is based upon the reality that discontinuation of wastewater-only service creates some liability for the service provider.

Service accounts that purchase other utility services from the City will be established for individual residential, multi-family residential, commercial, industrial, and other governments. No accounts will be set up where the wastewater billing is sent to private entities other than the water and/or electric account holders that generate the flow. Where mutually acceptable, such agreements may be entered into by the City Commission as inter-local governmental agreements.

This is not to preclude agreements to provide only billing/collection services for other entities (public or private), which collect and/or treat wastewater.

4 WASTEWATER SYSTEM CONSTRUCTION PROJECT OUTLINE

Project checklists will be issued to the owner/engineer/developer listing items required by the City at various stages during the design and construction process. It is required that the owner/engineer/developer convey these requirements to the contractor and ensure compliance with the listed items. Non-compliance with any of the items listed may result in the holding of building permits, certificate of occupancy, or letter of completion.

5 INSURANCE & INDEMNIFICATION

Contractors working in Rights-of-Way, easements dedicated to the City or on facilities intended for conversion to public maintenance shall carry insurance, as specified by the City's Department of Risk Management. The owner/contractor shall indemnify the City against losses and satisfy all Risk Management requirements before starting construction.

6 PROTECTION OF PROPERTY & OBSTRUCTIONS

6.1 Protection

Temporary support and/or adequate protection and maintenance shall be installed on all underground and surface structures encountered in the progress of the work. Structures that have been disturbed shall be restored, repaired, or replaced upon completion of the work.

6.2 Obstructions

Owners of utilities that are in the vicinity of the work shall be notified prior to beginning construction. Any known obstructions shall be shown on Drawings. Prudent care shall be exercised in all operations to avoid damage to existing infrastructure (for example, pipes, cables, conduit, utility poles, structures, etc.) whether shown on the Drawings. The contractor shall be held responsible per Sunshine One Call guidelines. Existing utilities shall be kept in operation by appropriate temporary means.

7 DESIGN & CONSTRUCTION SPECIFICATIONS

7.1 Trench Preparation

7.1.1 Excavation

The trench shall be excavated only so far in advance of pipe installation as to insure proper installation in accordance with the Drawings and the Standards herein. The trench shall be excavated to the depth required to provide a uniform and continuous bearing support for the pipe on undisturbed ground. Bell holes shall be provided at each joint so that pipe bells receive no bearing pressure yet permit proper jointing and inspection.

7.1.2 Trench De-Watering

An adequate means of de-watering shall be used when necessary to keep water from the trench bottom. The trench shall be excavated no more than the available pumping facilities can handle. This discharge shall be approved by SWFWMD before the pumps are routed to natural drainage channels or emptied into drains or storm sewers consistent with applicable regulations. De-watering shall continue until sufficient backfill is placed above the pipe to prevent flotation.

7.1.3 Excavated Material

Excavated Material shall not be permitted to endanger the work, or obstruct natural water courses, sidewalks, or driveways. Fire hydrants under pressure, valve pit covers, valve boxes, fire and police call boxes, or other utility controls shall be always left unobstructed and accessible. Gutters shall be kept clear or other satisfactory provisions made for street drainage.

7.1.4 Sheet piling & Shoring

Contractors shall furnish, install, and maintain piling, sheet piling, erosion control, bracing, etc., as required by conditions relating to building and construction work of the applicable area. All shoring installed in place shall be maintained as required to support the sides of the excavation to prevent any movement which would cause injury to persons, structures, utilities or property either public or private, or any portion of the work being performed for the duration of the required excavation. If required, trench sheet piling shall remain in place until the pipe has been laid, tested, and repaired if necessary, and the backfill compacted to a depth of one foot over the top of the pipe. Upon completion, all sheet piling shall be removed, unless otherwise approved by the City. All excavation, trenching, sheet piling, shoring, and de-watering shall be done in accordance with OSHA safety requirements including the Florida Trench Safety Law, Chapter 90 96, most current edition, and applicable City, County, and State standards.

7.1.5 Unsuitable Soils

During excavation, if unstable or unsuitable material is encountered, it shall be removed and the trench backfilled with approved material, tamped in six-inch (6") lifts. Where the bottom of the trench consists of unstable material to such a degree that it cannot be removed and replaced with an approved material, a suitable foundation shall be constructed and approved by the City. When backfill material is not specified on the Drawings, back filling with the excavated material may be acceptable provided that such material is suitable in accordance with Section 7.2.3.

7.1.6 Trench Width

Unsupported trench width shall be limited to the minimum practical, width allowing working space to compact the haunching materials. The width shall be at least the pipe diameter plus one foot.

Supported trench width shall be adequate to allow the pipe bedding and haunching to be placed and compacted, and removal of trench support without disturbing the pipe, bedding or haunching material within a pipe diameter plus 8" on both sides.

7.2 Sewer Pipe Installation

7.2.1 Inspection

The City's Water Utilities Inspector shall inspect all sewer mains and force mains, public and private, in accordance with the Standards and test criteria herein. Privately maintained facilities beyond the service lateral connection on private property may be inspected by the City's building inspector also.

Water Utilities inspectors shall be available approximately one hour per day during city business hours to inspect all construction, installation, and materials to ensure that city construction standards are being followed. Additional inspection is subject to the availability of inspectors and charges.

The City's Water Utilities Inspector shall be notified of a minimum of two working days prior to beginning construction. Inspectors may require all piping systems installed without notification to be uncovered for visual inspection.

All materials delivered to the job site shall be subject to Water Utilities inspection. All materials found damaged or unsound during inspection or during the progress of the work, shall be rejected and removed from the job site without delay.

7.2.2 Materials Required

All materials installed shall be in accordance with the materials and specifications described in the Wastewater Materials Specification. The Utility has the right to designate specific pipe materials based upon soils, loading, etc.

7.2.3 Back-Filling

Back-filling material shall be free from vegetation, organic material, cinders, ashes, refuse, boulders, rocks, and stones. Reference Standard Detail WWS-1. Results of all density tests shall be promptly provided to the City for trench bottoms and backfill for any section where the pipeline will be dedicated for public maintenance, or the City is named on any permit involving the installation of the pipe section.

If possible, natural material from the trench walls or other embedment materials should be migrated into the bedding. The embedment material should be finer than 1/4 inch and gradation properly designed to limit the size of the voids. Alternate provisions shall require City approval.

When pipe is laid on a disturbed trench bottom, approved bedding material shall be placed and compacted to at least 98% of maximum density per AASHTO T180. Mechanical compaction of bedding is acceptable.

The haunching material shall be hand placed under the pipe haunch, eliminating all voids. The haunching shall then be hand tamped to at least 98% of maximum density in six-inch (6") lifts. The pipe shall not be displaced vertically or horizontally during placement or compaction of the haunching.

Place "initial backfill" from the spring line, using hand operated device in twelve-inch (12") lifts. If pipe will be under pavement, lifts shall be six inches (6"). Initial backfill shall extend to twenty-four inches (24") above the pipe.

The final backfill may be machine placed and shall not contain any large rocks or debris. The minimum cover over all gravity sewer and force mains shall be thirty-six inches (36"), except as provided in Detail WWS-11. Final backfill density under all paved areas shall be a minimum of 98% by AASHTO T180. All work under pavement shall be conducted in accordance with state, county, local and other requirements. Reference Standard Detail WWS-11.

7.2.4 Pipe Laying

The entire wastewater system shall be installed to line and grade as specified on the Drawings and in accordance with City Standards. The grade line as given on the plans indicates the grade of the invert of the sewer pipe and indicates the N.G.V.D. Datum reference used.

A laser beam, batter boards or survey equipment shall be used to assure alignment and grade. Actual invert elevations shall be marked on all structures as they are installed.

Sewer pipes with factory fabricated slip-on joints shall be joined together in strict accordance with the manufacturer's specifications. The spigot exterior and the bell interior shall be clean and dry, free from oil and grease prior to lubrication. Precautions shall be taken to prevent any debris, tools, or other foreign material from entering the pipe. Inspection of sewers shall be made before backfilling the trench.

Lubricants shall be as specified by (and preferably as supplied by) the manufacturer of the pipe and gaskets.

When seating the pipe with a pry, lever or other approved device, care shall be taken to protect the pipe end from damage. Ends damaged in any manner shall be cause for rejection of the pipe.

Whenever pipe laying is not in progress, the open ends of pipe shall be closed by a watertight plug or other approved means. If water accumulates in the trench, the seal shall remain in place until the trench is pumped dry.

7.2.5 Above Ground Structure Separation

The construction of any structures or walls which cross existing or planned wastewater lines will not be permitted unless the lines are protected within steel sleeves which extend a minimum of 10-ft. either side of the structure's footers. The requirements for steel sleeves shall meet FDOT Standards.

Construction of any structures which do not cross existing or planned wastewater lines, but which are within 10-ft of lines at any point may require similar protection for the line. The City shall determine the type and extent of required protection, and this protection shall be provided prior to providing wastewater service.

If any structures or walls are to be constructed which requires the City Wastewater lines to be protected, they must be clearly shown on the design drawings. Any required sleeves must also be noted on the plans.

The City reserves the right to request the sleeving of wastewater lines at a date after their installation due to the subsequent construction of walls or other above ground structure. In order to protect public property, the City may request the relocation of the lines at the developer's expense.

The City accepts no liability for any damage to structures or obstacles constructed above or within 5-ft of a wastewater line.

Depending on pipeline depths greater than 36-inches, the above requirements may apply to more than 10-ft separation.

- 7.2.5.1 Large maturing trees (typically Oaks) shall be placed no closer than eight (8) feet (horizontal distance) to sewers. Other (smaller) trees shall be no closer than five (5) feet.

Note: Landscaping requirements and tree designation are outlined in Article 33.

7.2.6 Force Main Identification and Tracer Wire

Two continuous, insulated, green coated number (#) 10-gauge Copperhead SoloShot 1045 EHS and Copperhead Industries connectors pre-filled with dielectric silicone sealant shall be installed along all public and private force mains including directional bores and must be taped below the spring line of the pipe. At each valve, the wire shall be installed along the outside of the valve box. The adjustable top piece shall have a 2-foot by 2-foot concrete collar at grade with a Snake Pit Two-terminal Switchable Lid colored green where the tracer wire shall be connected. Sections of wire shall be spliced together using Copperhead Industries connectors pre-filled with dielectric silicone sealant. Twisting the wire together is not acceptable.

Foil detection tape buried 12-inches above the pipe shall be placed above pipe to provide early warning of force main. Reference Wastewater Division Materials Specifications Section 32.0.

PVC force mains shall be colored green. HDPE pipe shall be marked with a green stripe or be solid green.

SPECIAL NOTE: Reuse force mains shall have purple marker tape and purple location wire installed as above. If PVC, reuse force mains shall be colored purple.

7.2.7 Placing Joints

Mechanical joints shall be in accordance with the manufacturer's specifications. Gaskets shall be evenly seated, the gland placed in position, with the bolts hand tightened before final wrench tightening. Reference the Wastewater Materials Specification.

Dissimilar types of pipes shall be joined using a transition adapter where necessary. Reference for the Wastewater Materials Specification, Section 24.

Joining manhole stubs - Reference manhole Section 7.5.5

7.2.8 Valves and Fittings Installation

All valves and fittings shall be set and joined to the pipe in the proper location as specified on the Drawings. A valve box shall be provided for every valve. Valve boxes shall not transmit shock or stress to the valve or pipe and shall be centered and plumbed over the wrench nut of the valve, with the box cover flush with the final grade or as may be specified on the drawings.

At the time of installation, valves shall be carefully inspected, opened wide, then tightly closed and all nuts and bolts thereon tested for tightness. Special care shall be taken to prevent joint materials, stones, or other substances from becoming lodged in the valve seat. Valves, unless otherwise required, shall be set with their stems vertically above the centerline of pipe. Any malfunctioning valve shall be repaired or replaced.

7.2.9 Field Cutting Pipe

PVC sewer pipe shall be field cut using hand or power saws in accordance with the manufacturer's recommendations.

Ductile iron pipes shall be field cut with a power saw, not by impact cutting.

Asbestos Cement (AC) pipe is considered a hazardous material and shall be cut only by people trained and licensed to do so. Copies of the Certifications of the supervisor and all workers shall be provided to the City prior to commencing work. The cutting and disposal of AC pipes shall be in accordance with OSHA regulations for handling this material and documented with the Water Utility.

Clay pipes shall be cut only with patented pipe shears or a power saw. Field cutting of vitrified clay pipe at manholes shall be limited to that required in order to trim excess pipe inside the manhole.

All cut pipes, except clay pipe, shall have the end filed or ground smooth, to form a standard bevel. All burrs shall be removed.

7.2.10 Restrained Joints on Force Mains

Any new force main construction requiring the installation of bends, fittings, or dead ends shall require the use of retainer glands or tie-rod restraints. The length of each pipe to be restrained shall be clearly indicated on all designs and as-built drawings at each location of restraint. The limits of restraint shall be calculated using best engineering practices and shall be based on 150 psi (test pressure). The submittal of restraint charts or general restraint notes on the drawing is not an acceptable alternative to indication of the length and type of restraint at each location.

Where any connection to existing force mains is made that would require addition of restraint to the existing line, the contractor shall supply such restraint at no cost to the City. Installation of restraint on the City's system shall be done in the presence of the City's Water Utilities Engineering Inspector.

7.2.11 Service Connections

Service lateral connections shall be constructed where shown on the plans of the materials prescribed and in accordance with Standard Detail WWS-14 or WWS-14A.

7.2.11.1 Monitoring Manholes

Service connections serving industrial facilities and commercial food service establishments shall be designed with a standard concentric "monitoring" manhole to enable flow measurement and sampling. Due to the high cost of retrofitting, it is highly recommended that any facility which may in the future be so occupied, be designed accordingly. The location of the manhole shall be accessible, outside the roadway and in a location that permits safe entry. The location shall convey all the flow from the establishment and no other flow.

7.2.11.2 Wyes

Wyes of proper size shall be installed in the wastewater collection system at the locations shown on the Drawings. The wyes, unless otherwise specified, shall be inclined upward at an angle not more than 45 degrees from the horizontal in depths less than six feet (6') and fitted with an elbow. Tee wyes and wyes are acceptable in the vertical position only when depth of cover over main exceeds six feet (6'). Saddles are not acceptable. All wye units, stubs or other fittings placed in lines for future connections or services shall have the open end tightly plugged using pipe manufacturer's recommended watertight plug. All plugs shall withstand 4 psi yet permit easy removal for future use.

In the case of sewers greater than 15 feet deep, P401 lined ductile iron tees placed vertically shall be used rather than PVC wyes described above. To accommodate the PVC SDR 26 sewer OD, transition gaskets shall be used in the tee and will result in an acceptable flow depression inside the tee.

7.2.11.3 Clean Outs

If the service line exceeds 75 feet, service connection lengths between clean-outs shall not exceed 100 feet. However, the private system begins with the **one-way cleanout directing flow to City sewer main** at the edge of property, easement, or right-of-way, whichever is closest to the sewer main. A **one-way clean-out** is required at the point where the lateral transitions from private to public maintenance (edge of property, easement, or Right-of-way). Where the **service lateral connection** forms a wye, each branch shall have a clean-out. All **one-way clean-outs** shall be installed to finish grade and capped. Clean-out risers and plugs may have a diameter equal to that of the lateral but shall be no less than 4 inches in diameter. Reference Standard Detail WWS-14 or WWS-14A.

7.2.11.4 Grease Traps

Facilities producing grease are regulated under the City of Lakeland's Pretreatment Program. Grease, oil, or sand interceptors shall be required for the proper handling of liquid waste containing sand, fats, oils, or greases. This may occur in food processing, preparation, or service businesses (food oils and greases). It also occurs in businesses

dealing in mechanical equipment (lubricating greases or oils). A grease trap must be sized for the anticipated flow. Reference Standard Detail WWS-5A.

As the City's protocol for grease traps requires regular inspection and cleaning, the trap must be located to permit these activities with minimal disruption of the businesses' operations.

The developer may discuss with City plumbing inspectors or Water Utilities engineers if businesses producing this type of waste flow require a trap. If so, the traps, or allowances for future traps, should be provided upstream of the monitoring manholes.

7.2.12 Service Lateral Connections Made Concurrent with Gravity Main Construction

Service lateral connections shall be laid to and terminated at the right of way (or easement if present) line with a clean-out and plug. A green stake shall mark the point of termination of services. Where sidewalks or curbs are located near said termination, a mark shall be cut or chiseled in the sidewalk or curb. Service connections shall have a protective cover of not less than 36", within the right-of-way/easement. Reference Standard Detail WWS-14 or WWS-14A.

If the gravity sewer **is designed to be** under pavement, the developer shall provide service lines for all points of service brought out from under pavement.

Inspection of service pipe joints and fittings shall be made before backfilling. Service pipes shall have good line and grade.

7.2.13 Service Lateral Connections Made into Existing Sewer Lines

Any person needing a connection of commercial or multi-user residential property to an existing gravity sewer main shall notify the City's **Wastewater Collection Division** a minimum of 30 days prior to the desired connection date. The City shall make all connections, unless otherwise stipulated. The City shall provide a connection cost estimate. This cost and appropriate impact fee shall be due prior to making the connection. A licensed contractor may be allowed to make the connection, following approved plans, at the discretion of the City.

The person requesting the connection shall obtain rights-of-way permits and be responsible for any restoration costs imposed by the right-of-way agent.

Requests for gravity connections of individual residential lots, where sewers are existing and adjacent, shall notify the City's Wastewater Collection Division a minimum of 30 days prior to the desired connection date. The City shall provide a connection cost estimate. This cost and appropriate impact and connection fees shall be due prior to making the connection. After receiving payment of the cost to construct and appropriate fees, the Wastewater Collection Division shall schedule the construction of the new sewer connection. The City shall make all sewer connections to individual residential lots.

7.2.14 Connection to an Existing Force Main

Requests for a connection to an existing City force main (wet tap) should be made to Water Utilities Engineering **and follow the Plan Review Process for the New Development flow chart**. Such request should include plans and estimates of wastewater generation volume. Prior to approval of plans, an FDEP wastewater application is required. When the City approves connection to existing force main, the tap shall be made by the City of Lakeland at the developer's expense. Work will not be scheduled until payment is received.

The person requesting the connection shall obtain rights-of-way permits and be responsible for any restoration costs imposed by the right-of-way agent.

7.2.15 Connection to an Existing Manhole

All connections to an existing manhole shall be constructed by core drilling the appropriate size hole into the manhole. Breaking into a manhole by means other than drilling is prohibited. Connection shall be in accordance with Standard Detail WWS-5B, Sanitary Sewer Manhole Resilient Boot or PVC Sleeve Connection. All work shall be observed by a Water Utilities Inspector.

All existing manholes that receive a new force main connection shall be sprayed lined after the force main connection is made using approved vendor. Reference Wastewater Materials Specification Section 29.0.

7.3 Boring and Jacking

7.3.1 General

The requirements described herein are for the installation of casing pipes by the boring and jacking method to accommodate sewer pipelines. This method shall be used under City or County streets, state highways, and railroads unless otherwise approved in advance by the agency having jurisdiction, and Water Utilities Engineering.

All pipe crossings under a highway shall be installed in accordance with FDOT requirements governing the method and materials of the construction. All permits or approvals shall be obtained by the engineer of record prior to highway crossings.

Directional bores may be proposed for pressurized systems when crossing private driveways, roads etc. Final approval shall be by Water Utilities Engineering.

All jack and bores or directional bores shall be done in accordance with City of Lakeland Standards. Water Utilities Engineering Inspectors must be present during all jack and bores or directional bores. The contractor shall supply end of casing location dimensions or directional profile measurements to assist in locating. A minimum of 48 hours prior notice shall be given to Water Utilities Engineering. The Department shall receive a copy of the bore log.

7.3.2 Casings

Casings shall be installed accurately to grade and shall meet all requirements of the owner of the right of way. Reference Standard Detail WWS-3. All casing pipes shall be new welded

steel pipe conforming to ASTM A 139. They shall be jig cut square, beveled, and welded so that the entire length of the casing will be straight and true. Any butt welds shall be multipass with no intrusion of weld metal into the bore of the casing or shall be a coupling lap welded to both lengths of casings.

The casing shall extend a minimum of 8' from the back of curb on both sides of the road.

Installation of the casing shall not disrupt traffic nor damage roadway grade or surface.

7.3.3 Spacers

The annular space between the pipe and casing shall be sufficient to allow insertion and extraction of the carrier pipe, with appropriate restraining devices attached. To reduce pipe deflection, appropriately sized spacers shall be securely attached to the pipe prior to its insertion.

The materials, configuration, and installation of the spacer will be obtained from the City of Lakeland Wastewater Construction Materials Specification, Section 9.0 or the policies of the agency having jurisdiction over the roadway. Wooden skids shall not be used.

7.4 Directional Bores

[Reference Lakeland Water Utilities Directional Bore Design, Requirements and Post-Construction Standards.](#)

7.5 Manholes

7.5.1 General

The construction of new manholes for sanitary sewers shall be precast, cast-in-place concrete, **or polymer concrete**. The required location, if in a roadway, shall be in the center of the outside lane of traffic. **All new manholes receiving a force main connection, shall be Polymer Concrete.**

All frames and covers for manholes shall be clearly marked as "sanitary sewer" and "confined space". Those manholes installed on systems intended for City of Lakeland maintenance shall conform to the City's standard Detail WWS-9. Watertight covers designed for traffic loading shall be installed in all areas. Manhole covers subject to flooding, including those near gutters, shall be identified in the plans for maintenance monitoring.

The manhole frame and cover elevation shall be adjusted a maximum of 8" using bricks and mortar. The top adjustment section shall be coated as specified.

Also refer to Section 8.1.5 for other sanitary location requirements.

7.5.2 Standard Design

Manhole structures shall be designed and certified by a qualified Professional engineer to withstand outside forces (soil, water, etc.).

The manhole base shall be installed on undisturbed earth except when soil conditions are wet, soil is unsatisfactory material or is impractical.

Manholes shall be built without steps.

The manhole cone section shall be concentric, unless otherwise approved by the City. Manholes shall be installed at the end of each line, at all changes in grade, size, or alignment, at intersections of services, and at spacing no greater than 400 feet for sewers up to 15 inches, and 500 feet on sewers larger than 15 inches.

Due to maintenance and safety concerns manholes shall be designed with a maximum depth of 10-feet, from top of ring and cover to manhole invert, wherever possible. Any manhole depths greater than 10-feet shall be reviewed on an individual basis. Manholes requested to be greater than 10-feet deep shall be requested in writing prior to plans review submittal, demonstrating need and detailing the reason for the request. This approval process will occur outside of the plans review timeline and should occur in advance of final design submittal.

7.5.3 Coatings and Linings

Coatings shall be applied to clean, dry, structurally sound concrete surfaces. The surface preparation, application, and curing procedures for the coating to be applied shall be in strict accordance with the manufacturer's recommendations. All grouted areas in manholes shall be coated. **Reference Wastewater Materials Specification Section 30.0.**

Manholes into which a force main discharges shall be lined with an inert impervious polymer type liner. Pre-existing manholes shall require retrofit lining. Reference Wastewater Materials Specification Section 29.0.

7.5.4 Inverts and Drop Connections

An outside drop connection is required on all new construction where the invert drop exceeds 2.0 feet. (Reference Standard Detail WWS-7 and WWS-7A.) Inside manhole drops are not allowed. A channel invert shall be constructed for each entering and exiting pipe. It shall have a smooth U shape channel with a radius equal to the inside radius of the sewer pipe connection, its depth at least 75% of the pipe diameter. The bench slope shall be no greater than 4%.

All entering and exiting pipe across a straight manhole must maintain grade. Additional slope shall be required if the exiting pipe (flow) changes direction.

7.5.5 Connections and Joints

Stub outs for future sewers shall be constructed at the locations and to the elevations shown on the plans. They shall be extended to beyond the curb and a minimum of one pipe length to avoid future manhole and pavement disturbances. Stub outs shall have watertight plugs.

Force main discharge connections to manholes shall utilize one of the following pipe anchoring means:

- Anchor PVC pipe with suitable anchor or groutable collar.
- Ductile iron pipe may be directly grouted.
- Alternate City approved means of restrained connection.

Force main discharge connections to manholes shall be identified in the plans, providing the following:

- Means of anchoring pipe.
- Discharge no more than 2' above the invert, but without an inside drop.
- The elevation of the discharge.
- Show the plan view of the discharge site.
- A turned down 45-degree flanged bend if required.
- Plans to line the manhole per Section 7.5.3.

7.5.6 Precast Concrete Manholes

The following modifications to ASTM C-478 shall apply to precast concrete manholes:

- Section joints shall consist of formed male and female ends in order to make a continuous and uniform surface. Joints shall be sealed with a flexible hydrocarbon resin compound or equal in compliance with Federal Specification SS-S210-A and ASHTO M-198-B. Reference Wastewater Materials Specification Section 33.
- Precast manhole pipe joints shall be made via resilient pipe connectors. Said connectors shall be either the sleeve/boot type connector which is expanded into a hole, cut/formed into the manhole wall and meeting ASTM C-923, or a resilient wedge type seal which is factory cast into the manhole wall. The device used for mechanically compressing the resilient portion of the boot type connector against the inside of the manhole wall shall be per manufacturer's specifications. Reference Standard Detail WWS-5B and Wastewater Materials Specification Section 34.0.
- Every precaution shall be taken to prevent damage to the precast manhole sections during the transportation and unloading of the sections. The precast sections shall be unloaded using skids, pipe hook, rope slings, or suitable equipment. Under no conditions shall the precast sections be dropped, dumped, or dragged. If any precast section is damaged in the process of transportation or handling, such section shall be rejected and immediately removed from the site and replaced at the Contractor's expense.

7.5.7 Cast-in-Place Manholes

Cast-in-place manholes shall be constructed in accordance with Standard Detail WWS-4 except where otherwise specified herein. All forms shall be of durable construction to provide a smooth finish to the concrete.

DIP and VCP may be cast directly into cast-in-place manholes. If placed after manhole construction, DIP and VCP shall be sealed by tightly packing with non-shrink grout, or with City approved resilient boot.

PVC pipe shall connect to manholes by one of the following methods:

- A groutable sleeve meeting ASTM D3034 per Section 34.
- A circular opening may be cast into the manhole, or it may be cored, permitting the use of a boot connector per Section 7.5.6 and Standard Detail WWS-5B.
- DIP can be connected and extended three (3) feet beyond the manhole and joined to PVC with transition adapter.

7.5.8 Polymer Concrete Manholes

Polymer concrete manholes shall conform to the standard specifications of ASTM C478 and meet loading requirements of ASTM C857.

Every precaution shall be taken to prevent damage to the sections during the transportation and unloading of the sections. The sections shall be unloaded using skids, pipe hook, rope slings, or suitable equipment. Under no conditions shall the sections be dropped, dumped, or dragged. If any section is damaged in the process of transportation or handling, such section shall be rejected and immediately removed from the site and replaced at the Contractor's expense.

Polymer concrete manhole components must exhibit no defects, including indentations, cracks, or foreign inclusions, whose characteristics or severity negatively impact the component's ability to withstand designated loads and fulfill its intended service life.

Connections to existing polymer concrete manholes requirements:

All penetrations shall be mechanically rotary core-bore.

All piping entering existing manholes shall have a jack-in resilient pipe to manhole seal per ASTM C923.

Reference Standard Detail WWS-5 and Wastewater Materials Specification Section 20.0.

7.5.9 Dog-House Manholes

Dog-house manholes are not permitted for connections into existing gravity sewers except in unusual instances, such as involving large flow in trunks sewers. Exceptions must be approved in advance by Water Utilities Engineering.

7.6 Pump Station Standards

7.6.1 General

The purpose of this standard is to provide pump stations for raw sewage complete with pumps and all necessary electrical and mechanical accessories. All work shall conform to City Standards herein and the City's Standard Detail Drawings and Material Specifications (Reference Standard Detail WWS-15).

Projects involving manifold connections to force mains and/or long force mains likely to have future manifolded pump stations will be influenced by other connected pump stations, and those stations will be affected by the new station. Such station designs must allow capacity

for both existing and future anticipated demand in the force main to serve the project. To allow for future demand, a force main fluid velocity of 4.5 to 5 FPS shall be used if no more specific guidance is provided by the City. On force mains involving multiple existing manifold connections, the City shall provide maximum and minimum design heads at the proposed point of connection.

The Engineer shall be responsible for coordination of the station design with the City. The City shall make available to the Engineer applicable Drawings and Standards. The City shall approve the design and determine the requirements for future upgrading.

7.6.2 Pump Station Design

7.6.2.1 A master plan of the development, including phasing, shall be required along with estimated demand by phase. The station shall, at minimum, be designed to meet demand at build out. Stations shall generally be sized such that the capacity of one pump is at least 300% of average daily flow or in accordance with the Ten States Standards, **whichever is greater**. A development that will require multiple lift stations will have one master station and all other stations flowing to it, unless otherwise approved.

7.6.2.2 A pump station site plan shall be provided and shall include drainage design stating 100-year flood elevation, and design/layout of fence, influent and discharge lines, wet well level sensor, power panel, telemetry and water service with back-flow device. The site plan shall also include a driveway and provide safe access for maintenance vehicles and may require more than the property easement. The pump station site and design shall protect electrical and mechanical equipment from damage by the 100-year flooding.

The pump station shall remain operational without wet well flooding (slab elevation above) during the 100-year flooding.

When a public lift station is contemplated, a preliminary site plan review is required to ensure that adequate access and egress for a forty five-foot (45') long and twelve-foot (12') high service truck is provided. The Engineer shall demonstrate that vehicles can enter and exit the station site without blocking traffic.

7.6.2.3 During initial design, all flows from gravity sewers into a lift station shall be directed into a **single "kingpin" 6' minimum diameter polymer concrete manhole** located on the lift station site (reference WWS-19). From this manhole the sole run of gravity sewer to the wet well is installed. Subsequent gravity connections to the lift station shall be made at or upstream of the "kingpin" manhole. Flows exiting the lift station shall be directed through a valve vault, where isolation valves for each pump and a valved connection for bypass pumping are to be provided. See City-provided Drawings for typical layout of valves and fittings.

7.6.2.5 The electric service requirements for the site are:

- **Plans shall document if power is single or three-phased. Three phase is preferred. Single phase must be approved by the City of Lakeland as a special exception.**
- **For smaller than 10 HP Panel:** 240 V or 480 V, 1 or 3 phase, or VFD (Motor shall be 3 phase. Single phase shall be converted to 3-phase. Reference "Wastewater Division Material Specifications" "Submersible Pump Station Power Panel specification.).
- **For 20 HP and 40 HP Panels: 480 V, 3 phase.**
- For larger than 40 HP: 480 V, 3 phase, per approval.

The Engineer shall determine the nature (Voltage, number of phases, etc.) and source location of the electrical power. This information shall be clearly indicated on the plans. If phase conversion is required, that shall be so indicated. If the required electrical service is not available, it is the responsibility of the Developer to make necessary arrangements in advance.

The Water Utilities Department does not provide electrical service. The engineer is responsible for contacting Lakeland Electric or TECO to obtain information and schedules for supplying electrical power.

7.6.2.6 Water service shall be 2", including its corresponding water meter and backflow prevention devices. Reference Detail WWS-15.

7.6.2.7 The minimum pump station site will be 50' X 50', having a well-drained fifteen-foot (15') wide driveway. No appurtenance shall block access between roadway and wet well. A public pump station and related appurtenances shall be constructed within public right of ways or on City owned properties or in an exclusive easement dedicated for Water Utilities. The site shall be secured with six-(6) foot high chain link fencing (reference Wastewater Materials Specification and Standard Detail WWS-19).

7.6.2.8 The wet well shall be sized to provide the following volumes:

- Pump cycle time should be between 15-30 minutes based upon one fill and one draw down, considering both average and peak flow, unless otherwise approved by the City.
- The minimum reserve volume shall be 25% of the above stated pump cycle volume when defined as being between "lead pump start" and "influent" elevations.
- The reserve volume shall provide for "lag pump start" and "alarm" control points.

- Sixty (60) minutes of emergency storage volume (based on peak flow) is required at pump stations to enable time for staff to call out and to report to the trouble site. Emergency storage volume is the available wastewater storage between the alarm elevation and the spillage elevation, applicable when there is a total pump station failure. This volume includes the wet well, and the public gravity sewer system (sewer mains and manholes), if applicable. The spill elevation is the lowest elevation of a manhole top or wet well. Gravity and manholes are taken to already be 25% full. If it can be demonstrated that it is not feasible to obtain 60 minutes, an independently controlled, diesel-driven auxiliary pump can be proposed for approval.
- The wet well, anticipated to receive an abrasive or corrosive waste shall be coated with an impervious lining. (Materials Specification, Section 28.0).

7.6.2.9 Pumps shall be able to maintain a minimum of 2.2-FPS velocity in force mains and never exceed 7 FPS. Pump efficiency should be considered, and the design operating points should not fall within the first or last quartile of the flow and efficiency curves. Stations to be City maintained shall have pumps conforming to Wastewater Materials Specification, whose minimum size is 4 HP.

7.6.2.10 Public pump station control panels shall incorporate radio telemetry in accordance with Wastewater Materials Specification and shall be furnished and installed for stations to be City maintained.

Public lift station pumps are required to be controlled with VFDs, variable frequency drives. Pump control and telemetry will be designed into an all-in-one panel. All panel design and construction, plc programming, telemetry and SCADA programming will be done by a City approved vendor.

For private lift stations, reduced voltage motor starting and stopping shall be required in cases where force main velocity will exceed 4.5 fps.

All public lift station designs will fall into two categories with design criteria based on pump horsepower:

- Below 40Hp and flow rate less than 100,000 gpd; standard all in one panel design within one of three sizes, 10, 20, or 40 Hp.
- 40 Hp and above or flow rate greater than 100,000 gpd; size based on pump Hp. All pumps will have VFD control and a reduced voltage starter as the backup pump controller, also controlled by backup level controls. All communications to the Wastewater SCADA system will be accomplished over the City fiber network, if available within 300 feet of development boundary. The developer is responsible for the nearest city fiber location.

7.6.2.11 Pump stations shall be grounded and have power line surge protection. (Reference Standard Detail WWS-15).

7.6.2.12 Private pump stations may be constructed of materials other than concrete, including fiberglass. The engineer shall demonstrate that the connection design shall be water-tight and submit wet well design for approval.

- 7.6.2.13 **All public and private lift stations** will require a flowmeter on the discharge line. Acceptable manufacturers in accordance with the Wastewater Materials Specification.
- 7.6.2.14 All lift station design calculations shall include buoyancy calculations with a minimum safety factor of 1.2. This safety factor shall be based on water table at grade, displacement of dry soil, and negligible soil friction. Contents of the wet well (water and equipment) and the weight of the top slab shall be excluded.
- 7.6.2.15 **A 1/4" NPT pressure gauge port** to measure pump discharge is required within the valve vault for all stations and should be called out on the lift station detail drawing.
- 7.6.3 Construction Plan Submittals
- 7.6.3.1 The Engineer of record shall provide construction plans, sufficient engineering data, and manufacturer's shop drawings properly labeled to enable review of the plans. Four (4) sets of shop drawings, which list component information (size, manufacturer, make/model, etc.), shall be provided. City approval of plans and drawings shall not constitute a blanket approval of all details, nor relieve the Engineer of any errors or deviations from other requirement.
- 7.6.3.2 Construction plans shall include mechanical equipment with supporting data and calculations, hydraulic data and location/design of site facilities including water and electric utilities, control panel, driveway, and fence.
- 7.6.3.3 Construction plans for public lift stations shall include a site plan and appropriate detail sheets with necessary editing. Detail sheets are available from Water Utilities engineers.
- 7.6.3.4 Mechanical equipment submittals shall include, but not be limited to:
- Assembly drawings, nomenclature, and component materials list.
 - Flotation calculations, weights, and dimensions.
 - Drawings, method of anchoring equipment, and piping connection details sufficient to permit design of supportive structures and connections.
 - Hydraulic data submittals shall include, but not be limited to:
 - Pump and system curves on a graph, indicating design total head, static head, and flow rate.
 - Design calculations, including pump cycle times.
 - If the proposed lift station may affect the operation of existing lift stations, analysis shall be performed with all stations operating.
- 7.6.3.5 Shop Drawings shall include, but not be limited to, mounting dimensions, placement and anchoring of components, including pump, discharge elbow, guide rails, wet well, valve vault, access frames and covers, pipes, valves. Electric control panel schematics and layout shall be provided. Emergency generators may be required.
- 7.6.3.6 The developer assumes full responsibility for all equipment if shop drawings are not submitted during the design/review period.
- 7.6.3.7 Electric Motor data required:
- Name of manufacturer.
 - Type, model, and frame size.
 - Motor horsepower.

- Full load speed.
- Design letter.
- Construction.
- Temperature rise and class of insulation.
- Service factor.
- Voltage, frequency, number of phases.
- Full load and lock rotor current.
- Motor efficiencies at 1/2, 3/4, and full load.

7.6.3.8 Controls and Wiring Diagram requirements:

- Wiring diagrams of all electrical and controls components.
- Assembly drawings, nomenclature, and materials list.
- Outline, dimensions, and heights.
- Method of anchoring control panels.
- Detail description of components.
- Detail of grounding and surge (lightning) protection.

7.6.4 Inspection

The City's **Water Utilities representative** shall at minimum monitor the following pump station checklist during construction. The Contractor's responsibility is not herein limited.

- Notify the **Water Utilities office** at least two working days prior to construction.
- Alignment of pump station, access road, control panel and fencing shall be as indicated on the construction plans.
- Guide rails shall be attached to access lid with approved bracket assemblies. When more than 20', guide rails shall have intermediate support brackets.
- Wet well and valve pit lifting eyes shall be removed after installation to avoid tripping hazards.
- Force main check valves and plug valves shall be installed in the proper flow direction. The plug valve must close with the seated plug towards the wet well, so that solids may drain from the valve.
- All discharge elbows shall be level and plumb to ensure all guide rails will work properly and pumps can be removed easily and seat properly.
- All adapter flanges shall be installed according to drawings to allow easy removal of valves. Bolts shall be torqued according to the manufacturer's recommendations.

- An air gap will be incorporated between the electrical panel and the conduits leaving the wet well to eliminate gas intrusion. Pump cables will be protected with an electrical cable tray with louvered covers on both sides. Stainless Steel strain relief (CGB) fittings will be used in openings to the electrical panel to prevent migration of gases and or water into the panel. Grounded bushings will be used on the ends of the conduits to allow for venting. This will be done in accordance with the COL lift station detail drawings.
- A watertight electrical conduit connector shall be installed to protect the control panel from water intrusion.
- A water meter and backflow preventer shall be installed at the property line with the service extended to the wet well.

7.6.5 Start Up/Final Inspection

7.6.5.1 Prior to certification of projects involving a pump station, the station shall be tested at a pre-startup in the presence of the developer, engineer of record, and pump vendor. This City should be notified at least 72 hours ahead of time before scheduling a pre-startup and startup. Only the City is allowed to operate any public valves. If needed, the City will arrange for personnel to be present. No official startup will occur without a successful pre-startup. This means the station is 100% complete, found to be operational, and meets design standards. For the startup, the developer, engineer of record, pump vendor, and City will be present. A way to quickly fill the well with water is required should multiple tests be needed (**less than 15 minutes**). The field tests and inspection shall demonstrate that:

- The approved pump and impeller were installed.
- Components have been properly installed and are without mechanical defects.
- The system is free of overheating, vibration, overload, and leakage.
- Demonstrate that the control systems operate according to requirements.
- Design operating conditions are met.
- The station will not be susceptible to storm water inundations and has the appropriate grading.

7.6.5.2 If a private station performs a pre-start up with an emergency or temporary power source (generator), a subsequent test shall be necessary when permanent power becomes available prior to an official startup. At a minimum, it shall verify that the electrical system including transformers and conductor operates properly, pump rotation and discharge remain correct, and voltage and current readings are within design limits. All public stations startups must occur on permanent power.

7.6.5.3 The City reserves the right to assess a charge for second start-ups.

7.6.5.4 During any start up, both the manufacturer's representative and engineer of record shall be present at the job site.

- 7.6.5.5 A list of spare parts that the Contractor shall be **responsible for delivering at a startup to the City** for publicly owned stations is found in Lakeland Water Utilities' Wastewater Material Specifications.
- 7.6.5.6 For privately maintained stations, an emergency access key and contact information (Owner's Name, Phone Number, Maintenance, etc.) shall be provided to the City.
- 7.6.5.7 The Owner shall complete the "Privately Owned Wastewater Facility Commitment" form acknowledging ownership and maintenance responsibilities before wastewater service is granted.
- 7.6.5.8 Upon completion of the work, the Engineer shall certify, seal, and deliver as built drawings of the pump station to the City.
- 7.6.5.9 The Developer shall provide guarantees in accordance with City Procedure Manual (Ordinance 3316) for the pump station. Manufacturers' component warranties in accordance with the Wastewater Materials Specification shall be passed to the City.
- 7.6.5.10 The engineer of record shall certify the operation of the pump station and sign and seal the appropriate forms.

7.7 Paving, Curb, Gutter & Sidewalk Work

7.7.1 General

Any work in the existing public rights-of-way (ROW) requires a permit from the appropriate transportation agency. The developer shall be responsible for all restoration costs.

- 7.7.1.1 When open cutting of paving is permitted, the pavement, curb and gutter, driveway or sidewalk shall be saw cut, neatly removed and of a sufficient width to allow proper installation of the pipe. Reference Engineering Standards Detail.
- 7.7.1.2 Signal lights, warning signs and barricades shall be installed and maintained as required.
- 7.7.1.3 No pavement base shall be replaced before the ditch backfill has been inspected and approved. The authority having jurisdiction over the roadway involved shall require density and compaction tests. The City compaction standard is 98% per AASHTO T180.

7.7.2 Paving

The pavement shall be replaced in accordance with the requirements of the governing transportation agency.

7.7.3 Curb, Gutter, Sidewalk & Driveway

Pavement structures shall be replaced with new concrete units having the same cross section as the original. Backfill under concrete work shall be thoroughly compacted and the subgrade approved before any concrete may be poured.

8 ADDITIONAL STANDARDS FOR APPROVAL OF WASTEWATER FACILITIES

8.1 General

- 8.1.1 The City, in promoting an orderly and efficient expansion of its wastewater collection system, shall meet requirements upon the Developer's systems design. It shall be the responsibility of the Developer to coordinate planning and design with the appropriate City Departments.
- 8.1.2 Gravity collection systems shall be used rather than pump station systems where possible and shall be consistent with existing requirements.
- 8.1.3 The City may require that the Developer over design his collection/ transmission system to enable servicing neighboring areas and related flow. Additional costs due to the oversize/over design shall be reviewed with the City to define City contribution to and selection of optimal design capacity relative to costs.
- 8.1.4 The over design alternatives shall include at least:
 - Laying gravity sewer mains at or near minimum grade (or maximum acceptable depth).
 - When pump stations are necessary, install them deeply enough to provide future service to adjacent areas and indicating location.
 - Providing large enough lines and proper routing to facilitate future use and expansion and stub-outs for services.
 - Designation of corridors for utilities.
- 8.1.5 **All components of the City's wastewater system**, other than service connections, shall be in a public right-of-way and/or easement, which may be used for access to said sewer. Rear lot line easements shall be considered inaccessible. Force and gravity mains including manholes shall be constructed beyond the edge of pavement if possible.

Also refer to Section 7.5.1 for other sanitary location requirements.

8.2 Sewer Plans & Submittals

- 8.2.1 Plans shall be sealed by a registered engineer, licensed to practice in the State of Florida. The signature and seal shall be clearly imprinted on the document. The plans shall include a typed or clearly printed name, firm, and address.
- 8.2.2 One copy of the plans to be sent to the FDEP for the wastewater permit shall be submitted to the City to enable processing of the FDEP application.
- 8.2.3 Construction plan submittals shall include plan and profile views of both gravity and force mains for all new construction. Rim and invert elevations shall be provided in the profile view. The plans shall show high points with elevations. Sewers shall have direction of flow indicated in plain view.

- 8.2.4 Plans shall be dimensionally correct and drawn to a scale not smaller than 1 to 40, unless not legible because of the number of details. Significant features should be shown in enlarged detail if necessary. All plans shall be legible and suitably sized to allow scanning and/or reduction for records retention.
- 8.2.5 Profile views of the sewer shall show water mains, storm sewers, storm conflict structures, ditches/swales, and both existing and finished grade. All encroachments shall be noted.
- 8.2.6 The location and size of all existing and proposed water mains, water wells, reclaimed/reuse water lines, wastewater mains (gravity and forced), storm sewers and other utilities shall be determined and shown on the plans. DEP [RSWF *20]
- 8.2.7 Construction plans shall detail the connection of the proposed system into the existing collection system. This includes, but is not limited to, connection to existing manholes, gravity mains, and force mains. Connection to existing wet wells (Pump Stations) is not allowed.
- 8.2.8 If the City, FDEP or others require revisions, the revisions shall be submitted to the department.
- 8.2.9 Shop Drawings require:
- Pump Stations (if for public maintenance).
 - Power Panels & Telemetry (if for public maintenance).
 - Wet Wells and Valve Pits (if for public maintenance).
 - Manholes of 15' depth and greater.
 - Valves (plug, check, air release, and other).
 - Grease Traps.
 - Any items outside the established City materials listing for usual operations and maintenance.
- 8.2.10 As built drawings are required in accordance with Section 9.8.

8.3 Design Criteria

Unless other justification or data is submitted, residential sewer systems shall be designed based on an average daily per capita flow of wastewater of not less than 80 gallons per day including infiltration, exclusive of waste flow from industrial or commercial establishments. Waste flow from industrial or commercial establishments may be based upon FAC 64E6 (formerly FAC 10D6) or other justifiable data.

8.4 Protection of Water Supply

Where sewer lines run parallel to waterlines, there shall be a minimum separation of ten (10) feet horizontally. Encroachment upon this separation, if permitted by the Water Utility, shall require the use of C900 PVC or ductile iron pipe meeting the Wastewater Materials Specification. (Reference Standard Detail WWS-11, WWS-11A and WWS-11B).

Sewers shall be constructed crossing below water lines providing a minimum of 18" vertical separation. Where a sewer must encroach upon said separation, the sewer pipe shall either be placed in a steel sleeve or shall be arranged so sewer and water joints are

separated by at least 10 feet. Where a force main crosses a water main, the main joints are centered from the point of crossing and with no less than 10' separation between any two joints. Where there is no alternative to sewer pipes crossing over water mains, the criteria for minimum separation for lines and joints shall be as stated above.

Concrete encasement of sewers or water mains shall not be permitted.

8.5 Gravity Sewers

- 8.5.1 All sewer mains shall be a minimum of eight (8) inches in diameter and of color and/or code marking and specification in accord with the Wastewater Materials Specification.
- 8.5.2 All sewers shall be laid with straight alignment between manholes and in accordance with Section 7.2.3.
- 8.5.3 Sewers shall have the following minimum grades:

Diameter	Slope %	Diameter	Slope %
4"	1.0	21"	0.10
6"	0.60	24"	0.08
8"	0.40	27"	0.07
10"	0.28	30"	0.06
12"	0.22	36"	0.05
15"	0.15	42"	0.04
18"	0.12	48"	0.035

The above chart lists the required minimum slopes. Sanitary sewer designs should consider construction variations and account for possible deviations such that these slopes are met after construction completion.

- 8.5.4 Sewers shall be designed to have mean velocities at not less than 2.0 feet per second using the Manning formula when flowing full. The pipe roughness coefficient "N" shall be taken to be 0.013 to account for abrasion induced roughness as sewers age.
- 8.5.5 **Service lateral connections** shall be 6 inches in diameter at a minimum of 0.7%, with 1.0% slope preferable. Exceptions permitted are 4" services to individual residences and 8" where an individual user's demand is anticipated at 0.07-MGD minimum (average daily).
- 8.5.6 All gravity sewers shall have at least thirty six (36) inches of cover, except as provided in Standard Detail WWS-11.
- 8.5.7 Sub aqueous gravity sewers shall not be permitted where practical alternatives are available; and if permitted, shall be inside a steel casing. Subaqueous sewers shall have a minimum cover of thirty six (36) inches below the bottom of the wet ditch, canal, or other body of water, or shall have a suitable design acceptable by the City to ensure protection. Such lines shall be clearly and permanently marked where appropriate, at or near the edge of the water body.
- 8.5.8 Gravity sewers shall not be designed in storm drainages, gutters, swales, and the centers of inverted crown ("V" section) pavements.

8.6 Force Mains

- 8.6.1 Force mains shall be a minimum of two (2) inches in diameter and of color and/or code marking and specification in accordance with the Wastewater Materials Specification. Force mains shall discharge to manholes in accordance with Section 7.5.5 Manhole connections. The minimum cover shall be 36" except as provided in Standard Detail WWS-11. The approach and departure from a terrain crest with an ARV requires greater than 36" cover and shall be approved by Water Utilities Engineering.
- 8.6.2 Force mains restrained mechanically shall be shown in the plan view and shall specify the restraint type and provide supporting calculations.
- 8.6.3 Force main alignments may contain curvature in place of bend fittings. Ductile iron mains may contain joint deflections limited to 2 degrees per joint. PVC mains may be curved such that a true arc is formed uniformly throughout the pipe segments. PVC pipe curvature shall be limited in accordance with the following table:

Diameter (inches)	Minimum Radius (feet)
4	120
6	180
8	240
10	280
12	350

- 8.6.4 Where force main velocities will exceed 4.5 feet per second, design allowances shall be made for cyclic surge pressures. Surge pressure designs may include the use of pipe rated for higher pressure, superior gas venting from force main and controlled starting and stopping of fluid.
- 8.6.5 All plug valves in force mains shall be "full circle" opening to facilitate pigging. **Isolation plug valves shall be placed at 800' maximum spacing**, or otherwise as prompted by significant topographic features (creeks, railroads, etc).

Plug valves shall be placed at the point private wastewater systems connect to the city system.

Plug valve installation shall include valve box and a 24-inch by 4-inch thick concrete collar.

Plug valves greater than 6-inch with gear actuators, shall be installed with valve shaft horizontal to allow vertical operation of shaft. The valve plug in the open position shall be open at the bottom of the flow path.

The vertical force main alignment shall be designed, with a continuous positive or negative slope so far as is practicable, to promote the natural discharge of gases to ARV or manhole, rather than paralleling surface topography. See Materials Standard, Section 11.0.

- 8.6.6 Air release (ARVs) and air vacuum release valves within manholes shall be provided at high points in the force main (reference Detail WWS-8 and WWS-8B). The force main grade shall be reduced sufficiently in its approach to the crest to provide the necessary forty-eight (48) to fifty-five (55) inches of cover over the pipe where it enters the manhole.

The grade transition shall be smooth and shall at no point retrograde. Additional ARV's shall be installed as deemed necessary by Water Utilities Engineering.

- 8.6.7 Force mains to be manifolded shall be provided with plug and check valves installed inside concrete vaults near the manifold location, to enable isolation of force main branches. Reference Standard Detail WWS-10.

8.7 Conflicts

- 8.7.1 Wastewater sewer designs shall provide adequate support when overlaid by massive structures including storm sewers. For design alternatives where storm sewers overlay sanitary sewers with separations of less than 12", reference Detail WWS-11.
- 8.7.2 Conflict manhole designs shall provide for:
- Minimized manhole and differential manhole pipe settling.
 - Flexible walls to pipe joints tolerant to limited differential settlement.
 - Sizing sufficient for normal manhole operation and maintenance.
 - Epoxy lined Ductile Iron Pipe for use in conflict structures.

8.8 Location of Facilities

It shall be the engineer's responsibility to field verify the location and elevation of all appropriate utilities and drainage facilities for the purpose of design and construction. The proposed point of connection to the existing system shall be field located. Design information will be provided by the City for its facilities but remains subject to field verification by the engineer. Contacting other involved utilities will not be done by the City.

Prior to construction in any public right-of-way or easement, the contractor shall make initial and update notifications to the Sunshine One-Call system in accordance with its guidelines.

8.9 Water Supply to Facilities Served by the Wastewater Utility

An accurate method of metering the wastewater generated by all facilities and structures connected to the wastewater utility is essential. It is generally assumed all facilities served by COL Wastewater are served by COL Water, and the water consumed through the meter(s) shall be the basis of the wastewater bill. Any other provision must be explicitly approved by the Director. The typical basis of these approvals fall into the following categories:

- The facility or structure is served by another private or public water utility. The utility shall either allow the City to read its water meters, or shall agree to provide the data generated to the City in accordance with our needs.
- In some areas, the City has established agreements to bill for other utilities for water and other services. Where these agreements exist, the City shall bill based on metered consumption.

- Where the customer can establish significant “loss” of water beyond normal expected losses, the customer may elect to install and maintain a sewage meter. Normal losses are in the 30% range between metered water in and metered sewer out of most facilities. The meters shall be installed in a manner to allow safe, convenient, and expeditious reading by City staff.
- Where the customer is served wholly or in part by a private water supply, all uses that generate wastewater shall be metered. The meter(s) shall be installed in a manner to allow safe, convenient, and expeditious reading by City staff.
- Wastewater credit meters are possible where the customer has significant uses of water which do not generate wastewater. Plumbing of a device to the sewer outfall is sufficient to establish the device produces wastewater. The customer shall, with the express permission of the director, install and maintain these credit meters. The meters shall be installed in a manner to allow safe, convenient, and expeditious reading by City staff. Where the use produces small quantities of waste (i.e. cooling towers), alternate disposal of this waste shall be provided.
- Where strength of the waste is an issue, a wastewater metering/sampling installation shall be required. The data generated shall form the basis of all charges for service (See monitoring manhole requirements).

For the purposes of this section, “safe, convenient, and expeditious” shall mean the meter is located in such a manner the City employee shall be able to obtain the data without significant deviation from his normal duties. The meter shall not be located in a manner to require entering confined spaces or climbing ladders. The meters shall be accessed at ground level. Accessing the meter shall neither require entering a building, nor fenced areas not otherwise accessed by the employee. Where both City and private meters are provided, they shall be located in the same area.

8.10 Unaccepted Facilities

Until all requirements are met and ownership of Public Facilities is accepted by the City, the developer/contractor is fully responsible for maintaining, repairing and complying with locate requests as needed.

9 POST CONSTRUCTION TESTING AND SUBMITTALS

All wastewater systems, both public and private, must be tested to confirm compliance with City of Lakeland Wastewater Standards, in the presence of the Water Utilities Inspector.

9.1 Tests, Responsibility and Charges

A current schedule shall be maintained by the Water Utilities Engineering Division.

If retesting is required more than 2 times on the same system/phase, the City shall charge time, equipment, and material costs for each subsequent test.

9.2 Minimum Notice

No inspection shall be scheduled without two full working days' notice. Working days shall be considered as regularly scheduled working days of the City of Lakeland. (See Personnel Policy)

9.3 Testing of the Sanitary System

9.3.1 General

- 9.3.1.1 The Developer shall be required to perform tests to ensure installation of facilities to City Standards. Gravity mains and services shall be inspected by closed circuit TV and by infiltration and exfiltration testing if required. Manholes and wet wells shall be visually inspected and have exfiltration tests performed. All force mains shall be leak tested prior to acceptance. Pump stations shall be tested in accordance with Section 7. Testing shall be scheduled and conducted to minimize interference to the Contractor's progress. The Contractor shall coordinate the inspection with the City's Water Utilities Inspector.
- 9.3.1.2 The Contractor shall notify the City two working days in advance for testing and inspecting (See 9.2). Tests and inspections shall be made as soon thereafter as practicable. The Contractor shall furnish all labor, materials, services and equipment, including power, fuel, meters, gauges, water and other items and apparatus necessary for making leakage tests, preparing pipelines for testing, assembling, placing, and removing testing equipment, and placing pipelines in service; all to the satisfaction of the City.
- 9.3.1.3 When the contractor desires to have inspections performed after regular business hours, on holidays, or on weekends, he shall be responsible for the additional costs incurred to provide the inspectors and equipment. Should the City elect not to comply with the request, the inspections must be scheduled for regular business days and hours.

9.3.2 Exfiltration and Infiltration Testing

- 9.3.2.1 If the Exfiltration/ Infiltration Test shall fail for the below described reasons or any other reason(s), corrective measures shall be required prior to the City being requested to observe a subsequent test(s).
- 9.3.2.2 The City of Lakeland Water Utilities Inspector shall determine the appropriate testing procedure. Both infiltration and exfiltration testing may be required.
- 9.3.2.3 Exfiltration

Exfiltration test shall be conducted on portions of the gravity mains where the Existing Ground Water Table (EGWT) is at or below the crown of the pipe of the lowest invert in the gravity pipe run.

All manholes shall be exfiltration tested and shall be filled to at least 1-inch above the joint between the manhole frame and chimney. If necessary, the wastewater system may be tested in sections.

The Exfiltration Test shall be performed for 2 (two) hours. A City of Lakeland Water Utilities Inspector or representative must be present during the entire test.

During the Exfiltration Test, 0 (ZERO) leakage shall be allowed. If leakage is measured, the test will be terminated at that time and a subsequent test will be required to be scheduled at a later time. Only the City Water Utilities Inspector or representative shall measure and record the water elevation in each section of line being tested.

9.3.2.4 Infiltration

TV inspection will generally suffice as the infiltration test. No visible flow should be detected. Should infiltration or inflow be suspected the city reserves the right to require additional testing.

TV inspection of the gravity system is required regardless of whether an exfiltration test is performed.

9.3.2.5 Wet Wells

For testing both public and private wet wells, infiltration and exfiltration tests must be performed as described above. However, in the case of exfiltration testing, the wet well shall be filled to within 6-inches of the bottom of the top slab.

9.3.3 Force Mains – Leakage Test

Before leakage testing, force mains greater than or equal to 6-inches in diameter must be filled with water and flushed using poly pigs, which have been marked for retrieval. Any piping in this size range, but in short runs (i.e. stubs) may be flushed without poly pigs with prior approval of Water Utilities Engineering.

9.3.3.1 The contractor shall conduct a pressure and leakage test as required by City Standards, the engineer of record, and conforming to approved state, federal, and local standards. A copy of the pressure test form with pre-test data shall be provided to Water Utilities Engineering 48 hours prior to the test.

For SDR 11, Class 900, or ductile iron pipe, the following applies. First, a pressure at least equal to the City's existing system pressure must be maintained for two (2) hours. Should the new system appear tight, the pressure test may begin. The contractor will pump pipelines up to a pressure equal to 150 psi. Should the pressure at any time fall below 145 psi before the test period ends, the pipe lines shall be repressurized to at least 150 psi and the amount of water required recorded by the engineer or his designee. The test period shall be for two (2) hours unless otherwise specified by the City.

The amount of water forced into the line during the two-hour test shall be taken as the basis to compute the leakage for a 24-hour period. Allowable leakage shall be computed on the appropriate pipe materials Pressure Test Form by the engineer of record. The engineer of record shall supply the City a completed copy of the pressure test form for all tests attempted.

Tests using air instead of water are not acceptable.

For lines to be maintained by the City of Lakeland, the pressure test will not be accepted by the City of Lakeland if not witnessed by the Water Utilities Inspector. The Water Utilities Inspector shall witness the test and initial the form. The form shall be prepared in duplicate, and one original shall be provided to the Water Utilities Inspector.

Privately maintained force mains shall be inspected, pass all required tests, and have correct marking.

- 9.3.3.2 The leakage for all force mains, as determined by the above test, shall not exceed the allowable leakage as given by the following from Section 4.2.2 of AWWA Specification C600 82:

Diameter (inches)	Maximum Allowable Leakage (Gallons per Hour per 1000')
4	120
6	180
8	240
10	280
12	350

- 9.3.3.3 During the test, each valve shall be operated through several complete cycles of closing and opening. In addition, each valve will be tested in the closed position by having the test pressure applied to one end of the valve only. Each end of the valve shall be tested in this manner. There shall be no visible leakage through the valves, and the valves shall not show any evidence of structural distress.
- 9.3.3.4 All harnessed sections of the buried force main shall be completely backfilled before such sections are tested.
- 9.3.3.5 HDPE pipe will be tested in accordance with the Lakeland Water Utilities Directional Bore Design, Requirements, and Post-Construction Standards.
- 9.3.3.6 For any other pipe material, consult with Water Utilities engineering before scheduling the testing.

9.3.4 Repair of Leaks

When infiltration or leakage occurs more than the specified amount, defective manholes, pipe, pipe joints, or other appurtenances shall be located and repaired at the expense of the Contractor. If the defective portions cannot be located, the contractor, at his own expense, shall remove and reconstruct as much of the original work as necessary to obtain a sewer or force main within the allowable infiltration or leakage limits upon such retesting as necessary and directed by the City.

9.4 Closed Circuit Television Inspection of Sewer Lines

9.4.1 General

During plans review, manhole numbers shall be provided by Water Utilities Engineering for City maintained systems and used in the video log sheets for identification. All new gravity sanitary sewer lines shall be inspected by closed circuit TV prior to being accepted by the City, whether private or City maintained.

9.4.2 Requirements Prior to Inspection

- 9.4.2.1** All elements of the sewer system must be installed and be completed including sewer mains, services, and manholes. **This shall include poured and finished inverts with frame and covers set to final grade.**

- 9.4.2.2 All sewer mains and services shall be cleaned by flushing prior to the TV inspection. A hydraulic cleaner shall not be used during the TV inspection procedure. If lines are found to be unclean during the TV inspection, the inspection will be terminated.
- 9.4.2.3 If a sewer line is to be cleaned without cleaning all lines below the line in question, the Contractor shall plug all lines entering the manhole from which the line is being cleaned and shall remove all debris and water from that manhole before removing plugs.
- 9.4.2.4 When sewer lines are under a paved area, the area shall have base material installed and compacted before scheduling the final TV inspection.
- 9.4.2.5 All sewer mains and services shall be pre-televised in order to identify and fix any deficiencies prior to scheduling inspections with the City.
- 9.4.3 Procedure for Televising
- 9.4.3.1 The Water Utilities Engineering Division Inspection Section shall be given two (2) working days notice prior to the planned TV inspection. The Contractor and the Inspector will agree upon a definite time and date at that time. No T.V. inspection shall commence without the presence of the Inspector. **Televising shall start within 15 minutes of the schedule start time. Inspectors are not permitted to stay and wait for tardy contractors or faulty equipment.**
- 9.4.3.2 TV inspections shall commence in the most upstream segment of the system; working downstream, to prevent foreign substances from entering a section previously televised. Within each segment, the camera shall travel in a direction which allows viewing of service laterals connected to the first pipe joint and beyond.
- 9.4.3.3 No more than 24 hours prior to placement of camera into sewer, water shall be placed in the upstream manhole of the section to be televised to enable detection of changes in grade that may be present.
- 9.4.3.4 The TV camera and videotape shall be turned on before the camera is placed in the manhole for inspection and shall not be turned off until the camera is removed from the manhole. The camera shall be moved through the line under the control of the TV camera operator. The camera shall be drawn through the line at a rate not to exceed thirty (30) feet per minute and shall stop at all **service lateral connections** in the line, or at locations of concern as identified by the Inspector.
- 9.4.3.5 Video footage and logs shall be made of the entire system being televised. A flash drive containing both the video footage and log shall become the property of the City upon completion of the TV inspection (not a copy). The flash drives and logs shall be labeled in such a manner that states the project name, date of inspection, line sections, and city manhole numbers.
- 9.4.4 Television Equipment – Minimum Requirements
- 9.4.4.1 The closed circuit TV camera shall produce a clear color picture on the video monitor and on **the logged videos turned in via flash drive**. The camera shall be able to show detail to the point that all joints and any defects may be readily seen at the time of inspection. The camera shall be capable of viewing in a 360-degree pattern.
- 9.4.4.2 An electronic data view shall be used during the TV inspection, which projects the following information onto the video screen and videotape:
- Date of inspection.
 - City assigned manhole number(s) of sewer line being inspected.

- Footage of sewer line during inspection.

9.4.4.3 The video recorder shall produce a no noise still picture, and provide both audio and video during the inspection.

9.4.4.4 To verify the accuracy of pipe grade, a gauge shall be visible in front of the camera lens while the camera is propelled through the sewer line. If the camera is pulled through the line, the City has a grade gauge that can be utilized by the contractor. If a self-propelled camera is used for the inspection, it is the responsibility of the contractor to provide a means of indicating, at a minimum, ½-inch and 1-inch deviations in pipe grade. The apparatus shall not impair the camera's normal operation. All contractor supplied devices must be pre-approved by the City's Water Utilities Inspector prior to beginning inspection of the sewer lines.

9.4.4.5 Audio of the inspection shall be simultaneously recorded on the videotape. The audio shall consist of ordinary description and commentary.

9.4.5 Requirements Prior to Sewer System Being Accepted

9.4.5.1 Sewer systems shall be constructed as designed, on-line and on-grade. However, while sewer construction on-line and to grade is required, circumstances sometimes occur resulting in low areas or dips in gravity sewer lines. Since relative pipe depth available to flow relates to relative pipe capacity, the criteria for permitted pipe dip herein are based upon the pipe diameter. Based upon the conditions or circumstances which created this deviation, the City may at its sole discretion permit on a case-by-case basis deviations if the following criteria are not exceeded:

Size	Maximum Depth of Deviation	Size	Maximum Depth of Deviation
8"	0.5"	18"	1.0"
10"	0.5"	21"	1.5"
12"	0.75"	24"	1.5"
15"	1.0"	27"	1.5"

The maximum negative deviation from minimum standard grade in any sewer intended for public operation and maintenance is 10%.

9.4.5.2 Any sections requiring repairs due to pipe fractures, poor grade or dips must be re-televised within the same guidelines after repair work is completed.

9.4.5.3 Any section found to be unclean or any clogged clean outs shall also require re-televising when cleaning of said line is completed.

9.4.5.4 Any sections of pipe with more than 5% deflection (reduction in vertical inside diameter) shall not be accepted. Mandrel proofing will be required when TV inspection indicates deflection.

9.5 Continuity of Tracer Wire

After completion of all legs of a given project, continuity of conduction from one end to the other shall be demonstrated. This shall be demonstrated by connecting a signal generator at one terminus of the system and tracing the wire throughout the installation. Where the size of the system precludes a single connection, significantly overlapping sections may be individually tested. The Water Utilities staff may also test tracer wire.

Any break in conductivity shall be located and repaired by the installer of the pipe/wire and re-tested for acceptance.

9.6 Final Inspection

The City for compliance with approved construction plans and City requirements shall inspect all facets of sanitary sewer construction including pump stations. A Final Inspection shall not be requested prior to all wastewater facilities being completed.

9.7 Site Restoration

When the job is completed, all waste material and debris caused by or accumulated as a result of the job, shall be removed from the job site. Any depressions resulting from settlement of backfilled trenches shall be refilled.

9.8 As-Built Drawings

As built drawings shall conform to the definition in Section 2.1.

- 9.8.1 The Developer shall submit complete wastewater "as built record drawings" to the City. This submittal shall **include two sets of paper hardcopies, stamped "record drawings" and signed and sealed by the Engineer of record and one electronic copy in .pdf format** signed and sealed by the Engineer of record who has been retained by the Developer to provide Professional Engineering services during the construction phase of the project completion.

The Engineer shall certify that the system has been constructed substantially in accordance with approved plans and specifications, or that any deviations will not prevent the system from functioning in compliance with F.A.C. 17 604.

The engineer shall note and explain substantial deviations from the approved plans and specifications, including deviations from approved sewer slopes greater than 10%. The 10% deviation does not allow the final slopes to be less than the previously stated/required minimum slopes. Any slopes found to be less than the minimum shall be corrected at the developer's expense prior to acceptance and signing of FDEP clearance forms.

- 9.8.2 "As Built" drawings must accurately reflect the constructed system including any changes made during construction. Obtaining a Certificate of Occupancy shall be contingent upon receipt and acceptance of Engineer certified "as built" drawings.

Certifications annotated as based upon information provided by others, not under the supervision and control of the engineer, are not acceptable. Annotation disclaiming accurate knowledge and/or description of the facilities is not acceptable.

9.9 Certificates of Dedication / Schedule of Values

Where the City shall assume maintenance responsibility for all or some portion of a system, the developer shall prepare a Certificate of Dedication, clearly outlining the facilities to be transferred to public ownership and the portions (if any) to remain in private hands. Accompanying the Certificate of Dedication shall be a schedule of values for all facilities dedicated to the City.

9.10 Warrantee Certificates

The developer or contractor shall convey to the City of Lakeland all warrantees provided by the manufacturer of all components and equipment installed. Where the actions or omissions of the developer/contractor have potentially voided any portion of the warrantees, the contractor shall assume this responsibility.

The developer/contractor will actively pursue resolution of warrantee claims made by the City.

Additionally, any contractor employed by the City will provide a warrantee as outlined in the bid package.

All portions of the installed wastewater system and site restoration shall be fully guaranteed by the developer against material defects or improper workmanship for a period of one year from acceptance by the City. During this time any necessary repairs will be made by the developer at no cost to the City. Any repairs made by the City during this period shall be charged to the developer. All repairs will be overseen by the City. Extended warrantee period or maintenance bonds may be required because of soil conditions, continual failures, etc.

When a development inside the City of Lakeland limits is covered by a maintenance guarantee, bond, or similar instrument, the warrantee period shall not end prior to the end of the maintenance period.

9.11 Conveyance of Easements

All facilities that are accepted by the City for public ownership and maintenance shall be constructed within the public right-of-way or in easement granted to the City. Where all or portions of any system being placed into service are not either in an already recorded right-of-way or easement, or are upon properties owned or controlled by persons other than those receiving service, appropriate easements shall be conveyed. The easement shall be of sufficient size and configuration to allow maintenance and repair of the facilities contained within the easement. Executed easements conveyed to the City prior to acceptance of the system shall be general utility easements, not strictly wastewater easements. Lift Station sites shall be conveyed as an exclusive lift station easement or in fee simple with the grantor paying all closing costs, including title insurance. Where private facilities cross property of others, the City shall receive copies of the recorded easements. All easements and deeds obtained shall be recorded by the City.

9.12 Wastewater Service Agreements

Recorded copies of the accepted agreement (if applicable) shall be on file before Water Utilities shall release the Certificate of Occupancy (CO) of any building served by the expansion.

9.13 Annexation Agreements

Recorded copies of the accepted agreement (if applicable) shall be on file before Water Utilities shall release the Certificate of Occupancy (CO) of any building served by the expansion.

9.14 Provision of Contact Numbers of Responsible Parties

To facilitate the restoration of proper service in privately maintained systems connected to the City's system, the City shall receive information on where to direct emergency service calls and complaints lodged against the private system.

9.15 FDEP Certifications

FDEP Certification packages for wastewater system construction shall be submitted in a timely manner. Allowing for both City and FDEP action, a period of several weeks will be required for approval. Use of an uncertified wastewater system is prohibited by FDEP. The Water Utilities Department, in response to its obligations to the FDEP, reserves the right to withhold water and wastewater service until both the water and wastewater systems are released by the regulatory agencies.

No Certificate of Occupancy (CO) will be released by the Water Utilities Department, without complete regulatory clearance (water and/or wastewater, as applicable) of the utilities serving the building(s).

10 POLK COUNTY SCHOOL BOARD

Recognizing the School Board is exempt from some municipal regulations, a separate policy exists for facilities designed for, built by and maintained by the Polk County School Board. Contact Water Utilities Engineering for a current copy of the policy document.

11 DESIGN STANDARDS FOR MOBILE HOME & TRAVEL TRAILER PARKS

11.1 General

This section addresses private mobile parks as defined in 10D-26 but not subdivisions containing mobile homes.

- 11.1.1 "Laterals" are defined as "that portion of a park drainage system extending to a mobile home or travel trailer site."
- 11.1.2 The sewer laterals shall be installed in a separate trench not less than five feet (5) from the park water service.
- 11.1.3 Each travel trailer shall be considered as six (6) fixture units in determining discharge requirements in the design of park wastewater facilities.
- 11.1.4 The minimum sewer lateral size shall be four (4) inches, with a minimum of 1% slope.
- 11.1.5 Manholes and/or clean-outs shall be provided as required in Chapter VII of the Florida Building Code, Chapter 7 of the Florida Building Code, Plumbing.

11.2 Service Connections

- 11.2.1 Sewer inlets shall be four (4) inches in diameter and extend above grade 3" to 6". **Inlets in unpaved areas shall have a 2'x2' square concrete pad.** Each inlet shall be provided with a gas tight seal when connected to a trailer and have a gas tight seal plug for use when not in service.
- 11.2.2 Travel trailer sites shall be provided with a house trap. Sewer laterals over thirty (30) feet from the main park drainage sewer shall be properly vented and provided with a clean out brought to grade.
- 11.2.3 Service connections shall be located and terminated, providing the shortest possible drain connection between trailer outlet and service connection inlet.
- 11.2.4 Drain connections shall slope continuously downward and form no traps. All pipe joints and connections shall be installed and maintained gas and water tight.

12 Wastewater Rates, Charges and Fees

12.1 Wastewater Rates – by Ordinances and Resolutions

12.1.1 Residential Rates

The basic monthly customer service charge for residential customers is established for Single and Multiple dwellings. The expected flow is capped at 12,000 gallons per month.

12.1.2 Commercial Rates

The basic monthly customer service charge for commercial customers is based upon the size of the domestic water meter serving the facility.

The volume charge is calculated as a function of the domestic water provided to the facility.

12.1.3 Connection Charges

Customers shall pay a connection and inspection fee to connect to the wastewater system. The customer located inside the CITY shall pay and obtain a City plumbing permit. The customer located outside the CITY shall pay and obtain a County plumbing permit.

12.1.4 Pollution Control Fee (Impact Fee)

Each residential customer shall pay a Pollution Control or Impact fee prior to connecting to the CITY's wastewater system. For single family residential customers, the impact fee shall be based on 260 gpd average.

Attached single family homes and multi-family dwelling units (townhouses, condominiums, apartments, duplexes, etc.), and mobile homes, equal 244 gpd (does not include irrigation).

Hotels, motels, dormitories, and assisted living facilities equal 150 gpd/ per room (does not include food service or irrigation)

Commercial and industrial customer impact fees are based upon the expected / designed wastewater flow. Plumbing fixture unit's count may be used if required. For purposes of such computation 16 fixture units = 260 gpd.

12.1.5 Industrial Surcharges (per Lb. / Mo.)

High strength surcharges are imposed upon commercial or industrial customers whenever it is determined that their volume of equivalent daily flow of wastewater, in combination with strength, exceeds parameters established by CITY ordinance.

12.2 Force Main Tap Charges

Charges for taps to a City of Lakeland force main are established by contacting Water Utilities Engineering.

The work included in this charge shall only be for excavation and tapping into the force main. Any other work or requirements determined necessary by the City shall be paid by the customer.

13 Forms

All forms from the wastewater specifications, along with the material specifications and engineering detail drawings, are available on the City of Lakeland's engineering website.

[City of Lakeland Engineering and Design Standards](#)