
JEA Water, Sewer, and Reuse Design Guidelines

Section 1.0 General Information

1.0 General

Customer Order Management (COM) consists of the JEA Director, Managers, Engineers, Technicians, and Coordination staff.

JEA COM team is trained to assist in the project management, coordination with planning, system availability, hydraulic analysis, design review, construction inspection, as-built review, and acceptance processes of developer installed utility systems.

This section provides a summary of the processes included in the initial stages of the project development and the JEA personnel involved in the coordination of new developer installed utility system projects.

1.1 Preliminary Information Requests

1. Location Request

Upon request, JEA will provide an informal response using record information to find the nearest utilities to a site.

JEA – Records Section

21 W. Church St., T5

Jacksonville, FL 32202

Phone: (904) 665-4403

Fax: (904) 665-5713

E-mail: recordsrequests@jea.com

Web Site: www.jea.com/business/services/contractor/asbuilts.asp

2. Availability Request

The availability request is for similar information as a location request, but it involves a formal written response. In order for COM to evaluate an availability request as quickly and accurately as possible, the developer or his engineer must complete an availability request form. For the developer's convenience, this form can be completed on-line at <http://www.jea.com> under the sections entitled "For Your Business / Services and Solutions / Developers and Builders". Alternatively, the information requested may be emailed to wsavail@jea.com.

a. For commercial or residential developments with an anticipated average daily flow greater than or equal to 15,000 gpd:

JEA Water and Sewer System Planning

21 W. Church St., T11

Jacksonville, FL 32202

Phone: (904) 665-4441

Fax: (904) 665-7369

b. For commercial developments with an anticipated average daily flow less than 15,000 gpd:

JEA W/S Order Fulfillment

21 W. Church St., T4

Jacksonville, FL 32202

Phone: (904) 665-8880

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Fax: (904) 665-7372

c. For residential developments with an anticipated average daily flow less than 15,000 gpd:

JEA W/S Order Fulfillment

21 W. Church St., T4

Jacksonville, FL 32202

Phone: Southside Duval County, St. Johns County (904) 665-4406

Phone: North/Westside Duval County, Nassau County (904) 665-4469

Fax: (904) 665-7372

3. Availability Response

JEA will send the requesting party a written availability response with an availability number. This will be the reference number used through-out the permitting, plan review, and inspection processes. Where the proposed project requires a water and/or sewer main extension for a pipe that does not exceed 12" diameter, the assigned availability number will also become the JEA permit number.

Section 2.0

Water, Sewer, and Reuse General Design Guidelines

2.0 General

All projects requiring plan review shall have a water, reuse water and sewer availability performed prior to submittal. The number created at this step establishes the assigned JEA project number which is used for processing and tracking the project through JEA from the availability to the final acceptance.

JEA, in coordination with the Developer's Engineer, reserves the right to specify the point of service, the size of service, the type of service, and the general layout of the overall system within the guidelines established in this manual.

Water, reclaimed water, and sewer distribution and collection systems shall be designed and constructed according to the most current editions of the following publications:

Documents	Web Address (Link)
1. JEA Water & Sewer Design Guidelines	http://www.jea.com/business/services/devandbuild/developers.asp
2. The DIS Manual (future)	
3. Industrial Pretreatment Requirements	http://www.jea.com/business/services/industrialpre/index.asp
4. JEA Rules & Regulations for Electric Service	http://www.jea.com/business/services/devandbuild/rulesregs.asp
5. JEA Rules & Regulations for Water & Sewer Service	
6. JEA Water and Sewer Standards Manual	http://www.jea.com/business/services/contractor/standards.asp
7. The Recommended Standards for Sewage Works (Ten State Standards), as well as all FDEP and other applicable federal, state and local requirements	

For utility work outside of Duval County, the location of water meter boxes, the type and location of fire hydrants shall comply with the local (County) design and construction utility standards.

The engineer shall coordinate the location of water, reclaimed water and sewer facilities with other utilities (electric, gas, telephone, and cable TV) to minimize conflicts. Facilities shall be designed such that conflicts with driveways and sidewalks are minimized. In the event of conflict with a future driveway or sidewalk, the Developer and/or Builder shall be responsible to resolve the conflict at its expense.

2.1 Order of Precedence

For developer installed systems, JEA will generally consider the following order of precedence in resolving any conflict, error, or discrepancy:

1. Approved final design plans
2. Approved regulatory permits (JEA, DEP)
3. Approved County/FDOT agency permit requirements
4. JEA Water & Sewer Design Guidelines
5. JEA Water & Sewer Standards Manual
6. JEA Rules & Regulations for Water & Sewer Services

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2.2 Preliminary Design Review

1. General Plan Submittal Requirements:

Two sets of clear and legible design plans that have been signed and sealed by a design engineer registered in the state of Florida shall be submitted on 24" by 36" sheets for the preliminary plan review by JEA. As a minimum requirement, the following shall be included in the design drawings:

- a. A north arrow with scale indicated,
- b. A vicinity map,
- c. Lot numbers and street names,
- d. A permanent benchmark or temporary benchmark referenced to a permanent benchmark referenced to State Plane Coordinates,
- e. The engineer's name, project name and all phases to be planned, designed, and constructed on all sheets,
- f. Existing easements clearly marked with size, location and grantee,
- g. All materials shown and clearly labeled (pipe, valves, fire hydrants, fire sprinkler lines, water meters, fittings, manholes, services) with associated elevations, sizes, types, composition, slopes, and appurtenances,
- h. Approximate topographical location of existing utilities within the right-of-way including water mains, reclaimed water mains, force mains, gravity sewers, storm sewers, electric, gas, fiber optic, cable, and telephone,
- i. When connecting to an existing utility line, both horizontal and vertical field verification of the main, location and size using an approved Subsurface Utility Engineering (SUE) method is desired,
- j. Elevations (manhole tops and inverts) of all existing sewer facilities within the right-of-way, and easements,
- k. A site plan indicating any required grease, oil, sand, or lint separators and/or other required pretreatment systems such as dumpster pad run off,,
- l. A master paving and drainage plan showing all storm water facilities, retention or detention ponds with elevations and the design high water and 100 year flood elevations,,
- m. Utility Master Site Plan drawn with proposed phases clearly indicated. Updates provided as revisions are made,
- n. Match lines, when applicable, shall be indicated on all plan sheets,
- o. When available, preliminary plat shall be submitted on all platted projects in order for JEA to provide electric, water, or sewer services to the development,
- p. Design plan shall include station numbers along proposed roadways for all platted projects,
- q. For commercial or residential subdivisions, plan only sheets drawn at a maximum scale of 1" = 60' (40' preferred). For commercial and residential subdivisions, plan and profile sheets drawn at a maximum horizontal scale of 1" = 60' (1" = 40' preferred) and a maximum vertical scale of 1" = 5',

Exception: If requested and approved by JEA, certain projects may be designed using up to 1"=100' scale provided that the information on the plans is legible and approved by a Manager in Customer Order Management.

2. Plan and profile sheets shall include all sewer design information including pipe size, length, material, slope, and manhole top and invert elevations. Plan and Profile sheets shall show existing and proposed grades, the location of new gravity sewers and force mains, all crossings (storm

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water and water mains) and all additional pertinent information such as trench details, manhole details, joint details, and material specifications. Profiles may not be required for sewer force main projects.

- a. When available, landscaping plans with location of proposed utilities shown,
 - b. All existing and proposed utility easements and rights-of way with dimensions,
 - c. When available, building footprints (for commercial projects), decorative brick walls and paving, entrance signs, fountains, fences, etc. and landscape buffers shown,
 - d. Ownership of the proposed utility system shall be clearly designated as “JEA” or “Private”,
3. Roadway cross sections with utility space allocation depicted, road crossing details for open cuts, jack and bores and directional drills showing all existing utilities with actual surveyed elevations and field verified locations where possible.
4. The following information is desired on the design plans:
- a. Site contours shown at 2' maximum intervals,
 - b. Stabilized driveway shown in easements that cross wetlands and include manholes,
 - c. Minimum finished floor elevations and number of floors,
 - d. Sewer Plan Submittal Requirements
5. In addition to the general plan submittal requirements discussed above, sewer design plans shall include the following:
- a. Force main elevations every 100' minimum and at any grade changes exceeding 2 feet,
 - b. Pump station drawings shall include, cross sectional view of pump station showing pump station piping and fittings and wetwell elevations, pump information including model, impeller diameter, horsepower, motor speed, operating voltage, control panel, and operating point,
 - c. JEA general standard sheets where the pump station is to be dedicated to JEA. Where required, the standard site layout may be modified as necessary provided the minimum site dimensions are maintained and all standard general notes are included,

2.3 Utility Construction Notes

The following notes shall be included on all plan submittals. Any deviation from the standards shall be requested by the Developer’s Engineer and shall be approved, in writing, by JEA:

1. All piping and associated appurtenances, including joint restraints, shall be constructed in accordance with the latest JEA Water and Sewer Standards Manual and all applicable state and local regulations.
2. Minimum horizontal and vertical separation shall conform to the latest FDEP rules.
3. For trees, a minimum horizontal separation shall be provided to protect the utilities and the trees. (see JEA approved tree list)
4. A minimum distance of 10' or two times the depth over the main, whichever is greater, must be maintained from all buildings, foundations, and the top of bank of all ponds. (see Section 4.4, Table 2)
5. Water and sewer pipes shall be constructed with minimum 30” of cover in unpaved areas and minimum 36” cover in paved areas unless otherwise approved by JEA.
6. Pressure and leakage testing will be performed in accordance the JEA Standards Manual.
7. Disinfection of the water main shall be performed in accordance with the JEA Standards Manual.

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8. In the case where solvent contamination is found in the trench, work will be stopped and the proper authorities notified. With the approval of JEA and/or the FDEP, all water mains and service lines (from main to the cross connection device) within the contaminated area shall be ductile iron pipe and fittings with approved solvent resistant gasket material. The ductile iron pipe will extend at least 100' beyond the contaminated area.
9. Water meters will not be installed prior to issuance of the clearance letter (COC), or partial clearance letter, for the water AND sewer system. Irrigation meters may be issued at the time of water system clearance. A partial sewer system clearance may be obtained by requesting a pump-out agreement from the permitting agency.
10. Water and sewer Capacity Fees shall be paid for at the time of meter application. Fees shall be based on the total number of fixture units shown or listed on the building plans.
11. All taps, to be made by contractor, shall be noted on the plans and coordinated with the Inspector prior to construction.

2.4 Additional Submittal Documents

In addition to the plans, the following documents should be submitted for review:

1. Plans submitted for review depicting a point of connection other than that identified in the availability response shall require documentation supporting the design plans.
2. Sewer hydraulic calculations, signed and sealed by the Florida registered design engineer, including influent flow data, hydraulic analysis of the system, pump information with the operating point indicated on a manufacturer's supplied pump curve, buoyancy calculations for the wetwell (not required if wetwell is existing structure), and the power requirements (amps, volts, horsepower) for the pumps.
3. Hydraulic calculations supporting fire flows on all new hydrants located in the right-of-way or JEA easement. Fire hydrant flow test results should be included with these fire flow calculations.
4. All JEA easement interests and temporary or permanent utilization of such including JEA transmission line corridors.

2.5 Final Design Review

Design plans which have been revised and submitted for final review shall have the revisions listed in revision block on all affected sheets and the revisions "clouded" to bring attention to the proposed changes.

Any changes to the development following final plan approval which will result in changes to any system design may require additional plan review and approval of the Customer Order Management Team.

The following documents and information are necessary for the completion of the final design review process.

1. JEA requires and keeps three sets of design plans that have been signed and sealed and submitted on 24" by 36" sheets with all required preliminary review comments addressed. Design Engineer is encouraged to submit sufficient number of plans in order to meet JEA and the owner's requirements.
2. Electronic submittal of drawing, in AutoCAD or MicroStation format, for all platted residential and commercial subdivisions.
3. Required Document Submittal (All that Apply)
4. Letter of Intent to Dedicate
5. Developer Agreements
6. Connection Agreements (Owner)
7. FDEP permit applications (water and sewer permit)
8. JEA Right-of-way permits applications (JEA land use request)

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9. Cost Participation (Commitment Letter)
10. Deposits or Fees Paid (Cost recovery or other fees)
11. Revised Engineering Calculations
12. Other documents requested by JEA.

2.6 Permits

The Engineer shall submit completed JEA Water and/or Sewer Design and Construction Permit Applications (Available at www.jea.com/business/services/devandbuild/selfpermitprocess.asp). The Developer's Engineer shall fill out the permit checklists and submit with all pertinent data on the permit forms.

The Developer and his Engineer are responsible for ensuring that all permits, permit criteria, forms and other permitting requirements are met for the proposed project.

Water and/or sewer mains 12" in diameter and smaller in Duval County will be permitted through JEA's self permitting process.

All water and sewer mains located outside of Duval County must be permitted through the FDEP. In addition, all water and/or sewer mains within Duval County exceeding 12" in diameter will require a FDEP permit prior to plan approval.

Permit drawings may be required for work within the city, county and state rights-of-way. Contact the appropriate agency for R/W permitting requirements.

2.7 Pre-Construction Meeting

Upon final plan approval, the developer shall schedule a pre-construction conference with the JEA Engineer indicated on the final design plans. The Developer is cautioned from scheduling the pre-construction meeting until the project has reached a point where changes to the development concept are no longer anticipated. This meeting will not be scheduled if any cost recovery fees are outstanding.

Those invited to attend the meeting are members of JEA COM team which include JEA engineering, construction inspection and pump station operations personnel in the event of a JEA pump station, representatives of other utilities and/or regulatory agencies, the Developer, the Developer's Engineer and Contractor and any other personnel the developer desires to have in attendance. All attendees will be required to sign in on a sign in sheet at all pre-construction meetings.

The Contractor shall notify the Inspector of his/her construction schedule. If work is scheduled to begin immediately, the contractor may provide notification at the meeting.

2.8 Construction & Inspection

With distribution of the final design drawings, the project will be turned over to the Developer's Engineer for coordination of construction. JEA Construction Management will assign a Construction Inspector who shall be responsible for JEA's inspection activities of any facilities constructed for dedication to JEA. The Inspector will maintain communication with COM's engineering team as well as the Developer's Engineer throughout the project construction.

The Contractor installing the utilities shall be qualified as required under the current Florida Statute. JEA may require the contractor (or general contractor) to provide documentation verifying qualifications.

2.9 Project Installation

The utility system(s) shall be installed as depicted in the project drawings and in accordance with this manual.

Any utility adjustments resulting from grade changes made after plan approval will be the sole responsibility of the Developer. In no case shall maximum or minimum grades be exceeded as a result of field grade changes.

JEA Inspectors may inspect all construction, installations, and materials as necessary. JEA inspection of the work, or its failure to inspect the work, will not relieve the Contractor and/or the Developer from their

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obligation to fulfill the requirements of this document. JEA inspection guidelines are included in Appendix A of this manual.

Engineers, Contractors or Inspectors shall not be authorized to revoke, alter, or waive any requirements to modify the utility system design without consulting the JEA Engineer. Any changes required to the utility system design must be approved by the Developer's Engineer and the JEA Engineer and appropriately documented. The JEA Inspector is authorized to make certain changes in the field as necessary that do not require permit modifications. The JEA Engineer, in coordination with the Developer's Engineer, is authorized to make significant changes that may require permit modifications by the Developer's Engineer.

The Developer is ultimately responsible for the proper installation of the utility system(s) and compliance with all approved permit conditions.

Whenever the contractor schedules work outside the normal 8 hours per day for a five day week, he/she shall arrange with the Construction Inspector for inspection of the work 48 hours in advance of the scheduled work.

2.10 Shop Drawings

Any specialty pump station structures, pumps, panels, or materials not included in the JEA Water and Sewer Standards Manual will require two complete sets of shop drawings. to be submitted,

The Contractor shall submit shop drawings, to the Developer's Engineer for review and approval, consisting of individual manholes showing invert elevations, pipe sizes and similar details for approval before placing an order for the sewage manholes. The Engineer and Contractor are responsible for ensuring the precast structure design is accurate. The manhole structure ID on the Engineer's drawings shall be shown on the shop drawing submittals.

2.11 As-Built Drawings

Upon completion of the project and prior to dedication of utilities to JEA or final payment under the Contract with JEA, the Contractor shall furnish to JEA an electronic file and a reproducible mylar set of the as-built drawings revised in accordance with the JEA Water and Sewer Standards Manual Section 501. The Contractor shall deliver two copies of the as-built drawings to the Construction Inspector for review. The Construction Inspector shall review the documents to ensure accuracy with respect to actual construction and Section 501 of the JEA Water and Sewer Standards Manual. In the event data is missing, the Contractor will be notified and provided a marked-up copy showing the required changes within 5 working days of receipt. Upon correction of the as-builts, the contractor shall furnish the signed and sealed reproducible mylar along with five copies and an electronic file on CD to the Construction Inspector for approval. Upon approval, an approval letter shall be issued to the submittee within 3 working days with copies distributed to the appropriate segments within JEA.

Acceptance of the System

Following items are required prior to accepting any utility systems:

1. All executed and recorded easements and a copy of the recorded plat, where applicable,
2. Locate wire test report has been successfully completed for all pressurized mains,
3. All pressure tests have been successfully performed for all pressurized mains and bacteriological clearances received for potable water,
4. All required FDEP/JEA Environmental Certificates of Completion are submitted and approved,
5. A completed Certificate of Completion and Acceptance to JEA establishing the effective dates for warranty. JEA will execute the certificate and return a copy to the Developer,
6. A certified cost breakdown of the installed utility system(s),
7. All other documents, listed in attachment titled "acceptance checklist" shall be executed and submitted prior to acceptance of the system,

2.12 System Warranty

All portions of the utility system(s) installed, shall be fully guaranteed against material defects or improper workmanship for a period of twelve (12) months or as per agreement from the date of acceptance by JEA. In the event of failure to repair by the guarantor, or during emergency events, or in the event of imminent danger to JEA facilities or customers, repairs may be made by JEA at the Developer's expense or by the Developer at no cost to JEA.

If any facilities, including service lines, are installed that do not conform to the final lot layout, the installation shall be considered a misplacement of the installed system and all costs incurred by JEA for relocation shall be paid in advance by the Developer, or his successor.

2.13 Dedication of Existing Privately-Owned Systems

Typically, JEA will not accept existing privately owned, operated and maintained systems for dedication. These systems include, but are not limited to, the following types:

1. Existing master metered onsite water distribution systems.
2. Existing private pump stations.
3. Existing private onsite gravity sewer collection systems.

On a case by case basis, JEA may consider exceptions to the above given one or more of the following criteria are met.

1. JEA's system reliability or capacity may be improved or increased as a result of system dedication.
2. Additional customers who currently are not served will be provided service via the dedicated facilities.
3. Dedication of the system is warranted to eliminate or prevent potential environmental damage.

Request for exception shall be submitted to the Manager of Water/Sewer Order Fulfillment. The Director of Customer Order Management will call a meeting with the Director of Standards & System Analysis and the Director of W/S/R Delivery & Collection in order to review the request and determine a course of action. The decision by the 3-Director committee shall be final.

In the event JEA agrees to accept a privately-owned system, the following events shall occur:

1. JEA will evaluate the system, at the Owner's cost, to determine repairs and/or upgrades needed to bring the system into compliance with current JEA standards and regulatory requirements.
2. System owner shall, at no cost to JEA, repair or improve the system accordingly.
3. Repairs or improvements shall be designed and permitted in accordance with all Local and State rules and regulations.
4. Repairs and improvements shall be inspected by JEA during construction.
5. System shall be tested by owner's contractor and witnessed by JEA. This includes, but is not limited to, water pressure test, gravity sewer television inspection and pump station start up testing.
6. The system owner shall prepare an as-built of the system and submit to JEA for approval.
7. The system owner shall submit a dedication package to JEA

Once items 1-7 are complete, JEA will submit a written letter of system acceptance to the owner informing them that JEA has accepted the system for ownership.

JEA Water & Sewer Design Guidelines

Section 3.0

Potable Water Design Guidelines

3.0 General

This section provides the minimum guidelines for the design of water production, transmission, and distribution systems. The method of design and/or construction shall be according to accepted engineering practices; this manual; the most current JEA Water and Sewer Standards Manual; the American Water Works Association (AWWA); Chapter 62-555 of the Florida Administrative Code and all applicable Sections of the Florida Department of Environmental Protection Rules and Regulations for Water and Sewer Systems as well as all applicable federal, state, and local requirements.

3.1 Design Flows

All systems should be sized to provide at least maximum day domestic requirements plus fire flow at residual pressures of not less than 20 psi at all points in the system.

1. Average Daily Flow (ADF)

The developer's submittal to JEA should clearly state the basis for the design flows.

2. Single Family Residential

An Equivalent Residential Connection (ERC) is the equivalent flow that can be anticipated from one residential connection. In the absence of historical data to the contrary, assume 100 gallons per capita per day (gpcd) or per bedroom or 350 gpd/ERC to calculate the average daily flow (ADF).

3. Multifamily Residential, Commercial, and Industrial

Flows from these sites should be estimated on an individual case-by-case basis. When possible, actual historical data should be used. In the case where one utility is already served, this may be in the form of a 12 month average of the billing history. If billing for the proposed project does not exist, the average billing from a like-for-like project may be used. Design flows for new water distribution systems may be based upon Table 1 of the State of Florida Department of Health (FDH), Chapter 64E-6.08 F.A.C., Standards for Onsite Sewage Treatment and Disposal Systems or other approvable method where historical data is not available.

3.2 Fire Flow

The Developer shall furnish calculations from a registered Professional Engineer licensed to practice in the State of Florida supporting fire protection requirements in accordance with applicable county codes. The County Fire Marshall's Office shall perform its own review.

1. Single Family Residential

For fire protection purposes, single family residential is defined as detached buildings of no more than two living units. In single-family residential developments, the developer's engineer shall design for fire flows of at least 500 gpm at a minimum residual pressure of 20 psi at the hydrant.

2. Multi-Family Residential

Buildings containing three or more units are defined as multi-family. In multi-family developments, the developer's engineer shall design for fire flows of at least 1500 gpm from two fire hydrants with a residual pressure of at least 20 psi at the hydrant.

3. Manufactured Home Communities

In Manufactured Home Communities, design for fire flows of at least 750 gpm at a residual pressure of at least 20 psi at the hydrant.

4. Commercial and Industrial

Minimum fire flow requirements for commercial and industrial developments are the same as for

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multi-family residential developments. The developer's engineer shall design for fire flows of at least 1500 gpm from two fire hydrants with a residual pressure of at least 20 psi at the hydrant.

3.3 Sizing Water Mains

The pipe sizes as listed herein represent the approximate inside diameter (ID). For HDPE piping, the pipe size may require "up-sizing" to maintain the ID.

1. Major Transmission Mains

Size of major transmission mains shall conform to JEA Water Master Plan and JEA Water and Sewer Standards Manual, where applicable. HDPE pipe must be upsized to maintain the ID.

2. Distribution Mains

In non-residential areas, distribution mains shall be a minimum of 12" in diameter, unless they are in a closely interconnected grid, in which case they shall be a minimum of 8" in diameter.

It is preferred that residential subdivisions are designed with two feeds from distribution mains external to the subdivision to increase hydraulic reliability. Without two feeds from distribution mains external to the project, water mains serving hydrants in residential developments shall be a minimum of 6" in diameter arranged so that they form a closely interconnected grid.

Single main extensions supplying a looped grid or long lengths of dead end mains (greater than 1000') serving more than one hydrant shall not be less than 8" in diameter.

2" dead end water mains shall be a maximum of 600' and shall serve no more than 5 EDU's.

Dead end water mains shall terminate with a JEA standard stub-out and a 2" flushing hydrant.

3. Velocities

Velocities shall be less than 5 fps at peak hour.

4. "C" Factors

Use the following Hazen-Williams roughness coefficients for new construction:

Pipe Size / Type	Coefficient of Roughness
16" diameter and larger cement-lined ductile iron pipe	120
Less than 16" diameter cement-lined ductile iron pipe	130
PVC (all sizes including HDPE)	140

5. Water Main Material

Materials shall be in accordance with the most recent JEA Water and Sewer Standards Manual, Sections 350 and 351.

HDPE pipe shall be in accordance with the most recent JEA Water and Sewer Standards Manual, Section 750.

6. Water Main Depth

All water mains less than 24" in diameter shall be designed meeting minimum depth requirements of 30" in unpaved areas and 36" with a maximum of 60" in arterial or collector roadways where reconstruction is anticipated, unless approved otherwise by JEA. Water mains of 24" or greater diameter shall be designed meeting minimum depth requirements of 36" (paved and unpaved areas) unless approved otherwise by JEA. Cover for pipe under pavement shall be measured from finished grade. In cases of a 16" or larger water main, side actuated valve operators may be required to minimize the depth of bury of the main.

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- a. If the utility conflict is located in a non-traffic area (no traffic loads) and the new pipe is D.I., the minimum cover may be reduced to 24" only in the area of the conflict.
- b. In FDOT and railroad rights-of-way, the minimum cover shall be established by the FDOT and railroad, respectively.

7. Water Main Location

Preferred utility locations within the City of Jacksonville, St Johns County, Nassau County or Clay County rights-of-ways are to be as established by the City/County Department of Public Works. Water mains shall be designed to be a minimum 3' from right-of-way lines and a minimum 3' from pavement. Exceptions may be granted as appropriate by JEA provided the City/County agencies are in agreement with the proposed location.

- a. Water mains shall have a minimum 3' of horizontal distance between the outside of the water main and the outside of any other parallel underground utility or structures unless otherwise defined under Section C., Water and Sewer Separation Requirements.
- b. Typically, water mains shall not be designed below open ditch bottoms due to difficulties with utility access and potential damage from future dredging of the ditch.
- c. Water mains shall be generally designed over box culverts & drainage pipes. .
- d. Parallel water mains are generally not allowed. If a proposed water main is to be constructed in a right-of-way or easement where there is an existing JEA water main, the existing main must be abandoned for the length of the new main being installed. All effected services and fire hydrants shall be transferred to the new main and the remaining portion of the existing main shall be connected to the new main.
- e. Water mains shall be located outside of paved areas except at roadway crossings.

Exceptions to this requirement may be considered within town home, multi-family or commercial development projects provided the following apply:
 - i. The mains do not lie under parking areas

3.4 Water Main and Sewer Separation Requirements

Gravity sewer main and water main separations shall be in accordance with Florida Administrative Code Chapter 62-555 pursuant to FDEP permit conditions. Water main separation requirements shall also meet water construction detail W-10 and W-11 of the JEA Water & Sewer Standards Manual.

3.5 Easements and Encasements

Water mains shall not be located in utility easements unless there is no other reasonable way to serve the proposed development.

Easements, where allowed, on sidelines and between structures shall be identified as unobstructed and shall have a minimum width of 20' for water only or as shown in Table 2 section 4.4. Landscaping is not considered to be an obstruction, but large trees or bushes should be located so as not to obscure fire hydrants or hinder maintenance.

When easements are adjacent to and parallel to a public right-of-way, the minimum easement width shall be 10' for water only or 20' for both water and sewer mains.

A water/sewer easement with a minimum width of 5' is required opposite JEA electric easements in residential subdivisions with 50' rights-of-way.

When approved by JEA, on-site utilities for commercial projects under single ownership serving multiple customers or parcels may be accepted for operation and maintenance provided that a minimum right-of-way quality dedicated, unobstructed, defined JEA water and/or sewer easement is provided and sized according to the width and depth of the proposed utility.

A Hold Harmless Agreement may be required when installing special landscaping or paving in rights-of-way or easements.

3.6 System Connections

1. Connections and ties to the JEA Water System and transfer of services shall be performed by a licensed master plumber or underground utility contractor under supervision of the JEA representative. Taps should be scheduled 48 hours in advance by contacting the JEA inspector.
2. JEA forces will install the meter upon application and payment of all fees by the requestor at JEA Water and Sewer Counter, 21 West Church Street, 1st Floor, Customer Service Building.
3. Unless approved by JEA, no size-on-size taps shall be allowed except on 4" pipe which may be tapped with a 4" tapping sleeve and valve.
4. No taps shall be made within 5' of a joint.
5. When connecting a 2" main to an existing main, a minimum 4" gate valve shall be used with a 4" by 2" reducer. No 2" main valves will be allowed.
6. Taps requiring meter installations of size 2" and smaller shall include the service pipe, meter box, and corporation stop sized ready to accept the meter installation by JEA forces.
7. Taps requiring meter installation of size 3" and larger must include the service pipe and meter vault. Taps should be piped straight through where the meter is to be set according to the following laying lengths as measured between the control valve and the backflow prevention device:
 - a. Meters size 3" to 4" shall have a laying length of at least 14'.
 - b. Meters size 6" to 8" shall have a laying length of at least 20'.
 - c. Meters size 10" shall have a laying length of at least 24'.
 - d. For meters 3" and larger, JEA will build and install the meter assembly. After installation, JEA will install the meter vault (provided by the developer's contractor) to grade. Create a table if possible.

3.7 Fire Hydrant Location

1. General

Hydrants shall be painted and installed in accordance with the applicable county fire codes. Private fire hydrants shall be painted red unless otherwise specified in the local county's standards.

Fire hydrants shall be constructed on the same side of the road as the water main. Exceptions may be approved depending on a specific situation.

Fire hydrants shall be located in easily visible and accessible locations. They should be located at entrances and intersections whenever possible or between lot lines.

Fire hydrants should be located at property corners just inside the right-of-way. Fire hydrants should not be located at the same corners as water meters or electric transformers.

Fire hydrants should have a minimum clearance of 3' from the edge of pavement or the back of curb.

New or relocated fire hydrants shall be located so that the hydrants are at least 3' from any existing or proposed storm sewer, force main, or reclaimed water main; at least 3', and preferably 10', from any existing or proposed vacuum-type sanitary sewer; and at least 6', and preferably 10', from any existing or proposed gravity or pressure-type sanitary sewer or sewer force main.

Fire hydrants shall be located with the steamer nozzle (largest opening) directed towards the street or parking area.

There shall be no trees or permanent structures within 10' of any hydrant. There shall be no obstructions (fences, landscaping, signs, etc.) within 5' of each hydrant.

2. Single Family Residential

Single family residential areas shall have fire hydrants located not more than 600' apart when measured along streets or acceptable access ways, except in a cul-de-sac or dead-end street where a fire hydrant shall be located not more than 600' from the center of the turnaround. Single family detached residential property shall have a fire hydrant located within 600' of each building location. Create a table for all Counties

3. Commercial, Industrial and Multi-Family Residential

Fire hydrants in commercial, industrial, or multi-family residential areas shall be located not more than 500' apart when measured along streets or acceptable access ways, and shall be within 500' of the most distant corner of each commercial or multifamily structure.

All fire hydrants and independent valves are to be located within the street right-of-way or easement.

Multiple fire hydrants within commercial and multi-family residential projects shall be served with a minimum 8" water main.

If the proposed project is to be served by a well, fire protection must be addressed and approved per the Fire Marshal's requirements and indicated on the design plans. The Fire Marshal will require an on-site water storage tank or alternate water source.

3.8 Valves

There shall be a sufficient number of valves designed such that single mains in the network can be isolated from the remainder of the system thereby providing flexibility for operation and maintenance while minimizing the number of customers out of service.

Valves shall be marked with a "V" scribed in the curb closest/adjacent to the below grade valves. The "V" cut shall be painted blue.

Valves shall be installed on all water main branches as follows: two directions on a tee and three directions on a cross.

Valves should be located so as not to conflict with curb and gutter and should be located nearest the tee or cross fitting.

A 4" valve shall be required on a wrapped cul-de-sac at the point of transitioning to 2" PVC where an outage could affect 20 or more customers.

On transmission mains less than or equal to 16" in diameter with a limited number of service connections, valves shall be installed at a maximum of 1,000' intervals and at distribution branches. On transmission mains greater than 16" in diameter, valves shall be located at a maximum of 2500' intervals and at distribution branches. Where applicable, valves on transmission mains should be located next to the fire hydrant tees to facilitate field location.

Valves shall be provided at 800' (maximum) intervals within residential areas.

Valves shall be provided at 500' (maximum) intervals within multi-family residential projects as well as industrial and commercial areas.

3.9 Flushing Hydrants and Sample Points

A 2" flushing hydrant assembly shall be provided at the end of all dead-end, non-circulating water mains and stub-outs.

1" temporary sample points should be provided at the point of connection to the existing water main, the end of all water mains and stub-outs of 40' or greater, at 1000' maximum intervals on long main extensions, on all looped mains and in accordance with permit conditions. Fire hydrants shall not be used as sample points. The contractor shall remove all temporary sample points after clearance from JEA.

3.10 Services

Water services shall be provided to each lot, building, or parcel requiring a separate water meter.

Single long and short side water services shall be 1" for single-family residential subdivisions and shall be located at adjacent property lines along the front of the property to be served as shown in Plate W-1 of the JEA Water and Sewer Standards Manual.

Double 1 ½" long side services may be utilized and shall terminate with a 1" service for two adjacent lots per Plate W-1 of the JEA Water and Sewer Standards Manual.

No more than 5 domestic service connections are allowed on a 2" water main in a new subdivision.

Gang water services (5 or more services in one area) are acceptable for long side services if constructed in accordance with detail Plate W-1 of the JEA Water and Sewer Standards Manual.

The service size shall be smaller than or equal to the main size to which it is connecting.

No service shall be allowed beyond the valve on a phase line water main stub-out.

No 2" or smaller water service taps shall be permitted on water mains which are greater than or equal to 20" in diameter.

The maximum length of a water service (distance from the connection at the main to the water meter) shall be 100' unless approved otherwise by JEA.

Service locations shall be marked with a "W" scribed in the curb and painted blue.

3.11 Water Meters

1. General

All water meters shall be located in accordance with the JEA Water and Sewer Standards Manual unless otherwise approved. For typical residential layout, refer to Plate W-1. This location varies in St. Johns and Nassau Counties. Contact the appropriate County Engineering department for correct water meter location criteria.

The water meter shall be located adjacent to the property, lot, or parcel which it is serving and clearly marked with a 2"x4"x4' pressure treated post.

Water meters may not be located at property corners containing electric transformers or reuse service(s).

Water meters shall not to be located beneath driveways or within sidewalks. Exceptions may be approved in coordination with the Meter, Billing, and Collections Group on a case by case basis.

JEA policy does not allow the installation of sewer deduct meters. In order to achieve a metering/billing arrangement that would eliminate sewer charge that enters JEA system, the site can be designed with irrigation or water only meters or a separate sewer flow meter to correctly establish metering/billing service to the customers. Examples of this type of service include: cooling tower evaporation, industrial process water, etc. All sewer flow metering designs shall conform to JEA Commercial Meter Services, Sewer Flow Metering design guidelines.

2. Multi-Family or Commercial Developments

For multi-family developments and commercial developments serving multiple tenants where the entire project is to remain under single ownership, it is preferred the entire site be master metered with all on-site utilities remaining under private ownership and operation unless otherwise approved by JEA.

When approved by JEA, on-site utilities for projects under single ownership serving multiple tenants may be accepted for operation and maintenance provided that appropriate easements are provided. Individual water meters serving each tenant shall be provided.

For multi-family and commercial projects, water meters shall be located in accessible areas, outside of landscaped and paved areas, a minimum of 5' from buildings, behind sidewalks, and

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generally adjacent to parking areas or roadways a minimum of 3' from the edge of pavement.

For water meters greater than 2", the engineer shall submit a detailed water demand estimate with the average daily flow and peak hourly demand indicated for review and approval by JEA.

A 3" or larger meter shall be located in a 15' by 20' easement provided adjacent to the right-of-way line.

3. **Backflow Preventers**

A metered detector check backflow preventer shall be required on all projects requiring automatic sprinkler (AS) system services and/or the use of on-site private fire hydrants for fire protection. Shop drawings shall be submitted to and approved by JEA prior to installation.

Backflow preventers shall be in accordance with JEA's Cross Connection Control Manual and shall be located on private property within 10' of the meter, but outside of applicable meter easements. Alternative locations must be approved by JEA COM Engineer prior to installations.

4. **Water Treatment Plants**

JEA considers water treatment plants to be dedicated on an individual basis. It is the developer's responsibility to contact JEA Water and Sewer System Planning Team and the JEA COM Team in the planning stage for direction.

Section 4.0

Sewer Design Guidelines

4.0 General

This section provides the minimum guidelines for the design of sanitary sewer collection and force main systems. The method of design and/or construction shall be according to accepted engineering practices, this manual, the most current JEA Water and Sewer Standards Manual, the latest edition of the Recommended Standards for Sewage Works (Ten State Standards), and all applicable Sections of the Florida Department of Environmental Protection Rules and Regulations for Water and Sewer Systems.

4.1 Design Flows

1. Average Daily Flow (ADF)

Design flows for new sewage collection systems shall be based upon Table I of the State of Florida Department of Health (FDOH), Chapter 64E-6.008 F.A.C., Standards for Onsite Sewage Treatment and Disposal Systems or other approvable method where historical data is not available.

2. Equivalent Dwelling Units

An Equivalent Dwelling Unit (EDU) is the equivalent flow that can be anticipated from one residential connection. In all JEA sewage treatment areas, except Mandarin, assume 100 gallons per capita per day (gpcd) to calculate the average daily flow (ADF). For the Mandarin sewer treatment area, calculate the ADF using 71 gpcd (sewer only). To calculate the ADF from a single EDU, multiply the gpcd by 3.5.

3. Peak Flow

Sewer systems and facilities shall be designed for peak flows calculated in accordance with the Recommended Standards for Sewage Works, latest edition (Ten State Standards), and the Water Environment Federation MOP9 as depicted in Attachment No. 1 and shown below.

Peak Flow = Peaking Factor x Average Daily Flow (ADF)

Peaking Factor = $[18 + (\text{Population}/1000)^{0.5}] / [4 + (\text{Population}/1000)^{0.5}]$

4.2 Sizing Gravity Sewer Mains

1. Pipe Diameter

Design all sewer mains to carry peak design flow when flowing full (no hydraulic head allowed). Peak design flow may not exceed pipe capacity.

Gravity sewer mains shall be a minimum 8" diameter in the JEA right-of-way (R/W) and/or private R/W (easements).

Gravity sewer mains shall be installed on a uniform alignment and grade between manholes.

Collection systems serving more than two buildings, lots or parcels shall be 8" gravity mains with manholes.

2. Slope Requirements

Gravity sewer mains shall be designed in accordance with the preferred slopes shown in Table 1. A Developer must obtain JEA COM Engineer approval, in writing, for any deviation from the preferred slope. Minimum slope is only to be used (limited use) when no other engineering or economic solution is possible. The maximum slope for all pipe diameters shall be such that the velocity in the pipes does not exceed 5 fps when calculated using Manning's Equation. Maximum slope may be used on terminal pipe runs only unless otherwise approved by JEA. The maximum slope may be exceeded on the final run of gravity sewer between the junction manhole and the pump station structure. JEA reserves the right to require specific slopes as needed to insure future service and maintenance needs.

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Table 1: Gravity Sewer Slope

Pipe Diameter (inch)	Preferred Slope (ft/ft)	Velocity n=0.013	Minimum Slope (ft/ft)	Velocity n=0.013
8	0.0040	2.2	0.0030	1.9
10	0.0028	2.1	0.0022	1.9
12	0.0022	2.1	0.0018	1.9
15	0.0015	2.0	0.0014	2.0
16	0.0014	2.1	0.0013	2.0
18	0.0012	2.1	0.0011	2.0
21	0.0011	2.2	0.0009	2.0
24	0.0008	2.0	0.0008	2.0
30	0.0008	2.4	0.0008	2.4
36	0.0008	2.7	0.0008	2.7

3. Gravity Sewer Main Material

Materials shall be in accordance with the most recent JEA Water and Sewer Standards Manual, Section 428.

The type, class, grade, and alignment of sewer pipe may be changed only at manholes.

JEA requires gravity mains constructed at a depth of 12' or greater or within easements to be ASTM 3034, SDR-26 heavy wall sewer pipe.

DIP pipe is only allowed for gravity sewer where the mains or laterals are above ground or otherwise exposed as in bridge crossings or ditch crossings; however, installing a PVC gravity sewer main within a steel casing for special circumstances will be considered on a case by case basis. Gravity sewer mains within casings shall be ASTM 3030, SDR 26 heavy wall sewer pipe and shall be installed with approved skids or spacers.

4. Gravity Sewer Main Depth

Gravity sewer mains shall be designed meeting minimum depth requirements of 30 inches in unpaved areas and 36" in paved areas.

Gravity sewer mains with and without service laterals shall not be constructed at any depth greater than 15' and 20', respectively. A gravity sewer high-line of services connecting directly into the deep manholes will be allowed when the main is deeper than 20' deep.

5. Gravity Sewer Main Location

Gravity sewer mains shall be designed for installation on the centerline of roadways where possible. On curved roads, the sewer main and manholes shall be located such that the pipe remains within the limits of the paved area

Install gravity sewer mains with a straight alignment between manholes.

Locate centerline of gravity sewer manholes at a minimum distance of 4' off the face of the curb.

Locate trunk sewers 24" and larger to 5' west of, or 5' south of the centerline of the public rights-of-way or private rights-of-way (easements), unless approved otherwise by JEA.

A horizontal distance of 3' minimum (6' preferred) shall be maintained from all gravity sewer mains to drainage structures, telephone duct banks, electrical transformers, signal relays, power poles and other structures in the right-of-way as well as any other parallel underground utility with

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the exception of water mains. Where gravity mains cross other underground utilities with the exception of water mains, a minimum vertical separation of 6" shall be maintained. (See below for water main and gravity sewer main separation requirements.) All distances shall be measured from the outside edge of the pipes.

Distance from building foundations, or tops of banks, to gravity sewer mains must be a minimum distance of 2 times the vertical depth of the deepest portion of the manhole-to-manhole sewer run.

4.3 Gravity Sewer and Water Main Separation Requirements

Gravity sewer main and water main separations shall be in accordance with Florida Administrative Code Chapter 62-555 pursuant to FDEP permit conditions.

At crossings, pipe joints shall be as far as possible and equidistant from the point of crossing. Water main preferred on top. Separation shall be measured from the outside edge of the pipe to the outside edge of the pipe. A full length of pipe must be centered at the crossing.

Alternatively, at such crossings, the pipes shall be arranged so that all water main joints are at least 6' from all joints in gravity. **If unable to maintain either of these separation requirements, the contractor shall consult the Florida registered design engineer to obtain the approval of the permitting authority for the alternative construction methods, prior to construction.**

4.4 Easements and Encasements

Gravity sewer mains within easements and between lots are allowable only with prior approval from JEA.

Gravity sewer mains located adjacent to retention areas shall be designed with sufficient easement to avoid side slope collapse based on 3 to 1 side slopes and depth of bury. JEA reserves the right to require casing pipe as necessary to maintain the gravity sewer.

Easements, where allowed, on sidelines and between structures shall be identified as unobstructed, and shall have a minimum width according to the Table 2 below. These easement widths are based on 10 foot separation between water and sewer mains. In the event of reduced separation, these easement widths may be reduced accordingly.

Table 2: Easement Width

PIPE DEPTH, ft	EASEMENT WIDTH, ft		
	One Utility	Two Utilities	Three Utilities
0 – 6	20	25	30
6 – 8	25	35	40
8 – 10	30	40	45
10 – 12	35	45	50
Greater than 12	N/A	N/A	N/A

Gravity sewer greater than 12' deep shall not be located within easements unless approved by the COM Engineer.

When easements are adjacent to and parallel to a public right-of-way, the easement width may be reduced by 10' from that shown in Table 2 above. For example, at a pipe depth less than 6', the minimum easement width shall be 10' for sewer only or 20' for both water and sewer mains.

A Hold Harmless Agreement may be required when installing special landscaping or paving in rights-of-way or easements.

Long runs of gravity sewer located in easements that cross wetlands, which shall be restored as wetlands, shall be encased in a steel casing. Those runs which include manholes, located across wetlands, shall be

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accessible to vehicles. A stabilized access road, 12' wide with a minimum Load Bearing Ratio (LBR) of 30 shall be provided and indicated on the drawings for easements requiring multiple manholes. The access road should be designed to provide for adequate drainage and to prevent erosion from storm runoff. A truck turnaround area should be provided at the end of all access roads.

4.5 Stub-Outs

Gravity sewer main stub-outs shall be provided to all undeveloped property and future phases of the project in accordance with the sewer master plan for the collection system service area.

Gravity stub-outs shall be extended to the property line, plat line or phase line and shall extend a minimum of 10' past the edge of pavement or a distance of 1.5 times the sewer depth whichever is greater and terminate with a manhole.

4.6 Services

Single gravity services shall be provided to each lot, building, or parcel provided that adequate and accessible utility corridors are also provided for maintenance.

Single gravity services shall not exceed the size of the gravity main.

Single services shall be 6" minimum diameter at 1/8" per foot minimum slope.

Stub-outs for services shall be marked with a 2"x4"x4' pressure treated pine post.

Double services or multiple connected sewer services (gang services) are generally not acceptable. However, they may be used for privately maintained commercial and multi-family systems under single ownership. Double or multiple services may be allowed in the case of a condominium project where the onsite sewer systems are the property of the condominium association

A service shall be designed to connect to the gravity main with a wye fitting rotated 45 degrees up. The invert elevation of the service at the main shall be at or above the crown of the mainline pipe.

1. Single Family Residential Systems:

Single services shall be installed at the center of the lot and front the property being served. Services shall be drawn perpendicular to the sewer main. Deviations from this criteria must be pre-approved in writing by JEA.

6" single services shall be limited to 60' maximum length (length between sewer main and manhole to the customer's property line).

Services shall be marked with an "S" scribed in the curb and painted green.

Services shall terminate 30" to 60" deep at the R/W line where not expected to be in conflict with underground electric.

Services shall be designed at 2.5 to 5.0' depth of cover and be below underground electric (if possible).

Private clean-outs shall not be installed in the R/W or JEA easement.

2. Commercial and multi-family systems:

Services shall terminate with a clean-out as required by the Plumbing Code.

6" services shall serve no more than 8 multi-family units.

Services shall be designed with 36" minimum cover and shall terminate 36" to 60" deep at the R/W line where not in conflict with water mains or buried electric.

Clean-outs shall not be installed in the R/W.

Service connections are not permitted to 16" diameter trunk sewers or larger

Service Connections to manholes are allowed as follows:

- a. Inline manhole connections are limited to 2 services, one (1) from each side of the street and must be installed perpendicular to the R/W.

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- b. Terminal manholes located in residential cul-de-sacs are allowed 3 service connections provided the 0.80 point of the service connection and lateral sewer main are matched.

Services shall not be connected to stub-outs without a manhole.

Unless approved otherwise by JEA, no gravity sewer main with sewer service laterals shall be constructed with a “depth of cut” greater than 15'. Sewer service laterals associated with gravity sewer mains which are deeper than 20', must be routed to a gravity sewer high-line, a manhole, or other JEA approved method.

4.7 Sewer Meters

JEA policy does not allow the installation of sewer deduct meters. In order to achieve a metering/billing arrangement that would eliminate sewer charge that enters JEA system, the site can be designed with irrigation or water only meters or a separate sewer flow meter to correctly establish metering/billing service to the customers. Examples of this type of service include: cooling tower evaporation, industrial process water, etc. All sewer flow metering designs shall conform to JEA Commercial Meter Services, Sewer Flow Metering design guidelines.

4.8 Sewer Manholes

Manholes shall be installed at the end of each main and at all changes in grade, pipe size, pipe material, or alignment and at all pipe intersections.

Manholes where pipe size changes occur shall utilize the 0.6 crown match point when establishing invert elevations

The maximum spacing of manholes shall be 400' for sewer mains less than or equal to 16" diameter and 500' for sewer mains greater than 16". A gravity main exceeding the maximum length may be allowed, with prior written approval from JEA, if it is required to complete a terminal run. If this occurs, a note shall be added instructing the contractor “not to exceed the additional length required to complete the run”.

Manholes shall be located on the centerline of roadways or out of the wheel lane and a minimum of 4' from the edge of the manhole to the curb and gutter.

Manholes shall not be installed in the flow line of inverted crown roads or within the design high water limits of gutters, swales, or retention/detention areas.

Terminal manholes may be required on stub-outs for the purpose of inspection and maintenance or future extension of the system.

1. Invert and Rim Elevations

Manholes located within easements shall have the ring and cover at final grade level.

Design depth for all terminal manholes is to be at no less than four (4)' from the top of the manhole to the pipe invert, plus one course of manhole adjustments should be added as shown in JEA Standard Detail S-6.

2. Drop Connections

Outside drop connections are only allowed for 12" drop pipe size and larger (see detail S-7 in JEA Water and Sewer Standards Manual.

Inside drop construction is required for 2' or greater drops and shall be constructed per detail S-4 in JEA Water and Sewer Standards Manual.

3. Lining

All junction manholes (manholes located closest to the pump station's wetwell), manholes which include a 24" or larger pipe and manholes receiving a force main shall be coated internally as outlined in Section 446 of JEA Water and Sewer Standards Manual.

All manholes shall be coated with bitumastic as specified in JEA Water and Sewer Standards Manual.

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4.9 Force Mains

1. Pipe Diameter

Force mains shall be a minimum 4" diameter in the right-of-way or within JEA easement if the main is to be dedicated. Exceptions may be granted for low pressure systems or low flow pump stations which discharge directly into a gravity sewer system.

Force mains shall be sized for peak flow at a minimum velocity of 2.0 fps and a maximum velocity of 4.0 fps. Exceptions may be made on a case by case basis during the plan review process.

Pipe sizes and applications are to conform to JEA Water and Sewer Standards Manual, Section 429 Table 2.1.

2. Depth

Force mains less than 24" in diameter shall be designed meeting minimum depth requirements of 30" in unpaved areas and 36" in paved areas with a maximum of 60" in arterial or collector roadways where reconstruction is anticipated, unless approved otherwise by JEA. Force mains of 24" or greater diameter shall be designed meeting minimum depth requirements of 36" (paved and unpaved areas) unless approved otherwise by JEA. Cover for pipe under pavement shall be measured from finished grade.

Where conflicts require a deflection, a minimum cover of 24" may be allowed to design over the conflict using PVC DR18 pipe to clear the conflict before deflecting back to 36" depth. Any reduction in pipe cover will require written approval from JEA.

Force mains shall be designed so as to reduce or minimize the number of high points. Changes in elevation which exceed two feet will require an air release valve.

3. Material and Fittings

Materials shall be in accordance with the most recent JEA Water and Sewer Standards Manual Section 429.

HDPE pipe shall be used in accordance with JEA Water and Sewer Standards Manual.

Force mains shall have restrained joints for changes in direction.

Bends 45 degrees or less should be used in lieu of 90 degree bends unless otherwise approved.

All proposed force main extensions shall terminate with a JEA standard stub-out past the proposed project connection and shall consist of 40' of pipe, a resilient seat gate valve or plug valve installed adjacent to the last tee or tapping sleeve and a plug (the plug fitting shall include a 2" (bronze) corporation stop (MIP)) on the dead end. The length of the stub-out may be reduced to 20' (minimum) if approved by JEA to avoid installation conflicts in the right-of-way.

4. Location

Install force mains, where feasible, on the opposite side of the street from the water main unless otherwise approved by JEA.

A horizontal distance of 3' minimum (6' preferred) shall be maintained from all force mains to drainage structures, telephone duct banks, electrical transformers, signal relays, power poles, and other structures in the right-of-way as well as any other parallel underground utility with the exception of water mains. Where force mains cross other underground utilities with the exception of water mains, a minimum vertical separation of 6" shall be maintained. (See below for water main and force main separation requirements.) All distances shall be measured from the outside edge of the pipes.

Force main connections to manholes shall connect at the bottom of the manhole matching the crown of the existing pipe as shown in JEA Standard Detail S-18. The flow from the force main should be directed into the invert of the manhole in an effort to reduce turbulence.

Force mains shall not be constructed below open ditch bottoms unless no other location is

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available due to crowded corridor conditions such as other utilities or landscaping.

Sewer force main shall be located outside of paved areas except at roadway crossings.

Exceptions to this pavement rule may be considered within commercial development projects provided the following apply:

- i. The mains do not lie under parking areas

4.10 Force Main and Water Main Separation Requirements

Sewer force main and water main separations shall be in accordance with Florida Administrative Code Chapter 62-555 pursuant to FDEP permit conditions.

At crossings, pipe joints shall be as far as possible and equidistant from the point of crossing. Water main preferred on top. Separation shall be measured from the outside edge of the pipe to the outside edge of the pipe. A full length of pipe must be centered at the crossing.

Alternatively, at such crossings, the pipes shall be arranged so that all water main joints are at least 6' from all joints in the sewer force main. **If unable to maintain either of these separation requirements, the contractor shall consult the design engineer to obtain the approval of the permitting authority for the alternative construction methods, prior to construction.**

4.11 Valves

Valves and appurtenances shall conform to JEA Water and Sewer Standards Manual, Section 430.

Valves shall be marked with a "V" scribed in the curb closest/adjacent to the below grade valves. The "V" cut shall be painted red.

On force mains less than or equal to 12" in diameter, resilient seat gate valves shall be installed at a maximum of 1,000' intervals and at branches of intersecting force mains on tees and wyes, and at force main stubs.

On force mains greater than 12" in diameter, valves shall be located at a maximum of 2500' intervals.

A resilient seat gate valve shall be provided on the force main in the right-of-way adjacent to the discharge manhole.

Generally, resilient seat gate valves are preferred on sewer force mains (main valves and tapping valves), but must be in the vertical position (stem in vertical position). If a gate valve must be in the horizontal position (stem horizontal), then a double disc gate valve must be utilized. Horizontal valves are to be utilized only in extreme cases and as approved by JEA. In cases where gate valves are not practical, plug valves may be utilized. Plug valve 8" and larger must be equipped with worm-gear actuators.

Control valves shall be located so as not to conflict with curb and gutter and should be located outside of pavement when possible.

For private pump stations with JEA dedicated off-site force mains, a JEA approved gate valve (4" minimum) shall be provided at the right-of-way line (just outside the pump-out box) for all force main pipe which exceeds 15' within the City right-of-way area per detail S-46 of JEA Water and Sewer Standards Manual. The gate valve is not required on force main piping where the connection at the JEA main is located on the same side of the street as the pump-out box and consists of 15' or less within the City right-of-way area. This gate valve defines the "JEA Point of Service". If no gate valve exists, the right-of-way line defines the "JEA Point of Service".

2" air release valve assemblies with manholes shall be provided at all force main high points and when change of elevation is 2' or greater. Air release valves on force mains hung from bridges should be manual if accessible. Air release valves shall be constructed as per detail S-29 of JEA Water and Sewer Standards Manual. Combination valves (air release and vacuum valves) shall only be utilized if a major vacuum condition exists as specified by the design engineer.

Section 5.0

Pump Station Design Guidelines

5.0 JEA Dedicated Pump Stations - General

Design sewer pump stations in accordance with applicable sections of the Department of Environmental Protection Rules and Regulations, Recommended Standards for Sewage Works (Ten State Standards), latest edition, and as specified herein.

Pump stations shall be designed specifically to pump domestic sewage containing solids and fibrous materials.

Pump stations shall be designed and located on the site so as to minimize the effects resulting from odor, noise, and lighting.

Pump stations should be designed to pump at minimum the anticipated peak hourly flow with the one pump out of service.

Pump Stations are to conform to JEA Water and Sewer Standards Manual, Section 433.

If approved by JEA, a “reduced capacity” pump station may be used if the following criteria are met:

- a. Development does not exceed 75 EDU’s (Equivalent Dwelling Units)
- b. Development is located such that no other developable areas are adjacent to the property
- c. The off-site force main does not parallel a proposed force main route identified by the sewer master plan, 2010 comprehensive plan or any other regulatory, planning, or design document.

If approved by JEA, a “reduced flow” pump station may be used if the following criteria are met:

- a. Development is less than 50 EDU’s
- b. Development is located such that no other developable areas are adjacent to the property
- c. Sewer force main discharges to a gravity sewer system and is located such that no other force mains could manifold in the future

1. Site Plan

The pump station site is to be located outside of the street right-of-way (R/W) and/or private R/W (easement), but contiguous thereto, on a parcel of property indicated on the record plat or dedicated to JEA by Warranty Deed.

The pump station site plan should conform to the JEA Pump Station Site Plan Detail sheet unless otherwise approved.

On-site elevations should be indicated to establish that the concrete on-site is sloped to allow for drainage toward the City R/W.

The site elevation should be set at a minimum of 1' above the design high water level or 100 year flood elevation of adjacent stormwater areas.

The driveway shall be designed with a tee for turning around when, in the opinion of JEA, the station location and the roadway traffic conditions prohibit backing in and out of the site.

The paved driveway should have a uniform elevation along the wetwell and, if possible, should slope at 1/8” per foot away from the station.

The trees and ground cover to be used at the site should be identified on the site plan.

No catch basin should be located within the pump station site.

There should be 1' of separation for every 1' of wetwell depth between the junction manhole and the wetwell to avoid taking both structures out if construction work on either is necessary in the future.

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2. Junction Manhole

Pump stations shall be equipped with a junction manhole with only one influent main to the wetwell to facilitate bypass pumping.

The junction manhole shall be located on the same side of the driveway as the pump-out connection within 60' of the wetwell as accessed from the entrance gate.

The junction manhole shall not be located in the driveway or in the traffic lane of the street.

An approved JEA liner shall be installed on all junction manholes.

3. Wetwell - Duplex

The wetwell shall have a minimum diameter of 8', unless written approval is granted. The wetwell for a Reduced Capacity or a Low Flow Pump Station shall vary based on design flow but shall be large enough to accommodate duplex pumps and the appropriate centerline offset required stated by the pump manufacturer.

No wetwell shall exceed 25' in depth unless pre-approved in writing by JEA.

The wetwell shall have only one influent main.

The wetwell's operating water levels shall be arranged to insure pump operation without cavitation and insure the gravity sewer system is not surcharged.

The wetwell's storage volume should be calculated assuming a 12 minute cycle time, without considering pump alternation, for the pump rate at run-out condition. If JEA has approved an "initial/ultimate" station design, the storage volume must be sized for the ultimate pumps.

The storage height (distance between "Lead Pump On" and "Pumps Off" elevations) should be calculated and rounded up to the next highest increment divisible by 0.25'. If JEA has approved an "initial/ultimate" station design, the storage height should be designed for the initial pumps.

The Mercoïd Operating Level (emergency high level alarm) should be set at 0.5' above the invert elevation.

The operating levels for High Water Level, Lag Pump On, and Lead Pump On are established in 0.5' increments as follows:

$$\text{High Water Level Alarm} = \text{Virtual Invert Level} - 0.5'$$

$$\text{Lag Pump On} = \text{High Water Level Alarm} - 0.5'$$

$$\text{Lead Pump On} = \text{Lag Pump On} - 0.5'$$

The "Both Pumps Off Level" is established by subtracting the Storage Height from the Lead Pump On elevation and shall be equal to the invert elevation of the influent pipe.

The wetwell bottom elevation should be set at 3' below the "Pumps Off" elevation.

Where JEA has approved an "initial/ultimate" design, the wetwell is sized for the ultimate pumps whereas the storage height is established for the initial pumps. For "initial/ultimate" stations, the operating levels are established as follows:

$$\text{High Water Level Alarm} = \text{Lag Pump On} + 0.5'$$

$$\text{Lag Pump On} = \text{Lead Pump On} + 0.5'$$

$$\text{Lead Pump On} = \text{Pumps Off} + \text{Storage Height for Initial Pumps}$$

$$\text{Pumps Off} = \text{Bottom Elevation} + 3' = \text{Invert Elevation of Influent Pipe}$$

An approved JEA liner shall be installed on all wetwell concrete surfaces, including the underside of the concrete top slab, exposed to sewage or sewer gases.

4. Wetwell – Triplex

The wetwell shall have a minimum inner diameter of 10' for 8" and smaller pump discharge size

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and 12' for greater than 10" pump discharge size, unless otherwise approved.

No wetwell greater than 25' deep shall be allowed unless approved otherwise by JEA.

The wetwell shall have only one influent main.

The wetwell's operating water levels shall be arranged to insure pump operation without cavitation, provide cycle times not less than the manufacturer's recommendations, and insure the gravity sewer system is not surcharged.

The wetwell's storage volume should be calculated assuming a 12 minute cycle time, without considering pump alternation, for the pump rate at run-out condition. The storage volume is determined as shown below:

$$SV1 = (Q1_{\text{pump@run-out}}) (\text{Cycle Time}/4) = (Q1_{\text{pump@run-out}}) (3 \text{ min})$$

$$SV2 = (Q2_{\text{pumps@run-out}} - Q1_{\text{pump@run-out}}) (\text{Cycle Time}/4)$$

$$= (Q2_{\text{pumps@run-out}} - Q1_{\text{pump@run-out}}) (3 \text{ min})$$

where SV1 = Volume between pumps off and lead pump on

SV2 = Volume between lead pump on and #1 lag pump on

Q1_{pump@run-out} = Flow of One Pump Run-Out Condition

Q2_{pumps@run-out} = Flow of Two Pumps Run-Out Condition

The storage height1 (distance between "Lead Pump On" and "Pumps Off" elevations) should be calculated by dividing the SV1 by the wetwell area and rounding up to the next highest increment divisible by 0.25'. The storage height2 (distance between "Lead Pump On" and "#1 Lag Pump On" elevations) should be calculated by dividing the SV2 by the wetwell area and rounding up to the next highest increment divisible by 0.25'.

The Mercoird Operating Level (emergency high water level alarm) should be set at 0.5' above the virtual invert elevation.

The operating levels are established in 0.5' increments as follows:

$$\text{High Water Level Alarm} = \text{Virtual Invert Level} - 0.5'$$

$$\#2 \text{ Lag Pump On} = \text{High Water Level Alarm} - 0.5'$$

$$\#1 \text{ Lag Pump On} = \#2 \text{ Lag Pump On} - 0.5'$$

The "Lead Pump On" elevation is established by subtracting the Storage Height2 from the #1 Lag Pump On elevation.

The "All Pumps Off Level" is established by subtracting the Storage Height1 from the Lead Pump On elevation and is equal to the invert elevation of the influent pipe.

The wetwell bottom elevation should be set at 3' below the "Pumps Off" elevation.

If two pumps are to be installed initially (3rd pump to be installed in the future), piping and valves for the third pump must still be installed complete through the base elbow.

An approved JEA liner shall be installed on all wetwell concrete surfaces, including the underside of the concrete top slab, exposed to sewage or sewer gases.

5. Pumps

Pumps shall be in accordance with the latest version of the JEA Water and Sewer Standards Manual.

The pump impeller shall be a non-clog design capable of passing a minimum 3" solid (minimum 1¾" solid for reduced capacity stations).

Screw impellers are not acceptable.

Pump motors shall be of sufficient horse power to be non-overloading throughout the curve.

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Pump motors shall be a minimum 3 Hp unless otherwise approved.

All motors shall be suitable for operation with a 3-phase electric supply. Any special exception for single phase motors must be pre-approved through JEA.

Shutoff and check valves shall be provided in the discharge main of each pump. The check valve shall be between the shutoff valve and the pump's discharge.

- a. The check valve shall not be placed in the vertical position.
- b. Valves shall be accessible above ground.
- c. No valves shall be located inside the wetwell.

All pump stations shall be equipped with an easily accessible pump out connection assembly for use with portable pumps to allow bypass operation of the pump station.

Where JEA has approved the station to be designed as "initial/ultimate", the pump's base elbow should be sized for the ultimate pumps. The pump manufacturer should provide an adapter plate for the initial pumps.

Pump access covers shall be suitably sized to provide adequate clearances for installation and removal of the pumping units. Hatches should be sized for the ultimate pump design. The access hatch should be designed for a minimum width of 36" or 6" beyond the manufacturer's minimum required width, whichever is greater. The minimum hatch length should be 48" for standard duplex stations and 96" for triplex stations or the sum of the pump width, centerline pump separation, and 12", whichever is greater. If JEA has approved an "initial/ultimate" pump station design, the hatches should be sized for the "ultimate" pump design. Reduced capacity station hatches shall be sized to adequately remove the pumps and shall not be required to adhere to the minimum requirements.

6. Electrical Control Panel

The panel and all electrical components shall be in accordance with the latest version of the JEA Water and Sewer Standards Manual.

The enclosure shall be sized to enable all breakers and controls to be located not more than 5' above the walkway.

If the chosen pump has a motor greater than or equal to 20 Hp, a 480 volt service must be used. If a pump motor is less than 20 Hp, but the kilo-volt-amperes (kVA) as determined by the equation $kVA = (\text{Total Load}) \times (\text{Voltage}) \times (1.73/1000)$ is greater than 150, a 480 volt service may be used. Otherwise, a 230 volt service should be used.

If the pump motor is less than 25 Hp, across the line starters can be used. Therefore, pump breakers are sized by multiplying the full load amperage (FLA) for the specific motor at the appropriate voltage by 300% and rounding up to the nearest breaker size.

If the pump motor is over 25 Hp, Soft Starts are required. Therefore, pump breakers are sized by multiplying the full load amperage (FLA) for the specific motor at the appropriate voltage by 200% and rounding up to the nearest breaker size.

If JEA has approved the station to be designed as an "initial/ultimate" station, the pump breakers should be sized for the initial pumps, but a note should be added to the drawings stating: "Pump breakers should be spaced to accommodate future pump breakers."

The Main and Emergency breaker sizes are determined by adding the pump breaker size, the FLA of additional pump motors (beyond the one), and any auxiliary loads and rounding down to the nearest breaker size. If the total load for a 240-volt service is less than or equal to 100 Amps, 100 Amp emergency and main breakers should be used. If the total is greater than 100 and less than 200 Amps, round down to the nearest available breaker size, but, set the service size to 200 Amps. If the total is greater than 200 Amps, the service size shall be the same as the emergency and main breaker size. Where JEA has approved an "initial/ultimate" station, the main and emergency breakers, as well as service size shall be designed for ultimate design conditions.

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Starters should be sized corresponding to the NEMA ratings shown in the table below. Use the pump manufacturer's catalog to determine the full load amperage (FLA) corresponding to the appropriate voltage.

NEMA Ratings for Starters:

Max FLA	9	18	27	45	90	135	270	540
Starter Size	0	0	1	2	3	4	5	6

If JEA has approved the station to be designed as an "initial/ultimate" station, the starters should be sized for the ultimate pumps with a note added to the drawings stating: "Heater coil should be sized to protect the initial pumps."

7. Emergency Power

Pump stations with a design capacity of greater than or equal to 500 equivalent dwelling units (EDUs) shall be equipped with an automatic generator set.

Where required, the generator shall be supplied by the Ring Power Corporation in accordance with the existing purchase order between Ring Power and JEA. Under this purchase order, JEA and the contractor shall be entitled to special rates and purchase price of equipment and services. The contractor shall be responsible for all costs associated with the installation of the generator system. The generator system shall conform to the JEA Water and Sewer Standards Manual, Section 472.

The generator installation must be completed in conjunction with whichever phase of a project that causes the pump station influent flow to exceed 500 EDU's.

Pump stations with a design capacity less than 500 EDUs shall be equipped with a generator receptacle for use with a portable generator. Generator receptacles, where used, should be specified as indicated below:

Service Size	Generator Receptacle
100 Amps	JRFB1044FR
200 Amps	JRFB2044FR
>200 Amps	DF4521FRA

8. Water Service

Water service piping for the pump station site shall be 1 ½" diameter (minimum) and shall meet material and installation standards for water service construction as detailed in JEA Water and Sewer Standards Manual.

The water meter shall be 1 ½" diameter (maximum) and will be supplied and installed by JEA.

5.1 Pump Station – Private

All private pump stations discharging to the collection or treatment systems owned by JEA must be designed in accordance with FDEP Regulations and EPB Rule 3 criteria.

Pump stations shall be designed specifically to pump domestic sewage containing solids and fibrous materials.

Pump stations shall be designed and located on the site so as to minimize the effects resulting from odor, noise, and lighting.

The pump station shall have a minimum of 2 pumps with each pump being of the same capacity.

The pump station should be designed to pump the design peak hourly flow with one pump out of service.

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The pump station must be designed to withstand floatation when empty.

The pump stations shall be equipped with an audible and visible high water level alarm.

A 24-hour emergency contact number should be posted at the station.

Pump station should have locked fence or other appropriate features (such as locking hasps for wetwell, control panel, and valve box) to discourage unauthorized entry.

Control panel shall be equipped with lightning arrestors, surge capacitors, and phase protection.

Pump stations serving 500 EDUs or greater shall have provisions for continual operation. Auxiliary power in the form of an on-site generator is required.

Pump stations serving less than 500 EDUs shall be equipped with a generator receptacle.

A shut-off valve shall be provided on the suction main of a dry pit pump.

A shut-off and check valve shall be provided in the discharge main of each pump. The check valve shall be between the shut-off valve and the pump's discharge. The check valve shall not be placed in the vertical position. Valves shall be accessible either above ground or in a dry valve pit.

No valves shall be located inside the wetwell.

A pump out at the station shall be required. A pump out is an appropriate coupling device and valving to the discharge pipe to allow for connection of portable pumps. If the station is within 25' of the JEA required pump-out at the right-of-way, an additional pump-out at the station shall not be required.

Private pump stations manifolding with force mains owned or to be owned by JEA shall require the installation of a check valve, pump out tee, and shut-off valve in a valve pit located on the property adjacent to the right-of-way as per Detail No. S-46 of the JEA Water and Sewer Standards Manual. This pump out shall be accessible to JEA at all times. Operation and Maintenance of this pump out shall be the private owner's responsibility.

5.2 Low Pressure Systems

For the purposes of this document, a Low Pressure Sewers System (LPS) is defined as a Pressure Sewer System. The Environmental Protection Agency defines a Pressure Sewer as: An alternative wastewater collection system in which household wastewater is pretreated by a septic tank or grinder and pumped through small plastic sewer pipes buried at shallow depths to either a conventional gravity sewer or a treatment system.

Low pressure sewer systems may not be allowed for new developments. Exceptions may be approved on a case by case basis by the LPS Committee staff.

It is the policy of JEA to construct gravity wastewater collection systems to serve customers within the JEA's service territory. Low-Pressure Sewer Systems shall only be allowed when the project meets all of the following criteria:

1. A gravity wastewater collection system, designed in accordance with JEA standards, will be placed at a depth greater than fourteen feet (14') with service laterals or at a depth greater than twenty feet (20') without service laterals.
2. There are less than 10 customers that will be served by the low-pressure system.
3. The surrounding land is fully developed or cannot be developed due to environmental constraints and a gravity sewer system would not be economically feasible.
4. A gravity wastewater collection system with a low flow lift station cannot be constructed.
5. An on-site sewage treatment system can be constructed but would not be in the best interest of JEA.

A low pressure pump station shall not be allowed to connect into a JEA force main per FDEP and EPB Rule No. 3. No exceptions will be allowed.

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Appendix A - JEA Inspection Guidelines

Being developed with expected completion by early summer 2006.

