As per Resolution 09-R06 dated January 20, 2009 authorizes the Utility Systems Director to revise the manual as necessary to reflect industry standards and comply with applicable laws and regulations.

This manual, which takes effect on January 1, 2019, has been reviewed and approved by the Utility Systems Director.

__________________________  ______________________________
Brad Macek, Utility Systems Director  January 1, 2019

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The appendices listed below are referenced, but not included, in this document and can be downloaded from the PSLUSD website at https://utility.cityofpsl.com/get-connected/divisions/utility-engineeringcommercial-development/forms-downloads/.

Appendix A – Utility Standard Details
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PREFACE

The design and construction standards set forth in this manual and all subsequent supplemental standards, herein after referred to as the Utility Standards, are the minimum City of Port St. Lucie Utility Systems Department (PSLUSD) requirements. It is the intent that the Utility Standards and Standard Construction Details shall be applicable in all cases where the utilities being constructed will be connected to water, wastewater, and/or reclaimed water facilities owned by PSLUSD. These requirements do not apply to individual single-family dwellings connecting to existing PSLUSD facilities.

All utility projects, whether privately or publicly owned, shall be constructed in accordance with these Utility Standards. Any supplemental standards adopted by PSLUSD will supersede the standards adopted in this manual. If there is a conflict between the standards included in this manual and any supplemental standards, the requirements of the latest supplemental standards will take precedence.

All new work, connections, relocations, etc. must be completed with no service interruptions to existing customers. Exceptions are only granted in writing.

The Engineer of Record (EOR) shall be responsible for assuring that the design details, notes, and requirements presented herein meet all local, state and federal government regulations. If a provision of the Utility Standards is in conflict with the requirements of any state agency or local government having primary jurisdiction, the more stringent requirements shall prevail.

The minimum requirements of the Utility Standards shall not be modified excepting when unique circumstances exist, the public health and safety is not adversely affected, and written approval has been obtained from the Utility Director or designee. Any proposed modification to the minimum requirements must be substantiated by an engineering report prepared by a Professional Engineer licensed in the State of Florida, which would indicate compliance with the intent of the Utility Standards.

In case of a disagreement in the interpretation of any provision of this manual, or the supplemental standards, the decision of the Utility Director shall prevail.

PSLUSD reserves the right to impose additional field requirements not addressed in the Utility Standards, when those requirements will improve the operations, maintenance, or integrity of the utility system.

The terms “shall” and “must” are used when the requirement is mandatory. Other terms such as “recommended” and “preferred” indicate desirable procedures or methods, with deviations subject to individual consideration.

The latest revision of regulations, codes, standards and technical publications referenced in the Utility Standards shall be used.

All submittals to PSLUSD shall be in electronic formats and include the PSLUSD project name and number. Paper documents are typically reserved for some signed and sealed plans or where original signatures are required. File naming can be found on the City’s website.
CHAPTER I
APPLICATION PROCESS

A. GENERAL

1. In order to obtain utility services from the City of Port St. Lucie, the property owner must make an Application for Service to PSLUSD. A completed Application for Service must be submitted with the other items noted on the application form. The application form can be downloaded from the PSLUSD website https://utility.cityofpsl.com/get-connected/divisions/utility-engineeringcommercial-development/forms-downloads/.

2. Applications for services requested by firms, partnerships, associations and corporations shall be tendered only by their duly authorized agents and the official title of the agent shall be shown on the application. Failure to submit all the required information shall result in a rejection of the application, which will then be returned to the owner or designated agent.

3. Within thirty business days of acceptance of the completed Application for Service, including fees, and applicable plans, PSLUSD will provide review comments to the applicant. The applicant shall address the comments and submit construction plans, if applicable, to PSLUSD for review.

4. PSLUSD reserves the right to charge additional fees for services such as subsequent plan review, re-stamped plans, reinspections, permit modifications, partial certifications, turnovers, administrative fees, etc.

B. SITE PLANS

1. The following information shall be included with the site plan when submitted to PSLUSD for approval:

   a. Location and size of existing water, wastewater, and reclaimed water facilities, which are available to serve the proposed project.

   b. Approximate location of proposed on-site and off-site water and wastewater mains.

   c. Location of any existing or proposed well and septic tank system.

   d. Location of nearest fire hydrant within 1,000 feet of property.

   e. Location of any public wells within 1,000 feet of property. The City’s Wellfield Protection Ordinance restricts certain uses and development within the zone of protection. Confirmation shall be provided that the project is not within the zone of protection, either by a statement on the plan or in a separate document.

   f. Right-of-way (ROW), easements and lot lines and pertinent easement information, showing Official Record Book and page number.

   g. Project phasing shall be shown. Once approved, re-phasing shall not be permitted.
2. Guidance comments for future construction plans may be added to assist the applicant with future submittals.

C. CONSTRUCTION PLANS

1. All construction plans require review and approval by PSLUSD. A full set of plans shall be submitted digitally until final approval (electronically stamped by PSLUSD) by the applicant together with the completed PSLUSD forms for Water and/or Wastewater Design Information (with first set only), and applicable fees. Include PDF and CAD files with each submittal. After approval, provide one full set of signed and sealed plans on 24” X 36” sheets.

2. For clarity, utility plans shall be required on separate sheets (not combined with paving and drainage) unless approved in writing by PSLUSD. If approved, paving and grading shall be grayed out. Detailed drawings shall be provided for areas with poor legibility.

3. The construction plans shall be in compliance with the design, specifications and construction standards included in this document and shall be signed and sealed by a Professional Engineer licensed in the State of Florida. The EOR shall submit the design report, calculations and other pertinent information required in Section H, Chapter II, along with the construction plans. Note: Every project that includes a sewer connection must supply pump station calculations for the station, new or existing, that will be utilized for that project.

4. Construction plans shall include the following:

a. Cover sheet with the name of project, developer and EOR; detailed location map with street names and legal description; PSLUSD standards and details utilized (indicate effective date); an index and an issue date.

b. A revision block on all construction plans.

c. A north arrow and scale. The following scales shall be used:

i. 1” = 50’ horizontal or larger for water, wastewater and reclaimed water lines

ii. 1” = 5’ vertical or larger for gravity wastewater profile sheets

iii. 1” = 10’ or larger for details, blow-ups and pump station site plans

d. Phase lines and match lines must be clearly delineated.

e. Design plans with Record Drawings in mind. Leave room for completed construction data.

f. Elevations shall be referenced to the North American Vertical Datum of 1988 (NAVD 88). The location and elevation of at least one NAVD 88 benchmark shall be indicated. All construction plans to be drawn in State Plane Coordinates, Florida NAD 83 State Plane East Zone, US Foot.
g. Elevations of conflicting pipes shall be shown to indicate top and bottom pipe elevations.

h. Rights-of-way, all existing and proposed easements, lot lines, and the Official Record Book and page number, if applicable.

i. Lot and block numbers, if applicable.

j. Each lot, bay, and building; type of use and number of floors; each lot/bay shall have a separate water service line with a meter or lockable shut off valve and an individual sanitary sewer service cleanout.

k. The proposed service line, location of the interceptor and area(s) reserved for future potential interceptors for all buildings and each bay.

l. Facilities with interceptors shall be individually identified and metered; the type, capacity and location of interceptors shall be indicated. Leave room for Record Drawing information on the sheet and near each call-out to table. Add boxes, blanks, or table columns to fill in required Record Drawing. A Grease Management Plan is required for all food service related businesses.

m. Driveway locations for all developments, including residential driveways.

n. Existing and proposed water, wastewater and reclaimed water mains and easements; proposed mains shall be in City-owned road rights-of-way or utility easements.

o. Size, length and type of material used to construct all mains and casings.

p. Distance of mains from buildings or structures within 20 feet of the main.

q. Storm sewers including yard drains.

r. All facilities and appurtenances shall be clearly labeled (pipe, valves, fire hydrants, fire sprinkler lines, water meters, fittings, sampling points, manholes, service lines, power lines, fiber, pull boxes, splice boxes, etc.) with associated elevations, sizes, types, composition, and slopes. All manholes, fire hydrants, sample points, and valves shall be numerically identified.

s. The point of service for water, sewer, and reclaimed water, and electrical power for pump stations shall be labeled as Point of Service or “P.O.S.” and shall be as follows:

- Domestic water service – on discharge side of backflow preventer assembly
- Fire service – upstream side of the first shut-off valve of the DDCV assembly
- Gravity – first cleanout upstream of the gravity main
- Grinder with multiple customers – point where 2 services meet at the edge of the lift station easement
- Grinder with single customer – point of connection to wet well
- Lift station electrical power – within 5’ of lift station easement
t. Separation between water mains, gravity sewer, force mains, reclaimed water mains and storm sewers.

u. Field verified data (sizes, materials, elevations and locations) for existing utilities including, but not limited to, water mains, force mains, gravity sewers, storm sewers, reclaimed water mains, electric, gas, fiber optic, and telephone.

v. All paved non-asphalt surfaces (pavers, stamped concrete, etc.) proposed over PSLUSD owned facilities shall be identified on plans. PSLUSD shall not be responsible for the restoration of any landscaping, aesthetic or structural features, and surfaces in the event of damage during maintenance of its water and wastewater facilities.

w. The plan view and profile of gravity sewer indicating the length and slope of pipe between the manholes; elevation of each manhole rim and inverts; location and elevation of connection to existing sewage collection system or proposed pump station; finished grade elevation; and elevation of water, storm sewer and reclaimed water lines crossing the sanitary sewer.

x. The details indicated hereunder shall be provided if a wastewater pump station is proposed. Keep all lift station details on the same sheet.

i. A plan and section view of the pump station with dimensions and size of the wet well, showing the placement of all components and clearances; elevation of wet-well bottom, top and at ground adjacent to wet-well; elevation of all influent inverts; elevation of emergency off (back-up), pump off, lead pump on, lag pump on and high-water alarm levels; pump information including model, impeller diameter, horse power, motor speed, operating point, operating voltage, and control panel.

ii. A detailed site plan drawn to scale for the pump station including all applicable structures, components and appurtenances such as wet-well, valve vault, telemetry, generator, fuel tank, odor control equipment; water service and reduced pressure principle backflow prevention assembly; gravity sewer, manhole and pressure main; landscaping and irrigation system; control panel, auxiliary electrical enclosure, and all buried electrical conduit including electrical service to control panel, as applicable; concrete and gravel areas; easements; fence; and access driveway. Proposed grade elevations shall be indicated on the site plan in the proximity of the pump station.

y. PSLUSD Standard Details located at https://utility.cityofpsl.com/get-connected/divisions/utility-engineeringcommercial-development/forms-downloads/) shall be utilized, but do not have to be included in the construction plans submitted for review. If the standard details are included in the construction plans, the detail sheets shall not be reduced in scale. If the standard details are not included in the construction plans, the contractor and EOR shall ensure that a copy of the Utility Standards Manual, including Standard Details, is available at the project at all times.

z. After the initial PSLUSD plan submittal, all revisions shall be noted in revision block on cover sheet and clouded on corresponding plan sheets.

aa. Landscaping plans shall be submitted for the project as indicated below in Section D.
bb. Conflicts shall be called out with sequential numbers, beginning with 1, on the utility sheet.

5. PSLUSD will notify the applicant when the construction and landscape plans are in compliance with the Utility Standards, however, the plans will not be approved until the Utility Service Agreement has been executed, all fees are paid, and a Construction Permit/Approval to Connect is issued by PSLUSD or FDEP.

6. No changes shall be made to the approved plans after a Construction Permit/Approval has been issued without specific written concurrence of PSLUSD. Revisions which directly or indirectly impact utility design void the plan approval. Such revisions include, but are not limited to, changes in use from retail to restaurant, adding or deleting bays in buildings, site plan changes, and changes from single-family homes to multiple-family homes. Revised plans are required for approval and are subject to new plan review fees.

D. LANDSCAPE PLANS

1. Landscape plans shall be submitted for the project indicating the location of landscape areas, perimeter walls, foundations, berms, tree wells, fences, gates, signs, decorative rocks, sculpture, fountains, and any other features that may influence the location of water/wastewater/reclaimed water facilities; also, existing and proposed water/wastewater/reclaimed facilities, and right-of-way, lot lines and all easement information, showing Official Record Book and page number, shall be included. The plans shall include and confirm to the following standard notes:

   a. All landscaping within PSLUSD utility easements and within 10’ of PSLUSD infrastructure shall comply with Chapter 154 of the City’s Code of Ordinances and PSLUSD Utility Standards.

   b. No landscaping shall be planted in such a manner as to adversely affect utility installation, operation, or maintenance.

   c. No landscaping other than sod grasses may be planted within a 5’ radius maintenance area of any PSLUSD appurtenance such as water meters, backflow devices, fire hydrants, sanitary sewer cleanouts, manholes, air release valves, etc. Trees shall not be planted within 10’ of any PSLUSD infrastructure. All measurements are from outside to outside, not centerline to centerline. Example: outside of pipe to nearest point on tree trunk.

E. UTILITY SERVICE AGREEMENT

1. When the Application for Service and construction plans have been completed satisfactorily, the applicant/property owner is required to enter into a Utility Service Agreement with PSLUSD. The agreement shall be binding on the applicant/property owner, successors and assigns.

2. The Utility Service Agreement shall detail the terms, conditions and responsibilities of the applicant/property owner, including, but not limited to, warranty of all work and equipment for the project.

3. If utility construction has not been initiated within one year of execution of the Utility Service Agreement or inspections by PSLUSD indicate that utility construction activity has not occurred
for a period of 12 months, a re-approval of the project is required. For re-approval of project by
PSLUSD, construction plans shall be revised to meet the current standards and submitted with
the appropriate charges/fees; an amendment to the Utility Service Agreement may be required.
4. The applicant shall pay all required charges and fees prior to execution of the Utility Service
Agreement by PSLUSD. The Guideline for Estimating Project Fees can be obtained on our
website at https://utility.cityofpsl.com/get-connected/divisions/utility-engineeringcommercial-
development/forms-downloads/.

F. CONSTRUCTION PERMITS

1. If required, a permit must be obtained from PSLUSD prior to construction of water and
wastewater facilities, except utility facilities mentioned below. A completed Application for
Permit to Construct a Water Main/Distribution System (PSLUSD Doc No 61) and/or Application
for Permit to Construct a Domestic Wastewater Collection/Transmission System (PSLUSD Doc
No 60) must be submitted prior to the pre-construction meeting being scheduled.
2. PSLUSD is authorized by the Florida Department of Environmental Protection (FDEP) to
independently regulate the construction of water distribution mains of 12” or less in diameter,
gravity wastewater collection systems of 12” or less in diameter, wastewater force mains of 12”
or less in diameter, and pump stations appurtenant to such force mains. Construction of these
projects is exempt from FDEP permit requirements.
3. Applications for FDEP permits for construction of mains larger than 12” and pump stations
appurtenant to such mains can be submitted concurrently with the construction plans; however,
PSLUSD will not sign the FDEP application form until PSLUSD has executed a Utility Service
Agreement and approved the construction plans.

CHAPTER II
DESIGN, SPECIFICATIONS AND CONSTRUCTION STANDARDS

A. GENERAL

1. The standards set forth in this manual are intended to provide a basis for design and
construction. Applicable federal, state and local laws and regulations should be considered
concurrently with this text. Any variation from these standards shall be specifically requested by
the EOR and requires written approval from PSLUSD prior to construction plan submittal.
Approval of construction plans by PSLUSD does not constitute written approval of deviations
from the Utility Standards.
2. All references to stainless steel shall refer to grade 316 unless otherwise noted.
3. Water, wastewater and reclaimed water lines shall not be constructed without first obtaining
an approval or permit, as applicable, from PSLUSD.
4. All construction shall be in accordance with this manual, the City of Port St. Lucie Code of
Ordinances, and with all applicable FDEP rules and regulations. If any conflict exists between
the standards, the more stringent governs, as determined by the PSLUSD. Copies of City Code of
Ordinances are available with the City Clerk’s office and can also be accessed online at
FDEP rules are available online at [www.dep.state.fl.us](http://www.dep.state.fl.us).

5. Construction shall be in accordance with the Utility Standards in effect at the time the project was approved by PSLUSD and will not be subject to changes in the standards during the life of the project. However, if utility construction has not been initiated within one year of execution of the Utility Service Agreement or inspections by PSLUSD indicate that utility construction activity has not occurred for a period of 12 months, a re-approval of the project is required.

6. Wastewater discharge shall be subject to PSLUSD wastewater system user rules in accordance with the City of Port St. Lucie Code of Ordinances - Title VI.

7. All abandoned mains and service lines shall be removed or filled with cement grout at the discretion of PSLUSD. Asbestos cement pipe (ACP) must be removed and handled in compliance with applicable federal, state and local regulations. All cutting, removal, and disposal of ACP shall be performed by a Florida licensed Asbestos Abatement Contractor.

8. The design and construction of privately-owned fire lines shall conform to the St. Lucie County Fire District standards ([www.slcfd.com](http://www.slcfd.com)) pertaining to dedicated fire sprinkler systems. The District has final jurisdiction on all hydrant and fire sprinkler line requirements. A plan approved by the District is required to be submitted at the pre-construction meeting with any revision that relocates a hydrant or a fire line connection.

9. Cross connection control shall be provided in compliance with City of Port St. Lucie Code of Ordinances – Title VI and FDEP regulations.

10. Permits shall be obtained for subaqueous and aerial pipe crossings canals and other surface waters from jurisdictional agencies and construction shall be in accordance with the permitted plans and conditions.

11. All new/replaced facilities shall be restored with a minimum of one full row (1’ wide) of sod.

### B. EASEMENTS/RESTRICTIONS/CONVEYANCE TO PSLUSD

1. Water, wastewater, and reclaimed water facilities shall be placed in a city-owned ROW or utility easement. Placement of facilities on or adjacent to interior property lines or between structures is discouraged but may be considered by PSLUSD on a case-by-case basis.

2. A minimum 10’ wide easement is required adjacent to any non-city-owned ROW for future PSLUSD facilities.

3. All other utility easements must be a minimum of 20’ wide. For gravity sewer, transmission mains, and mains deeper than 12’, the easement shall be calculated using the equation: Easement = 1 + 1.5D, where D is the depth from the finished grade to pipe invert.

4. Utility easements shall extend a minimum of 10’ beyond a manhole and 7.5’ beyond a hydrant.
5. Structural landscape features such as rock, sculpture and tree wells, berms, signs, walls, foundations, fences and gates are not allowed in a utility easement but may be considered by PSLUSD on a case-by-case basis. PSLUSD shall not be responsible for the restoration of any landscaping, aesthetic or structural features and surfaces in the event of damage during maintenance of its water and wastewater facilities.

6. No landscaping shall be planted in a manner that would adversely affect utility installation, operation and maintenance. Landscaping shall be in compliance with Chapter 154 of the City of Port St. Lucie Code of Ordinances. Approved shrubs and ground cover listed in Chapter 154 may be planted in the easement.

7. Minimum easements shall be provided for pump systems as follows:

   - Grinder System – 20’ x 20’
   - Duplex/Triplex Lift Station – 30’ x 45’

Larger easements may be required based on the site plan prepared by the EOR for the pump station.

8. The developer/property owner shall convey easements and/or property essential to operation of the utility at no cost to the city by fee simple deed. Conveyance may be needed for the construction of water wells, mains, pump stations, storage tanks, etc.

9. Easements shall be submitted to PSLUSD prior to any scheduling of leak testing. The submittal shall be in PDF format. Once approved by PSLUSD, the Applicant shall record the easement in St. Lucie County and provide the recording book and page on the Record Drawings. A copy of the recorded easement shall be provided to PSLUSD.

C. SETBACK REQUIREMENTS

1. All water, wastewater, and reclaimed water facilities which require an excavation with a depth of 6’ or less, as measured from the bottom of the excavation to finished grade, shall be installed at a minimum of 10’ horizontally from any structures. This setback requirement also applies to new structures being constructed in the vicinity of existing PSLUSD facilities. The 10’ horizontal setback shall be measured from the outside edge of the utility facilities to the nearest part of the structure, including underground (e.g. footers) or above-ground (e.g. roof overhangs) features. In addition, the 10’ setback applies only to mains skirting a single structure. Where utility facilities deeper than 6’are installed adjacent to or between structures, setback shall be calculated using the equation: Setback = 1 + 1.5D, where D is the depth from the finished grade to bottom of the excavation.

D. SEPARATION BETWEEN PSLUSD MAINS AND OTHER UTILITIES

1. The minimum separation between PSLUSD mains and other utilities, as measured from the outside of each pipe, shall be as follows:
a. Water mains shall be located a minimum of 10’ from a storm sewer, a gravity sewer, a force main and a reclaimed water main. The vertical separation shall be at least 18” with the water main crossing over the other pipes.

b. All PSLUSD pipes shall have a minimum horizontal separation of 5’ from all other underground utilities including light poles and a vertical separation of at least 18” including footers.

c. When gravity sewer, force main, or reclaimed water main is to be installed parallel to a drainage pipe, a minimum horizontal separation of 10’ is desired. A greater separation may be required for drainage pipes larger than 48” in diameter.

E. REPLACEMENT AND UPGRADING OF EXISTING FACILITIES

1. Upon development or improvement of a property, the owner shall be required to replace any existing onsite PSLUSD water and wastewater facilities constructed of ACP or ‘transite’ pipe, cast iron pipe (CIP), vitrified clay pipe (VCP) or any facilities that do not meet the specifications of this manual with currently approved materials at no cost to PSLUSD. Replacement easements shall be shown on construction plans and conveyed to the City in proper form.

2. When development or improvement of a property causes offsite drainage and/or road improvements to be constructed, the property owner shall be required to replace any existing ACP, CIP, and VCP pipes or any pipe located within the road/drainage ROW or easements that does not meet the Utility Standards. All such installations, whether planned or unplanned, shall be subject to review by PSLUSD prior to actual commencement of any site/road work.

3. When a proposed project causes existing PSLUSD facilities to be hydraulically overloaded or at risk of damage or contamination, the developer shall be required to upgrade and/or relocate the facilities in compliance with the current Utility Standards.

4. In case of road surfacing and other improvements, adjustments shall be made to manholes, valves, fire hydrants and other appurtenances to meet the current Utility Standards at no additional cost to PSLUSD. All work shall be inspected by PSLUSD for compliance.

5. Developments with privately-maintained water and wastewater utility systems may request PSLUSD to accept ownership of the systems subject to the following conditions:

   a. The property owner submits information regarding the system to the PSLUSD, including:

      i. Record Drawing of the system prepared by a Professional Engineer licensed in the State of Florida.

      ii. An engineering report with details on the condition of the system. The report shall be prepared by a Professional Engineer, licensed in the State of Florida and shall contain results of inspection and testing of the mains, appurtenances, structures, and equipment.

   b. The system is repaired or replaced to meet current Utility Standards by the property owner.

   c. Utility easements are conveyed to PSLUSD.
d. PSLUSD is given access to perform inspections and testing to determine the condition of the system and conformity to current Utility Standards.

F. RELOCATION OF EXISTING FACILITIES

1. Relocation of existing facilities shall conform to the design and construction standards of this manual. All materials used in construction shall be on the PSLUSD Qualified Products List (QPL). Design for relocation of existing facilities must provide for continuity of service to existing customers as well as verification that the relocated facilities will not cause additional operation and maintenance expense to PSLUSD.

G. WASTEWATER QUALITY/PRETREATMENT REQUIREMENTS

1. City of Port St. Lucie Code of Ordinances – Title VI, prohibits the discharge of commercial and industrial wastewater into the city’s wastewater collection system if the wastewater contains pollutants and contaminants that are:

   a. Harmful to the operation of wastewater facilities.

   b. Untreatable and will result in violation of city, state, and federal standards.

   c. Hazardous or harmful to the health and safety of city personnel and the general public.

2. Any wastewater that has the potential of causing the above adverse effects will require treatment and/or disposal in compliance with the city, state and federal regulations.

3. Discharge of wastewater from commercial and industrial establishments may be allowed in some cases if pretreatment is approved by FDEP and PSLUSD.

4. Interceptors are required for certain establishments specified in Section F of this Chapter.

5. All waste streams, other than domestic wastewater, shall be identified by the applicant. The information regarding the quantity and quality shall be submitted to PSLUSD with the application for wastewater service.

H. DESIGN OF WATER, WASTEWATER, AND RECLAIMED WATER FACILITIES

1. Water, wastewater, and reclaimed water facilities shall be designed by a Professional Engineer licensed in the State of Florida. It is recommended the developer and EOR meet with PSLUSD staff to determine feasibility, conformance with the PSLUSD Master Plan, and any other special project requirements prior to beginning of any design work on a project. In areas where Master Plan facilities have not been constructed, the design of such facilities shall be incorporated in the overall design of the project. A Master Plan for the development shall be required prior to the submittal of construction plans. Construction plans prepared without regard to PSLUSD requirements shall not be accepted for review.

2. The design criteria specified herein is applicable to PSLUSD facilities, including, potable water mains, gravity sewer, wastewater pump stations, force mains, reclaimed water mains and appurtenances which fall within the PSLUSD service area. The criteria shall be used in
conjunction with the design guidelines and technical references required in FDEP regulations. Deviations shall not be made without first receiving written approval from PSLUSD. If special circumstances or conditions necessitate deviation from the criteria, the EOR shall submit documentation to show that the deviation is based on good engineering practice and provide reasonable assurance that public health and safety will not be compromised.

H1. DESIGN CRITERIA FOR WATER MAINS

1. Water mains shall be designed in accordance with Chapter 62-555 of the Florida Administrative Code (F.A.C.), St. Lucie County Fire Department standards, and provisions of this manual.

a. Sizing

i. The EOR shall submit a report including the design and calculations for sizing of the water main on the basis of following considerations:

1. The PSLUSD Master Plan.

2. The specific development Master Plan.

3. The mains shall be sized to provide at least maximum day domestic requirements plus fire flow at residual pressures of not less than 35 psi at all points in the system.

4. Domestic flows shall be based on 250 gallons per single-family dwelling unit, which equates to one Equivalent Residential Connection (ERC); the ERC factors for residential, commercial, and institutional establishments.

5. The velocity shall be less than 6 feet per second (fps) at peak hour.

6. Distribution mains shall be at least 6" in residential areas. A 4” water main may be proposed for non-hydrant lines serving cul-de-sacs where additional development will not occur. In non-residential areas, distribution mains shall be a minimum of 8”. Material type for all pipe 24” and above must be approved, in writing, by PSLUSD.

b. Layout

i. All developments shall be required to extend water mains across existing or proposed streets, whether public or private, for future extension of other developments. In order to facilitate potable water service for all properties within the service area, the developer/owner shall extend the water main along the full length of all fronting boundaries of the property and may be required to extend it through the property.

ii. Water mains shall be looped at all locations. A looped line shall have two separate branches at least 500’ apart with an isolation valve in between. Grid spacing shall not exceed approximately 100 feet per inch of pipe diameter. Multiple feed lines may be required at the discretion of PSLUSD.
iii. Written approval must be obtained from PSLUSD for dead-end water mains. Dead-end water mains shall be planned and located such that new or existing pavement will not have to be cut in the future when the main is extended. In such instances, mains less than 16” shall end with a valve, a plug, and a blow-off assembly. Water mains 16” and larger shall end with a teed-off fire hydrant, an inline valve, and a plug. Permanent dead-end water mains shall be equipped with an automatic flushing valve, that may be metered, with water billed to the developer.

iv. Water mains shall be located to maintain the minimum separation required in Section D of this Chapter and the standard detail unless a deviation is approved in writing by PSLUSD. Separation less than the minimum required in Chapter 62-555, FAC shall not be permitted.

v. Water mains shall not be placed in ditches, landscape buffers, wetlands, storm water management areas or under sidewalks, concrete slabs and paved areas, unless specifically noted on the plans and approved by PSLUSD.

c. Design Working Pressure

i. Water main systems shall be designed for a minimum working pressure of 150 psi. The system pressure is typically 60-80 psi and not less than 35 psi.

ii. Where system water main pressures meet the minimum requirements but additional pressure is desired by individual customers (such as for high-rise buildings), individual, privately-owned booster pumps may be installed subject to approval by PSLUSD. The EOR shall submit design information to PSLUSD to assure that the booster pump facilities will not adversely affect the pressures in the utility mains and/or result in cross-connection. Appropriate features shall be incorporated in the design to prevent a drop in pressure in the utility mains below 40 psi.

d. Cover

i. Water mains shall have a minimum cover of 36” and a maximum of 60”, unless otherwise approved in writing by PSLUSD.

e. Valves

i. Valves shall be designed to facilitate the isolation of each section of pipeline between intersections of the grid system. The number and location of valves shall provide for flexibility of operation and maintenance, while minimizing the number of customers out of service. In all instances, effectiveness of placement shall be primary criteria in determining valve location.

ii. Valves shall not be placed in curbs, gutters, sidewalks, parking spaces, and handicap ramps.

iii. Generally, the number of valves at an intersection shall be one less than the number of pipes forming the intersection. Wet taps may require a valve installed on the main being tapped.
iv. Inline valves shall be installed for mains near each side of a canal crossing and/or major road crossing.

v. Valves shall be located at not more than 500’ intervals in multi-family residential, industrial and commercial districts and at not more than 800’ intervals in single-family residential districts. On transmission water mains less than or equal to 16” in diameter, valves shall be installed at a maximum of 1000’ intervals and at distribution branches. On transmission mains greater 16” in diameter, valves shall be located at a maximum of 2500’ intervals and at distribution branches.

vi. Air release valves shall be placed at all canal crossings, high points and at other locations specified by PSLUSD. The EOR shall consult with PSLUSD regarding the type of valve to be used and its location. The valve shall be located inside a maintenance access structure as shown in the PSLUSD standard details. Automatic valves shall not be used in situations where flooding of the maintenance access structure may occur. Valves shall be sized per the manufacturer’s recommendations.

f. Fire Hydrants and Fire Sprinkler Systems
i. The St. Lucie County Fire District has final jurisdiction on all fire hydrants and fire sprinkler line requirements. Written approval must be obtained from the Fire Chief and submitted to PSLUSD.

ii. Unless specifically provided in the Utility Service Agreement, all new fire hydrants shall be owned and maintained by PSLUSD and painted safety red. Private hydrants are allowed only with specific written approval and project-specific conditions. Approved plans do not constitute approval. If approved, privately-owned fire hydrants shall be painted safety yellow.

iii. Hydrants shall be located so as to provide complete accessibility and minimize the possibility of damage from vehicle or injury to pedestrians. The following setbacks and clearance shall be observed for fire hydrants:

1. On or near side lot line.
2. No more than 15’ from edge of pavement.
3. Clearance of 7.5’ in front and sides and 4’ to the rear, including landscaping.
4. No less than 2’ from curb/edge of pavement/sidewalk.
5. No less than 3’ from storm sewers/structures.
6. No less than 6’ from a gravity sewer, reclaimed water main or force main.
7. No less than 10’ from wastewater pump stations and onsite sewage treatment and disposal systems.
g. Water Meters and Service Lines

i. Water meters and service lines shall be sized by the EOR in accordance with AWWA Manual of Water Supply Practices - M22. The size of the service line shall be a minimum of 2" except single-family residential. The location of meters and service lines shall be shown on the plans per the standard details and as follows:

1. Water service lines to each lot, parcel, or building.

2. All services lines after the meter shall be located on the property, outside of any easements.

3. Water meters shall be located in accessible areas, outside of landscaping and pavement, a minimum of 5’ from buildings and electric transformers, adjacent to parking areas or roadways and a minimum of 3’ from the edge of pavement.

4. Water meters shall not be located within 10’ of wastewater and reclaimed water service lines.

5. Each lot/bay shall have a separate water service line with a meter or lockable shut off valve. A separate water meter shall be provided for businesses required to have an interceptor.

6. Temporary and permanent water meters shall only be installed on City-owned water mains.

h. Cross Connection Control/Backflow Prevention

i. Cross connection control/backflow prevention shall be incorporated in the design of facilities in compliance with the City of Port St. Lucie Code of Ordinances – Title VI. Specifications are included in this Chapter and the approved backflow prevention assemblies are on the QPL.

i. Sampling Points

i. Bacteriological sampling points shall be located at the point of connection to existing water main, at all dead ends, on the far side of all loops and no more than 1200’ apart. A sample point location map shall be submitted on the overall utility plan prior to disinfection.

H2. DESIGN CRITERIA FOR GRAVITY SEWERS

1. The property owner of existing and proposed developments shall provide a gravity wastewater collection system. A pump station will be used when connection to the PSLUSD wastewater collection system is not possible due to the elevation or other constraints of the receiving gravity sewer, as determined by PSLUSD. PSLUSD may require submittal of an economic analysis by the EOR to compare the cost of gravity sewer versus a pump station over a period of 30 years, including capital and maintenance costs.
2. Gravity sewers shall be designed in accordance with Chapter 62-604, FAC and provisions of this manual.

3. Pump stations are to be designed to serve neighboring parcels to maximize the benefit to the system and minimize maintenance costs.

   a. Sizing
   i. The size shall conform to the approved Master Plan for the development.
   ii. The minimum allowable size for a gravity sewer, other than a service connection, shall be 8”.
   iii. Lateral sewers shall be designed with capacities of not less than four times the average flow. Trunk lines shall have capacities of not less than 2.5 times the average flow.
   iv. The minimum service pipe size shall be 6” in diameter.
   v. Material type for all pipe 24” and above must be approved, in writing, by PSLUSD.

   b. Layout
   i. In order to facilitate wastewater service for all properties within the PSLUSD service area, wastewater gravity sewers shall be extended by the developer/owner along the full length of all fronting boundaries of a property and through the property.
   ii. All wastewater mains shall terminate with a manhole. In “phased” projects, pavement must be in place over stub-out runs a minimum of 5’ past the end manhole.

   c. Slope
   i. All gravity wastewater lines shall be designed with hydraulic slopes sufficient to give mean velocities, when flowing full or half full, of not less than 2 fps and not more than 5 fps, based on Manning’s formula using an “n” value of 0.013. The upsizing of sewers to reduce slopes will not be permitted unless justified by calculated flows.
   ii. The following minimum slopes will be used:
      - 8” – 0.40%
      - 10” – 0.28%
      - 12” – 0.22%

   d. Cover
   i. The minimum cover over gravity sewers shall be 4’.
e. Manholes

i. Manholes shall be installed at the end of each sewer, at every change in grade, size, or alignment, at all sewer intersections, and at distances not greater than 400’ apart.

ii. Manholes shall be placed in accessible locations, preferably in pavement flush to the surface. Manholes shall not be located in low areas and wheel paths (i.e. structures shall be located centered in the travel lane, crown of the road, paved shoulder or off the pavement). Manholes located in unpaved areas shall have a rim elevation 2” higher than the surrounding ground and a concrete collar shall be placed around the manhole; the concrete shall be sloped from the rim and taper out to the existing ground.

iii. Manholes shall not be placed in low-lying areas where storm water inflow may occur. The manhole cover and frame shall prevent inflow of storm water and shall be on the QPL.

iv. The design depth of the manhole from rim elevation to invert elevation shall be no more than 20’, unless specifically approved in writing by PSLUSD.

v. Standard manholes shall be provided with a minimum 0.1’ drop in the invert.

vi. Where the drop in invert exceeds 0.1’ but is less than 2’, a channel shall be constructed to prevent solids deposition in the manhole.

vii. An outside drop connection shall be provided when a sewer enters a manhole 2’ or higher than the main invert channel as shown in the standard detail.

viii. A sewer service connection shall not be directed into a manhole.

H3. DESIGN CRITERIA FOR INTERCEPTORS

1. Interceptors shall be provided when, in the opinion of the Utility Systems Director, they are necessary to prevent the discharge of liquid wastes containing grease, fats, oils, hair, lint, sand and other substances or materials that may be harmful to the operation and maintenance of the City's wastewater facilities.

2. Interceptors are specifically required for establishments with food service, laundry, car wash, services for repair or maintenance of vehicles/mechanical equipment, barber shops, beauty salons, and animal care facilities. Interceptor may be required for institutional facilities and other establishments based on the characteristics of the wastewater, past experience, field inspections, maintenance records and operational issues. Separate plumbing shall be provided for the wastewater to be treated through an interceptor (see example on exhibit in this chapter).

3. An interceptor shall be provided in compliance with these requirements when an existing establishment, listed in 2. above, is expanded or remodeled.

4. Interceptors are not required for single-family homes and private dwelling units.
5. Interceptors shall not be shared. Each business required to have an interceptor shall have its own separate plumbing, interceptor and water meter (see example on exhibit in this chapter). When the same establishment has multiple uses requiring an interceptor, such as an institutional facility with a kitchen and laundry, each use shall be provided with separate plumbing and interceptor.

6. Wastewater from toilets, urinals, showers, and other similar plumbing fixtures for human waste shall not discharge into an interceptor for kitchen, laundry, animal care or facilities for servicing vehicles/mechanical equipment (see example on exhibit in this chapter).

7. Wastewater required to be treated in an interceptor shall enter the interceptor through an inlet pipe only.

8. All equipment and plumbing fixtures in a food service facility that may introduce fats, oil or grease into the PSLUSD wastewater facilities must be connected through the grease interceptor, including but not limited to:

   i. Scullery sinks (two or three compartment).

   ii. Pots and pan sinks.

   iii. Floor drains in kitchen, walk-in coolers and washing areas (not including public restrooms).

   iv. Pre-wash sinks.

   v. Dishwashers and other washing machines.

   vi. Automatic hood wash units.

   vii. Indoor garbage can wash units.

9. Establishments with facilities for servicing of vehicles/mechanical equipment shall connect all plumbing (other than the restroom) from the area where repairs and maintenance is being performed into a sand/oil interceptor. Engine oil, transmission oil, coolant, solvents, additives, brake fluid and any other fluid collected in the process of servicing vehicles/mechanical equipment shall not be discharged into the interceptor or other plumbing. The handling and disposal of these fluids shall be in compliance with FDEP and PSLUSD rules and regulations.

10. Concrete interceptors shall be designed in accordance with ASTM C 890-91 (Reapproved 1999), Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures, for the appropriate loading.

11. Grease, oil, and sand interceptors shall be provided with an access manhole over the inlet and outlet ends. Traffic rated lids shall be installed with manhole covers to finished grade.

12. The wastewater collection system for commercial projects shall be designed to accommodate the installation of interceptors for future uses and phases of the project (see example on exhibit in this chapter). Construction plans submitted to PSLUSD shall indicate areas reserved for the
placement of future interceptors. Physical property restrictions or lack of sewer gradient shall not
be a defense for failure to provide adequate interceptors.

13. A sampling and inspection manhole may be required downstream of grease, oil, and sand
interceptors.

a. **DESIGN CONSIDERATIONS**

1. Interceptors shall be designed by a Professional Engineer licensed in the State of Florida, in
accordance with applicable building codes, state regulations and provisions of this manual. The
design shall be based on the characteristics of the wastewater and the peak flow rate. The EOR
shall take into consideration the specifications for interceptors in this Chapter, the PSLUSD
standard details and the criteria indicated below.

a. **Location (Not Applicable to Interceptors for Barber Shops & Beauty Salons)**

i. The site plan shall provide for area(s) conducive to the installation of an exterior, in-
ground interceptor for all spaces, bays, or suites. Proper planning of areas for
interceptors is particularly essential when designing a new strip center, strip mall, plaza,
shopping center, or any other commercial project where the type of tenancy is uncertain.
The location shall be based on the following criteria:

1. Interceptors shall be located in proximity of the building and the sewer lateral to
allow gravity flow.

2. Interceptors shall be located outside building structures and shall not be placed in
any type of enclosure.

3. Interceptors shall be located in grass/non-traffic areas, unless approved in writing
by PSLUSD.

4. Interceptors shall not be located in low areas subject to flooding. The site shall be
sloped to drain storm water away from the interceptor.

5. Interceptors shall be located as to be easily accessible at all times for routine
inspection, cleaning and maintenance, and to pose no hazard to public health or
safety. Interceptors shall not be placed in parking spaces or sidewalks.

b. **Sizing**

i. PSLUSD will confirm the minimum capacity and the type of interceptor that will be
required based on the information submitted by the applicant and the EOR. The EOR
may specify a larger capacity.

c. **Minimum Design Criteria**

i. The design criteria shall include, but not be limited to, the following depending on the
type of facility:
1. **Food Service Facilities** – PSLUSD will specify size and type of interceptor based on the following category of food service establishments:

   a. Mobile food vendors – An under-the-sink grease trap may be used.

   b. Limited food facilities – Food preparation on the premises is limited to hot dogs, popcorn, coffee and soft drinks, food is served only with disposable utensils, plumbing fixtures do not include floor drains or a garbage grinder or dishwashing machine, and the amount of grease is expected to be minimal. Examples: ice cream and frozen yogurt shops, concession stands, and convenience stores. An automatic grease removal unit may be used.

   c. Full service facilities – Food preparation is not limited as in paragraph above. Examples: restaurants, cafeterias, butcher shops, institutional kitchen facilities, meat and seafood markets. A grease interceptor shall be provided in accordance with the standard detail and as specified below:

      i. A baffle is required, as shown in the detail, unless multiple tanks are used.

      ii. When the size specified by PSLUSD is greater than 1250 gallons, the installation of multiple tanks in series may be required.

      iii. When food wastes containing grease or oil are processed through a garbage disposal, the waste from the garbage disposal shall be directed to a solids separator for separating the solids before discharging into the grease interceptor (see example at the end of this Section). A combination solids and grease interceptor may be installed if the effective capacity of the interceptor is increased to accommodate the waste from the garbage disposal.

2. **Laundry Interceptor** - Interceptors for commercial laundries shall be equipped with a wire basket or similar device removable for cleaning that prevents passage of solids ½” or larger in size, strings, rags, buttons or other materials detrimental to the wastewater facilities.

3. **Interceptor for car washes and facilities servicing vehicles/mechanical equipment** - All such facilities shall install a combination sand and oil interceptor.

4. **Interceptor for barber shops and beauty salons** – A hair interceptor shall be installed under the sinks used for shampoo.

5. **Interceptor for institutional facilities that include uses such as schools, child care, adult congregate, assisted living, nursing homes, hospitals, labor camps, juvenile detention, prisons, etc.** – When required by PSLUSD, an interceptor for such facilities shall be designed to remove rags, clothes, diapers, toys or other objects that would cause overflow of sewage or damage to PSLUSD wastewater facilities. Separate plumbing and interceptors shall be provided for the human, kitchen, and laundry wastes.

6. **Interceptor for animal care facilities for housing, holding, hygiene or medical treatment of animals, i.e. kennel, pet grooming, pet shop, shelter, hospital, etc.-**
Such facilities shall, as a minimum, install an interceptor for retention of hair. A combination hair and solids interceptor may be needed depending upon the characteristics of the wastewater.

**d. Submittal**

- The following information shall be submitted by the EOR to PSLUSD:
  1. A site plan showing the proposed service line, location of the interceptor and area(s) reserved for future interceptors. This is not required in the case of interceptors for barber shops and beauty salons.
  3. Detailed calculations for the peak flow rate of commercial/industrial wastewater.
  4. Characteristics of all commercial/industrial wastewater from proposed and potential uses of the project.
  5. A copy of the floor plan, plumbing plan and configuration as shown in the examples on the following pages.
  6. The capacity of the interceptor, manufacturer and model number shall be specified prior to the preconstruction meeting. The interceptor shall be on the QPL or shop drawings shall be submitted to PSLUSD.
1 REQUIRED: Stub-out must be provided for future line to interceptor.
2 REQUIRED: Must provide adequate space to install future interceptor.
3 Sanitary sewer stub-out.
4 Private sewer.
5 Must provide adequate space for sampling / inspection manhole, if required by PSLUSD.

Notes
- If (2) is an oil / grease / sand interceptor refer to Standard Detail for installation.
LEGEND:
C.O.  Cleanout
F.D.  Floor Drain
F.S.  Floor Sink
G.G.  Garbage Grinder or Disposal
H.S.  Hand Sink
Lav.  Lavatory
M.S.  Mop Sink
S.   Sink
S.I.  Solids Interceptor
VTR.  Vent To Roof
W.C.  Water Closet

Notes
- This EXAMPLE PLUMBING RISER DIAGRAM is intended for informational purposes only. It does not match the Example Grease Interceptor Site Plan.

EXAMPLE PLUMBING RISER DIAGRAM WHEN GREASE INTERCEPTORS ARE USED
H4. DESIGN CRITERIA FOR WASTEWATER PUMP STATIONS

1. The property owner of existing and proposed developments shall provide a gravity wastewater collection system. A pump station will be used only when connection to the PSLUSD wastewater facilities is not possible due to elevation of the receiving gravity sewer. PSLUSD may require submittal of an economic analysis by the EOR to compare the cost of gravity sewer versus a pump station over a period of 30 years, including capital and maintenance costs.

2. Pump stations shall be designed in accordance with Chapter 62-604, F.A.C. and provisions of this manual. The specifications for the various components are provided in this Chapter and the PSLUSD standard details shall be used in conjunction with the design criteria specified herein.

3. All wastewater pump stations shall be owned, operated, and maintained by PSLUSD. An exclusive utility easement shall be provided as required under Section B of this Chapter.

4. Pump stations shall be designed for a 30-year useful life and shall conform to the PSLUSD Master Plan. PSLUSD shall have the right to require the design and construction of the pump station to allow other properties to connect to the system.

5. The developers/owners of adjoining properties shall coordinate to provide a common pump station.

6. Pump stations shall be designed and located so as to minimize the adverse effects resulting from odor, noise and lighting. The installation of an odor control system such as a mulch bed, chemical feed, etc. will be required if cycling time is more than 30 minutes.

7. Pumps shall be designed, at a minimum, with capacity to handle the anticipated peak hourly flow with one pump out of service.

8. Electric power shall meet the 3-phase and voltage requirements of the pump station, which shall be made available to the pump station site. All solids-handling pumps shall be either 240 or 480 volts. Grinder pumps shall be 208 or 240 volts.

9. Pump stations shall be protected from lightning and transient voltage surges. As a minimum, stations shall be equipped with lightning arrestors, surge capacitors or similar protection devices and phase protection.

10. The potential for damage or interruption of operation because of flooding shall be considered in the location of new pump stations. Pump stations shall be designed to stay fully operational and accessible during a 25-year flood. The electrical and mechanical equipment shall be protected from physical damage by a 100-year flood. Design shall include measures to withstand floatation forces when empty.

11. Pump stations shall be equipped with submersible pumps.

12. Pump stations shall be equipped with an audible and visible high-water level alarm.

13. Water service shall be provided to the pump station site and protected with an approved backflow prevention assembly.
14. A fall through prevention system is required for the wet well access opening. Safety grates shall be used for concrete wet wells and safety nets shall be used for fiberglass wet wells. The system shall be installed by the manufacturer or by a contractor approved by the manufacturer.

15. Explosion proof motors, lights, cables, conduits, switch boxes, and other electrical equipment shall be used in areas where fire or explosion hazards may exist due to flammable gases, vapors, or liquids, combustible dust or ignitable fibers or flyings. The electrical components shall comply with the National Electrical Code requirements for Class I, Division I, Group D locations.

a. Submittal

   1. Design report prepared by the EOR must be submitted with the following information:

      a. Construction plans as required under Section C, Chapter I.

      b. Calculations including, but not limited to:

         i. Average Daily Flow (ADF) and Peak Hourly Flow (PHF) - ADF shall be based on the type of use and the number of hours of operation. Engineering references, historical flows or other acceptable methods may be used to determine ADF. The method used shall be specified. The ADF for facilities subject to seasonal high use (e.g., recreational areas, resorts, campuses, industrial facilities) shall be based on the daily average flow during the seasonal period.

         ii. A maximum storage retention time of 30 minutes.

         iii. ADF/PHF cycle/run times and starts per hour - cycle time calculations for pump starts between 2 and 10 per hour, not to exceed the manufacturer’s recommendation.

         iv. Total Dynamic Head.

         v. Analysis of system pressure for current and future (30-year projection) conditions, including highest and lowest, actual or projected, system pressures.

         vi. Protection against floatation with a minimum safety factor of 1.1. Assume station is empty, ground water is at the rim elevations, and no soil weight.

         vii. The size of the emergency power equipment based on capacity to start and maintain the total rated operating capacity of the pump station. Electrical sizing calculations shall assume loading based on the starting and full operation of pumps and all electrical equipment associated with the pump station.

   c. The information listed on the Pumping Station Data Table, including but not limited to, the dimensions of wet well and valve vault, size of piping, pump specifications, operating levels, and elevations intended to provide a basis for design and construction. The EOR shall modify the information, as necessary, and provide additional details not shown as may be required by applicable codes and standards.
All changes shall be clearly identified. The Pumping Station Data Table and accompanying details can be downloaded from the PSLUSD website at https://utility.cityofpsl.com/get-connected/divisions/utility-engineeringcommercial-development/forms-downloads/.

d. Pump data including the performance curve, capacities and efficiency based on the manufacturer’s shop testing of like units. Curves shall be submitted at as large a scale as practical. Curves shall be plotted from zero flow at the pump’s shut off head to the pump’s capacity. The EOR shall plot the specific system design on the manufacturer’s original curve, plotting from zero flow at the designed static head, to and through the selected pump performance curve. Pump duty point shall be within 75% and 115% range of pump flow at Best Efficiency Point (BEP). Pump family curve tables are not acceptable.

e. The availability of electric power compatible with the pump voltage and phase requirements. The EOR shall address whether existing electrical service is adequate or will need to be extended to the site. The details for extension of service shall be included.

f. The electric power service from the ground transformer or pole hand hole/pull box shall be minimized. No greater than 50’ of conduit.

g. Communication shall be by extension and connection to the City’s fiber optic system unless approved in writing to use radio communication.

b. Type of Pump Stations and Related Design Considerations

i. The type of pump station required depends on the size of the project and whether the connection is into a low-pressure sewer system or a force main. Table 1 and the details provided herein shall be used as design criteria.

1. Grinder Station – A grinder pump system is typically used for small projects with 7500 gallons per day (GPD) flow or less. The requirements for single-phase and 3-phase grinder systems are detailed below:

   a. Single-Phase Duplex Grinder Station consists of a dual pump system that operates on 230-volt, single-phase electrical power, with a 2 horsepower (HP) motor. The single-phase duplex system may be approved on a case-by-case basis by PSLUSD if the wastewater generated by the project is limited to 1000 GPD and an interceptor is not required for the proposed use. Written approval must be obtained from PSLUSD.

   b. Three-Phase Duplex Grinder Station consists of a dual pump system that operates on 208-volt or 230-volt, three-phase electrical power with a 2, 3 or a 5 HP motor. The three-phase duplex system may be used in commercial applications in accordance with Table 1.
c. Minimum Design Requirements

a. The wet well shall be 4’ diameter fiberglass basin. Depth shall be site specific and a minimum of 6’ deep.

b. The wet well shall have only one influent pipe.

c. A swing check valve and gate valve are required on the discharge line of each pump.

d. An emergency pump-out connection with a gate valve is required on the discharge piping.

e. A separate valve vault is required for grinder stations.

f. An approved generator receptacle shall be provided for connecting to a portable generator during extended power failure.

g. Pumps and motors completely submerged at all times.

h. Minimum operating range shall be 1’.

i. Minimum float spacing is 6”.

j. A 10’x 45’ unobstructed area for a vacuum truck within 10’ of the wet well. The slope of unobstructed area for the truck and access driveway shall not exceed 10%. NOTE: See Sample Location for Maintenance Truck

3. Lift Stations (other than grinder stations) – A lift station shall be designed for 208/230/460 volt, 3-phase, and 60-cycle electric service. Each pump shall have a horsepower rating between 10 HP and 47 HP and a speed rating between 1700 and 1800 rpm. A lift station shall be provided in accordance with Table 1 when the project does not meet the requirements of a grinder system or the constraints of the PSLUSD wastewater collection system.

4. Minimum Design Requirements

a. A duplex lift station shall be provided for projects with a flow of up to 250,000 GPD. A triplex lift station shall be provided for projects over 250,000 GPD or peak flows over 700 gallons per minute (GPM).

b. In projects constructed in phases and/or where future conditions change significantly, lift stations shall be equipped with temporary impellers, pumps, and/or electrical equipment with reduced capacity at PSLUSD discretion. A second set of impellers, pumps, and/or electrical equipment for full flow conditions shall be required to be furnished at lift station start-up. The selected pumps and electrical system must allow for a minimum of one impeller upgrade or downgrade in the future.
c. The station shall include a wet well, control valves, generator pad, telemetry system, a 6' chain link fence with a lockable gate and a 10' x 45' unobstructed area for a vacuum truck within 10' of the wet well. **NOTE: See Sample Location for Maintenance Truck**
d. The minimum diameter of the wet well shall be 8’. The depth of wet wells shall not exceed 25’ unless approved in advance by PSLUSD. The wet well and access cover shall be as per the specifications included in this Chapter.

e. A wet well elevation control system shall be provided. The system shall be composed of a five-float system used in conjunction with various monitoring, indicator and logic control devices. The floats shall have the capability to control several pumps and alarms, as well as indicate levels using discrete set points. The float installation shall allow for multiple operating ranges over a period of 30 years, as noted within the PSLUSD Master Plan Model.

f. The wet well’s operating water levels shall be arranged to ensure pump operation without cavitation and ensure the gravity sewer system is not surcharged. The operating levels for Pumps Off, Lead Pump On, Lag Pump On, High Water Level Alarm, and Backup Relay System shall be established in increments as explained below.

g. The depth of the wet well shall be adequate to provide for the necessary incremental set points of the floats without surcharging the influent line. The High-Water Alarm elevation shall be set at a minimum of 6” below the lowest influent pipe invert elevation. The Pumps Off elevation shall be set so that the pumps are completely submerged at all times. The highest float shall be used to control the Backup Relay System.

h. Minimum float spacing is 6”. Additional float spacing may be required as determined by PSLUSD.

i. The valve assembly shall be designed per the PSLUSD standard detail. A plug valve is required on the discharge line of each pump with a pressure gauge on the discharge side of the plug valve. A check valve is required between the pump and plug valve. An emergency pump connection device shall be provided and shall be a male aluminum or bronze "Cam-lo" fitting with a dust cap and an isolation plug valve. A stainless-steel ball valve shall be provided on the dust cap.

j. The pump station site shall be well drained and graded to prevent flooding or inflow of surface runoff after a storm event. The exterior top of the wet well shall be designed at or above the 100-year/1-day flood elevation below the finished floor elevation by at least 6” and shall not be below the crown elevation of an adjacent roadway.

k. Emergency pumping capability shall be provided for all lift stations. Stations that receive flow from one or more pump stations through a force main, triplex stations and pump stations discharging through pipes 12” or larger, shall provide for uninterrupted pumping capabilities, including an in-place emergency generator or emergency pumping system. For other stations, emergency pumping capability may be accomplished by connection of the station to at least two independent utility substations or by providing an approved generator receptacle and a portable generator or approved emergency pumping system. Such emergency standby system shall have sufficient capacity to maintain the total rated running capacity of the station. In-place generators shall be equipped with an automatic transfer switch. The lift station site shall include extension of the concrete driveway such that the emergency system can be operational on the driveway inside the
fence and still allow access for operation and maintenance of the wet well, control valves, and control panel.

1. A telemetry and communication system shall be provided in accordance with the specifications in this Chapter. Connection to and extension of fiber optic cable is required unless PSLUSD approves the use, in writing, of radio communication.

m. Odor control may be required as directed by PSLUSD.

<table>
<thead>
<tr>
<th>Design Basis</th>
<th>Low Pressure System</th>
<th>Force Main</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADF (gallons/day)</td>
<td>7500 Max.**</td>
<td>7500 Max.**</td>
</tr>
<tr>
<td>Type</td>
<td>Grinder</td>
<td>Grinder</td>
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<tr>
<td>Size (HP)</td>
<td>2</td>
<td>3</td>
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<tr>
<td>Voltage</td>
<td>208/240</td>
<td>208/240</td>
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<tr>
<td>Phase</td>
<td>Three</td>
<td>Three</td>
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<tr>
<td>Wetwell Diameter</td>
<td>4**</td>
<td>4'</td>
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<tr>
<td>Wetwell Depth</td>
<td>6'-10'</td>
<td>Varies</td>
</tr>
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<td>Wetwell Material</td>
<td>Fiberglass</td>
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<tr>
<td>Valve Vault</td>
<td>Inside Vault</td>
<td>Inside Vault</td>
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<tr>
<td>Easement (Min.)</td>
<td>20'x20'</td>
<td>20'x20'</td>
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</tbody>
</table>

*anything greater than 10’ deep and no more than 12’ deep will be 5’ diameter

**Limited by capacity of the Low Pressure Sewer System
## Pumping Station Data Table

<table>
<thead>
<tr>
<th>Pump Model Number</th>
<th>WGL 20</th>
<th>WGL 30H</th>
<th>WGL 50H</th>
<th>Float</th>
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<td>Pump Type</td>
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<td>Grinder</td>
<td>Grinder</td>
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<td>Non-Clog</td>
<td>Non-Clog</td>
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<td>Horse Power</td>
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<td>Impeller</td>
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<td>N/A</td>
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<tr>
<td>Best Efficiency Point Head (ft)</td>
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<td>N/A</td>
<td>N/A</td>
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<tr>
<td>Pump Efficiency @ BEP Point (%)</td>
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<td>N/A</td>
<td>N/A</td>
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<td>Run Out Flow (gpm)</td>
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<td>35</td>
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<tr>
<td>Run Out Head (ft)</td>
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<td>20</td>
<td>60</td>
<td></td>
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<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**A** Wet Well Rim Elevation (NAVD)

**B** Wet Well Diameter (ft)

**C** Wet Well Bottom Elevation (NAVD)

**D** Influent Pipe Inlet Elevation (NAVD)

**E** Influent Pipe Diameter (in)

**F** * Lead Pump 2 On Elevation (To flex only)

**G** Lead Pump On Elevation (NAVD)

**H** Lead Pump On Elevation (NAVD)

**I** Pumps Off Elevation (NAVD)

**J** Alarm Elevation (NAVD)

**K** Emergency Off Elevation (NAVD)

**L** Discharge Pipe Diameter (in)

**M** Pump Out Diameter (in)

**N** Discharge Pipe Diameter (NAVD)

**O** Pump Submergence (in)

**P** Pump Discharge Diameter (in)

**Q** C.L. of wetwell to C.L. of pump (in)

**R** C.L. of wetwell to C.L. of pump bolts (in)

**S** C.L. of pump to C.L. of pump (in)

**T** Wet Well Hatch (in)

**U** Wet Well Hatch (in)

**V** Exterior Valve Vault (in)

**W** Exterior Valve Vault (in)

**X** Valve Hatch (in)

**Y** Valve Hatch (in)

**Z** Wet Well to Inside Edge of Hatch (in)

### Pumping Station Data Table Notes

1. The Engineer of Record (EOR) shall verify all dimensions shown and add or revise the specific pump information in the appropriate column as necessary, and provide additional details not shown as may be required by applicable codes and standards. All changes to these pages shall be clearly identified when submitting for approval.

2. The EOR shall submit the information on this table to the PSLUSD for review and approval with all items filled in or revised for the specific pump model chosen.
GRINDER SYSTEM WET WELL

NOTE: INFORMATION RELATING TO THE DIMENSIONS AND/OR ELEVATIONS NOTED IN " " SHALL BE SUBMITTED BY ENGINEER-OF-RECORD TO THE PSUSD.
NOTE: DIMENSIONS FOR ITEMS "M" AND "V" THROUGH "Y" SHALL BE SUBMITTED BY THE ENGINEER-OF-RECORD TO THE PSLUSD WITH THE SHOP DRAWINGS.

VALVE VAULT
NOTE: THE DIMENSIONS SHOWN SHALL BE SUBMITTED BY THE ENGINEER-OF-RECORD TO THE PSLUSD WITH THE SHOP DRAWINGS.

PUMP STATION WET WELL
H5. DESIGN CRITERIA FOR FORCE MAINS

1. Force mains shall be designed in accordance with Chapter 62-604, F.A.C. and the criteria specified herein.

a. Sizing

i. The EOR shall clearly state the basis for design, which shall include:

1. The PSLUSD Master Plan.
2. The specific development Master Plan.
3. Force mains shall generally not be less than 4” ID and with an ultimate design flow velocity of no less than 2.0 fps nor greater than 5.0 fps. Force mains less than 4” in diameter or velocity less than 2.0 fps may be approved by PSLUSD on a case-by-case basis if proper justification is submitted in writing by the EOR.

3. Material type for all pipe 24” and above must be approved, in writing, by PSLUSD.

b. Layout

i. In order to facilitate wastewater service for all properties within the service area, force mains shall generally be extended along the full length of all fronting boundaries of a property by the developer/owner.

ii. Force mains shall not be placed in ditches, landscape buffers, wetlands, and storm water management areas.

iii. Separation from other mains, structures, and utilities shall be as in Section D of this Chapter.

c. Cover

i. The minimum cover shall be 36” and a maximum of 72”.

d. Valves

i. Valves shall be designed to facilitate the isolation of each section of pipeline between intersections of the grid system. The number and location of valves shall provide for flexibility of operation and maintenance, while minimizing the number of customers out of service. In all instances, effectiveness of placement shall be primary criteria in determining valve location.

ii. Valves shall not be placed in curbs, gutters, parking spaces, and handicap ramps.

iii. Generally, the number of valves at an intersection shall be one less than the number of pipes forming the intersection. Wet taps may require a valve in the main being tapped as well.
iv. Valves shall be installed for mains near each side of a canal crossing and/or major road crossing.

v. On force mains less than or equal to 16” in diameter, resilient seat gate valves shall be installed at a maximum of 1000’ intervals and branches of intersecting force mains on tees and wyes and at force main stubs. On force mains greater than 16”, valves shall be located at a maximum of 2500’ intervals.

vi. Air release valves shall be placed at all canal crossings, high points, and at other locations specified by PSLUSD. The EOR shall consult with PSLUSD regarding the type of valve to be used and its location. For below ground installation, the air release valve shall be located inside an above-ground access structure as shown in the standard details. Valves shall be sized as per the manufacturer’s recommendation.

H6. DESIGN CRITERIA FOR LOW PRESSURE SEWER SYSTEMS

1. Low Pressure Sewer Systems (LPSS) shall be designed in accordance with the “Design and Specification Guidelines for Low Pressure Sewer Systems”, prepared by a Technical Advisory Committee for FDEP and the PSLUSD Utility Standards.

2. Separation to other mains and utilities shall be as in Section D of this Chapter.

3. The minimum cover shall be 36” and a maximum of 72”.

H7. DESIGN CRITERIA FOR RECLAIMED WATER MAINS

1. Reclaimed water mains shall be designed in accordance with Chapter 62-610, F.A.C. and this manual.

2. In order to facilitate service for all properties within the service area, reclaimed water mains shall generally be extended along the full length of all fronting boundaries of a property by the developer/owner.

3. Separation to other mains and utilities shall be as in Section D of this Chapter.

4. The pipes shall be PVC and meet the specification outlined in Section N of this Chapter.

5. The minimum cover shall be 36” and a maximum of 72”.

6. Extension of the City’s fiber optic system is usually required.

H8. DESIGN CRITERIA FOR RECLAIMED WATER METERING STATIONS

1. An engineering report and construction plans prepared by the EOR shall be submitted to PSLUSD for review and approval.

2. Design shall incorporate the requirements included in Section N of this Chapter.
3. All communication and control panels will require extension of and connection to the City’s fiber optic system.

4. The City will own the reclaimed water main meter, control valve and fittings up to the point of service as well as the control panel, level control, and related electrical components.

I. QUALIFIED PRODUCT LIST

1. Products listed on the QPL have been approved by PSLUSD for use in the construction of water, wastewater, and reclaimed water facilities. Prior to the pre-construction meeting, the contractor shall submit to PSLUSD a list of products and equipment to be installed selected on the QPL. Any materials not listed on the QPL shall require submittal of shop drawings approved by the EOR, and review by PSLUSD prior to ordering the materials. Use of products on the QPL will expedite the review and approval process and is, therefore, encouraged. If the applicant prefers to use other products, it is strongly suggested that a request be submitted to include such products on the QPL.

2. PSLUSD reviews new products through the Product Evaluation Committee (PEC). The PEC provides technical information to the Utility Director regarding the inclusion or exclusion of products on the QPL. The goals of the PEC are to:

   a. Review and evaluate new and existing technologies and products for potential application in the rehabilitation and expansion of the PSLUSD utility system.

   b. Encourage standardization and interchangeability of parts/products. Remove obsolete, inferior equipment or discourage having too many options.

   c. Provide the Utility Director with technically sound information regarding new and existing products.

3. The PEC consists of PSLUSD staff members and usually meets during the months of May and October each year.

4. The Product Review Application Form contains instructions on how to complete the application form and lists the necessary documentation required supporting the application. A total of seven (7) copies of the completed application form, together with all the supporting documentation or samples, shall be submitted to the PEC Chairperson by April 1st for the May meeting and September 1st for the October meeting. The Product Review Application Form can be downloaded from the city website at https://utility.cityofpsl.com/get-connected/divisions/utility-engineeringcommercial-development/forms-downloads/.

5. The product representative will be notified, by e-mail, that the Product Review Application Form has been received and whether it is administratively complete. If items are found to be incomplete, the application will not be reviewed by the PEC until all sections of the application are complete. Applications that are not properly completed and are not returned to the PEC within 60 days of the notice of an incomplete application shall be considered void and the process must be started over.
6. An administratively complete application will be reviewed at the next scheduled meeting of the PEC. The PEC shall present to the Utility Director all pertinent information related to the product including performance, costs for labor and materials, comparison with currently approved products, references from other users, spare parts availability, standardization, financial stability of the manufacturer, etc.

7. The PEC may also review a previously approved product on the QPL and provide the Utility Director with technically sound information for decision-making purposes. Prior to the PEC meeting, the product representative will be notified of PSLUSD’s concern with the product and will be offered an opportunity to meet with the PEC. The Utility Director may then approve or disapprove the inclusion/exclusion of a product on the QPL.

8. The Utility Director may approve use of products for trial periods of up to five (5) years prior to inclusion in the QPL. Products acquired for such trial periods may be provided free of charge by the vendor or may be purchased sole source with the concurrence of the Utility Director. The Utility Director may require that in order for a product to be used on a trial basis, a performance bond be posted in the amount equal to all-inclusive cost associated with the product’s removal and replacement. The Utility Director may also cancel the use of the product at any time during the trial period.

J. MINIMUM TECHNICAL SPECIFICATIONS AND CONSTRUCTION STANDARDS

1. This section includes the specification of materials, construction standards, and contractor responsibilities associated with the installation of water, wastewater, and reclaimed water facilities. These specifications relate to construction and installation work associated with the following:

   1. Earthwork, excavation, backfill and compaction
   2. Jack and bore
   3. Directional boring
   4. Pipe and fittings
   5. Valves and appurtenances
   6. Gravity sewer
   7. Interceptors
   8. Wastewater pump stations
   9. Pipeline cleaning – poly pig method
   10. Reclaimed water metering station
**J1. EARTHWORK, EXCAVATION, BACKFILL, AND COMPACTION**

1. The provisions set forth in this section shall be applicable to all underground water, wastewater, and reclaimed water main installations unless deviations are approved in writing by the EOR and PSLUSD.

2. The contractor shall be responsible for furnishing of all labor, materials, equipment, and incidentals required to properly perform clearing, grubbing, filling of undeveloped ROWs or corridors, excavation, backfill and compaction for all water, wastewater, and reclaimed water facilities, as shown on the approved plans and as specified herein. Imported material, provided by the contractor, shall be at no additional expense to PSLUSD unless specifically stated.

3. All excavations shall be properly shored, sheeted and braced or cut back at the proper slope to provide safe working conditions, to prevent shifting of material, to prevent damage to structures or other work, and to avoid delay to the work, all in compliance with the Occupational Safety and Health Act (OSHA), the State of Florida Trench Safety Act, and under Section 107 of the Contract Work Hours and Safety Standards Act. In all cases where a conflict exists in the requirements of OSHA, the Florida Trench Safety Act, and these specifications, the requirements that are more stringent shall prevail.

4. The EOR or their representative shall inspect the work as needed in order to comply with the permit requirements, certify the project, and ensure a quality constructed project. This may include additional inspections other than scheduled inspections with PSLUSD. The contractor shall provide appropriate notice to the EOR to allow time for scheduling. No work shall be covered up, nor test results accepted unless witnessed by the EOR or their representative. Inspections by the EOR shall not be performed in lieu of inspections required by the City, County, or Federal requirements.

   **a. Submittals**

   i. Contractor shall obtain necessary permits for any required dewatering activity in accordance with the applicable governmental agencies. These permits must be submitted to PSLUSD and the EOR prior to construction.

   **b. Materials**

   i. Fill and backfill material shall be clean, fine earth, granular shell, or sand, free of vegetation or organic material. Material may be from onsite excavation or may be imported. The contractor shall supply load tickets on every truck of fill, which identify and confirm the source of fill.

   ii. Suitable materials for fills shall be classified as A-1, A-3 or A-2-4 in accordance with American Association of State Highway and Transportation Officials (AASHTO) Designation M-145 and shall be free from vegetation and organic material. Not more than 12 % by weight of fill material shall pass the No. 200 sieve, and no particle shall be larger than 1” in diameter. The Contractor shall furnish all additional fill material required.
iii. Suitable material for fills to be placed in water shall be classified as A-1 or A-3 in accordance with AASHTO Designation M-145.

iv. Unsuitable materials are classified as A-2-5, A-2-6, A-2-7, A-4, A-5, A-7 and A-8 in accordance with AASHTO Designation M 145 or soils, which cannot be compacted to specified percentage of maximum density.

v. All fill shall be placed with moisture content within 2% of the optimum moisture content.

c. Clearing, Grubbing, and Stripping

i. All clearing work shall be done for the full width of the corridor area or ROW shown on the approved plans.

ii. Existing vegetation including trees, roots, and stumps shall be removed from the corridor areas. Damage to trees or other items outside of the corridor area shall be prevented. If damage occurs, the contractor shall be responsible for repairs or replacement. The contractor shall dispose of all vegetation material and trash removed from the site to a permitted disposal facility

d. Filling and Grading

i. Future roadway elevations are shown on the drawings when available from construction plans on file with the owner or proposed by others. These elevations shall be used as guides for the filling and grading of the corridor.

ii. All filling and grading work shall be done to provide corridor access and suitable conditions in preparation for utility pipeline construction.

e. Excavation

i. Unsuitable material shall be removed from the corridor area only as necessary for access and pipeline construction.

ii. The maximum amount of open excavation/trench permitted in any one location shall be the length necessary to accommodate the amount of pipe installed in a single day. All excavation/trenches shall be fully backfilled at the end of each day. Barricades and warning lights meeting OSHA requirements shall be provided and maintained.

1. Trench Dimensions: The minimum width of the excavation/trench shall be equal to the outside diameter of the pipe, plus the minimum necessary to obtain proper utility facility excavation backfill and compaction requirements. The maximum width of trench, measured at the top of the pipe, shall not exceed the outside pipe diameter plus 2’, unless otherwise shown on the drawing details or approved by the EOR.

2. Trench Grade: Standard trench grade shall be defined as the point of contact between the utility facility and the soil. Excavation/trench grade for utilities in rock or other non-cushioning material shall be defined as 6” below the outside of the bottom
of the utility, which 6” shall be backfilled with extra utility bedding material.

Excavation below trench grade shall be backfilled to trench grade with granular
material placed in appropriate lift thicknesses, compacted, and meet density
requirements stated herein.

3. Utility Bedding: The bottom of the trench shall be shaped to provide firm bedding
for the utility facility/pipe. The utility shall be firmly bedded in firm soil, or hand-
shaped unyielding material. The bedding shall be shaped so that the pipe will be in
continuous contact therewith for its full length and shall provide a minimum bottom
segment support for the pipe equal to spring line of the pipe or one-half of the outside
diameter of the barrel. Special bedding may be required due to depth of cover, impact
loadings, or other conditions.

4. Unsuitable Material Below Trench Grade: Soil unsuitable for a proper
foundation encountered at or below trench grade, such as muck or other deleterious
material, shall be removed for the full width of the trench and to the depth required to
reach suitable foundation material, unless special design considerations receive prior
approval from PSLUSD and the EOR. Backfilling below trench grade shall be in
compliance with the applicable provisions of "Backfilling", with material as specified
in Section g. - BACKFILL.

5. Extra Utility-Bedding Material: When rock or other non-cushioning material is
encountered at trench grade, excavation shall be extended to six inches below the
outside of the bottom of the utility, and a cushion of granular material shall be
provided. Utility-beding material shall be installed as specified in Section g. - BACKFILL.

6. Sheeting and Bracing: In order to prevent damage to property, injury to persons,
erosion, cave-ins, or excessive trench widths, adequate sheeting and bracing shall be
provided, as required within these specifications, in accordance with accepted
standard practice. When the situation arises, sheeting and bracing shall be used as
necessary to protect the integrity of the road shoulder. Sheetling shall be removed
when the trench has been backfilled to at least one-half its depth, or when removal
would not endanger the construction of adjacent structures. Upon written approval
from the EOR and PSLUSD, to eliminate excessive trench width or other damage,
sheeting, bracing, or shoring shall be left in place and the top cut off at an elevation of
5.0 feet below finished grade or 1.0' above top pipe whichever is less, unless
otherwise directed. All sheeting and bracing will be in accordance with OSHA and
the Florida Trench Safety Act.

7. Excavated Material: Suitable material to be used for backfill shall be neatly and
safely deposited at the sides of the excavations/trenches where space is available. The
contractor will make every effort to segregate any and all unsuitable material and
isolate it from the clean fill intended for backfilling. Whenever possible, excavated
material near a roadway should be deposited on the ROW side of the trench away
from the travel-way. Where temporary stockpiling of excavated material is required,
the contractor shall be responsible for transporting the material to and from the
stockpile site. No excavated material shall be placed within roadside swales for
longer than that day’s work.
8. Excess Fill Material: Clean excess fill shall be the property of the City. The contractor shall deliver and stockpile this material to areas designated by the City, within the City limits. Resale of excavated material on the project site will not be permitted.

9. Material Disposal: Unsuitable fill material or cleared and grubbed material resulting from the utility installation shall be removed from the work site and disposed of at location(s) secured by the contractor, and in accordance with the agency having jurisdiction.

10. Borrow: Should there be insufficient satisfactory material from the excavations to meet the requirements for fill material, borrow shall be obtained from pits secured by the contractor. All borrow shall meet the provisions of these specifications.

11. Dewatering

   a. Utilities shall be laid "in the dry", unless otherwise approved in writing by PSLUSD and the EOR. The contractor, at no direct cost to PSLUSD, shall perform all dewatering activity required for facilities to meet PSLUSD Standards. Dewatering systems shall be utilized in accordance with good standard practice and must be efficient enough to lower the water level in advance of the excavation and maintain it continuously to keep the trench bottom and sides firm and dry.

   b. Trench excavations shall be dewatered by using the well point system, sumps with pumps or other method(s), as approved by the EOR. If the material encountered at trench grade is suitable for the passage of water without destroying the sides or utility foundation of the trench, sumps with pumps may be provided.

   c. Discharge from dewatering shall be disposed of in such a manner that it will not interfere with normal drainage of the area in which the work is being performed, create a public nuisance, or cause flooding. All discharge shall be in accordance with South Florida Water Management District issued permits. The operations shall not cause damage to any portion of the work completed or in progress, to the surface of streets, or to private property. Prior to construction, the EOR and applicable regulatory agencies shall approve the proposed dewatering method(s) and schedule. Additionally, where private property will be involved, the contractor shall obtain advance permission from the property owner.

12. Obstructions: It shall be the contractor's responsibility to become acquainted with existing conditions and to locate structures and utilities along the proposed utility alignment in order to avoid conflicts. Where actual conflicts are unavoidable, work shall be coordinated with the facility owner and performed so as to minimize any adverse impact on the use of affected property. All affected utilities shall be notified prior to excavation in their vicinity.
a. BACKFILL

1. Backfill of all excavations shall be conducted as promptly as the work permits, but not until completion of the following:

- Completion of construction below finish grade.
- Inspection, testing, approval and recording locations of underground utilities.
- Removal of shoring, and bracing, and backfilling of voids with satisfactory materials.
- Removal of trash and debris.
- Permanent or temporary horizontal bracing which is in place on horizontally supported walls.

2. Backfilling shall be divided into two specified areas:

a. Trench grade to a point 12” above the top of the utility, shall be referred to as initial backfill.

b. From the top of the pipe to the bottom of the sub-grade if under pavement, or profile grade if the pipe is not under pavement shall be referred to as final backfill.

c. Where encasements or other below grade concrete work have been installed, backfilling shall not proceed until the concrete has obtained sufficient strength to support the backfill load.

d. All fittings, restraints, and conflicts shall not be backfilled until approved by PSLUSD.

3. Initial Pipe Backfill

1. No pipe backfill shall be placed until density testing approved in writing by PSLUSD. Backfill material shall be carefully placed and tamped around the lower half (spring line) of the utility. Backfilling shall be carefully continued until the fill is 12” above the top of the utility in layers not exceeding 12” (un-compacted thickness), using the best available material from the excavation, if approved. The material shall be lowered to within 2’ above the top of the previously compacted lift before it is allowed to fall. Initial backfill shall exclude organic matter and or deleterious material, stones, or rock fragments larger than 1” for PVC pipe. Compaction of each lift shall be equal to 98 % of maximum density as determined by AASHTO T-180.

4. Final Pipe Backfill

1. The remainder of the trench above initial backfill shall be backfilled and compacted in layers not exceeding 12” (un-compacted thickness) per lift. Compaction of each lift shall be equal to 98% of maximum density as determined by AASHTO T-180.
5. Structure Backfill

1. Prior to backfill, all structures shall have one-foot increments marked in spray paint on a minimum of one side and lines and footage must be visible from outside of the excavation. Backfill material shall be carefully placed and tamped around the structure with the first lift of material starting at the bottom of the structure. Backfilling shall be continued in layers not exceeding 12” (un-compacted thickness). Backfilling shall be continued until the fill is at plan grade. The material shall be lowered to within 2’ above the top of the previously compacted lift before it is allowed to fall. Backfill shall exclude organic matter and or deleterious material, stones, or rock fragments larger than 1”. Compaction of each lift shall be equal to 98% of maximum density as determined by AASHTO T-180.

6. Shoulder Restoration

1. All shoulder restoration shall be in accordance with the applicable permit requirements of the agency having jurisdiction. In excavated locations outside a 2(horizontal) to 1(vertical) slope downward from the shoulder line or the back of the curb, backfill (initial and final) shall be compacted to a density equal to 98% of maximum density, as determined by AASHTO T-180.

7. Non-Structural Backfill

1. When approved in writing by the EOR and PSLUSD, non-structural backfill can be used and compacted to a density of 95% of maximum density as determined by AASHTO T-180.

c. COMPACTION

1. Compaction Methods

   a. Specified compaction shall be accomplished using accepted standard methods (powered tampers, vibrators, etc.), with the exception that the initial backfill below 12” over top of pipe shall be compacted by hand-operated tamping devices. Flooding with water to consolidate backfill is not acceptable.

2. Density Tests

   a. Density tests for determination of the above-specified compaction shall be made by a testing laboratory selected by PSLUSD and the EOR. If any test results are unsatisfactory to PSLUSD or the EOR, the contractor shall re-excavate, re-compact the backfill, and retest, at his expense, until the desired compaction is obtained. Additional compaction tests shall be made to each side of an unsatisfactory test, as directed, to determine the extent of re-excavation and re-compaction necessary. All costs associated with additional testing required to verify that all specifications have been met shall be the responsibility of the contractor.

   b. Acceptance Density Testing for Pipe: The first lift of testing shall start with the bedding material under the utility pipe for all utility mains and structures. All bedding material shall have passing density tests prior to installation of utilities. All density testing shall be completed with a Nuclear Density Gauge or Drive Cylinder Method per ASTMD D-2397. The second lift of testing shall be along the sides of the pipe, after the first lift of backfill is placed. A lift of backfill shall be considered passing when the criteria of the lift being firm,
unyielding, and passing a density test using the appropriate proctor is met as determined by the Geotechnical Engineering Firm. No backfill for the subsequent lift shall be placed until such time as the underlying lift has met acceptance criteria. “Stepping, Sloping, or digging down” to take density tests on an underlying lift of backfill is prohibited. Each lift of backfill is to be placed and meet acceptance criteria prior to any portion of the subsequent lift of backfill material being placed in the excavation/trench.

c. Acceptance Density Testing for Structures: (interceptors, manholes, wet wells, valve vaults, etc.): The first lift of testing shall start below the bottom center of the structure, prior to placement. All density testing shall be completed with a Nuclear Density Gauge or Drive Cylinder Method per ASTM D-2397. The Drive Cylinder Method (ASTM D-2937) may be used if approved in writing by the EOR and PSLUSD in certain cases. A lift of backfill shall be considered passing when the criteria of the lift being firm, unyielding, and passing a density test using the appropriate proctor is met. No backfill for the subsequent lift shall be placed until such time as the underlying lift has met acceptance criteria. “Stepping, sloping, or digging down” to take density tests on an underlying lift of backfill is prohibited. Each lift of backfill is to be placed and meet acceptance criteria prior to any portion of the subsequent lift of backfill material being placed in the excavation/trench.

i. NOTE: If the question of accuracy of moisture levels arises due to any given lift being yielding or “pumping”, a Calcium Carbonate Moisture Test (Speedy) shall be performed to determine if actual moisture levels are within the acceptable limits established by the proctor test. Any soils that appear soft, pumping or otherwise yielding as determined by the EOR, PSLUSD or testing laboratory personnel will not be considered to have met the compaction specifications stated herein.

ii. For large projects (see 5.e. below), a density log book with all densities graphed, equal to that accepted by the Florida Department of Transportation (FDOT), shall be submitted to PSLUSD with the Record Drawings seven days prior to leak testing. See Section 5 below for submittal requirements.

iii. No more than 2 tests over 100% will be accepted on any given section of testing. If results over 100% continue, a new proctor shall be taken.

3. Location of Density Tests for Pipe

a. Density tests shall be made on each individual section of trench backfilled and compacted during each work day’s production or every 200’, whichever is less. At least three density tests shall be taken under each roadway cut, per lift of backfill. Test locations shall be staggered and random as determined by the testing lab. Additional test locations may be requested by the EOR or PSLUSD.

4. Location of Density Tests for Structures

a. Density tests shall be made on each individual lift of backfill, with the first test at the center of the structure, prior to setting of structure. There shall be two tests per lift, randomly chosen around the structure. One test shall be within 2’ of structure walls, and the second test shall cover the remaining excavation backfill for the structure. A lift of backfill shall be considered passing when the criteria of the lift being firm, unyielding, and passing a density
test using the appropriate proctor is met. No backfill for the subsequent lift shall be placed until such time as the underlying lift has met acceptance criteria.

5. Submittal of Density Test Results

a. Determination will be made during the initial plan review if a log book is required and comments will be provided by the reviewer.

b. Small projects, which are defined as a single structure, such as a convenience store or a pharmacy, will not require a log book. They will require an Earthwork Density Report located on the PSLUSD website located at https://utility.cityofpsl.com/get-connected/divisions/utility-engineeringcommercial-development/forms-downloads/ along with the signed and sealed test.

c. Large projects, which are defined as a residential subdivision or a shopping plaza, shall require a log book. It is not a requirement to provide signed and sealed tests, but a signed and sealed letter, on the Geotech firm’s letterhead, certifying the densities will be required as part of the closeout/turnover process. In addition, the Geotech firm shall provide a marked-up utility plan or clear description of test locations. The body of the letter shall contain, at a minimum, the following verbiage:

“Our company has completed final field density testing at the above-referenced project for the utilities indicated on the attached utility plan and/or as described in this letter. I certify that all testing was done per the City of Port St. Lucie Utility Systems Department Standards and meets all specified requirements for locations, quantities, and minimum compaction.”

d. The firm performing the densities for large projects shall create all log book forms and present them to the PSLUSD project manager during the pre-construction meeting.

e. Density test results shall be submitted to PSLUSD on the 1st and the 15th of the month by the EOR. The PSLUSD project manager may ask for them at shorter intervals if they deem necessary.

f. The inspections required for items noted below shall not be scheduled until such time as the density test results have been approved by PSLUSD:

- Installation of lift station/grinder structures/valve vaults
- Installation of manholes
- Pressure/leak testing
- Infiltration/Exfiltration test
- Concrete pad formwork/rebar placement
J2. JACK AND BORE

1. The contractor shall be responsible for furnishing of all labor, materials, equipment, and incidentals required to complete the jack and bore installations as shown on the approved plans and as specified herein.

2. The provision of this section shall be the minimum standards for the installation of casing pipe by the jack and bore method. Other types of trenchless methods may be acceptable and encouraged if the specific method is at least equal to the performance of typical jack and bores.

3. Casing Pipe Materials

   a. Casings shall be steel pipe conforming to the requirements of ASTM Designation A-139. The minimum casing pipe size and wall thickness shall be as shown on the approved plans. For sizes not included therein, or for special design considerations, approval shall be obtained from the EOR and PSLUSD.

   b. For crossing of state roads, casing materials and installation shall conform to FDOT Standards, latest edition.

4. Carrier Pipes

   a. Water, wastewater, and reclaimed water carrier pipes to be installed within the specified casings shall be equipped with restrained joint connections.

   b. Pipe and fittings shall comply with the applicable provisions of these standards.

5. Casing Insulators

   a. Non-corrosive casing insulators shall be used.

   b. The casing runner height shall be large enough so that it does not interfere with the pipe-restrained joints.

   c. Stainless steel nuts and bolts shall be used.

   d. Installation and spacing of casing insulators shall be as required by the manufacturer.

6. Installation

   a. Casing pipes crossing under roadways/railroads shall be located at suitable approved alignments in order to eliminate possible conflict with existing or future utilities and structures, with a minimum 36” depth of cover between the top of the casing pipe and the surface of the roadway. For casing pipe crossings under roadways/railroads, the contractor shall comply with the regulations of jurisdictional authority in regard to design, specifications, and construction. Casing installations shall be as specified in the FDOT Utility Accommodation Manual and the American Railway Engineering Association for railroads.
b. The jack and bore operations shall be conducted simultaneously with continuous installation, until the casing pipe is in final position. Correct line and grade shall be carefully maintained. Add-on sections of casing pipe shall be full-ring welded to the preceding length, developing watertight total pipe strength joints. The casing installation shall produce no upheaval, settlement, cracking, movement, or distortion of the existing roadbed or other facilities. Following placement of the carrier pipe within the steel casing, end link seals are to be installed at each open end. Said end link seals shall be suitable for restraining the external earth load, while allowing internal drainage.

c. Casing pipe holes shall be mechanically bored through the soil by a cutting head on a continuous auger mounted inside the pipe. The distance between the leading end of the first auger section and the leading end of the casing shall be as necessary to maintain a solid plug of spoil material inside the forward portion of the casing.

d. The casing pipe shall be adequately protected to prevent crushing or other damage under jacking pressures. Backstops shall be provided for adequately distributing the jack thrust without causing deformation of the soil or other damage. Should the casing pipe be damaged, such damaged portion not in the hole shall be replaced; however, if installed, the encasement pipe shall be abandoned in place, grouted full, and suitably plugged, and an alternate installation made. An alternate installation will also be required if the casing alignment or elevation substantially deviates from the plan locations, and results in the installation being unusable, as determined by PSLUSD and the EOR.

e. Required jack and bore pits or shafts shall be excavated and maintained to the minimum dimensions necessary to perform the operation. Said excavations shall be adequately barricaded, sheeted, braced and dewatered, as required, in accordance with the applicable portions of Section N of this Chapter -"Earthwork, Excavation, Backfill and Compaction" and applicable regulations/specifications. The pits will normally be no closer than 5’ from the edge of pavement, with the permitting agency having final determination of the required setback distance.

J3. DIRECTIONAL BORING

1. Portions of pressure mains shall be installed by the directional boring method within the limits indicated on the approved plans and as specified herein. Generally, as a minimum, the pressure main is to be located within the road ROW or easement and shall be installed by directional boring. Piping not designated for installation by a specific method may be installed by open trench or directional boring, as approved by the EOR and PSLUSD.

2. The contractor shall be responsible for furnishing of all labor, materials, equipment and incidentals required to perform trenchless installation of pressure mains, as shown on the approved plans and as specified herein.

3. The contractor is required to bring to the attention of the EOR any known design discrepancies with actual tunneling methods that the contractor will be performing no later than the pre-construction meeting.
4. Contractor's Experience

a. The contractor must demonstrate expertise in trenchless methods by providing a list of ten utility references for which similar work has been performed in the last two years. The name and telephone number of the references shall be included so contact can be made to verify the contractor's capability. Also, the contractor must provide documentation showing successful completion of the projects used for reference. Conventional trenching experience is not sufficient to demonstrate expertise in trenchless methods.

b. All supervisory personnel must be adequately trained and will have at least four years’ experience in directional boring. The contractor shall submit the names and resumes of all supervisory field personnel prior to construction. In order to save time, the contractor may wish to provide multiple experienced directional boring crews.

5. Submittals

a. Technical data must be submitted for equipment including clay slurry material, method of installation with working drawings, and proposed sequence of construction for approval by the EOR and PSLUSD.

b. Prior to approval for directional boring, the contractor shall submit the names of supervisory field personnel and historical information of directional boring experience. In addition, the contractor must submit for approval nameplate data for the drilling equipment, mobile spoils removal unit, and Safety Data Sheets (SDS) information for the drilling slurry compounds.

6. Installation

a. Installation shall be in accordance with American Public Works Association (APWA) publication “Trenchless Technology Applications in Public Works” and in a trenchless manner producing continuous bores.

b. The tunneling system shall be remotely steerable and permit electronic monitoring of tunnel depth and location. Accurate placement of pipe within a ± 2” window is required both horizontally and vertically. Turning capability of 90º is required. Continuous monitoring of the boring head is required, including across open water if necessary.

c. The directional boring contractor shall be required to submit a bore log to the EOR, who will verify that the directional boring has been performed in accordance with the approved construction plans and the EOR will provide signed and sealed Record Drawing drawings of the installation.

c. Tunneling must be performed by a fluid-cutting process (high pressure-low volume) utilizing a liquid clay, i.e. bentonite. Liquid clay type colloidal drilling fluid shall consist of at least 10% high-grade, carefully processed bentonite to consolidate cuttings of the soil, to seal the walls of the hole, and to furnish lubrication for subsequent removal of cuttings. In addition, the clay fluid must be totally inert and contain no environmental risk.
e. The contractor must have a mobile vacuum spoils recovery vehicle on-site to remove the drilling spoils from the access pits. The spoils must then be transported from the job site for proper disposal. Under no circumstances will the drilling spoils be permitted to be disposed of into sanitary or storm sewers, public or private drainage systems, and surface waters.

f. Mechanical, pneumatic, or water-jetting methods will be considered unacceptable. After an initial bore has been completed, a reamer will be installed at the termination pit and the pipe will be pulled back to the starting pit. The reamer must also be capable of discharging liquid clay to facilitate the installation of the pipe into a stabilized and lubricated tunnel. Upon completion of boring and pipe installation, the contractor will remove all spoils from the starting and termination pits. All pits will be restored to their original condition.

7. Restoration of Paved, Improved and Unimproved Areas

a. The shoulders, ditches, banks and slopes of roads and railroads crossed and paralleled shall be restored to their former condition and properly sodded to prevent erosion. Restoration shall be as required by the jurisdictional authority and as specified within the contract documents. Road and railroad crossings and parallel installations are to be continuously maintained until completion of the work.

J4. PIPE AND FITTINGS

1. The contractor shall be responsible for furnishing of all labor, materials, equipment and incidentals required to install and complete, all pipeline and fittings as shown on the approved plans and in accordance with the design, specifications and construction standards incorporated in this manual.

2. All pipe and fittings shall be clearly marked with the name or trademark of the manufacturer, the batch number, the location of the plant, strength designation, and standards as applicable.

3. All pipe, fittings, valves appurtenances and linings for potable water facilities shall be in conformance with ANSI/NSF Standard 61-Drinking Water System Components – Health Effects.

4. Related Sections (Section N of this Chapter)

- Earthwork, Excavation, Backfill and Compaction
- Jack and Bore
- Directional Boring
- Valves and Appurtenances
5. Pipe and Fittings (Material type for all pipe 24” and above must be approved, in writing, by PSLUSD.)

a. Ductile Iron

i. Use of Ductile Iron Pipe (DIP) is not permitted for underground pipe excepting in limited special circumstances where PVC and HDPE do not meet the design requirements. The EOR shall submit justification for the use of DIP to PSLUSD for review and approval.

1. Pipe

a. DIP shall conform to ANSI/AWWA C151/A21.51.

b. All above-ground pipe shall be flanged and shall conform to ANSI/AWWA C115/A21.15. Flanges shall be threaded unless otherwise noted. Flanges shall be flat faced unless they are mating up to existing raised flanges.

c. The EOR shall specify the pressure class rating and special thickness class rating of the pipe for the prevalent conditions.

2. Fittings

a. DIP fittings for buried pipe shall conform to ANSI/AWWA C153/A21.53.

b. All above ground fittings for flanged pipe must conform to ANSI/AWWA C110/A21.10 or C153/A21.53, with a minimum pressure rating of 150. Gaskets shall be full face, 1/8” thick, cloth-inserted rubber and furnished in Buna-N rubber suitable for sewage and water service, rated for pressure class 150. Bolts and nuts for flanges shall be Type 316 stainless steel conforming to ASTM A193, Grade B&M for bolts, and ASTM A-194, Grade M for nuts. Washers shall be provided for each nut and shall be of same material as the nuts.

3. Joints

a. All buried joints at fittings must be restrained with mechanical joints.

b. "Push on" and mechanical joints shall be in accordance with ANSI/AWWA C111/A21.11.

c. Restrained joint assemblies with mechanical joint pipe shall be approved restraining devices on the QPL.

4. Coatings and Linings

a. Buried ductile iron pipe and fittings for water facilities shall receive an exterior asphaltic coating as specified in ANSI/AWWA C151/A21.51. The pipe shall be cement mortar lined and sealed with a coat of asphaltic material, in accordance ANSI/AWWA C104/A21.4.
b. For wastewater and reclaimed water facilities, ductile iron pipe and fittings shall be cement mortar and epoxy lined and a bituminous coating applied on the exterior, in accordance with the manufacturer’s recommendations.

c. Machined surfaces shall be cleaned and coated with a suitable rust-preventive coating at the shop immediately after being machined.

d. Ductile iron pipe exposed to the atmosphere and all above ground applications shall be cleaned and given a new inhibitive primer coat at the place of manufacturer. The prime coat shall be compatible with the finish coat of alkyd enamel. Minimum primer dry-film thickness shall be 3 mils. A field prime coat shall be applied in areas where the initial prime coat is damaged in the field. After installation, all above ground ductile iron piping shall receive two or more coats of a high grade, gloss or semi-gloss alkyd enamel coating. Each coat shall have a minimum dry thickness of 3 mils. All related piping shall be the same color.

5. Special Exterior Protection for Corrosion

a. When specifically required, extra protection shall be provided for underground cast or ductile iron pipe and fittings within areas of severe corrosive conditions. This shall be accomplished by the installation of polyethylene encasement as per AWWA C105, through the area of concern. Soil-test evaluation to determine the necessity for extra protection in suspect areas shall be as set forth in ANSI Standard A21.5.

b. If a ductile iron pipe crosses another pipe with cathode protection, it shall be protected for a distance of 20’ on each side of the crossing; also, protection shall be provided when the ductile iron pipe is laid parallel to and within 10’.

b. Polyvinyl Chloride (PVC): Water, Wastewater, and Reclaimed Water Pressure Mains

1. Pipe

a. PVC pipe must meet requirements as set forth in AWWA C900 and C905 and potable water pipe must bear the National Sanitation Foundation seal. Provisions must be made for contraction and expansion at each joint with a rubber ring and integral thickened bell as part of each joint. Pipe and fitting must be assembled with nontoxic lubricant.

b. Water mains shall be blue, wastewater mains shall be green and reclaimed water mains shall be purple.

c. The Dimension Ratio (DR) and Pressure Rating shall be C900, DR-18 (Pressure class 235) for 4” to 12” pipe and C905, DR-18 (Pressure rating 235) for 14” and above pipe.
2. Joints

a. Connections for pipe 2” or greater in diameter shall be rubber compression ring-type. Pipe shall be extruded with integral thickened wall bells without increase in the DR. Rubber ring gaskets shall consist of synthetic compounds meeting the requirements of ASTM Designation D869 and suitable for the designated service.

3. Fittings

a. Ductile iron fittings shall be used on all PVC C900 & C905 mains. Fittings shall conform to AWWA/ANSI C153/A21.53.06 with a minimum pressure rating of 350 psi. Fittings shall be coated as specified under c. (1) (d) Coating & Linings for DIP.

c. PVC: Gravity Sewer

1. PVC pipe and fittings for gravity sewer as well as service lines shall, as a minimum, conform to ASTM D-3034, Standard Dimension Ratio (SDR)-26 and meet requirements of ASTM D-3212 on joints for sewer pipe using flexible elastomeric seals. For depths greater than 15’, the pipe, joints and fittings shall meet the specifications for pressure mains.

d. PVC: Low Pressure Mains

1. Pipe

a. PVC pipe for low-pressure mains, as a minimum, must meet requirements set forth in ASTM D2241 with an SDR-21 and pressure rating of 200 psi. Fittings shall be of the same type of material used for the pipeline.

b. Pressure mains installed along side lot lines shall be HDPE and sleeved the full length of the lot line.

2. Fittings

a. Fittings shall be manufactured in one piece of injection-molded PVC meeting ASTM D-1784, class 200.

3 Joints

a. Pipe shall have push-on type joints with integral wall bell. Bell shall be a gasket joint conforming to ASTM D-3139 with gaskets conforming to ASTM F477. Push joint or mechanical joint ductile iron fittings meeting AWWA C153 may be allowed as an alternative when PVC sizes are not available, as approved by PSLSUD.
e. Polyethylene Tubing up to 3” diameter

1. Pipe

a. Polyethylene tubing shall conform to AWWA C901, Standard Code Designation PE 4710; Pressure Class 200 DR-9 for water use and blue in color and Pressure Class 160, DR-11 for sanitary use and green in color.

2. Joints

a. Joints for polyethylene tubing shall be of the compression type utilizing a totally confined grip seal and coupling nut. Stainless steel tube stiffener inserts shall also be used for tubing services.

3. Fittings

a. All fittings and stops to be high quality water works brass. No PVC fittings or adapters will be permitted. Fittings shall be brass or bronze, equipped with compression-type connectors.

f. High Density Polyethylene (HDPE) Pressure Pipe over 3” outside diameter (OD)

1. Pipe and Fittings

a. Pipe supplied under this specification shall have a nominal DIP size OD unless otherwise specified. The pipe and fittings shall conform to AWWA C906, Standard Code Designation PE 4710. The SDR and the pressure rating of the pipe and fittings materials shall be as specified by the EOR. As a minimum, the materials shall be Pressure Class 200 DR-11 for water use and Pressure Class 160, DR-11 for sanitary use.

2. Joining

a. Sections of polyethylene pipe should be joined into continuous lengths on the job site above ground. The joining method shall be the butt fusion method and shall be performed in strict accordance with the pipe manufacturer's recommendations. The butt fusion equipment used in the joining procedures should be capable of meeting all conditions recommended by the pipe manufacturer, including but not limited to, temperature requirements of 500° F, alignment, and 150 psi interfacial fusion pressure.

b. Butt fusion joining shall be 100% efficient offering a joint weld strength equal to or greater than the tensile strength of the pipe. Socket fusion shall not be used. Extrusion welding or hot gas welding of HDPE shall not be used for pressure pipe applications or in fabrications where shear or structural strength is important. Flanges, unions, grooved-couplers, transition fittings, and some mechanical couplers may be used to mechanically connect HDPE pipe without butt fusion.
6. Installation (Pressure Pipe)

a. The installation standards detailed below apply only to pressure pipe - water mains, force mains, low-pressure sewer mains, and reclaimed water mains. The installation of gravity sewers is covered in Section N of this Chapter.

i. Existing PSLUSD Facilities and Other Utilities

1. The contractor is required to verify location, depth, and size of existing PSLUSD facilities, service lines and other utilities (telephone, gas, electric, cable, etc.) prior to beginning of construction, whether shown in the construction drawings or not. Any discrepancies between the construction drawings and field conditions shall be brought to the attention of the EOR prior to construction. Construction shall not be initiated if the discrepancy may result in non-compliance with Utility Standards; the EOR shall obtain prior written approval from PSLUSD.

2. Any damage to existing utilities or services shall be repaired immediately in coordination with the utility, with all repair costs being incurred by the contractor.

b. Piping and fittings shall be installed in accordance with these standards and in general with the manufacturer’s recommendations for the applicable service.

c. Piping shall be installed along straight line and grade between fittings, or other defined points, unless other definite lines of alignment deflection or grade change have been established. Modification to approved alignment or grade during construction shall not be made without prior approval from the EOR and PSLUSD.

d. The standard minimum cover for utility mains shall be 36” and a maximum of 72”.

e. Utility crossing signs may be required along the pipe alignment at each side of the canal, waterway, storm water retention area, etc. and shall be approved by PSLUSD and agency having jurisdiction over the water body.

f. All piping shall be laid in a clean dry trench on line and grade. All valves and vertical appurtenances shall be plumb. Large gate valves may be rotated horizontally with vertical gear operators upon written approval of PSLUSD.

g. Materials shall be cleaned and maintained clean, with all coatings protected from damage. The interior of the pipe shall be free of dirt and debris, and when work is not in progress, all open ends shall be plugged with an approved device.

h. Pipe, fittings, and other items shall be inspected prior to installation and any items showing a fracture or any other defect shall be rejected. Additionally, any pipe or fitting which has received a severe blow that may have caused an incipient fracture may be salvaged by cutting off the impacted section 12” past the damage, providing the remaining pipe is sound. Discoloration of PVC due to exposure to the sun may result in pipe rejection.
i. Underground piping shall not be driven to grade by striking it. After the pipe has been properly bedded, enough compacted backfill shall be placed to hold the utility in correct alignment. Precautions shall be taken to prevent flotation when necessary.

j. Joining shall be by the manufacturer's approved method and shall not require undue force to accomplish full satisfactory seating and assembly. Connections at structures shall be cut accurately and worked into place without forcing and shall align with the connecting point. Flanged joints shall be made tight, but with care taken to prevent undue strain upon equipment or other items. Suitable flange filler rings shall be installed where required to provide suitable joints. The installation shall be permanently watertight with no visible leakage at joints, connections and other locations, under operational or testing conditions. Material that in jointing does not remain completely seated and/or watertight shall be rejected.

k. Pipe Restraints

i. Underground pressure piping systems shall be securely anchored by acceptable means at all tees, plugs, caps, bends and valves, and at all other fittings or locations where unbalanced forces exist or as directed by PSLUSD, the EOR, and as specified herein.

1. All pressure pipes at fittings shall be restrained by appropriate restraint devices meeting requirements of UNI-B-13 for PVC pipe and the Ductile Iron Pipe Research Association for DIP, and be UL listed. The criteria for establishing required pipe restraint lengths are specified in the standard details.

2. Approved pipe restraint devices that are on the QPL shall be used. Shop drawings shall specify the particular system to be utilized and no substitutions will be allowed after approval without re-submittal of shop drawings to PSLUSD for written approval.

3. All bends, tees, crosses, reducers, valves, and dead ends shall be restrained through an approved means of mechanical joint restraint. Any line terminated as a construction phase that is a known future extension, shall have a plugged valve placed at the end and restrained with approved mechanical joint restraint.

4. Restrained joints shall be installed in accordance with manufacturer's recommendations and PSLSUD Standards. Every pipe joint that is required to be restrained shall be inspected by PSLUSD and the EOR prior to the contractor backfilling the restrained joint.

ii. Exposed systems shall be supported as necessary to hold the piping and appurtenances in a firm, substantial manner to the required alignment and grade, with no undue piping stresses transmitted to equipment or other items. Above-ground pipe outside of buildings shall be supported on concrete supports or pre-manufactured adjustable pipe supports.

iii. In case of conflict between various installation requirements, the more stringent one shall apply.

iv. Installation of pipe and testing shall be performed in the presence of PSLUSD and the EOR.
v. Pipeline joint deflections shall not exceed what is recommended in the Uni-Bell Handbook of PVC Pipe or 75% of the manufacturer's maximum allowable deflection, whichever is more stringent.

l. Ductile Iron Pipe:

i. Installation shall be performed in accordance with the applicable provisions of AWWA Standard C600 and the manufacturer’s recommendations.

m. Polyvinyl Chloride Pipe

i. Water, Sewer, and Reclaimed Water Mains (C900 & C905)

1. Installation shall be performed in accordance with the applicable provisions of AWWA 605, ASTM D-2774, AWWA Manual M23 and the manufacturer’s recommendations. Lubrication used for pipe and fitting joints shall be nontoxic.

ii. Low Pressure Mains (SDR-21)

1. Installation shall be performed in accordance with the applicable provisions of ASTM D-2774, Uni-Bell B-3 for PVC pressure sewer pipe and with the manufacturer’s recommendations. If there are conflicts in installation methods, the more stringent installation criteria shall apply.

2. Pressure mains installed along side lot lines shall be HDPE and sleeved the full length of the lot line.

n. HDPE

i. Construction and installation shall be performed in compliance with the Poly Pipe Institute and manufacturer’s guidelines and the standards included in this document.

o. Service Connections

i. Residential Water Service Connections (Water Main): Connections to water mains shall be made by installing service saddles or tees. A corporation stop shall be placed at the saddle or fitting, with the service line extended to the ROW/easement/property line perpendicular to said line and terminating with a curb stop pending meter installation. Corporation stops shall not be placed under sidewalks, driveways, or pavement.

ii. Non-Residential Water Service Connections (Water Main): Connections to water mains shall be made by installing service saddles. A gate valve shall be placed at the saddle or fitting, with the service line extended to the ROW/easement/property line perpendicular to said line and terminating with a riser and an angle valve, above ground in grass areas, pending meter installation.

iii. Residential Wastewater Service Connections (Low-Pressure Main): Connection to low-pressure mains will be made by use of a tapping sleeve, valve, and check valve with
the service line extended to the ROW/easement/property line perpendicular to said line, terminating with a cap.

iv. Non-Residential Wastewater Service Connections (Low-Pressure Main):
Connection to low-pressure mains will be made by use of a tapping sleeve, valve, gate valve, and check valve, with the service line extended to the ROW/easement/property line, perpendicular to said line, and terminating with a cap.

v. Services Crossing under Roadways: Shall be pushed, moled, or installed by the jack and bore method. Jetting shall not be used. No open cutting of roads for service lines will be allowed. The service line shall have a minimum cover of 30” with slight grade sloping away from the water main or low-pressure main. The service shall be enclosed within a casing pipe. Casing pipe shall be at least schedule 40 PVC or HDPE.

p. Locating Devices

i. Locator Wire

1. Locator wire is required to be installed on all PSLUSD facilities except gravity sewers. All pressure mains and pressure service lines shall be marked by use of an approved solid copper locator wire per the QPL. The wire shall be installed on the top of the pipe and attached or looped at each pipe bell. The wire shall be inserted into a curb stop box at each valve and blow-off pad. The wire shall be looped into the valve box where the pump out is located on all grinders. The loops shall be a minimum of 24” long.

ii. Marking Tape

1. Marking tape shall be placed in the trench above all PSLUSD pressure mains 12”-18” below grade.

   a. Marking tape shall be minimum 6” wide.

   b. Marking tape shall be per the QPL, as specified, with "CAUTION PSLUSD MAIN CALL BEFORE DIGGING (772) 873-6400" printed every 3’ in black letters.

   c. The tape shall be a dielectric, polyolefin film tape that is tear resistant, and corrosion resistant. The tape shall be constructed using material and ink colors which will not change when exposed to acids and other destructive substances commonly found in the soil.

iii. Marker Balls

1. Service connections for water mains, gravity sewer and low-pressure mains shall be provided with an electronic marker ball, placed directly above the end of the pipe at the ROW/easement/property line. Marker balls with tie down straps shall be placed on fittings at service termination points, service connection points on all pressure mains, stub outs for future construction, buried abandon valves, and all vertical and
horizontal deflections. The marker balls shall be installed in accordance with the
manufacturers requirements and be capable of operating at a depth of 6’ below the
ground surface. The marker balls shall have separate and unique frequencies for
water, wastewater, and reclaimed water service connections. Any marker ball that is
deeper than 6’ shall have additional marker balls placed vertically at 4’ spacing and
connected by locate wire. (Example: main 13’ deep, ball at 13’ deep, 9’ deep, and 5’
deep).

J5. VALVES AND APPURTENANCES

1. The contractor shall be responsible for the proper location and installation of valves and
appurtenances for utility pipeline construction, as shown on the approved plans and as specified
herein.

2. Materials shall include, but not be limited to, the following:

- Gate valves
- Butterfly valves
- Ball valves
- Plug valves
- Valve boxes
- Extension stem for valve operator
- Check valves
- Air release valves
- Corporation stops and curb stops
- Service saddles
- Water meters
- Water meter boxes
- Tapping valves and sleeves
- Backflow prevention assemblies
- Fire hydrant assemblies

3. All equipment and appurtenances shall be of the size shown on the approved plans and all
equipment of the same type shall be from one manufacturer.

4. All equipment and appurtenances shall have the name of the manufacturer, the size and the
design working pressure either cast in raised letters or on a stainless steel plate.

   a. Coating conforming to ANSI/AWWA C550 shall be applied to the interior surfaces of
      valves and appurtenances that will be in contact with water.

   b. One 5’ (min) valve key (wrench) shall be provided per project.

5. Installation

   a. Valves and appurtenances shall be installed in accordance with the manufacturer's
      recommendations for the applicable service. Approved restraint devices shall be used as
detailed in Section N of this Chapter.
6. Reflective Pavement Markers (RPM)

a. RPM, marking locations of valves, blow offs, etc., shall be placed 6” from edge of pavement in the event the plans do not call for roadway striping, and 8” from edge of pavement in the event the plans call for roadway striping to be placed.

b. All fire hydrants shall be marked with a blue RPM placed in the center of the travel lane closest to the hydrant, outside of the crosswalk.

c. RPMs shall NOT be placed in crosswalks. If RPM placement falls within the crosswalk, it shall be placed outside of crosswalk as close to valve or hydrant location as possible.

7. Inline Valves

a. Valves shall be carefully inspected, opened wide, and then tightly closed then placed in the normal operating position. All the various nuts and bolts thereon shall be 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 the pipe. Any valve that does not operate correctly shall be adjusted to operate properly or removed and replaced.

b. Buried valves shall be installed vertically where depth of cover permits. Where depth of cover does not permit vertical installation, side operators shall be used if approved in writing by PSLUSD. The operating nut shall be between 24”- 30” below final grade. Extension stems shall be provided on all buried valves when the operating nut is deeper than 30” below the final grade.

c. Valves shall open left (counterclockwise).

d. Gate Valves

i. Gate valves 2” and larger shall be gray or ductile iron body, conforming to AWWA C509 or C515, with mechanical joints or flanged ends, and shall be equipped with a 2” square gray or ductile iron wrench nut.

ii. The stem shall be non-rising type for underground and outside stem-and-yoke rising type for above-ground installation.

iii. Gate valves shall be resilient wedge type and meet the following provisions:

1. The wedge shall be of ductile or gray iron, fully encapsulated with EPDM rubber, including the glide path.

2. The gland flange shall be ductile iron for maximum strength.

3. The stem material shall be 316 stainless steel with yield strength of 40,000 psi.

4. Valve body, bonnet, and gland flange shall have an electrostatic applied, fusion-bonded epoxy coating internally and externally, a minimum of 8 mils thick. The
coating shall meet or exceed the requirements of the AWWA C550. Coating shall be applied at the valve manufacturer’s facilities.

5. All bolts, nuts, and washers shall be stainless steel to limit exterior corrosion and maintain fastener strength. Manufacturer shall use a lubricant listed on the QPL during assembly of bolt and nut sets to prevent galling of similar metals.

6. Valves shall be rated for 250 psi working pressure. All valves shall have pressure tests performed to the requirements of AWWA C509 or C515 specifications, as applicable, prior to shipment from the manufacturer.

7. Valves shall be covered by a Manufacturer’s 10-year Limited Warranty from date of purchase by the end user.

e. Butterfly Valves

i. Butterfly valves shall be used only at the discretion of PSLUSD. Butterfly valves shall be cast or ductile iron body, alloy cast iron or ductile iron disc, one-piece stainless steel shaft, or short or long body-type with the valve class, shaft size, and other special requirements selected in accordance with the specific design and shall comply with the provisions of AWWA C504, "Rubber-Seated Butterfly Valves".

ii. The valve disc shall be gray iron or ductile iron. The valve disc or valve body shall be fitted with a resilient seat of synthetic rubber.

iii. Valves shall open counterclockwise. Actuators shall comply with AWWA C504 with 2” square operating nut. Actuators shall be capable of developing torques listed in AWWA C504 for Class 150B valves. Valve actuators shall be traveling nut or worm gear type, fully field adjustable stops so the actuator does not have to be disassembled for valve seat adjustment.

f. Ball Valves

i. Ball valves shall be limited to ¾” through 2” in size and shall have cast bronze or stainless-steel body, bronze tee head, stem with check, full round way opening and provisions for locking in a closed position.

ii. Ball valves shall be used on all water and low-pressure service lines ¾”-2” in size.

iii. Ball valves shall be designed to be fully open by a 90° turn of the operating handle and shall be full port design with bi-directional sealing rated for 150 psi minimum working pressure.

iv. Valve ends may be threaded if Schedule 80 PVC is used and push-on restrained or solvent welded ends may be used for other PVC.

g. Plug Valves

i. Plug valves may be used if approved in advance by PSLUSD in writing.
ii. All valves shall be cast or ductile iron or steel body, non-lubricated, eccentric-type
with resilient faced plugs and capable of drip-tight shutoff at the rated pressure when
applied at either port. Valve surfaces in contact with the plug face shall be 90% pure
nickel. Operation of all valves 10” and larger and smaller sizes in exposed locations
which require hand wheels or chain wheels, shall be by approved gear actuators,
equipped with position indicator and stop, and shall be furnished by the valve
manufacturer. Gear actuators for buried or submerged installations shall be furnished
with sealed enclosures. Valves shall be equipped with 2"actuating nuts, cast iron hand
wheels, or chain operators, with galvanized steel chains, as appropriate for the installation
and type of operator.

iii. Port areas of valves sized 3” through 24” shall be at least 100% and 30” and larger at
least 75% of full pipe area.

iv. Valves shall be non-lubricated and rated for 150 psi pressure differential acting in
either direction. At this differential, the valve shall provide drip tight shutoff.

v. The valves shall have a balanced plug to assure low torque and drip tight shutoff.
Valves shall be equipped with resilient plug facings to provide drip tight shutoff without
use of sealing lubrications. Even if small solids are trapped between the plug and seat, the
resilient facing shall provide tight shutoff and prevent seat damage.

vi. Plug valves shall have heavy-duty upper and lower guide bearings capable of resisting
corrosion and preventing binding. Bearings shall be stainless steel or bronze bushing.

h. Valve Boxes

i. Units shall be adjustable, cast iron, two-piece screw-type with minimum interior
diameter of 5” with covers cast with the applicable inscription in legible lettering on the
top -“SEWER”, “RECLAIM” or "WATER". Boxes shall be of heavy-duty construction
for traffic loading. Extension pieces, if required, shall be the manufacturer's standard
screw-type for use with the valve box. Bolt down covers shall be provided when
requested by PSLUSD.

ii. The top side of valve box cover and the inside of the top section of the valve box shall
be painted blue for water mains, green for sewer mains and purple for reclaimed water
mains. The paint used shall be on the QPL.

iii. Valve boxes shall be provided with concrete base and valve nameplate with suitable
anchors for casting flush into concrete. Nameplate shall be 3” diameter bronze disk
according to PSLUSD Standard Detail G-07. Information on disk shall be of specific
valve type, size, direction and number of turns, and schematic of facilities. The brass disc
shall be set into wet concrete to be flush with the pad. Discs that have been drilled in and
set with epoxy will not be accepted. All water valve locations are to be marked by a blue
RPM, wastewater valves by a green RPM, and reclaimed water are to be marked by a
purple RPM.

iv. A valve box alignment device shall be used to eliminate the shifting of the valve box
against the operating nut.
v. The tops of valve boxes shall be set to the required grade. Any valve box that becomes out of alignment or is not to grade shall be dug out and adjusted.

vi. The valve box shall not transmit surface loads directly to either the pipe or valve. Care shall be taken to prevent earth and other material from entering the valve boxes.

i. Extension Stem for Valve Operators

i. Where the depth of the operating nut is more than 30”, operating extensions shall be provided to bring the operating nut to a point 24”-30” below finished grade. The extension shall be high strength steel construction and permanently attached to the operating nut or handle on the valve. Where extension stems are required within valve boxes, approved insert stem guides shall be provided and a steel centering plate welded to the extension shall be provided.

j. Check Valves

i. Check valves less than 2” (Water) shall be bronze body and disc, swing check-type with removable inspection covers and rated for 150 psi minimum working pressure.

ii. Check valves (Low-Pressure Mains) shall be a brass or stainless-steel check valve rated for 150 psi. The check valve will provide a full-ported passageway when open. A non-metallic hinge shall be an integral part of the flapper assembly providing a maximum degree of freedom to assure seating, even at a very low back pressure.

iii. Check valves 2” and larger shall conform to ANSI/AWWA C508, Standard for Swing Check Valves and shall meet the following additional provisions:

1. Valves shall be of the flanged type and shall be supplied with or without external lever and weight or lever and stainless-steel spring. A priming actuator may be supplied for installations that require manual backflow to prime pumps, drain the line, and/or back flush.

2. Valve bodies and bonnets shall be of ductile or gray iron meeting the requirements of ASTM A536. The check valve shall be a clear waterway design as defined by AWWA C508. The minimum working pressure rating shall be 250 psi.


4. All internal uncoated ferrous components and bolting shall be stainless steel. The hinge and hinge pin shall be constructed of AISI 316 stainless steel. O-rings shall be used to seal the hinge pin. Exterior bushing material shall be bronze.

5. All exterior bolting shall be stainless steel.

6. All valves shall be covered by a Manufacturer’s 10-year Limited Warranty from date of purchase by the end user, which shall include repair parts and reasonable labor costs.
k. Air Valves

i. Air valves for water facilities shall conform to AWWA C512 and be of single body configuration. Valves shall be of stainless steel, gray cast iron or ductile iron body and cover, with stainless steel float and trim, and rated for a minimum 150 psi working pressure. Combination valves shall be used unless a different type of air valve is approved by PSLUSD based on recommendation of the EOR. Air valves shall be equipped with an inflow prevention device when required by PSLUSD.

ii. Air valves for wastewater facilities shall be of single body configuration and shall be constructed with stainless body and cover with stainless steel trim and float for a minimum working pressure of 150 psi. Combination valves shall be used unless a different type of air valve is required by PSLUSD based on recommendation of the EOR.

l. Ball Corporation Stops and Curb Stops

i. Ball corporation and curb stops shall be required on all water services. The units shall be manufactured from cast bronze or brass with machined fitting surfaces and, for sizes ¾”-2” in accordance with AWWA C800.

ii. Units shall be equipped with connections compatible with the connecting service pipe-type; must have pack-joint type connections for polyethylene tubing with locking collars and stainless-steel inserts.

m. Service Saddles

i. Service saddles for PVC, HDPE, or DIP shall conform to AWWA C800. Saddles shall be double strap, stainless steel full circle type with a bronze body and epoxy lined. Sealing gaskets shall be suitable for the applicable service.

n. Water Meters

i. All water meters shall be owned and maintained by PSLUSD. Water meters up to 2” in size shall be furnished and installed by PSLUSD. The property owner shall be responsible for furnishing and installing the meter above 2” and shall obtain a written approval from PSLUSD prior to installation. Meters 2” and above shall be compound meters unless specifically approved in writing by PSLUSD. Shop drawings shall be submitted for the proposed meter along with a certification of calibration. Ownership of meters provided by the owner/developer shall be transferred by Bill of Sale. The meter shall meet the following specifications:

1. Turbine - The meter to be furnished shall be Class II, horizontal shaft, and shall meet the requirements of AWWA C701, with particular reference to flow capacity, pressure loss, accuracy, physical dimension, and material construction.

2. Compound – The meter shall comply with the requirements of AWWA C702 with particular reference to flow capacity, pressure loss, accuracy, physical dimension, and material construction.
3. The main case shall be of high-grade bronze containing not less than 75% copper and with operating pressure test of 200 psi without leakage at gasket. The name of the manufacturer shall be marked permanently on the lid of the register box. The serial number of the meter shall be imprinted on the lid and on meter main case.

4. The meter must be able to use a strainer without the additional piping upstream and downstream to control accuracy of the meter; strainer will come with meter only upon request.

5. The register shall be permanently hermetically sealed, magnetic drive, low torque registration, straight reading, large numerals, and no fogging type lens.

6. The connection shall be flanged and shall come with companion flanges, gaskets, bolts and nuts.

7. Meters shall have an Encoder-Receiver-Transmitter device for automatic meter reading compatible with existing PSLUSD system.

8. Meters shall be NSF approved for potable water use.

o. Meter Boxes

i. Meter boxes shall be high-density polyethylene body with a solid cover.

ii. Meter boxes shall be the same type throughout the project.

p. Tapping Valves and Sleeves

i. Tapping valves shall have a ductile iron body that accommodates a full-size shell cutter.

ii. Tapping valves shall conform to the specifications set forth previously for the applicable service conditions. Additionally, units shall be comparative with the connecting sleeve or saddle and specially designed for wet tapping installation operations.

iii. When specified, tapping valves 4” through 12” shall have a ring cast with the body on its flanged end to ensure proper alignment with suitable tapping sleeves. All other end configurations shall be specified as mechanical joint (MJ).

iv. Tapping sleeves shall be split-type stainless steel or MJDI with flanged outlet for connection to tapping valve. Carbon steel flanges are not allowed without written approval by the EOR and PSLUSD.

q. Backflow Prevention Assemblies

i. Domestic water backflow prevention assemblies shall be owned and maintained by PSLUSD. Fire backflow assemblies shall be privately owned and maintained. Backflow
prevention assemblies shall be manufactured and installed in full conformance with the following standards:

1. AWWA C510 – Standard for Double Check Valve Backflow Prevention Assembly.
2. AWWA C511 – Standard for Reduced Pressure Principle Backflow Prevention.
3. AWWA M14 – Recommended Practice for Backflow Prevention and Cross Connection Control.
4. Laboratory and Field Performance Specifications of the Foundations for Cross Connection Control and Hydraulic Research, University of Southern California.

ii. Domestic backflow prevention assemblies shall be tested by PSLUSD. Final approval for fire line backflow preventers shall be based on a “Certificate of Approval” issued by an approved testing laboratory certifying full compliance with above standards. Backflow prevention assemblies which have been fully tested and have been granted a certificate of approval by an approved testing laboratory, may be used if listed on the QPL.

r. Fire Hydrant Assembly

i. Fire hydrant assemblies shall include fire hydrant, spool pieces, gate valve, hydrant extensions, valve extensions, valve box, concrete collars around valve box and hydrant, tee at the main, necessary bends and fittings, restraining devices, and bedding material.

ii. All fire hydrants shall be of the size and type specified and all hydrants shall be from one manufacturer.

iii. Fire hydrant extensions shall not be used unless specifically approved in writing by PSLUSD.

iv. Fire hydrant adjustments and relocations include all materials and labor that may be required to complete adjustment and/or relocation to PSLUSD specifications.

v. Fire hydrants shall be connected to the main with a minimum 6” branch controlled by an independent 6” gate valve. All pipe, valve, and joints from the hydrant to the main shall be restrained. Hydrants shall stand plumb and true and shall have nozzles parallel with or at right angles to the curb or edge of pavement with the pumper nozzle facing the curb or edge of pavement. Hydrants shall be set to the established grade with nozzles at least 18” above the ground.

vi. Fire hydrants shall be free of corrosion and all working parts shall be properly lubricated. Hydrants shall be painted with an approved paint on the QPL. Hydrants owned and maintained by PSLUSD shall be painted red. Private fire hydrants shall be painted yellow.
vii. Fire hydrants shall have a minimum of 10-year warranty from the manufacturer covering 100% of all parts and labor for repairs/replacement. The warranty shall become effective on date of acceptance by PSLUSD.

viii. One operating wrench for every ten fire hydrants shall be provided to PSLUSD.

ix. Specifications

1. Hydrants shall be dry barrel type and shall meet the following provisions:


   b. Shall be listed by Underwriters Laboratory (UL) and approved by Factory Mutual (FM) for fire line service. UL and FM trademarks shall be cast on the hydrant nozzle section.

   c. A weather shield shall be provided to prevent dirt and corrosion from affecting the operating mechanism. It will be marked with an arrow indicating the direction of opening (counterclockwise). Weather shields and nozzle cap nuts shall be 1½” pentagon shape.

   d. Hydrant bonnet, nozzle, standpipe, shoe sections, and flanges shall be made of ductile or gray iron. All caps and weather shields may be manufactured of cast or ductile iron. Caps shall be provided with gaskets and cap threads shall be lubricated before delivery with an anti-seize lubricant listed in the QPL.

   e. Hydrant sections shall have an electrostatic applied, fusion bonded, epoxy coating internally and externally. The coating shall meet or exceed the requirements of AWWA C550. Coating shall be applied only at the valve manufacturer’s facilities. New hydrants shall be painted at the manufacturer’s facility; field painting will not be accepted.

   f. The standpipe shall be Bitumen coated internally and externally with a bury line present below the break flange to indicate proper installation depth. Bury depth will be clearly stenciled or cast on the standpipe section.

   g. Rated working pressure shall be 250 psi and test pressure shall be 500 psi in both the open and closed position. Independent testing shall certify fire hydrants have a maximum head loss of 2.5 psi when flowing at 1000 gpm through the 4½” nozzles. Tests will be performed as described in AWWA C502.

   h. The hydrant main valve shall be 5¼” and true compression type, opening against and closing with the pressure. All working parts shall be removable without excavation.

   i. The hydrant’s upper and lower stem, as well as its break coupling, internal pins and clips, shall be manufactured of stainless steel or epoxy coated steel. External bolting shall be manufactured of stainless steel. Manufacturer shall use a lubricant during assembly of bolt and nut sets to prevent galling of similar metals.
j. All hydrants shall be of the traffic breakaway type and allow a 360° rotation to position the pumper nozzle in the desired direction after installation. Undercut or breakaway bolts will not be permitted.

k. Hydrants will consist of one 4½” NST pumper nozzle and two 2½” NST hose nozzles. Each nozzle will be bronze and secured with a stainless-steel set screw for easy maintenance and replacement, should damage occur. Nozzles threaded into the nozzle section shall be lubricated with a lubricant before delivery.

J6. GRAVITY SEWER

1. The contractor shall be responsible for furnishing of all labor, materials, equipment, and incidentals required for construction of gravity sewers and appurtenances as shown on the approved plans and as specified herein.

2. The contractor shall be responsible to ensure that all safety requirements are met.

3. Materials shall include, but not limited to, the following:
   - Gravity wastewater main
   - Wastewater manholes
   - Service laterals and cleanouts

4. Sewer Pipe

   a. Materials
      i. The pipe material, joints, and fittings shall be as specified in Section N of this Chapter and on the QPL.

   b. Installation
      i. All sewer pipes shall be true to line and grade with bells facing upstream. The sections of the pipe shall be so laid and fitted together that when complete, the sewer shall have a smooth and uniform invert. All pipes shall be free from defects. Trenches shall be kept dry while the pipe is being laid. Visible leakage, deflections, horizontal misalignment, non-constant slopes between manholes, and sagging joints shall each be grounds for rejection of lines.

      ii. Where navigable waterways are crossed, approved utility crossing signs shall be placed on the pipe alignment at each side of the waterway.

      iii. Special care shall be exercised in design and installation to provide adequate bedding for the type of pipe used, taking into consideration trench width and depth, superimposed loadings above grade, and the material below trench grade. Pipe loading capabilities shall be computed in accordance with established design criteria and special supporting bedding or facilities shall be provided as required by the EOR. The pipe barrel shall be uniformly supported along its entire length on undisturbed soil or bedding material.

      iv. A sewer service connection shall not be directed into a manhole.
v. No service connection shall be made within 5’ of any manhole. The allowable length of PSLUSD-owned service laterals shall be no more than 150’.

vi. Cleanouts shall be spaced a maximum of 75’ apart. Cleanouts shall be shown on the plans at the property/ROW line or other required locations to limit PSLUSD maintenance and ownership responsibility. Cleanouts ending PSLUSD maintenance responsibility shall be installed at a minimum of 3’ from back of curb, edge of driveway/pavement. For cleanout installations within a non-exclusive utility easement paralleling a road ROW, the cleanout shall be located a maximum of 1½’ from the ROW line.

vii. The service pipe lateral and required fittings shall extend to the property line, perpendicular to said line, terminating with stoppered ends or fittings, as indicated. The exact location for each installed service shall be marked by marker balls.

5. Manholes

a. Materials

i. Manhole interior shall be lined as detailed and specified by the manufacturer. The minimum inside diameter of manholes shall be 48”. Non-penetrating lift pin inserts shall be installed by pre-cast fabricator. Pre-cast reinforced manholes shall be in accordance with ASTM C478, Class II, made with Type II acid resistant cement, shall attain a minimum compressive strength of 4000 psi in 28 days. The liner system shall be cast integrally into the manhole, pre-cast concrete surrounding it, with alignment/grade of channels/openings for connecting pipes matching drawing requirements. Liner integrally formed bell gaskets shall comply with ASTM F 477 Standard Specification for Elastomeric Seal (Gaskets) for Joining Plastic Pipe. Installation of pre-cast manholes shall comply with the details shown in the Construction Standards and in accordance with the manufacturer's recommendations.

ii. Manhole frames and covers shall be ductile iron or gray cast iron traffic rated heavy duty conforming to ASTM Designation A48, Class 30 and on the QPL. Covers shall be marked with the word “SANITARY SEWER” in 2” raised letters. Frames and covers shall be set to the correct finish grade elevation and have a rubber O-ring seal.

iii. The base slab and first ring of the pre-cast manhole shall be cast monolithically.

iv. Lift holes shall be grouted once the manhole is in place.

b. Marking and Identification

i. Each manhole shall be marked on the inside and outside with the following information:

- Manufacturer's name or trademark
- Manufacturer's factory location
• Manufacturer's serial number

• Total manhole depth

c. Installation

i. Manholes shall be installed at the end of each sewer, at every change in grade, size, or alignment, at all sewer intersections, and at distances not greater than 400’ apart.

ii. Manholes shall be placed in accessible locations, preferably in pavement flush to the surface. In unpaved areas, a concrete collar shall be poured around the top of the manhole flush with the cover and 2” above finished grade.

iii. Manholes shall be set according to approved construction plans and shall be pre-cast in accordance with approved shop drawings, specifications, and construction standards.

d. Manholes shall not be placed in low-lying areas where storm water inflow may occur. The manhole cover and frame shall be water tight to prevent inflow of storm water and shall be on the QPL.

iv. Certification from manufacturer stating that manufacturer has provided factory training to the pre-cast fabricator, and that the pre-cast fabricator is approved by the liner manufacturer for incorporation of manufacturer's liner into fabricator's pre-cast manhole product, shall be required.

v. All joints, including manhole sections and risers, shall be sealed using a bonding compound that meets ASTM C-990-96, latest revision. Also, an approved external joint sealing system may be applied on the outside of all joints. The application of sealants shall be in accordance with standard detail WW-04.

vi. Fabricator shall provide on-site guidance during manhole pipe connection and joint sealant installation of first manhole. Upon completion of construction, contractor shall provide certification from the fabricator stating that such field guidance was provided to the contractor.

vii. Concrete manhole exterior shall receive three (3) applications, 3-5 mils each, of a 100% solids water base epoxy. The first coat is a primer followed by two (2) finish coats. Application shall be by an approved applicator.

viii. All manholes shall require backfill compaction as specified in compaction specifications.

d. Tools

i. One manhole lid removal hook/bar shall be provided per project.
J7. GREASE, OIL, AND SAND INTERCEPTORS

1. The contractor shall be responsible for furnishing all labor, materials, equipment, and incidentals required for installation of a grease, oil or sand interceptor as shown on the approved plans. The installation shall comply with the standard detail and as specified herein.

2. Installation of the interceptor and its components shall be performed by a licensed plumber or septic tank contractor registered with the Florida Department of Health.

3. Materials shall include the tank, baffle, lid, manhole covers, valve boxes, pipe, tees, elbows and miscellaneous fittings and hardware.

4. Tank

   a. The tank shall be built of pre-cast concrete with a minimum of 4” thick walls and pre-cast holes for the inlet/outlet pipes. The lid shall be at least 8” thick. Traffic lids shall meet the specifications of ASTM C890-91, latest revision.

   b. The inlet and outlet holes shall have a prefabricated pipe boot with stainless steel-clamp or gasket.

   c. The inlet invert level shall be a minimum of 2½” above the water level.

   d. The liquid depth shall be at least 42”.

   e. A baffle shall be installed such that the first chamber shall have a minimum effective capacity of ½ (one-half) to 2/3 (two-thirds) the total required effective capacity. The flow between the two compartments shall be through an 8” diameter hole in the baffle. The hole shall be located 12” from the tank bottom for a grease interceptor and 16” to 20” for a sand/oil interceptor. A baffle is not required if multiple interceptors are installed in series.

   f. A manhole shall be provided over each compartment for access to the inlet and outlet tees.

5. Installation

   a. All piping shall be a minimum of 4” PVC.

   b. The inlet and outlet tees shall be located no more than 4” from the end of the tank and shall be in accordance with ASTM C923-98, latest revision, Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals. The inlet tee shall extend no more than 24” below the water level for a grease interceptor. An inlet tee is not required for sand/oil interceptors. However, if used, it shall not extend more than 12” below the water level. The outlet tee shall extend to within 8” of the bottom of the tank.

   c. The inlet and outlet tee shall be attached to the tank wall as per detail submitted by the EOR and approved by PSLUSD.

   d. Inspection ports (two-way clean-outs) shall be installed on each end of the interceptor, which are easily accessible for inspection/sampling.
e. When the required effective capacity of the interceptor is greater than 1250 gallons, PSLUSD may require installation of multiple tanks in series. When multiple tanks are used there shall be a minimum 4’ separation between tanks with the required inspection port installed in the center.

f. The manholes shall be brought to grade and fitted with covers.

g. All joints, including mid-seams, risers and lids shall be sealed using a bonding compound that meets ASTM C-990-96, latest revision.

h. An approved external joint sealing system on the QPL shall be applied to on the outside of all joints.

**J8. WASTEWATER PUMP STATIONS**

1. These specifications are the minimum requirements for pump stations, including factory testing of all materials, equipment and appurtenances, delivery and installation. The manufacturer’s recommendations, approved plans and standard details may contain additional requirements pertinent to the installation including accessory and auxiliary equipment and material types, which may not be specified herein.

2. The specifications for “Grinder Pump Station” and “Lift Station” shall be used in conjunction with Section H of this Chapter - Design Criteria for Wastewater Pump Station.

3. The pumps and appurtenances furnished shall be installed in accordance with the industry standards and methods, as specified herein. All pumps shall be manufactured in accordance with the Hydraulic Institute standards.

4. In the event that it is impossible to conform to certain details of the specifications due to different manufacturing techniques, a written justification shall be submitted for all non-conforming aspects.

5. Only components on the QPL shall be utilized.

6. All equipment and materials furnished shall be new and the standard product of the manufacturer.

7. The use of stainless steel nuts and bolts, minimum grade 316, is required on all parts.

8. When pump stations are located in areas where fire or explosion hazards may exist, the electrical components (e.g. motors, lights, cables, conduits, switch boxes, control circuits, etc.) shall comply with the National Electrical Code requirements for Class I, Division I, Group D locations. The pumps and electrical components shall be certified as explosion proof by Factory Mutual Approvals.
9. Shop Testing

a. Each pump shall be tested in the manufacturer's shop to demonstrate the proper operation of all components. Testing shall also be conducted to determine overheating of bearings, motors or other components.

10. Submittals

a. Contractor shall provide to PSLUSD factory test results and shop drawings in PDF format for review and approval.

i. Grinder Pump System - The following information shall be provided as a minimum:

1. Dimensions and anchor bolt locations.

2. Descriptive literature, bulletins, and/or catalogs of the equipment.

3. A list of the manufacturer's recommended spare parts to be supplied in addition to those specified herein under Section X - Spare Parts in this Chapter i.e. gaskets, packing, etc. shall be included and bearings shall be listed by the manufacturer's item numbers only.

4. Complete motor data.

5. Copies of all factory test results.

6. A certified Hydraulic Institute test curve from an identical pump including head, capacity, brake horsepower, and pump efficiency for each pump type supplied.

ii. Lift Station – The submitted drawings and data shall be provided by the manufacturer, including but not limited to the following:

1. Information on wet well, pumps, discharge piping, valves, guide rail systems, pressure gauges, access covers, control panel, electrical schematics and any other requirements necessary to complete the lift station installation, including:

   • Assembly drawings, nomenclature, and materials list
   • Outline dimensions and weights
   • Drawings, method of anchoring equipment, and piping connection details
   • Electric motors
   • Name of manufacturer
   • Type, model and frame size
   • Motor horsepower
   • Full load speed
   • Construction
   • Temperature rise and class of insulation
   • Service factor.
   • Voltage, frequency, number of phases
b. Drawings and descriptive information in sufficient detail to show the kind, size, arrangement, and operation of component materials and devices, the external connections, anchorages, and support required, and the dimensions needed for installation and correlation with other materials and equipment. All part numbers and catalog data required for ordering spares and replacements shall be provided.

c. The acceptance of drawings returned marked "REVIEWED" or "REVIEWED AS NOTED" will not constitute a blanket approval of dimensions, quantities, and details of the materials, equipment, device or items shown and does not relieve the contractor of responsibility for errors or deviations from the requirements.

d. Manufacturer’s Qualifications

i. Equipment and materials shall be furnished by a manufacturer fully experienced, reputable and qualified in the manufacture of items to be installed.

e. Product Handling

i. All equipment and parts shall be properly protected so that no damage or deterioration will occur during a prolonged delay from the time of shipment until installation is completed and ready for operation.

ii. Factory assembled parts and components shall not be dismantled for shipment unless permission is received in writing from the EOR.

iii. Finished surfaces of all exposed pump openings shall be protected by wooden planks, strongly built and securely bolted thereto. Finished iron or steel surfaces not painted shall be properly protected to prevent rust and corrosion.

iv. After hydrostatic or other tests, all entrapped water shall be drained prior to shipment, and proper care shall be taken to protect parts from entry of water during shipment, storage and handling.

v. Each box or package shall be properly marked to show its net weight in addition to its contents.

f. Warranty

i. Pumps shall have a minimum of 5-year warranty from the manufacturer, covering 100% of all parts and labor for repair/replacement. The warranty period shall commence at the time of pump station acceptance by PSLUSD.
g. **Spare Parts**

i. Spare parts to be furnished to PSLUSD shall include:

- 1 full set of fuses for entire panel.
- 1 full set of fuses for disconnect (if fused).
- 1 set of motor starters for a grinder pump station or 1 set of starter contacts for the lift station, as applicable.

ii. These items shall be turned over to PSLUSD at the start-up inspection.

h. **Field Quality Control**

i. The services of a qualified factory-trained manufacturer’s representative shall be provided to assist the contractor in installation and start-up of the equipment specified under this section. The manufacturer’s representative shall provide technical direction and assistance to the contractor in general assembly of the equipment, connections, adjustments and testing. The following work shall be performed by the contractor, as a minimum, under the technical direction of the manufacturer’s service representative:

- Inspections and final adjustments.
- Operational and functional checks of controllers/starters and spare parts.

i. **Pump Station Specifications and Installation**

i. **Grinder Pump Station** - A single manufacturer shall be responsible for supplying the entire grinder pump station including, but not limited to, pumps, motors, wet well, valve vault, rail assembly, electrical controls and appurtenances. PSLUSD will make available to developer/contractor for purchase the major components of the single-phase grinder system. All appurtenances and labor required to complete the installation will be the responsibility of the developer/contractor.

1. **Pumps**

a. The pumps shall be totally submersible grinder type, designed to pump raw sewage. The pumps shall be standard dimensions such that parts will be interchangeable between like units. The same manufacturer shall supply all units.

b. The pumps shall be equipped with a rail and discharge connection assembly which will allow the removal of the pumps without the need for personnel to enter the wet well.
2. Valves & Piping

a. Pipes, fitting, valves, and appurtenances shall meet the specifications included in this Chapter and must be approved by PSLUSD or on the QPL.

b. A heavy-duty brass or stainless-steel check valve, rated for 150 psi, shall be installed in the discharge line at the point of connection to the main, as shown on the approved plans and standard details.

c. Discharge piping shall be schedule 80 PVC.

d. For grinder pump stations, a valve vault made of fiberglass shall be provided as required in the design criteria and shown on the standard details. The valve vault shall include a check and plug valve for the discharge line for each pump and an emergency pump out connection with a 3” Camlock. The lid and cover shall be made of aluminum, capable of bearing a live load of 300 pounds per square foot.

3. Wet Well and Access Cover

a. The wet well shall be sized as specified in the approved plans and made of molded reinforced polyester resin and fiberglass construction. The wet well shall have a minimum wall thickness of ¼”. An inlet hub of the O-ring seal type shall be provided for field installation of the lateral. Other wall penetrations for electrical conduits and venting shall be provided.

b. The wet well manufacturer shall furnish wet well access covers and frames as shown on the approved plans and PSLUSD standard details for the wet well. The cover shall be made of aluminum, gasket sealed, with 316 stainless steel bolts used to secure the cover to the wet well and shall be capable of bearing 300 pounds per square foot live load.

c. An approved QPL safety net or grate shall be provided for fall prevention.

4. Pump Control System

a. A pump controller shall be provided for each grinder pump unit. The controller shall automatically start and stop the pump and switch the lead and lag pump on each start-up.

b. The pump controller shall be the standard system of the manufacturer, as modified for the proposed application.

c. The control panel shall consist of a lightning arrestor, a disconnect switch, a circuit breaker and NEMA rated magnetic starter for each pump motor. A high-level alarm and pump shut-off shall be activated by a float type, low voltage liquid level control system. Control switches shall provide means to operate each pump manually or automatically.
d. The electrical control equipment shall be mounted within a NEMA control panel with all stainless-steel hardware. The enclosure shall be UL listed as an assembly and shall incorporate a removable back panel on which control components shall be mounted. Back panel shall be secured to enclosure with collar studs. A high level and seal failure alarm light shall be mounted on top of the control cabinet. The light shall be enclosed in a red polycarbonate enclosure. The high-level alarm float installed in the wet well shall activate an exterior light and audible alarm. Seal failure alarm circuitry shall only be provided if required to obtain manufacturer’s warranty.

e. The enclosure shall be installed with stainless steel anchors imbedded a minimum of 2” into concrete.

5. Installation

a. Installation shall be strictly in accordance with the manufacturer's instructions, PSLUSD standard details, and in the location shown on the approved plans. If the equipment requires an arrangement or dimensions different from those shown on the approved plans or the standard details, the EOR shall submit shop drawings, showing all necessary changes, to PSLUSD for review and approval.

ii. Lift Station

1. Wet Well

a. The base slab and the first ring of the pre-cast wet well shall be cast monolithically.

b. The holes for influent pipe and discharge pipes shall be pre-cast and have pre-fabricated boots installed by the manufacturer of the wet well.

c. A liner shall be provided as a corrosion barrier by an approved manufacturer on the QPL.

d. Installation of the lift station risers shall be in accordance with the manufacturer’s specifications.

e. The exterior of the wet well shall receive three (3) applications 3-5 mils each of a 100% solid water-based epoxy on the QPL. The first coat is a primer followed by two (2) finish coats. The coatings shall be applied at the manufacturer’s facility. Field application is not acceptable excepting for repairs and shall be conducted by a factory representative.

f. Holes to accommodate pipe shall be pre-cast into the section at the manufacturer's plant.

g. Any visible reinforcing wire, steel or honeycombs on pre-cast structures shall be cause for rejection.
h. Interior of wet well shall be fitted with 316 stainless steel upper guide bar brackets, cable holder, guide rails, and grip eyefit cable.

i. The wet well shall have a concrete top and a pad lockable aluminum hatch cover and frame with stainless steel hardware. The cover shall be sized and located to allow for unobstructed vertical removal of all pumps and mixed flush valves and shall be capable of supporting a 300 pounds per square foot static load. The cover shall have a pull-up handle to open and have a locking safety handle to retain the covers in an open position.

j. All access openings shall be fitted with a permanently installed fall through prevention system that is easily retractable for access to the opening below. The fall through prevention system shall consist of the following components:

i. A safety grate
ii. All 316 stainless steel hardware
iii. A permanently attached metal tag with the following information:

- Name of the grate manufacturer
- Identification of the grate material
- Date of manufacture
- Date of prototype test
- Name of testing agency
- Serial number

k. Installation shall be in accordance with the manufacturer’s instructions.

2. Discharge Piping

a. Discharge piping from the pumps shall be installed in accordance with PSLUSD standard details. Piping inside the wet well shall be flanged 316 stainless steel or HDPE pipe. HDPE shall be DR-9 and stainless steel shall be Schedule 40 gauge. Submerged fittings can be ductile iron.

b. Each base elbow shall be secured to the concrete floor with stainless steel expansion bolts and a stainless-steel plate per PSLUSD standard details.

c. The pipes, valves, and fittings shall be coated as specified for exterior of wet well.

d. Check valves shall include external spring and lever.

e. Shutoff valves shall be resilient plug valves.

f. An emergency pump connection device shall be provided and shall be a male aluminum or bronze Camlock fitting with dust cap and an isolation plug valve. A stainless steel ball valve shall be provided on the dust cap.

g. All fittings to have flange ends.
h. All hardware shall be grade 316 stainless steel.

i. An air release valve shall be provided with a vent into the wet well.

j. An oil-filled pressure gauge and a pressure transducer shall be provided in the discharge pipe after the check valves. The gauge shall read in pounds per square inch, with a range suitable for the required service. Gauge shall be equipped with diaphragms (neoprene or stainless steel), or other suitable separating device, to preclude wastewater from entering the mechanism.

3. Pumps

a. Pumps shall be non-clog and mechanical seal submersible pumps.

b. The pump electrical conductor shall be continuous multi-conductor, copper cable (no splices), in compliance with industry standard for load and resistance against sewage. The conductor shall enter the pump through a heavy-duty entry assembly that shall be provided with an internal grommet assembly to protect against leakage once secured and must have a strain relief assembly as part of standard construction. The pump conductor shall be the length required to properly connect the pump and panel, but in no case shall be less than 40’.

c. Each pump shall be provided with a guide rail assembly designed so that each pump automatically connects to the discharge piping when the pump is lowered into place. The pump to guide rail assembly connection shall be non-sparking. The pumps shall be easily removable for inspection and/or service.

d. Pumps shall have a tandem mechanical shaft seal system. Mechanical seals shall be made of tungsten carbide or silicon carbide with a stainless steel case. Wearing rings shall be abrasion resistant and shall be installed at the inlet side of the pump to provide protection against wear to the impeller.

e. The lifting handle shall be stainless steel and be large enough to hook the pump with a standard assembly from a height of 20’ and be equipped with a grip eye lifting cable and tool.

f. The pumps with a size of 15 HP or greater shall be equipped with a moisture sensor to detect seal failures. A visual signal with a manual override shall be used at the control panel.

g. One pump shall be equipped with a utility approved mix flush system per the pump manufacturer.

h. Pump motor shall be housed in an air-filled watertight casing and shall have Class F insulated windings which shall be moisture resistant. The motor shall be Nema Design B rated 155° C maximum and have a minimum 1.15 service-factor. Pump motors shall have cooling characteristics suitable to permit continuous operation in a totally, partially, or non-submerged condition. The pump shall be capable of running dry continuously in a totally dry condition.
Cable junction box and motor shall be separated by a stator-lead sealing gland or terminal board which shall isolate motor from any water or solids gaining access through pump cable.

4. Motor Starter/Controller

a. To extend the useful life of the pump station components including the pump and motors and comply with the rules and regulations for electrical service and maximum allowable voltage fluctuations, one of the following starter/controllers is required for each pump/motor based upon the motor horsepower. The warranty shall include materials or workmanship, which do not conform to these specifications.

i. Type “one” (MCC I): 10 HP 230 VAC started across the line shall be protected at 300% of nameplate Full Load Amperage (FLA), using NEMA motor starters.

ii. Type “two” (MCC II): 11 HP – 30 HP 480 VAC requires soft start device with internal bypass protected at 200% of nameplate FLA.

iii. Type “three” (MCC III): 31 HP and above 480 VAC requires a soft start device with internal bypass or a variable frequency drive protected at 200% of motor nameplate FLA.

iv. NEMA Motor Starters (MCC – I Only): NEMA Magnetic Motor Starter with solid state overload relay with life time coil warranty. Overload relay includes phase loss and phase unbalance. Device must be manufactured to ensure full voltage is applied to coil even at 85% of nominal eliminating contact chatter and premature contact failure. When lower than acceptable voltages are applied, the motor starter will not start or will break the circuit to prevent contact chatter.

v. Soft Start Motor Starters (MCC – II Only):

1. Reduced Voltage Solid State Motor Starters shall be severe duty rated with overload protection, adjustable ramp times, and adjustable torque control and shall be ordered with edge control option of automatic reset if desired. The starter shall offer adjustable kick start control, soft stop control feature, which reduces water hammer through soft stop control. The starter shall shut down at 110º C and have jam and stall detection and protection features. Kick Start feature shall provide 0 to 550% full load current for a duration of 0-2 seconds. Ramp up start, current limit start features are also required. Device shall incorporate an internal by pass, shunting Silicon Controlled Rectifier (SCR) after reaching full load.

vi. Solid-State Reduced Voltage Motor Control:
1. The solid-state reduced voltage starter (soft starts) shall be UL and CSA listed and bear the CE mark for compliance with applicable IEC and Euro Norm standards for solid state reduced voltage starters. The solid-state reduced voltage starter shall be an integrated unit with power SCR’s heat sink, logic board, paralleling bypass contactor, and electronic overload relay enclosed in a shingle molded housing. The SCR based power section shall consist of six (6) back-to-back SCRs and shall be rated for a minimum peak inverse voltage (PIV) rating of 1600 volts. The starter shall be three-phase, 60 Hz, and rated for the HP, current, and voltage as shown on the QPL. The following control function adjustments on the device keypad are required:

- Selectable Torque Ramp Start on Current Limit Start
- Adjustable Kick Start Time, 0-2 seconds
- Adjustable Kick Start torque, 0-85%
- Adjustable Ramp Start Time, 0.5-180 seconds
- Adjustable Initial Starting Ramp Torque, 0-85%
- Adjustable Smooth Stop Ramp Time, 0-6 seconds

2. Enclosed units shall include a thermal magnetic circuit breaker or Motor Circuit Protector (HMCP) for short circuit protection and quick disconnect means. Starters with breakers/HMCPs are to be rated per UL508D with a withstand rating of 65 kAIC rms. Control power shall be 24V DC as standard for safety and reliability. Separate control terminals shall be provided for 24V DC power, logic levels signals for permissive, start, jog forward, ramp start overload override and electric reset. Control terminals shall be pull-apart for easy access and wiring. Optional external interface circuitry shall include 120-volt relay logic interface capability. A removable Customer Interface Module (CIM) shall be provided that allows for full adjustment of control and protection functions through the use of potentiometers and DIP (Dual in-line package) switches. Enclosure shall be of welded construction with gasketed heat sink and doors.

vii. Variable Frequency Drive (VFD) Controllers (MCC III Only)

1. The VFD shall be rated for input voltage. The VFD shall be microprocessor-based control for three phase induction motors. The VFDs shall be Pulse Width Modulated (PWM) design. Adjustable current source VFDs are not acceptable. Insulated Gate Bipolar Transistor shall be used in inverter section. Bipolar Junction Transistor, Gate Turn-Offs (GTO) or SCRs are not acceptable. The VFDs shall have efficiency at full load speed that exceeds 97% for motors over 40 HP.

2. The system containing the VFDs shall comply with the 5% level of total harmonic distortion of line voltage and the line current limits as
defined in IEEE 519-1992. If the system cannot meet the harmonic levels with the VFD provided with standard input line reactor or optional input isolation transformer, the VFD manufacturer shall supply a multiple bridge rectifier AC to DC conversion section with phase shifting transformer for all drives above 100 HP. Harmonic filters are not acceptable above 100 HP. The device shall be capable of communicating with PSLUSD approved programmable logic controller with optional Modbus communication capability.

iii. Controls

1. Control Panel Builder

   a. The panel builder shall be experienced in the construction of lift station control Panels, shall have a UL approved shop, and shall be able to provide both a UL 508 label for the panel, and a UL label for service rated.

   b. The panel builder shall warrant the panel for one (1) full year minimum from the date of start-up.

   c. The panel builder or qualified technical representative shall checkout and test the panel as part of the lift station start-up with PSLUSD and the EOR.

2. Panel Components

   a. The panel and panel components are specified in the PSLUSD standard details. Omission of any component on the standard details does not relieve the contractor from furnishing such components that would normally be required for wastewater pumping stations.

   i. Enclosure

      1. The EOR shall ensure the panel sizing is in accordance with the pump size of the lift station.

      2. The panel shall be of a NEMA, 3R construction as listed on the QPL with a drip lip.

      3. The panel shall be constructed of grade 316 stainless steel, 14 gauge with a #3 polish on the exterior.

      4. All external hardware shall be stainless steel with piano hinge, three-point latch with roller fitting top and bottom and single handle with padlock fitting and stainless steel external parts.

      5. Drip shield to deflect water from the door, closed cell neoprene gasket on the door.
6. Blank outer door with dead front inner door of 1/8" thick aluminum hinged on the left with the operator’s controls mounted on or projecting through it.

7. Painted steel back mounting plate for heavy components.

8. Aluminum enclosure 1/8” thick around the surge arrestor and surge capacitor with a 1/8” minimum, Lexan cover for the ends of the arrestor and capacitor and the incoming line terminals to isolate the lightning arrestor and surge capacitor in case of failure and to provide protection for the operator from the live terminals if the breaker is open.

9. The outer door is to have 9" x 11" painted steel or aluminum pocket for the log book tack welded to the inside of door.

10. Arms and latches shall hold both outer door and inner door in an open position; these must be sufficiently rigid and secure to hold doors open under windy weather conditions.

11. Sliding locking bar to allow only main or emergency breaker to be closed. Bar shall be aluminum with stainless steel hardware.

12. All hardware shall be grade 316 stainless steel.

3. Telemetry

a. The contractor shall furnish and install the new radio telemetry equipment and programming as specified in the approved plans and in accordance with the PSLUSD Standard Details. Extension of fiber optic cable may be required when deemed necessary by the Utility Director. A single subcontractor shall be responsible for all hardware, software, system integration, programming, testing, and startup.

i. Components

1. Remote Telemetry System

a. The Remote Telemetry shall be a microprocessor based Programmable Logic Controller (PLC) and shall serve as an interface to accumulate, process, transmit, and receive discrete and analog status and control messages between the RTU base station and the remote RTU sites. Remote sites shall be 452.100 MHZ or 151.565 MHZ or fiber optic PLC depending on location.

b. The PLC shall be designed to operate in an industrial environment, be capable of operation in an ambient temperature range of 0-60° C and a relative humidity of 5%-95%, non-condensing. The PLC shall operate on supply voltages of 24 volts DC.

c. LED-type indicating lights shall be provided as follows:
i. READY; RUN; BATTERY LOW; MODBUS; ETH, Serial.

ii. Controller and accessory equipment shall be Modicon M340 PLC.

iii. All IEDs shall be powered with 24 vdc through a power supply capable of float charging sealed Gel-Cell batteries and shall include AC Power monitor with alarm output to the RTU loss of AC power. Batteries shall be sized to provide 60 minutes of full load back up in the event of AC power loss.

iv. Input/output modules shall be wired to terminal strips.

2. RTU Communication Interface

a. The radio transceiver shall be complete Calamp Vipier SC series radio with serial and ethernet interface. The radio transceiver shall include automatic frequency, control, loop back, and SMART diagnostics. Radio enclosure shall include RF shield. Radio transceiver shall be 5 watts at a frequency of 452.100 MHz or 151.565 MHz depending on location. Cisco IE 3000-4TC Ethernet switch on required for locations with fiber optic communication.

b. The complete communications subsystem including interconnecting cables shall contain lighting, surge, and transient protection.

c. Control panels shall be sized to accommodate the PLC, radio transceiver or fiber optic switch, power supply, backup battery, and other ancillary equipment related to the remote telemetry system, as well as all starters, soft starts, relays, over current protection and Modicon TeSys T motor management system.

3. Antenna and Tower Assembly

a. Antenna and tower assembly shall be installed in accordance with standard details.

b. Antenna cable shall be ½” Heliax with LMR connectors and protected in panel with a Polyphaser surge protector.

4. Surge Protection

a. Surge protection shall protect the 120 volts AC system, the ½” helix cable and antenna subsystem.

5. Electrical Transient Protection

a. All electrical and electronic elements shall be protected against damage due to electrical transient induced in interconnecting lines from lightning discharges and nearby electrical systems.
6. Manufacturer’s Qualifications

a. The company shall have at least five years’ experience in the design, development, and manufacture of surge suppressors.

7. Surge Suppressor

a. Surge suppressors shall be located at:

i. Any connections between AC power and electrical and electronic equipment, including panels, assemblies, and field mounted analog transmitters.

ii. The field, panel, or assembly connections of all analog signal circuits that have any portion of the circuit extending outside of a protecting building.

b. Surge suppressor assemblies for 120-volt AC power supply connectors shall be:

i. Provided with two 3-terminal barrier terminal strips capable of accepting a No.12 - AWWC solid or stranded copper wire. One terminal strip shall be located on each end of the suppressor unit.

ii. Epoxy encapsulated within a nonflammable phenolic enclosure with provision for mounting to interior or equipment racks, cabinets, or to the exterior of freestanding equipment. Epoxy encapsulation shall be flame retardant.

iii. Constructed as multistage devices. The first stage shall be a high-energy metal oxide variator element. The second stage shall consist of fast-acting high power bipolar silicon avalanche devices. First and second stages shall be interconnected through a series air core inductor of sufficient current-carrying capacity to permit a continuous operating current of 15 amperes. Inductors having ferrous or other high permeability core materials are not acceptable.Suppressor assemblies shall be the automatic recovery type.

c. Surge suppressors shall meet or exceed the following performance criteria based on a test surge wave shape with an 8-microsecond rise time and a 20-microsecond exponential delay time:

- Minimum Operating Voltage: 120 volts AC
- Maximum Breakdown Voltage: 150 volts AC
- Maximum Operating Current: 15 amps
- Peak First Stage Surge Current: 20,000 amps
- Maximum Second Stage Clamping Voltage: 350 volts
- Minimum Second Stage Clamping Voltage: 210 volts
- Ambient Temperature Range: -20°C to +85°C
d. Surge suppressors for analog signal connections shall:

i. Have four lead devices with a threaded mounting/grounding stud.

ii. Have a circuit consisting of a 3-electrode gas tube and silicone avalanche devices to clamp each line to the ground. High-energy gas tube and silicone avalanche devices shall be separated by series impedance.

iii. Be epoxy encapsulated with a nonflammable phenolic enclosure. Epoxy encapsulation shall be flame retardant.

iv. Limit line-to-ground and line-to-line voltage to 30 volts on 24 volts DC circuits.

v. Meet or exceed the following performance criteria based on a test surge wave with 8-microsecond rise time and 20-microsecond exponential decay time:

- Recovery - Automatic
- Peak Source Current - 10,000 amps
- Pulse Lift Before Failure - 100 occurrences
- Minimum Voltage Clamp Rating - 30 volts
- Series Impedance - 24 ohms total
- Temperature Range - -20º C to +85º C
- Operating Voltage - Less than 30 volts DC
- Operating Current - 4 to 20 mA DC
  ○ (ix) Resistance Line-to-Ground - Greater than 1 megaohm

8. Corrosion Protection

a. All indoor and outdoor panels shall be fitted with vapor phase corrosion inhibitor capsules. Capsules shall be labeled with the date of activation.

9. Workstation Displays/Database

a. The graphics screens shall match existing plant standard screens. The database shall be configured for complete functionality including I/O driver, tag names, alarm points, and printouts.

10. Fabrication

a. Cabinets and panel shall provide mounting for power supplies, control equipment, input-output subsystems, panel mounted equipment and appurtenances. Ample space shall be provided between equipment to facilitate servicing and cooling.
b. The rack framework shall be stainless steel construction, 1-5/8” x 1-5/8”, using Powerstrut, Unistrut, or equal and/or angle to provide a rigid assembly. Racks shall be of open, box-like framework with all frame supports welded and ground smooth. Stainless steel straps shall be used for locating terminal blocks. The terminal blocks shall be factory assembled on a miniature mounting channel and the channel bolted to the stainless-steel strap. Terminals shall be miniature screw type unless otherwise required and shall be rated at least 300 volts, 20 amps, per the QPL.

c. The terminals shall be marked vertically with a permanent, continuous marking strip from top to bottom. One side of each terminal strip shall be reserved exclusively for field incoming conductors. Common connections and jumpers required for internal wiring shall not be made on the field side of the terminal subject to the approval of PSLUSD. A vendor’s pre-engineered and prefabricated wiring termination system will be acceptable.

d. Wiring shall comply with accepted standard instrumentation and electrical practices and codes. For each pair of parallel terminal blocks, the field wiring shall be between the blocks. Solder-less horseshoe (spade) connectors, with insulating sleeves shall be used for connecting wires to terminal blocks.

e. All wiring shall be bundled and run open or enclosed in vented plastic wire way, as required. All conductors run open shall be bundled and bound at regular intervals, not exceeding 12”, with nylon cable ties. Care shall be taken to separate electronic signal, discrete signal, and power wiring. A copper ground bus shall be installed the full length of each panel. Interior panel wiring and field wiring shall be tagged at all terminations with machine printed plastic sleeves. The wire number shall be the ID number listed in the input/output schedules.

f. Wires shall be color coded as follows:

   - Neutral – White
   - Ground – Green
   - Power – Red
   - Signal – Black and White
   - Control – Violet
   - Special – Blue

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g. \text{ Panels shall be provided with a main circuit breaker and a circuit breaker on each individual branch circuit distributed from the panel. Main breaker and branch breaker sizes shall be coordinated such that a fault in a branch circuit will trip only the branch breaker, but not the main breaker.}
\]
h. Panels shall be provided with an exterior, weatherproof 120-volt
duplex receptacles for service equipment, and an internal LED panel
light with separate switch located on dead front.

i. Provide separate 120-volt feeder circuit complete with circuit
breaker and on/off switch.

j. Panels shall be furnished with red laminated plastic warning signs in
each section. The sign shall be inscribed “WARNING - This Device is
Connected to Multiple Sources of Power”. Letters shall be 1” high,
white.

k. Panels shall have equipment racks mounted on a removable back
plate (sub panel) to permit withdrawal of the equipment for
maintenance or adjustment. Panels shall be designed to permit front
access for all service and removal of equipment. Front access panels
shall be hinged, removable with common keyed locking hardware. The
interconnection between equipment and panel shall be by means of
flexible cables provided to permit withdrawal of the equipment from
the cabinet without disconnecting the plugs.

l. Panels shall be provided with separate 120-volt circuit and switch for
area flood light.

11. Supplier’s Qualifications:

a. The system supplier shall be ISO 9000 certified, and regularly
engaged in design, construction, installation, and startup of SCADA
RTU systems.

4. Wiring

a. All wiring shall be copper, AWG 14 minimum. Wires shall be color coded as
follows:

<table>
<thead>
<tr>
<th>Controls</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground</td>
<td>Green</td>
</tr>
<tr>
<td>Grounded Neutral</td>
<td>White</td>
</tr>
<tr>
<td>120-Volt Power</td>
<td>Black</td>
</tr>
<tr>
<td>Control</td>
<td>Red</td>
</tr>
<tr>
<td>24-Volt Control</td>
<td>Blue</td>
</tr>
<tr>
<td>Power</td>
<td>240Y/120</td>
</tr>
<tr>
<td>Phase A</td>
<td>Black</td>
</tr>
<tr>
<td>Phase B</td>
<td>Red</td>
</tr>
<tr>
<td>Phase C</td>
<td>Blue</td>
</tr>
<tr>
<td>Neutral</td>
<td>White</td>
</tr>
<tr>
<td>Ground</td>
<td>Green</td>
</tr>
</tbody>
</table>
b. Different control wiring colors are acceptable if clearly identified. Power wiring shall be kept separate from control wiring and shall be identified by phase. The high leg shall be the center terminal on the main breaker.

c. All wires shall be numbered with machine made plastic wrap around labels at both ends.

d. All external connection and internal connections, where shown on the drawings, shall be brought to the numbered terminals.

e. Wiring shall be enclosed in panduct or equivalent wire ways and wiring between the doors and the panel shall be enclosed in a spiral wrap or approved equal with sufficient slack to allow full opening of the door.

f. Wiring shall be secured with screw-on tabs. Tabs with adhesives shall not be used.

g. All wiring shall be front accessible.

h. All conduits to be ultra-violet resistant PVC, Schedule 80 or stainless steel for electrical use, as indicated in the PSLSUD standard details for control panels and shall be of 2” minimum size.

5. Component Mounting

a. All components shall be securely mounted with stainless steel hardware. Self-tapping screws are not acceptable.

b. All relay bases shall be front-mounted with screw terminals. No soldered connections shall be used. All base terminals shall be numbered to correspond to relay numbers. Where plug-in components are not firmly secured in bases, hold down clamps shall be provided.

6. Identification

a. All components shall be identified in accordance with the schematic diagram, using permanent nametags on the panel of laminated micarta or approved equal. The permanent nametags shall be securely attached and in a position where they are clearly visible.

b. All operators’ controls shall be provided with laminated micarta nametags attached with stainless steel screws, with minimum lettering height of 1/8”.

c. A laminated schematic drawing shall be attached to the inside of the outer door, minimum size 11” x 17”.

d. Attach a separate laminated label showing the following details:

<table>
<thead>
<tr>
<th>Pump</th>
<th>Motor</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Brand</td>
<td>Horsepower</td>
</tr>
<tr>
<td>• Catalog Number</td>
<td>Speed</td>
</tr>
<tr>
<td>• Impeller Number and Size</td>
<td>Voltage</td>
</tr>
</tbody>
</table>
7. Component Features

**a. Main and Emergency Breaker:** The panel shall include circuit breaker sized as required for main power and emergency power disconnect. Breakers shall be mounted on the sub panel with handles through inner door and shall include a mechanical interlock on the handles to ensure that only one breaker can be in the "ON" position at any one time. Circuit breaker Ampacity Voltage and Interrupting Capacity shall be listed on the construction drawings. Panel shall also include an externally mounted generator power receptacle pre-wired to the emergency breaker.

**b. High Level Alarm System:** The panel shall include a vapor-proof red light mounted on the top of the enclosure for high-level alarm visual indication and a weatherproof horn mounted on the underside of the panel box. The alarm light and horn shall be pre-wired to terminals to operate on a high-level control signal. An alarm silence push button labeled "Alarm Silence" shall be mounted on the outside of the enclosure and pre-wired to a relay which will silence the horn under all conditions, and automatically reset when high level condition is corrected. The high-level light shall have a flasher to pulse the red external visual indicator light during a high-level condition. The alarm light is to be designed and positioned to provide an unobstructed access for changing light bulb.

**c. Elapsed Time Meters:** The panel shall include a non-resettable type elapsed time meter for each starter mounted on the inner door to record the accumulated running time of each pump. A totalizer to record running time of all pumps shall also be provided.

**d. Convenience Receptacle:** The panel shall have a Ground Fault Interrupter (GFI) type convenience receptacle mounted on the inner door to provide plug-in 120-volt power with ground fault protection.

**e. Phase and Voltage Monitor Relay:**

i. The panel shall have a line voltage rated phase sequence and loss monitor relay. The monitor relay shall be the adjustable type to be field set for nominal available incoming voltage. The monitor relay will be pre-wired to take the control circuit out of service if a phase is reversed, one or more phases are lost, or drops below nominal voltage or if all three phases drop below nominal voltage.

ii. The unit will automatically restore when normal conditions are restored.

iii. Relay shall be the socket-mounted type.
f. Seal Failure Indicator: The panel shall have a seal failure (leak detector) indicator pilot light for each pump, if applicable. These pilot lights shall be operated by moisture sensing monitors that are signaled by probes supplied in each pump.

g. Lightning Arrester/Surge Suppressor: The panel shall have three-phase transient voltage lightning arrester/surge suppressor protection. The suppressors shall be pre-wired to the point of incoming line service.

h. Float Control System:

i. The panel shall have a five-float control system, to activate the appropriate controls. The floats shall have the capability to control several pumps and alarms, as well as indicate levels, using discrete set points. Floats shall be used in conjunction with various monitoring, indicating, and logic control devices. The highest float shall operate a relay-controlled backup system.

ii. Each motor shall have a separate circuit breaker.

iii. Each control cable from the wet well into the control panel shall be protected by a suppressor.

iv. Each alarm shall have a spare contact. The contacts shall be terminated on a terminal strip for future use.

i. Telemetry System: The components shall include, but not be limited to, terminal strip, relays, float switches, power supply (24 volt and 120 volt) and pilot lights.

j. Main Power Disconnect: A service rated fused type circuit breaker shall be included, sized as required for disconnecting main power to panel box and shall be housed in separate stainless-steel enclosure mounted behind main panel box as indicated on the PSLUSD standard detail. Where required by the power company, an additional disconnect will be provided prior to the meter.

8. Installation

a. Installation of piping and valves shall be in accordance with specifications in Section N of this Chapter.

b. All installations shall be performed in such a manner so that components are plumb and true and aligned in such a manner that the station is fully operable and functional and no additional maintenance or restorative action is required. All electrical installations shall be performed by a licensed electrical contractor in accordance with prevailing codes and licensing requirements and shall result in a fully functioning station meeting the full intent of these specifications and the drawings.
c. The contractor shall install the required fence in a true and straight manner, construct the required water service with a reduced pressure principle backflow prevention assembly, construct the concrete driveway access, construct all necessary conduit and electrical connections and all other appurtenances shown on the approved plans or reflected within these specifications and PSLUSD Standard Details, to provide for a fully functional installation.
d. The contractor should give particular attention to the following items during installation of the lift station:

i. All guide rails shall be attached to access lid frame with approved bracket assemblies. Intermediate guide rail supports shall be provided per manufacturer's recommendations and at least every 10’. Guide rails shall be 316 stainless steel piping.

ii. Lifting rings for the wet well or valve vault shall be removed below the surface and grouted flush to avoid tripping hazards. Exterior lifting holes shall be grouted flush.

iii. Concrete work is to be of a professional quality with nonskid finish.

iv. All discharge elbows shall be level and plumb to ensure all guide rails will work properly and that pumps can be removed easily and seat properly.

v. All adapter flanges shall be installed according to drawings to allow easy removal of valves. All bolts shall be torqued according to the manufacturer's recommendations.

vi. The pedestal, control panel, and related components shall not be painted.

vii. The lift station site, within the fenced area, shall be covered with # 57 stone, a minimum of 6” and a maximum of 8” deep, over 2-ply 4mil visqueen. The site shall be graded for proper drainage to prevent inflow of storm water into the wet well.

viii. Modifications to an existing pumping station shall be completed in accordance with these specifications and the details shown on the approved plans. This includes all work, materials, and cleaning to provide a fully operational station in a "like-new" condition.

9. Generator

a. Where portable emergency power equipment is utilized, the generator shall be diesel fuel powered, trailer mounted, and with sufficient capacity to run the pumps and all electrical equipment at the pump station during a power failure.

b. The developer shall pay for the cost of the generator and related equipment, as required in the Utility Service Agreement.
J9. PIPELINE CLEANING (Poly Pig Method)

1. The contractor shall provide supervision, labor, tools, material and equipment necessary to clean all newly constructed mains, using an approved poly pig procedure. The contractor shall provide and install all items required, including poly pigs, launching and retrieval devices and test equipment, in accordance with the specifications incorporated herein and PSLUSD standard details.

2. The materials specified shall be constructed and installed in accordance with the best practice and methods.

3. Contractor Qualifications

   a. The materials and work specified herein shall be furnished and performed by firms fully experienced, reputable, and qualified in pipeline cleaning with the poly pig method.

   b. Equipment shall be installed in accordance with manufacturer’s recommendations by personnel thoroughly trained, knowledgeable and experienced in the technology and procedures required for the proper and safe "pigging" of the system.

4. Contractor Responsibilities

   a. Supervision

      i. There shall be on-site at all times during the work, one supervisor with experience in the cleaning of utility mains utilizing the procedure outlined herein.

   b. Proposed Method

      i. The method of cleaning shall be by use of bare swab type poly pigs with light-density open-cell urethane foam body, base coated with urethane elastomer. The pigs shall have the characteristics detailed below in section 5.-Poly Pigs. A minimum of two pigs of a size 2” larger than the diameter of the pipe shall be used for each main that is cleaned.

   c. Cleaning & Testing

      i. Cleaning shall remove soil, debris, suspended or floating matter and other foreign material from the pipe, without over abrading or over cleaning the interior walls of the pipe. PSLUSD shall consider a pipe to be clean when a sample of approximately two gallons of water is swirled and allowed to settle in a clean white five-gallon bucket and there is no visible soil, debris, suspended or floating matter or any other foreign material. This test shall be performed when the water leaving the pipe appears to be clean for a minimum of two minutes.

      ii. The pigging procedure will be repeated until the above-mentioned test shows that the cleaning is satisfactory.
5. Poly Pigs

a. Poly pigs shall be constructed of blown elastomer polyurethane with an open cell construction and a density equal to or suitable for use in the piping system being cleaned. Poly pig configuration shall consist of a parabolic nose and a concave base. The pig shall be coated with a resilient surface material that will maintain a peripheral seal and effectively clean the pipe without over abrading or causing any damage to the interior wall.

b. Poly pig characteristics shall include the ability to navigate through 90° and one hundred and 180° turns, bi-directional fittings, full port valves and comparable in-line appurtenances, reduce its cross-sectional area and restore itself to its original design configuration, be propelled by applications of hydraulic and pneumatic pressure while maintaining its primary function as an internal cleaning device of conduits. When in use, the pig must be able to undergo a reduction to a minimum of 65% of the original cross-sectional area and return to shape while maintaining the sliding seal and ability to clean. Pigs shall be bi-directional and have the ability to negotiate fittings, valves and other appurtenances.

6. Performance

a. Contractor will prepare, with assistance from the EOR, the design of the cleaning procedure including the provision of:

- Selection of starting and ending points for the cleaning process.
- Evaluation of total volume of fluids to be used and the disposal and the source(s) of fluids.
- Mechanical or piping adaptation to the existing piping configuration.
- Coordination and scheduling of the cleaning process to include selection of the distances and sizes of the piping to be cleaned as one procedure.
- Immediately available alternative procedures to be applied if the cleaning of the system requires such remedial action.

b. PSLUSD will not accept any utility mains that do not pass the cleanliness test required in Section c. above.

J10. RECLAIMED WATER METERING STATIONS

1. The contractor shall be responsible for furnishing of all labor, materials, equipment and incidentals required to install a complete and operational reclaimed water metering station with fiber optic communication as shown on the approved plans, the PSLUSD standard details and as specified herein.

2. These specifications are the minimum requirements regarding the equipment application, furnishings, installation, delivery, shop and field-testing of all materials, equipment and appurtenances for reclaimed water metering stations. The manufacturer’s recommendations and
approved plans may contain additional requirements pertinent to the installation of equipment, including accessory and auxiliary equipment and material types, which may not be specified herein.

3. Installation shall be completed in a manner that all components are plumb, true, properly aligned, fully operable and functional, and no additional maintenance or restorative action is required. Electrical work shall be performed by a licensed Electrical Contractor in accordance with prevailing codes and licensing requirements. The fence, driveway and other features shall be constructed in accordance with the approved plans and the PSLUSD Standard Details.

4. The specifications shall not be construed as requiring the contractor to utilize personnel supplied by his assigned instrument manufacturer’s organization, or any division thereof, to accomplish the physical installation of any elements, instruments, accessories or assemblies specified herein. However, the contractor shall employ installers who are skilled and experienced in the installation and connection of all elements, instruments, accessories and assemblies.

5. PSLUSD shall be provided with an exclusive easement around the metering station, consistent with PSLUSD detail RW-01. Dedicated easements for ingress and egress shall also be provided where necessary.

6. Developer/Contractor shall pay for all costs associated with having electrical power designed and installed to the metering facility. This shall include any and all fees or charges which may be required and payable to Florida Power and Light Company (FPL).

7. The operation of the metering station shall allow PSLUSD to control flow to a customer based upon the following options of operational control:

- Flow
- Upstream pressure
- Downstream pressure
- Daily volume and storage levels

The EOR shall obtain written approval from PSLUSD as to the specific type of operational controls required.

8. Related Sections

   a. Design Criteria for Reclaimed Water Mains
   b. Pipe and Fittings
   c. Valves and Appurtenances

9. Contractor’s Qualifications

   a. A contractor who is experienced, reputable and qualified in the installation of underground and above ground utility lines and related appurtenances, as determined by PSLUSD.
b. A manufacturer who is experienced, reputable and qualified in the manufacture of items to be installed/constructed shall furnish all equipment and materials, as determined by PSLUSD.

c. All materials, fittings and appurtenances intended for use in pressure pipe systems shall be designed and constructed for a minimum working pressure of 150 psi unless otherwise specified.

10. Submittals

a. The EOR must submit signed and sealed flow meter sizing calculations for review and approval by PSLUSD.

b. When selecting the electronic/hydraulic control valve, the EOR shall provide PSLUSD with a copy of the cavitation analysis performed by the manufacturer, and any anti-cavitation device recommendations, if necessary. PSLUSD retains the authority to request additional cavitation analysis for varying scenarios. Additionally, should the use of an orifice plate be required by the manufacturer, or if PSLUSD opts to use one instead of other anti-cavitation options recommended by the manufacturer, the EOR must submit signed and sealed calculations to PSLUSD for review to verify proper sizing and adjustment of hydraulic grade.

c. Shop drawings shall be submitted to PSLUSD and the EOR for review and/or approval. Shop drawings shall be submitted as a complete bound color PDF package. Stamps and signatures on each of the individual components for each sheet shall be required from both the contractor as well as the EOR. Each shop drawing submittal, whether it is the first submittal to PSLUSD or subsequent revised submittal, must be accompanied with the “Shop Drawing Review Form”, which is available on PSLUSD’s website at https://utility.cityofpsl.com/get-connected/divisions/utility-engineeringcommercial-development/forms-downloads/.

d. Shop drawings shall include information on all above ground piping, piping primer/intermediate/finished coats, above ground fittings, above ground valves, flow meter, all telemetry hardware, interface between instruments, control panel, level detection components, electronic/hydraulic control valves, pipe supports, pressure gauges, electrical schematics and any other requirements necessary to complete the reclaimed water metering installation.

e. Data shall include drawings and descriptive information in sufficient detail to show the kind, size, arrangement, and operation of component materials and devices, the external connections, anchorages, and support required, and dimensions needed for installation and correlation with other materials and equipment. All part numbers and catalog data required for ordering spares and replacements shall be provided.

f. Data sheets for each component must be submitted together with a technical product brochure or bulletin. This includes electronic indicator, manual set-point station, ultrasonic level controller, RTU, panel enclosure and all other devices or equipment which will be used.

g. The Instrumentation Systems Integrator (ISI) shall be per the QPL and shall be submitted to PSLUSD, through the EOR, detailed procedures to physically test each Input/Output (I/O)
that provides control and/or warnings such as alarms, level controls and pressure and flow
set-points. PSLUSD reserves the right to modify the testing procedures provided by the ISI.
Any modifications to the procedures by PSLUSD will be provided in writing to the EOR.

h. Drawings showing definite diagrams are required for every instrumentation loop system.
Drawings shall include electrical schematics, layout, wiring diagrams, and a parts list for all
control circuits and within the control panel.

i. The acceptance of drawings returned marked "REVIEWED" or "REVIEWED AS
NOTED" will not constitute a blanket approval of dimensions, quantities, and details of the
materials, equipment, device or items shown and does not relieve the contractor of any
responsibility for errors or deviations from the requirements.

j. The EOR must submit to PSLUSD start-up documentation, initialized by the contractor, ISI
and the valve manufacturer, indicating that the hydraulic control valve and all associated
equipment have been installed correctly and operating per the manufacturer’s specifications.

k. The ISI shall submit to PSLUSD (through the EOR) any independent instrumentation
programs outside the PLC in hard copy format (i.e., storage level sensor, etc.).

11. Meters

a. The flow meter shall be per the QPL and have a sealed indicator having a range
determined by the EOR and approved by PSLUSD, or an approved equal.

b. The flow meter shall also be equipped with a transmitter per the QPL. The transmitter
signal output shall be in direct proportion to the flow through the meter and shall be
converted to a two-wire 4 to 20 mA DC current output transmitted to a local display and the
PLC.

c. Meter shall be a velocity propeller type, magnetic drive, sealed housing, flanged tube
meter for 150 psi working pressure. It shall comply with the applicable provisions of
AWWA, except for the higher standard required in this specification. In the event of conflict,
the specification herein shall prevail. Meter shall be equipped with a six-digit totalizer
reading in units of gallons and shall be accurate within ±2% of true flow within the
manufacturer’s specifications for flow range, or an approved equal.

d. Meter tube shall be fabricated steel pipe and use 150 lb AWWA Class "D" flat face steel
flanges. The internal and external of the meter tube and meter head shall be blasted to near
white metal and coated with 12-15 mils of fusion epoxy coating, applied by the fluidized bed
method. Meter tubes shall have a constant nominal inside diameter to offer minimum
obstruction to the flow and shall be furnished with four straightening vanes.

e. Meter head shall be connected to the tube by means of a flanged, O-ring sealed connection
with stainless steel bolts. The meter head shall be designed for easy removal of water wetted
parts from the tube for inspection or repair without having to remove the complete tube.
Water wetted meter components that are permanently attached to the tube will not be
accepted.
f. Gear box shall be bronze, sealed and filled with a high-grade lubricant. The drive
mechanism shall be magnetically driven from the propeller, through a magnetic coupling and
be isolated from the water flow by means of an O-ring sealed housing. A rigid stainless steel
vertical shaft is required from the miter gear frame to the totalizer drive magnet. Flexible
cables will not be accepted.

g. Propeller shall utilize a water lubricated ceramic sleeve and spindle bearing system. The
stainless steel/ceramic spindle on which the propeller is mounted shall be parallel to the
direction of the water flow in the pipe. Dual ceramic thrust bearings shall be standard on the
meter. Ball bearings or other types of sleeve bearings will not be accepted. The propeller
shall be a conical shaped, three bladed, injection molded of thermoplastic material, resistant
to normal water corrosion and deformity due to high flow velocities. Propellers, which have
been trimmed, shaved or require varying change gears for the same size meters, will not be
accepted.

h. Transmitter shall be encased in a sealed housing conforming to NEMA standards for
weatherproof enclosures. It shall provide a solid state, optically coupled pulse output and a
loop powered current output to drive the associated instrument(s). The unit shall be per the
QPL. The standard 4-20 mA DC sourcing type current output gives 4 mA output at zero
flow and 20 mA output at the maximum scale range selected by the EOR and approved by
PSLUSD. The pulse output (open collector transistor output) will be a minimum of 150
pulses per minute at the maximum flow range of the instrument that the transmitter is
controlling. The transmitter enclosure shall be made from injection molded 20% glass filled
engineered grade thermoplastic. Transmitter shall attach directly to the propeller meter head
with screws having holes for seal wires and be protected with an O-ring seal.

i. Transmitter output shall be in direct proportion to the flow through the meter at the above
pulse rate and current output. The unit shall be powered by an external 12-30 volts DC power
supply wired in a loop with the current output. The 4-20 mA DC output shall not change or
require any field adjustments with the varying voltage of the power supply.

j. Indicator-totalizer shall be equipped with a digital transmitter and six-digit, straight reading
type totalizer. The totalizer shall read in units of gallons and be able to check the accuracy of
the indicator. The indicator drive mechanism shall be temperature compensated, so the
indicator hand shall be accurate and linear within +/- 1% at all points when the unit is
operated within the temperature range of 32° to 140° F. The indicator-totalizer shall be
protected by an O-ring sealed bonnet made from injection molded 20% glass filled
engineering grade thermoplastic. The bonnet shall be attached to the meter head by screws
located under the hinged lid, which has a padlock hasp.

k. Volumetric testing of all meters must be performed and approved prior to shipment. The
complete meter head assembly must be accuracy tested in the same pipe size and same type
tube that the meter will be mounted in. The test shall be at near minimum, intermediate, and
maximum manufacturers specified flow ranges of the meter. The amount of water used to
conduct the test must be left on the totalizer. Prior to shipping, a tag shall be attached to the
meter showing the totalizer reading after the test. The test facility must be certified annually
to an accuracy of ±0.2% and be traceable to the National Institute of Standards and
Technology. If desired, the test shall be witnessed by the customer or their selected agent and
a copy of the certified accuracy test record must be furnished at no charge to the customer, if requested.

12. Electronic/Hydraulic Control Valves

a. The electronic/hydraulic control valve shall be a dual solenoid control which shall close valve upon power loss or PLC failure. The valve shall also have the ability to be operated manually, via the pilot system, upon power or PLC loss and/or during normal operation. The valve shall be per the QPL. The valve to be manufactured as followed, ductile iron body, globe, 150-pound class flanged, 304 stainless steel trim (disc guide, seat and cover bearing), 304 stainless steel cover hardware, brass ASTM B283 solenoid body and pilot tubing, 304 stainless steel disc retainer and diaphragm washer, Buna-N rubber, isolation valves, and flow clean strainers. Valve should be sized in accordance with manufacturer’s recommendation. The valve may require an anti-cavitation option or an orifice plate, as determined by the manufacturer and with approval by PSLUSD, based upon the cavitation analysis submitted to PSLUSD. The valve shall have the ability to modulate flow, via a set-point signal from a remote computer, based upon varying feedback signals such as flow rate, upstream and/or downstream pressures, daily volumes delivered and storage levels.

b. A valve positioning transmitter shall also be provided. The valve positioning transmitter shall be per the QPL. The transmitter shall be installed and interfaced with applicable electronic components to provide remote monitoring of valve position. The signal from the position sensing mechanism shall be converted to a two-wire 4 to 20 mA current output transmitted to a local display and the PLC. The output signal shall range from 4 mA to represent valve fully closed to 20 mA for valve fully open.

c. The brass solenoid body, brass pilot tubing, name plate data and all instrumentation connections to the valve shall not be painted.

13. Storage Requirements

a. Storage shall be provided by the developer/customer for the purposes of retention during wet weather conditions, maintenance of irrigation equipment, or other conditions which preclude the use of reclaimed water. Type of storage may include a pond, reservoir, tank, or an above/below ground structure and shall be addressed in the design engineering report required in this Chapter. As a minimum, storage capacity shall be three times the average daily volume of reclaimed water used. Construction shall be in compliance with applicable state and local agencies.

14. Storage Level Sensor

a. The level monitoring system shall be ultrasonic type, continuous level measuring system consisting of, at the minimum, an ultrasonic level element/transducer, local display of storage elevation and cable for connection from level element to local display and PLC. Level element system shall have the ability to monitor storage levels both locally and through a remote telemetry system.

b. Level element shall be ultrasonic type transducer. Transducer shall be of waterproof construction with minimum operating range of -20° to +50° C (larger range preferred) at one
(1) atmosphere, unless otherwise noted. The instrument supplier will coordinate with the
transducer manufacturer for proper mounting of the transducer within the storage stilling
well, as shown in the standard detail.

c. The storage level monitoring system shall provide a 4 to 20 mA DC output signal to the
PLC in linear proportion to the level being sensed. The level range/readouts shall be based
upon the maximum storage elevation allowed (high level), which is to be provided by the
EOR and approved by PSLUSD. The local display component for the storage level shall be
provided in the control panel, along with the any necessary functions for level
calibration/controls, for use by the PSLUSD operator.

d. The system shall have an overall accuracy of plus or minus 0.25% of full scale and shall
operate on 120 volts, 50/60-HZ power.

e. All necessary interconnecting cables shall be furnished with the equipment provided in
sufficient length.

f. All equipment shall be provided transient surge protection for the incoming 120 volts AC
and DC signals.

g. The sensors shall be accessible for calibration, maintenance, and replacement.

15. Control Panel and Telemetry System

a. Fiber optic communication shall be used in lieu of radio telemetry in all instances.
Extension of and connection to the existing fiber optic system is required.

b. The system supplier shall be per the ISI on the QPL and will be responsible for furnishing
and installing the new Telemetry equipment and programming as specified. ISI shall be
responsible for all hardware, software system integration, programming, testing and startup.
HMI graphical screen development and required database configuration of the existing data
acquisition software shall be provided consistent with the monitoring facility (Glades or
Westport WWTP).

c. Local control of the reclaimed water metering station shall be through a portable laptop
computer.

d. The panel builder shall be experienced in the construction of lift station control panels,
shall have a UL approved shop, and shall be able to provide both a UL 508 label for the
panel, and a UL label for service rated.

e. The Remote Telemetry shall be microprocessor based, user programmable PLC, and shall
serve as an interface to accumulate, process, transmit, and receive discrete and analog status
and control messages between the RTU base station and the remote RTU sites located.

f. The panel builder shall warrant the panel for one (1) full year minimum from the date of
start-up.
g. The panel builder or qualified technical representative shall checkout and test the panel as part of the station start-up with PSLUSD and the EOR.

h. The panel shall be 316 stainless steel modified NEMA-12 control panel with a drip shield along the complete top of panel. Padlocking handles shall be provided with accessories and doorstop kit. Provide two extra bolted clips on front edge of door panel with all stainless-steel hardware. An aluminum inner hinged door shall contain all operators’ controls and the dead front panel outside door shall be blank. Provide duct seal putty on all outgoing conduits. Provide corrosion inhibitor per the QPL.

i. Control panel shall be mounted to two (2) 3” diameter aluminum pipe supports (6061-T6-Sch40). Length of the pipe supports shall be sized so as to provide for 36” of burial (in 3000 psi concrete) and extend to 3” above the top of the supports. The panel shall be mounted to the pipe supports with one (1) 5/8” x 5/8” 12-gauge stainless steel Unistrut at a height consistent with FPL requirements for mounting their meter. Paint below ground portion of supports with asphalt-based paint to 3” above grade. All hardware shall be stainless steel.

j. A back-mounting panel for heavy components including RTU shall be provided.

k. Panel shall be surface wired with numbered terminals. Terminal strip shall be located at least 4” from the bottom of the enclosure for accessibility.

l. All wiring shall be copper THWN. Shielded cable shall be Belden 8760 or approved equal.

m. Panel shall be built by UL approved shop and adhere to UL label 508.

n. A circuit breaker disconnecting NEMA-4X stainless steel enclosure shall be provided outside the control panel. Disconnect shall be service entrance rated.

o. Panel components shall be as listed. No substitutions shall be made without prior approval in writing from PSLUSD.

p. Telemetry hardware and conduit will conform as specified in control panel requirements. Telemetry systems shall be compatible with PSLUSD’s central control receiving station.

q. RTU antenna requirement shall be as shown on the standard detail.

r. Local and remote readouts shall be provided per the standard detail for I/O Schematic and, at a minimum, as listed below in the units shown:

- Upstream pressure (psi)
- Downstream pressure (psi)
- Flow (gpm/gpd) (two readouts/modes):
  - Instantaneous flow rate
  - Daily volume delivered
- iv. Storage Level (two readouts/modes):
  - Storage Elevation (NGVD)
  - Feet above or below storage high water elevation
• v. Valve position (% open)
• vi. FPL power (light)

s. Breakers shall be per the QPL.

t. Pilot lights, selector switches and push buttons shall be per the QPL.

u. Surge Arrestor for power and lighting shall be per the QPL.

v. The PLC shall be per the QPL and shall have:
• One (1) digital output card 8-channel
• One (1) digital input card 8-channel
• One (1) CPU
• One (1) Ethernet Module or Ethernet/Modbus converter
• One (1) fiber optic/Ethernet switch
• One (1) 8-channel analog input card
• One (1) 4-channel analog output card

a. General I/O schedule is as follows, unless otherwise modified by PSLUSD:

• Upstream Pressure
  Analog Input
• Downstream Pressure
  Analog Input
• Instantaneous Flow rate
  Analog Input
• Daily Volume Pumped
  Totalizer Programmed into PLC
• Daily Volume Delivered
  Totalizer Programmed into PLC
• Valve Position (Feedback)
  Analog Input
• Valve Position (Flow rate Set Point)
  Analog Output
• Storage Level
  Analog Input
• FPL Power
  Analog Input
• Storage Flow Rate
  Analog Input
• Local/Remote Indication
  Discrete Input

CHAPTER III
CONSTRUCTION COORDINATION, INSPECTIONS AND TESTING

A. GENERAL

1. The EOR shall have a pre-construction meeting with PSLUSD and the contractor prior to
starting construction. The meeting shall be held at the Utility Department’s Office.

2. The EOR shall coordinate all construction and inspections on the project and shall be the point
of contact with PSLUSD. Testing shall be conducted by or at the direction of the EOR in the
presence of a PSLUSD inspector.

3. The contractor shall contact the EOR, the appropriate governmental jurisdictional agency, and
all utility companies at least 48 hours prior to commencement of construction for coordination of
any utilities.
4. There shall be no field changes or deviations from design without prior written approval of PSLUSD and the EOR.

5. All materials, construction methods, testing, and disinfection shall conform to the requirements of the PSLUSD, FDEP, and AWWA current standards.

6. It is the EOR’s responsibility to coordinate the installation of other public utilities near PSLUSD facilities.

7. The contractor shall strictly adhere to the horizontal and vertical separation requirements specified in the PSLUSD Utility Standards and applicable standard detail. All crossings between PSLUSD facilities as well as with other utilities shall be left exposed until observed by a PSLUSD inspector.

8. Contractor shall adhere to the approved Temporary Traffic Control Plan at all times where work is in progress. Traffic control, barricades, etc. shall be in accordance with applicable permits, local regulations and FDOT and OSHA standards.

9. Contractor shall repair any damage caused to existing utilities by construction activity in accordance with applicable standards.

10. No pollution or erosion caused by this project will be allowed off site or in the stormwater drainage system. The contractor shall install any devices necessary to prevent pollution or erosion and comply with the City’s code for erosion and sediment control standards. The cost of pollution and erosion control shall be incidental to the cost of construction.

B. INSPECTIONS & TESTING

1. The EOR shall perform inspections, observations, and tests necessary to assure compliance with Utility Standards, complete the required PSLUSD forms for inspections and testing, and certify completion of the utility facilities.

2. The contractor shall not cover newly constructed facilities prior to a required inspection being conducted by the EOR and PSLUSD. If any construction is covered before an inspection by PSLUSD, the contractor shall be required to uncover it at his expense. If work is being performed on days that are non-PSLUSD working days, i.e. weekends and holidays, pictures of conflicts, etc. shall be taken and e-mailed to PSLUSD within 48 hours.

3. All work that has been rejected or condemned shall be repaired, or if it cannot be satisfactorily repaired, shall be removed and replaced at the contractor/developer’s expense.

4. Materials not conforming to the requirements of the specifications shall be removed immediately from the site of work and replaced with satisfactory material by the contractor/developer.

5. PSLUSD shall have the right to require additional inspections, certifications and/or testing to confirm that the deficient work has been corrected.
B1. PSLUSD INSPECTOR’S AUTHORITY

1. The PSLUSD inspections are intended to make observations for verification of compliance and do not relieve the EOR or contractor from fulfilling their responsibilities. Any items found to be deficient after PSLUSD has approved an inspection will still require correction at the contractor/developer’s expense.

2. The PSLUSD inspector is not authorized to revoke, alter or waive any requirements of the specifications, but is authorized and expected to call to the attention of the EOR and/or contractor any failure of work or materials to conform to the plans or specifications. The PSLUSD inspector does NOT have the authority to make changes to the approved plans. The inspector shall have the authority to reject materials or suspend the work until questions of issue can be referred to and decided upon by the Utility Director or his designated representative.

4. The inspector shall in no case either act as foreman or perform other duties for the EOR and/or contractor nor interfere with the management of the work. Advice that the inspector may give shall in no way be construed as binding to the City of Port St. Lucie or releasing the developer, his engineer or contractor from performing according to the intent of the plans and minimum PSLUSD Standards.

B2. SCHEDULING OF INSPECTIONS

1. It shall be the responsibility of the EOR to schedule inspections via e-mail and their qualified representative shall be present at all scheduled tests and inspections. Pre-testing is encouraged to be completed prior to scheduled inspections, to minimize failures. A scheduled inspection will be canceled and a re-inspection fee assessed if one of the three following situations occurs:

   • A failing test result.
   • Cancellation of the inspection with less than 24 hours’ notice.
   • Failure to show for inspection by the EOR or contractor.

2. Re-inspection fees shall be assessed per scheduled hour of the inspection. The exception is for TV inspection of gravity sewer, for which the re-inspection fee will be assessed on the hours scheduled for the repairs and the TV inspection. The EOR will be notified or given a Failed Inspection Notice at the time of the failed inspection. All re-inspection fees shall be paid to PSLUSD prior to any subsequent scheduling of further inspections.

3. PSLUSD shall be provided with at least two (2) full working days’ notice for scheduled inspections. Inspectors will make unscheduled visits as needed to observe such items as ongoing work on site, restraints and clearances between conflicting lines.

4. Scheduled inspections will be conducted during normal business hours 7:30 am – 3:30 pm, Monday through Friday, except when service disruptions are anticipated. When progress of a project requires, for the convenience of the contractor, the periodic presence of a PSLUSD representative during after hours, weekends and/or city holidays, the contractor/developer shall accept the financial responsibility for the overtime hours (at overtime rates) with a possible minimum of four (4) hours, including travel time.
B3. REQUIRED INSPECTIONS

1. The following are the required inspections:

- Materials inspection
- Installation of lift station/grinder structures/valve vault/grease interceptor
- Installation of the first manhole of the lift station and the first manhole to be installed
- Jack & bores and installation of the carrier pipes, directional drilling, directional boring (and any other type of bore)*
- Connection to existing mains, tie-ins, wet taps, etc., witness installation of pigs and temporary jumper assembly
- Flushing (pigging)*
- Restraints and conflicts*
- TV inspection (gravity sewer)*
- Infiltration/ex-filtration test report (leak test on gravity sewer, manholes, and pump stations)*
- Pressure/leak testing*
- Chlorination/disinfection test*
- Chlorination flush
- Concrete pad formwork/rebar placement
- Liner welding and spark testing
- Wire trace continuity and electronic marker verification*
- Any reconstruction repairs and field changes (including lines that have not been turned over to PSLUSD)
- Removal and plugging of sample points – Removal is at your risk unless the water main has been certified
- Fire hydrant flow test*
- Electrical components of pump station
- Pump station start-up*
- Deflection test*
- Removal of temporary jumper assembly
- Final inspection/work completion

Some of the above inspections, such as Materials Inspections, Restraints and Conflicts, etc., may be required on multiple occasions. The above inspections are performed typically in this order unless otherwise agreed to and adjusted in the Pre-Construction Meeting.

*As a courtesy, PSLUSD Inspection/Test Reports can be completed on-site electronically by the PSLUSD inspector or EOR’s representative. Tests and inspections are typically determined to pass or fail at the time of the test or inspection. No separate paperwork is required for a passing test or inspection. All test reports must be completed and can be downloaded from the city’s website at http://www.cityofpsl.com/utility/commercial development/utility-commercial-development.html.

2. EOR’s representative shall e-mail PSLUSD results of tests that are not marked with an asterisk.
3. All pipe restraints and crossings shall be left exposed until inspected and approved by PSLUSD. Such inspections may be combined with scheduled inspections or will be conducted at a separate scheduled time.

B4. REQUIRED TESTING

1. The testing for various components of the water, wastewater and reclaimed water system components shall be performed as detailed below. The EOR shall provide PSLUSD with written test results on PSLUSD forms noted above for each required test. During construction, the individual test reports shall be prepared and signed in the field immediately following the test.

a. Performance testing of pressure pipe

i. Type of Testing

1. The following performance testing must be conducted:

- Water Main: Hydrostatic, Leakage, and Bacteriological Testing
- Force Main: Hydrostatic, and Leakage Testing
- Low Pressure Main: Hydrostatic and Leakage Testing

ii. References - Testing shall be performed in accordance with the following references:

- ANSI/AWWA C600 – Ductile Iron Pipe Installation and Testing
- ANSI/AWWA C605 – Polyvinyl Chloride (PVC) Pipe Installation/Testing
- ANSI/AWWA C651 – Disinfecting Water Mains
- ANSI/AWWA C900 – PVC Pipe, 4"-12" for Water Distribution
- ANSI/AWWA C905 – PVC Pipe 14"& above for Water Distribution

iii. Regulations – No leak testing shall be performed until easements, Record Drawings, and density tests have been submitted to the City. Incomplete easements, Record Drawings, and density tests will prevent passing of leak testing, and no further testing can be scheduled. Re-review fees may apply. Testing shall conform to PSLUSD requirements and FDEP regulations.

b. Temporary Connection to PSLUSD Water Main

i. A temporary jumper connection is required between an existing active water main and a newly constructed main until a clearance is obtained from PSLUSD. The temporary connection shall be used at point(s) of filling in accordance with the standard details for potable and non-potable water jumper connection.
ii. The EOR shall contact PSLUSD via e-mail at (inspectors@cityofpsl.com) regarding scheduling of required inspections listed in this Chapter or any other inspections deemed necessary by PSLUSD and shall strictly follow all procedures detailed in this Chapter.

iii. The temporary jumper assembly (flange to flange) will be supplied, installed and tested by PSLUSD, in coordination with the EOR and the contractor. Other materials and installation required for the connection shall be responsibility of the contractor. The contractor shall disinfect the tapping sleeve and exterior of the main to be tapped by spraying and swabbing with chlorine in the presence of a PSLUSD inspector. The underground fittings shall be restrained mechanical joint type. All materials shall be per the PSLUSD approved QPL.

iv. The jumper connection shall be maintained by the contractor until filling, flushing, hydrostatic pressure/leakage testing, disinfection and bacteriological sampling have been satisfactorily completed by the contractor and the test results are in compliance with the PSLUSD and FDEP standards. Disinfection and bacteriological sampling is not required for newly constructed force mains and reclaimed water mains.

v. A physical separation shall be maintained between an existing water main and the newly constructed water main, except as noted herein. If approved in writing, PSLUSD may allow a physical connection under controlled conditions as follows:

1. The procedure will be conducted by the contractor in the presence of a PSLUSD inspector and the EOR or representative.

2. The new valve(s) shown in this detail shall be pressure/leakage tested and replaced if leakage is observed. The valves will be kept closed by PSLUSD and shall not be operated by anyone other than PSLUSD personnel.

3. The jumper connection shall be used to fill the new main.

4. The contractor shall disinfect the pipe and fittings used to make the connection by spraying and swabbing with chlorine.

5. All valves in the new system downstream of the jumper shall be opened by the contractor prior to flushing. The valves shown in the standard detail shall be opened by PSLUSD personnel only.

6. The pigging and flushing shall be performed by the contractor in the presence of a PSLUSD inspector. The valves will be closed by PSLUSD personnel after the main has been flushed.

7. The main shall be pressure tested after flushing and prior to disinfection. All valves shall be kept closed during the pressure test and will be opened by PSLUSD personnel if the test results are satisfactory.

8. Disinfection shall be conducted in accordance with AWWA C651. A minimum pressure of 20 psi shall be maintained in the new water main after disinfection.
vi. Bacteriological sampling and testing of the new water main shall be conducted per Section B of this Chapter and a clearance obtained from PSLUSD or FDEP, as applicable. The sampling points shall be removed and plugged, and the permanent connection made by the contractor. The contractor shall disinfect the pipe and fittings used to make the connection by spraying and swabbing with chlorine.

vii. At the request of the EOR only, PSLUSD will remove the jumper assembly (flange to flange) after the corporation stop valves to the jumper have been closed, the valves shall be plugged by the contractor after removal of the assembly.

viii. The contractor shall pay PSLUSD for all the water used, based on the initial and final reading of the water meter.

c. Cleaning/Flushing

i. Flushing shall be conducted to clean the mains and remove all foreign matter.

ii. For water mains, flushing shall be conducted prior to disinfection. Hoses, fittings and temporary pipes in ditches shall be provided as required to dispose flushing water without damage to adjacent properties. Flushing velocities shall be at least 2.5 fps.

iii. All mains shall be cleaned using a poly-pig cleaning system as detailed in Chapter II, Section N. All equipment and piping shall be provided by the contractor. Testing shall be conducted to ensure proper cleanliness of the pipe as detailed in this section. PSLUSD will not accept any utility mains that do not pass the cleanliness test.

iv. Prior to the actual line flushing operation, the contractor shall properly notify PSLUSD and the EOR of such intended water use a minimum of 48 hours prior to flushing of mains up to 8” diameter, and at least 1 week prior to flushing of mains larger than 8”. All flushing times will be limited to off peak times of water system demand and consumption. No flushing shall take place without the PSLUSD inspector and EOR being present.

v. The contractor shall pay PSLUSD for all water used.

vi. The flushing report shall be submitted by the EOR on the PSLUSD form prior to disinfection.

d. Hydrostatic and Leakage Testing

i. Hydrostatic and leakage tests shall be made between valves and/or connectors for each section tested using the procedure outlined in ANSI/AWWA C600 for DIP and C605 for PVC.

ii. The contractor shall provide all necessary equipment such as pumps, gauges and water measuring tanks and shall perform all work required for pipe pressure and leakage test. The gauge shall read in 2-pound increments and shall be a maximum of 250 psi.

iii. Hydrostatic testing shall be performed for a period of not less than 2 hours at 150 psi pressure for water/force/reclaimed water mains and at 100 psi for low-pressure mains.
The allowable rate of leakage shall be less than the number of gallons per hour determined by the following formula:

\[
\frac{L}{SD \sqrt{P}} = \frac{148,000}{148,000}
\]

- **L** = Allowable leakage in gallons per hour.
- **S** = Length of pipe tested in feet.
- **D** = Nominal diameter of the pipe in inches.
- **P** = Average test pressure maintained during the test in pounds per square inch gauge.

iv. The testing procedure shall include the continued application of the specified pressure to the test system for the two-hour period using a suitable pump connected to the pipeline. The pipeline shall be allowed to stabilize at the test pressure before conducting the hydrostatic test. The pressure shall not vary by more than ±5 psi from the required pressure for the duration of the test. Test pressure shall be maintained with this tolerance by adding makeup water through the pump into the pipeline. The amount of makeup water shall be accurately measured and shall not exceed the allowable leakage rate as determined using the above formula. If at any point during the test the pressure loss exceeds 5 psi, the test is considered failed. Should the test fail, the contractor shall make necessary repairs and the test shall be repeated until satisfactory results are obtained.

v. Any exposed pipe, fittings, valves, hydrants, and joints shall be examined during the test to ensure there are no visible leaks. Any damaged or defective pipe fittings, valves, or hydrants that are discovered following the pressure test shall be repaired or replaced with sound material, and the test shall be repeated.

vi. The pressure test report shall be submitted by the EOR on PSLUSD form prior to disinfection.

e. **Disinfection (Water Facilities Only)**

i. Disinfection of mains shall comply with AWWA C651. Each unit of completed water main and distribution system shall be thoroughly flushed and then disinfected with chlorine.

ii. Chemicals:

1. Sodium or calcium hypochlorite conforming to ANSI/AWWA B300 shall be used.
2. Calcium hypochlorite intended for use in swimming pools shall not be used.
3. Chlorine tablets shall not be used unless specifically approved in writing by PSLUSD.
4. Pure chlorine gas or liquid shall not be used.
iii. The disinfection test report shall be submitted by the EOR on PSLUSD form prior to final inspection.

f. Bacteriological Sampling & Testing (Water Facilities Only)
   
i. The contractor shall verify that piping system has been cleaned and properly isolated. The maximum length of line to be tested as one section will be equal to or less than 2500’.
   
ii. Bacteriological testing shall not begin until after the pressure test has been passed.
   
iii. The contractor shall install sampling points required to take all necessary water samples at locations designated in the approved plans and submit a single-sheet PDF map of all sample points for review and approval prior to sampling.
   
iv. The contractor shall coordinate with a Florida Department of Health certified testing laboratory to take all water samples required for bacteriological tests and shall maintain continuous running bacteriological sample taps. Water mains being tested must remain under line pressure until release of system into service by PSLUSD and FDEP.
   
v. The test report shall include the following information:
   
   • Date issued, project name, and testing laboratory name, address, telephone number and State Certification Number.
   
   • Time and date of water sample collection.
   
   • Name of person collecting samples.
   
   • Test locations.
   
   • Coliform bacteria test results for each outlet tested.
   
   • Certification that water conforms to bacterial standards.
   
   • Bacteriologist's signature and authority.
   
vi. The bacteriological test results shall be submitted to PSLUSD with the Final Inspection Package.


g. Fire Hydrant Flow Testing

i. A flow test to verify the fire flow rates shall be performed by the EOR on all new fire hydrants prior to the project’s final inspection. The gauges for the test will be provided by PSLUSD. The flow tests shall be witnessed by the PSLUSD and contractor. The contractor shall make provisions for minimizing interruptions to traffic and for adequate drainage of water.
ii. Each hydrant shall be capable of delivering a minimum flow of 600 gpm for residential areas and 1250 gpm for non-residential areas (or a higher flow as required by the Fire Marshal), with a residual pressure of not less than 20 psi.

iii. The contractor shall provide one hydrant wrench, fire hydrant repair kits and maintenance manuals to PSLUSD at the time of flow testing. One fire hydrant repair kit shall be provided per every five fire hydrants. If there are less than five hydrants, one kit will be required. These kits shall be turned over to PSLUSD at or before hydrant testing. Each kit shall include a sufficient quantity of parts and lubricant to facilitate quick repairs, and a copy of the maintenance manual. The repair kit items required for each approved manufacturer are mentioned on the QPL.

iv. The test results shall be submitted by the EOR on PSLUSD form prior to being considered passing.

h. Infiltration/Ex-filtration Test (pump station and interceptor)

1. Infiltration and ex-filtration testing shall be performed on interceptors and pump stations to assure there are no leaks from joints or as a result of improper construction. The following observation and test shall be conducted by the EOR in the presence of the PSLUSD inspector:

   i. Visual – During and after construction the inside of the structure shall be closely observed for signs of wetness and leaks. PSLUSD will fail the inspection if wetness and leaks are visible.

   ii. Ex-filtration Test – All pipe openings shall be plugged and the interceptor/wet-well shall be filled with water to the level of the underside of the access covers. After allowing for an initial drop in elevation the chamber shall be refilled and the level observed for duration of 2 hours. Any drop in water level is unacceptable and result in the inspection being failed by PSLUSD. Pressure grouting shall not be considered an acceptable method of repair.

   iii. The results of the test shall be submitted by the EOR on PSLUSD form prior to being considered passing.

i. Pump Station Start-up and Testing

1. Upon completion of the entire pump station, including approved Record Drawings and complete Pump Station Data Sheet, an inspection shall be coordinated with the EOR, PSLUSD, contractor, and manufacturer’s representative for the station. The EOR and PSLUSD shall be notified 48 hours in advance of the start-up. The following items shall be the basis of a satisfactory inspection:

   i. The station was built in accordance with the approved plans and Utility Standards.

   ii. The station is functioning as designed.
iii. Tests shall be conducted to determine if the pumps conform to the specifications.

Specifically, the testing shall confirm that –

- The pumps are working per the design curve.
  - Shut-off head
  - Current pressure head
  - Future pressure head
- The design amperage is not being exceeded.
- Both pumps can be removed and reinstalled without obstructions.
- The pump station can be operated with a generator in the same manner as with electric power. PSLUSD shall provide the generator for start-up for a lift station. If the pump performance does not meet the specifications, corrective measures shall be taken or pumps shall be removed and replaced with pumps that satisfy the conditions specified.

iv. The contractor/manufacturer representative shall check direction of rotation of all motors and reverse connections if necessary.

v. All pump operation settings, alarms, and shutdown devices shall be calibrated and tested during the field test.

vi. Should any material or installation fail to meet the specifications, the contractor shall take corrective measures, or the item shall be removed and replaced.

vii. A repair kit shall be provided to PSLUSD at the time of start-up and testing inspection. The kit shall include one full set of fuses for entire control panel, one full set of fuses for the disconnect box (if fused), and one set of contacts for the motor starts for each pump station.

viii. The test report shall be submitted by the EOR on PSLUSD form prior to being considered passing. EOR is required to submit a report describing if the station is running as designed or if modifications are needed.

j. Gravity Sewer Inspection and Testing

1. The contractor shall perform testing of all wastewater gravity mains, as set forth in the following, and shall conduct said tests in the presence of representatives from PSLUSD and the EOR.

k. TV Inspection

1. A television inspection shall be performed by the contractor or his representative as stated below, in the presence of the EOR and PSLUSD prior to final inspection by PSLUSD. Testing shall not proceed until the facilities have been backfilled and the compaction of roadway base and Record Drawings are complete.
i. At time of inspection, the lines shall be clean with sufficient water having been introduced into each segment of the line to show any sags or dips present. The video camera shall have a depth gauge attached to the front of the camera that will show depth of water in the line dips.

ii. If inspection reveals cracked, broken, or defective pipe or pipe misalignment resulting in vertical sags ¾” or more, the contractor shall be required to repair or replace the pipeline at no cost to PSLUSD. Retesting is not allowed until repairs are made, unless done on the same day, no exceptions. Prior to repair or replacement of failed sewer pipe, the method of replacement shall be submitted to PSLUSD for approval. Pressure grouting or pipe vibration shall not be considered as an acceptable method of repair.

iii. The test results shall be submitted on PSLUSD form by the EOR prior to the infiltration/exfiltration test. Color CD/DVD and inspection logs shall be provided prior to final inspection.

1. Infiltration/Ex-filtration Test

1. The gravity sewer shall be subjected to infiltration and/or ex-filtration tests after it has passed the TV inspection. The test shall be conducted as follows:

   i. When testing mains and laterals separate of the manholes and the groundwater is at least 2’ above the highest invert, infiltration testing shall be performed.

   ii. When testing mains and laterals separate of the manholes and the groundwater is less than 2’ above the highest invert, ex-filtration testing shall be performed.

   iii. All manholes shall be subject to an ex-filtration test and may be conducted in conjunction with the testing of the mains and laterals. A maximum of 1200’ of mainline and four structures shall be tested. The PSLUSD inspector must be able to view all the manholes from one location at the site.

   iv. The allowable leakage shall not exceed 50 gallons/day/inch of diameter/mile.

   v. Should the test fail, the contractor shall accomplish necessary repairs and the test repeated until the results are satisfactory. The contractor shall furnish the necessary labor, water, and all other items required to conduct the testing and shall perform the necessary system repairs required to comply with the specified test. All re-testing shall be at the contractor’s expense.

   vi. Pressure grouting or pipe vibration is not considered an acceptable repair.

   vii. The test results shall be submitted by the EOR on PSLUSD form prior to being considered passing.
m. Deflection Test

1. Testing is required for all flexible pipes to assure that deflection does not exceed 5%. The test shall be performed as follows using a mandrel or a calibrated television/video camera.

   i. Test shall be conducted at least 30 days after the final backfill (including pavement base course) has been in place to allow for stabilization of the soil-pipe system.

   ii. If a mandrel is utilized, its diameter shall be 95% of the inside diameter of the pipe being tested. Prior to use the mandrel shall be certified by the EOR and PSLUSD. Use of an uncertified mandrel or a mandrel altered or modified after certification will invalidate the test. The mandrel shall be flushed with water or pulled through the pipe by hand with a ¼” nylon rope; mechanical pulling devices shall not be used. Excessive force shall not be applied in pulling the mandrel that may damage the pipe or erroneously indicate that deflection was within acceptable limits by temporarily expanding the pipe. The pipe shall be deemed acceptable if the mandrel passes completely through the pipe without restriction. When the mandrel does not pass through the pipe, the contractor shall locate and correct the defect to the satisfaction of the EOR and PSLUSD. Retesting of the pipe after correction of the defect shall be no sooner than 30 days after final backfill has been in place.

   iii. The test report shall be submitted by the EOR on PSLUSD form prior to being considered passing.

n. Reclaimed Water System Start-up and Testing

1. All reclaimed water main shall be tested in accordance with the Hydrostatic and Leakage Testing procedure specified in this section. The test results shall be submitted by the EOR on PSLUSD form immediately upon completion.

2. The EOR and PSLUSD shall be notified 48 hours prior to start-up and final inspection of the reuse metering station.

3. All systems shall be exercised through operational tests in the presence of the EOR and PSLUSD representatives to demonstrate achievement of the specified performance. The scheduling of tests shall be coordinated by the contractor, so that the tests may proceed without delays or disruption by incomplete work.

4. During start-up, the contractor’s and/or manufacturer's representative shall be present at the job site.

C. RECORD DRAWINGS

1. The goal is to be able to accurately record utility improvements and to be able to easily locate these improvements with or without using specialized equipment.
2. Completed Record Drawings with a PSLUSD approval stamp are required for all new facilities prior to Utility Completion (Final) Inspection.

3. Photographs by the EOR and contractor are encouraged for above-ground and below-ground improvements.

4. Record Drawings shall be prepared by a Professional Engineer licensed in the State of Florida AND signed and sealed according to the State requirements. Information from a Florida licensed surveyor is also required as noted below and incorporated into the Record Drawings.

5. Record Drawings are to be reviewed by the contractor and EOR prior to submitting to PSLUSD.

6. The surveyor shall show actual location and elevation of all pressure mains at 100-foot intervals, tees, wyes, crosses, bends, reducers, sleeves, terminal ends, corporation stops, valves, fire hydrants, air release valves, restraints, sleeves, casing pipes, sampling points, ends, reducers, connection points, and anywhere that cover is less than 36” or more than 60”, etc. A complete point data file shall also be submitted in Excel format.

7. EOR shall submit all Record Drawings electronically in PDF, (CAD files to be provided with first submittal and after approved). After approval, Record Drawings shall be submitted as a single PDF file (300 DPI) of the full set of Record Drawings, one Signed and Sealed bound 24” X 36” paper set, one AutoCAD DWG file with all reference files, line-types, fonts, etc. bound to the DWG file in State Plane Coordinates. Photos, PDFs and other attachments in the drawing file shall be transmitted with the drawing. When possible, use the “eTransmit” command and include plot styles and fonts.

8. Using the EOR’s CAD file as the base drawing, redraw all information in the actual location Record Drawing in State Plane Coordinates, Florida NAD 83 State Plane East Zone, US Foot. Elevation information shall be referenced to the North American Vertical Datum of 1988 (NAVD 88).

9. Fonts, line-types and line weights must be such that different lines are distinguishable, and the Record Drawing information is the most prominent information on the sheet. (mains cannot look like sidewalks, edge of pavement, etc.)

10. The EOR shall ensure each sheet is labeled “RECORD DRAWINGS” in 1” high block printed letters.

11. The EOR shall label the point of service for all potable water, fire lines, wastewater, or reclaimed water services.

12. The scale and size shall be the same as the approved construction plans.

13. Record Drawing data should be redrawn by surveyor over the design plan information and be on a separate layer system so that design plans (proposed construction) can be turned off and on for comparison.
14. Utilize Record Drawing layer in CAD drawing for surveyor to fill in required Record Drawing data.

15. EOR shall allow room on the plan sheet for Record Drawing/record information. Areas of congestion or detail may require blow-up details.

16. The EOR shall ensure that Record Drawings match, sheet by sheet, the construction plans approved and stamped by PSLUSD. Additional sheets may be submitted if necessary.

17. Horizontal dimensions shall be to the nearest tenth of a foot (0.1) and vertical dimensions/elevations shall be to the nearest hundredth of a foot (23.11). Sanitary sewer slopes shall be to the hundredth of a percent (0.40 % or 0.0040).

18. Trace wire* and electronic marker balls* are not to be shown, but locations clearly described with notes. For example: Trace wire on all pressure mains and water services. Electronic marker balls placed on all fittings, valves and service ends as confirmed by the 05/24/2018 passing inspection.

19. The EOR shall provide one NAVD 1988 benchmark reference per plan set and the surveyor shall provide at least two GPS reference points shown on the plans.

20. Pressure pipe lengths* are not required to be called out but totaled by size and material for the entire plan.

21. Buildings or structures within 20’ of the main shall be drawn and separation listed by EOR.

22. EOR shall provide special detail drawings and/or photos where installations are not as shown on the construction drawings due to the field conditions or where required for clarity.

23. EOR shall provide right-of-way, lot lines and pertinent easement information to be shown.

24. EOR shall provide all easements (existing and proposed) and show Official Record Book and Page Number for the recorded easement document or plat.

25. Project total quantities* listed in a table for pipes, manholes, valves, etc. to be used later in the Bill of Sale/Asset List. Example below:
Record Drawing Final Quantities

Commercial Grinder Station - 240 Volt/3 Phase _______ EACH
6" Sewer Service - PVC _______ LF
Sewer Cleanout _______ EACH
2" Poly Water Service _______ LF
6" PVC Water Main _______ LF
8" PVC Water Main _______ LF
2" Force Main - PE _______ LF
6" Gate Valves _______ EACH
Fire Hydrant Assembly _______ EACH
2" Compound Meter _______ EACH
2" RPZ _______ EACH

26. EOR must confirm project total quantities. EOR must ensure there is room so that all data can be kept on the same sheet; not tables on separate sheets.

27. EOR shall show all information recorded during the work, including all subsurface anomalies.

28. EOR shall provide pipe material and class that can be addressed in General Notes. Example: All gravity sewer is PVC SDR-26.

29. EOR shall provide a Directional Drill Bore Log showing recorded X/Y/Z locations of the drill head at minimum every ten (10) feet under all roads, railroads, or other significant crossings as determined by City, or minimum every twenty-five (25) feet in other locations, or as specified on the plans or as noted in the written Pre-Construction Meeting summary. Bore company shall provide paint dots and depth along route to provide more accurate depth and location of the bore for the surveyor.

30. EOR shall provide horizontal location of all conflicts with other utilities (mains only), including vertical clearance dimension in inches (if 24” or less, feet and tenths otherwise, i.e. 3.1”) at all conflicts or crossings and the conflicting utility type, size, material, etc. Callout with sequential numbers, beginning with 1, on the utility sheet.

31. A Valve Table* including the Plan ID, Size (in.), Type, Fluid, Manufacturer, Date Set, Number of Turns, and PSLUSD ID # shall be on each sheet having valves. All information except the PSLUSD# shall be provided by the EOR. The PSLUSD# shall be provided by the City.

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<th>Valve Table</th>
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27
32. The EOR shall ensure water and sewer services are redrawn as they were constructed including any bends, skews, etc. (Particular care needed in drawing needed in special situations, i.e., cul-de-sacs and locations where services are not perpendicular to the main).

33. The surveyor shall ensure the location of all gravity sewer piping, wyes, tees, manholes, cleanouts and points of connection to the existing system is shown as constructed. The EOR shall ensure runs of gravity sewers are identified (e.g., 300' of 8" PVC SDR-26 at S=.0040 or .40%)*. Lengths of gravity sewer shall be measured from manhole to manhole with the actual pipe length constructed.

34. Elevations shall be provided by the surveyor for the north rim of all manhole covers and at all manhole inverts provided by the EOR. The surveyor shall provide sewer service elevation and finished grade at the plumber tie-in or PSLUSD point of service.

**a. Wastewater Pump Stations**

i. The surveyor shall provide a detail of the pump station site showing above-ground and below-ground improvements. The EOR shall provide wet-well internal diameter size, lining material, and location. Elevations shall be indicated at inverts, floats/probes, wet-well top***/bottom, and at ground adjacent to wet-well and fence corners**.

 ii. The surveyor shall provide all mains (material and size), fittings services, conduits servicing the pump station, pull boxes, transformers, pedestals, water meters, electric meters, slabs, odor control facilities and antennas within the pump station site/easement shall be shown in the actual locations. A permanent benchmark shall be placed on the lift station in the NE corner of the concrete pad.

 iii. EOR shall ensure that all schedules* that show pump, motor and electrical data shall show the Record Drawing conditions. Indicate the make, model number, serial number, horsepower, impeller and condition point of each pump installed, location of control panel, conduits, transformers, location of pump out connection, hose bib, RPZ, generator, irrigation system, fence, and any deviation from the plans.

* The EOR is responsible for certifying these items
** Items provided by the surveyor

**D. COMPLETION INSPECTION PACKAGE**

1. The completion inspection shall be scheduled by contacting the Utility Engineering Division Inspection group at inspectors@cityofpsl.com. The Utility Completion Inspection Package shall be submitted prior to PSLUSD scheduling a completion inspection, including but not limited to the following items: (each signed item must be accompanied by the Sunbiz page for authorized signatures).

2. PSLUSD will schedule the inspection no more than 7 calendar days after receiving a completed package. If the package contains unacceptable information, the inspection is considered as not passing.
a. Utility Completion Inspection Checklist

i. The Utility Completion Inspection Package Checklist and other related forms can be downloaded from the PSLUSD website at https://utility.cityofpsl.com/get-connected/divisions/utility-engineering-commercial-development/forms-downloads/. The EOR must initial each applicable item on the form to certify that the information is satisfactory and meets the PSLUSD requirements. The required information must be submitted together with the completed form; submittal of incomplete or unsatisfactory information will delay transfer of the system to PSLUSD.

b. Record Drawings

i. One black or blue line set of Record Drawings, stamped approved by PSLUSD, shall be submitted to PSLUSD at least 7 days prior to the desired inspection date together with a completed form for project completion. If Record Drawing survey is not correct, the final inspection will be completed but considered a failed inspection. A punch list compiled by the EOR of incomplete minor items and a schedule for completion shall be submitted with the Record Drawings.

c. Project Completion Certification

i. One original of the Project Completion Certification shall be signed by the Surveyor, Contractor, and the EOR. This shall be submitted on PSLUSD Doc. No. 131.

d. Bill of Sale with Sunbiz Detail by Entity Name

i. This shall be a draft with all spaces filled in and proposed signers name (no signature).

ii. Bill of sale shall be submitted on the City’s standard form.

iii. Exhibit A – shall contain the legal description of the property.

iv. Exhibit B – shall contain the list that includes the “furnish and install” price of all materials, equipment and labor. This shall be submitted on the City’s standard form.

e. Gate Codes and Contact Information

i. If applicable, submit all gate codes and contact information to gain entry to the property for maintenance and repair of all PSLUSD facilities.

CHAPTER IV

ACCEPTANCE OF SYSTEM FOR OPERATION

A. GENERAL

1. Upon completion of construction by the contractor and passing of the completion inspection by PSLUSD, the EOR must submit the turnover package to the PSLUSD office in PDF format. The submittal will undergo an initial review for content only and shall be accepted or rejected for a complete review. If the submittal is incomplete and rejected, it will be returned to the EOR in
its entirety. Once the submittal has been accepted by PSLUSD for complete review, the detailed review will be completed within 7 days. NOTE: Items are not required if previously approved by PSLUSD.

B. UTILITY ACCEPTANCE TURNOVER PACKAGE

I. The Utility Acceptance Turnover Package includes the following:

a. Utility Acceptance Turnover Checklist

i. The Utility Acceptance Turnover Checklist and other related forms can be downloaded from the PSLUSD website at https://utility.cityofpsl.com/get-connected/divisions/utility-engineeringcommercial-development/forms-downloads/. The EOR must initial each applicable item on the form to certify that the information is satisfactory and meets the PSLUSD requirements. The required information must be submitted together with the completed form. Submittal of incomplete or unsatisfactory information will delay transfer of the system to PSLUSD. (each page with a signature must be accompanied by the printout from Sunbiz showing the names of authorized signatures).

b. Contractor’s Affidavit & Release of Lien with Sunbiz Detail by Entity Name

i. Contractor’s affidavit and final release of lien shall be submitted on the City’s standard form.

ii. All Contractors who performed work on the utility portion of the project must submit an affidavit and release of lien.

c. Request to Place Water Distribution and/or Sewage Collection/Transmission System into Operation

i. A Request to Place a Water Distribution and/or Sewage Collection/Transmission System into Operation shall be submitted on FDEP or PSLUSD forms, as applicable. If the water and wastewater system are permitted by FDEP for construction, approval to place the system into operation must be obtained from FDEP. PSLUSD will not release the water and wastewater facilities for use until an approval has been issued by FDEP. The FDEP forms must be completed and submitted to PSLUSD for signature. In addition, the EOR shall include a map showing what area is sending in certification and what was previously certified for that specific project/phase. The forms will be signed by PSLUSD after the system has passed final inspection.

d. Owner’s Affidavit with Sunbiz Detail by Entity Name

i. Owner’s affidavit shall be submitted on the City’s standard form. Exhibit A shall contain the legal description of the property

e. Bill of sale with Sunbiz Detail by Entity Name

i. This shall be the complete signed original.
f. Material and Installation Warranty

i. Any cost associated with the repair or adjustment of PSLUSD facilities during the warranty period shall be the responsibility of the contractor and/or developer. The PSLUSD may perform the necessary work and bill the contractor and/or developer for the expenses. The developer may perform this work with prior approval, and inspection of the PSLUSD.

ii. The materials and workmanship shall be warranted on all equipment supplied for a period of one (1) year. Warranty period shall commence on the date of PSLUSD acceptance.

iii. The equipment shall be warranted to be free from defects in workmanship, design and materials. If any part of the equipment should fail during the warranty period, it shall be replaced in the machine(s) and the unit(s) restored to service at no expense to the PSLUSD.

iv. The warranty shall be submitted on the City’s standard form on contractor’s letterhead.

g. Fees and Charges

i. All fees and charges must be paid prior to acceptance of the turnover package, including:

- Overtime inspection fees
- Re-Inspection fees
- All other fees incurred, including Guaranteed Revenue

h. Passing Final Completion Report

i. A completion inspection report completed by the EOR on PSLUSD forms must indicate compliance with all items on the form. The final inspection shall be considered unsatisfactory by PSLUSD if any items on the report do not comply with the Utility Standards even if the EOR has noted that the project did pass final inspection.

C. APPROVAL TO PLACE SYSTEM INTO OPERATION

1. When all the items, as required in Sections A and B above, are in compliance, PSLUSD will issue a Letter of Acceptance, release the water meter(s) to be installed and begin billing, and give clearance to the Building Department for issuance of a Certificate of Occupancy.