Technical Manual for Design and Construction of Water, Wastewater, and Reclaimed Water Facilities

for

Pasco County Utilities Department

Revised: February 10, 2021

Customers in need of accessibility assistance can connect by phone through the Federal Information Relay Service at 800-877-8339 for TTY/voice communication or by visiting PascoCountyFL.net/Accessibility for other available support avenues. Customers in need of accessibility assistance specific to the renderings or content within this document may contact Pasco County Utilities Engineering, Aurybel Rivero, at 813-235-6189 Ext. 6796, or via email at arivero@mypasco.net, as well as Eric B. Patrick at 813-235-6189 Ext. 6929, or via email at epatrick@mypasco.net.

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PREFACE:

This Technical Manual for Design and Construction of Water, Wastewater and Reclaimed Water Facilities is a revision of the *Standards for Design and Construction of Water, Wastewater and Reclaimed Water Facilities*, Pasco County, dated 1995. This revision updates the referenced standards and incorporates several new features designed to provide more complete direction to applicants seeking to connect to Pasco County Utilities, including a guide to application and permitting procedures located in the main text of the Technical Manual, and new appendices providing specific guidance on preparation of Master Utility Plans, design reports, and construction plans.

These standards apply to all water, wastewater, and reclaimed water facilities that are owned, or to be owned, by Pasco County. The information contained herein is to be incorporated into the design of water, wastewater, and reclaimed water facilities for commercial, industrial, and residential development and is to be used in the construction of such projects. As it is not possible to include every design detail in such a document, the standards listed are incorporated by reference. In cases of conflict, the Pasco County Utilities Engineering and Contract Management Department should be contacted for guidance and the Utilities Director will be the final arbiter of any disputes.

Corrections and comments should be submitted to:

Pasco County Utilities Engineering and Contract Management Department
19420 Central Blvd
Land O' Lakes, FL 34637

Charles J. Cullen, PE, BCEE
Utilities Engineering and Contract Management Director

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LIST OF APPENDICES

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Section 1.
Project Review and Acceptance Process Overview

1.1. Introduction

1.1.1. The primary purpose of this technical manual is to communicate the basic and minimum requirements for all facilities to be owned, operated and maintained by Pasco County Utilities (PCU) and proposed private development (Developer) water, sewer, and reclaimed water permitting and acceptance by PCU to expedite the approval process. Because this document is intended as a guideline for submittal, it does not list all project-specific requirements. Accordingly, silence on any topic shall not be construed as an indication that it is not required.

1.1.2. As a general rule, PCU owns and maintains all water, wastewater, and reclaimed water facilities within the public rights-of-way and easements. Therefore, plans for these facilities must be reviewed and approved by PCU. In addition, utility facilities that are constructed on private property that are connecting to PCU facilities are also subject to review, inspection, and approval by PCU.

1.2. Application for Service

1.2.1. Every Developer involved in the subdivision of real property or the construction of any building that will be served by PCU must submit a completed Service Connection Application (SCA) for Water, Wastewater, and/or Reclaimed Water Service to PCU to obtain service.

1.2.2. Refer to Section 6 for further details.

1.3. Project Review Process

1.3.1. Proposed new developments generally contain the following phases of the planning and approval process:

1. Early Planning and Coordination
2. Master Utility Plans
3. Utility Service Agreements
4. Site Development Pre-application Meeting
5. Construction Plan Processing*
6. Florida Department of Environmental Protection (FDEP) Permit Processing
7. Construction Phase*
8. Post Construction/Final Acceptance Phase*

**Note that underlined items are common to all projects. Items not underlined are required for many, but not all, projects, depending on project size and/or other thresholds or parameters.*

1.3.2. Early Planning and Coordination

1.3.2.1. Any project that contains one or more of the following listed items is strongly encouraged to incorporate early communication and meetings with PCU. The Engineer of Record (EOR) for the Developer may initiate such coordination by calling or emailing the Planning and/or Service Commitment Divisions of PCU.

- Off-site utility main extension

- Potential over-sizing or proposed improvements to off-site utilities
- Large meter/large water use projects
- Multi-phase development projects.

1.3.2.2. The purpose of this coordination is to identify potential improvements/system capacity before the master planning or Construction Plan phase. While not required, projects that do not take this step may experience longer review times in later steps because this type of planning/coordination will still need to occur.

1.3.2.3. Existing infrastructure maps can be requested through the following website: http://www.pascocountyfl.net/FormCenter/Utilities-Services-6/Map-Request-Form-for-Water-Sewer-and-Rec-127.

1.3.2.4. More detailed information can be found in Section 2 of this document.

1.3.3. Master Utility Plans

1.3.3.1. Master Utility Plans (MUPs) are required for:

- any project for which the rezoning conditions of approval or other development order stipulate that a MUP is required;
- any residential project that has multiple phases
- any residential project with more than one proposed pump station;
- any commercial subdivision*

**Note that no individual commercial project contained within a commercial subdivision shall be approved prior to the commercial subdivision master utility plan submittal. The MUP must be approved prior to the approval of the SCA for the development, or any phase/component thereof.*

1.3.3.2. The Developer's EOR shall prepare and submit a MUP to PCU Planning and Asset Management Division as fully set forth in Section 3.

1.3.4. Utility Service Agreements

1.3.4.1. Utility Service Agreements (USAs) are required for 1) any project for which the rezoning conditions of approval or other development order(s) stipulate that a USA is required; or 2) any project requiring construction of County utility infrastructure.

1.3.4.2. USAs, where required, must be approved by the Board of County Commissioners (BCC) prior to approval of the Construction Plans for a project or phase/component thereof.

1.3.4.3. USA requirements are fully set forth in Section 4.

1.3.5. Site Development Pre-application Meeting

1.3.5.1. With some limited exceptions, a Site Development Pre-Application Meeting is a standard requirement of the Pasco County Planning and Development (P&D) Department. PCU is notified to attend the meeting by P&D. PCU typically attends these meetings to provide general information such as points of connection, as well as other information intended to help expedite the Developer through the approval process. However, information provided at the pre-application meeting is not intended to be interpreted as a comprehensive listing of requirements. Therefore, silence on particular topics shall not be construed as relief from any requirements.

1.3.5.2. Additional information is set forth in Section 5.

1.3.6. Construction Plan Processing

1.3.6.1. Proposed Construction Plans are submitted primarily to demonstrate that construction of public utility infrastructure will comply with PCU standards and applicable FDEP regulations.

1.3.6.2. The Construction Plan review and approval process is further detailed in Section 6.

1.3.7. FDEP Permit Processing

1.3.7.1. The Letter of Commitment (LOC), which is described in detail in Section 6, will indicate whether FDEP permitting is required. Generally, FDEP permits are required for projects that extend County utility infrastructure or contain a pump station (private or public). The EOR shall submit applicable FDEP permit documents available on-line and described in the Construction Plan review letters.

1.3.7.2. This process is fully set forth in Section 7.

1.3.8. Construction Phase

1.3.8.1. The construction phase involves installing the proposed infrastructure. PCU utility inspectors will inspect the construction activities for compliance with the approved drawings and permits and with applicable PCU standards.

1.3.8.2. All requests for inspections etc. must be made by the EOR and are fully set forth in Section 8.

1.3.9. Post Construction/Final Acceptance Phase

1.3.9.1. Post Construction and Final Acceptance includes final documentation from the EOR and Developer such as recorded easements, record drawings, etc. in order to finalize permit clearances (for projects with FDEP Construction Permits), issuance of Certificates of Occupancy (CO), and other documents as applicable.

1.3.9.2. This process is fully set forth in Section 9.

1.3.10. Alternative Standards

1.3.10.1. If any deviation from the requirements of this Technical Manual are proposed, the applicant shall submit a request for alternative standards.

1.3.10.2. This process is fully set forth in Section 10.

Section 2.
Early Planning and Coordination

2.1. Purpose

2.1.1. The primary purpose of early planning and coordination is to determine project needs and requirements as early in the project's planning stages as possible.

2.1.2. Early coordination is strongly recommended when projects contain meters 3" or larger, off-site main extensions 500' or longer, potential over-sizing or proposed off-site utilities system improvements, or other special conditions.

2.2. Existing Infrastructure Review

2.2.1. Atlas Map Request and Use

2.2.1.1. Existing potable water, reclaimed water, and wastewater collection system infrastructure are shown in atlas maps. They can be requested through the following website: http://www.pascocountyfl.net/FormCenter/Utilities-Services-6/Map-Request-Form-for-Water-Sewer-and-Rec-127

2.2.1.2. The atlas maps are for planning and information purposes only. They may not be used in place of current survey information and other best practices, such as obtaining field-determined sub-surface utility information.

2.2.2. System Record Drawings

2.2.2.1. Record drawings may be available for certain portions of Pasco County's existing potable water, reclaimed water, and wastewater collection system infrastructure. To find out if record drawings exist for a particular portion of the County's system and to obtain copies, contact PCU and ask for the Service Commitment Division.

2.2.2.2. As with atlas maps, any record drawing information obtained from PCU for any portion of Pasco County's infrastructure must be considered as reference material only and may not be used as a replacement for current survey information and other best practices, such as obtaining field-determined sub-surface utility information.

2.3. Off-site Extensions

2.3.1. Where a proposed project does not have potable water, reclaimed water, or wastewater collection/transmission system infrastructure that extends along the property's full public roadway frontage and/or the existing infrastructure is not adequate to support the proposed project, off-site improvements will be necessary. Generally, each development must install the piping infrastructure necessary to support its proposed entitlements at build out. However, PCU may require a phasing plan for larger developments to assist in maintaining initially oversized lines. Discussions regarding off-site utility extensions will be part of early coordination. However, failure to discuss this issue during early coordination does not foreclose PCU's right to require, nor excuse a developer's obligation to provide, off-site extensions.

2.3.2. Reclaimed water is an essential portion of the utility service and will be considered required as a condition of wastewater service, unless otherwise instructed by the PCU Director or designee. Discussions regarding the requirement to provide reclaimed water will be part of early coordination. However, failure to discuss this issue during early coordination does not foreclose PCU's right to require, nor excuse a developer's obligation to receive, reclaimed service.

2.3.3. Note that Section 110-35(b)(4) of the Pasco County Code (PCC) of Ordinances states that "in addition to any required off-site mains, each Developer or owner of property who requests water service shall install, as required by the county, a water main along one entire boundary line of the property which actually abuts a public road or street. However, in its sole discretion, the county may require the Developer or property owner to install additional water mains as the county may deem necessary to promote the public interest and the orderly development of a countywide water system. Such additional mains may be required by the county to be installed along all or part of the boundaries of the remainder of the property or through the property which is to receive water service." Similar language for wastewater collection/transmission systems exists in Section 110-118(b)(4). Discussions regarding installation of these additional mains along property boundaries will be part of early coordination. However, failure to discuss this issue during early coordination does not foreclose PCU's right to exercise its discretion as outlined above at any point during development of the project, nor excuse a developer's obligations under the PCC.

2.4. Oversizing Agreements

2.4.1. In cases where, at the PCU's sole discretion, the public utility system would be better served by sizing off-site extensions larger than needed for the proposed project's needs, an oversizing agreement will be entered into as provided for in the PCC Sections 110-36(a)(6) and 110-121(a)(5).

2.4.2. The oversizing agreement is typically accomplished through a special provisions section of the Utility Service Agreement. Refer to Section 4.

2.5. Large Meter/Large User Projects

2.5.1. For projects with potable water demand, wastewater generation, or reclaimed demand of an amount representing 100 or more equivalent residential units (ERUs), early coordination shall be undertaken even if the local infrastructure can convey the projected flows.

2.5.2. The primary purpose of this coordination is to ensure that adequate supply supply/treatment capacity exists. This will allow any discovered deficiencies to be assessed as soon as possible so that appropriate capital improvements can be planned.

Section 3.
Master Utility Plans

3.1. General

3.1.1. Master Plans for water, wastewater, and reclaimed water (collectively, "Master Utility Plans" or MUPs) are required for all commercial subdivisions, all residential projects to be constructed in multiple phases, or for single-phase residential projects with more than one pump station. Also, an MUP is required if such a requirement exists in the conditions of approval of a Master Planned Unit Development (MPUD) or other development order issued by Pasco County, whether or not the above thresholds are met. In addition, developments that do not exceed the above thresholds, including single commercial uses, may be required to prepare a MUP or an update to an existing approved MUP if, in the sole discretion of the PCU Director or designee, the use will have a significant impact on system operation or provision of service to adjacent parcels.

3.1.2. The purpose of the MUP is to provide sufficient planning-level detail to demonstrate adequate hydraulic capacities and appropriate utility layout conditions, particularly where wastewater pump stations and potential future connection points for adjacent parcels are concerned, where applicable.

3.1.3. The MUP must be approved prior to the approval of Construction Plans. MUPs may be reviewed and approved during the processing of the Utility SCA. However, in general, the MUP should be submitted prior to submittal of the SCA for a project or a phase/component thereof.

3.1.4. MUPs must be prepared in accordance with the Guidelines for Preparation and Submittal of Master Utility Plans, incorporated herein as Appendix A.

3.1.5. It is the responsibility of the Developer's EOR to submit all applicable sections of MUPs, and failure to do so does not preclude PCU from requiring submittal of any section later. For example, failure to submit a Reclaimed Water Master Plan as part of the MUP submission does not imply that reclaimed water will not be required for the project.

3.1.6. The terms Master Plan, Master Utility Plan, and MUP as used herein, does not include the term "Reclaimed water master plan" as used in PCC Section 110-66 – Definitions, which refers specifically to a County-adopted plan dealing with reclaimed water storage and pumping facilities and designated areas of the County within which construction of reclaimed water distribution systems are required for new developments.

3.2. Timing of Submittal

3.2.1. If a project meets the thresholds indicated in Section 3.1.1 that trigger the requirement for preparation of a MUP, the Developer will benefit from submitting the MUP as early as possible in the development planning process.

3.2.2. It is recommended that the Developer submit the MUP as soon as possible after the project is rezoned to the zoning district appropriate for the proposed development or, if the project is already appropriately zoned, as soon as possible after the project's layout and geographic distribution of residential units and other entitlements has been established by the Developer. If the Developer is not ready to advance the project at that time, it is recommended that the MUP be submitted not later than ninety (90) days prior to submittal of the SCA for the project or the first phase or component thereof to avoid delays.

Commission of the project's application to rezone to a zoning district appropriate for the proposed development. However, PCU will not approve the MUP until after the rezoning is approved by the BCC.

3.2.4. If the Developer does not submit a MUP prior to submitting the SCA for the development or the first phase or component thereof, PCU may determine during review of the SCA that a MUP is required. In such cases, the MUP review process may occur simultaneously with the review of the SCA. This likely will result in project review delays, as the MUP must be approved prior to the approval of the first SCA.

3.3. Requirement for Updates

3.3.1. While the MUP is considered to be a planning-level document, it also is a living document that must be updated from time-to-time to reflect changes in conditions that occur, whether those changes are imposed by the Developer, Pasco County, or by changes in system flows/demands that result from increases in population, or other external causes.

3.3.2. Developer Changes

3.3.2.1. If the Developer proposes changes to a development that has an approved MUP, the MUP must be revised and submitted to PCU for review and approval if the changes have a material impact on the MUP, including but not limited to:

- Significant change in layout that impacts points of connection or distribution of flows/demands along the project's planned transmission mains;
- Significant change in the number or type of units or uses that materially affects the amount of water demand, reclaimed water demand, or wastewater flow generation for the project;
- Any change that impacts the number of wastewater pump stations proposed within the project;
- Any change in points of connection for water, wastewater, or reclaimed water mains; or
- Any change in diameter or length of off-site utility main improvements.

3.3.2.2. If Construction Plans for a component or phase of a project are submitted that, in the sole opinion of the PCU Director or designee, demonstrate that significant deviations from the approved current master plan are proposed, the Developer may be required to submit an updated Master Plan to be reviewed and approved prior to or simultaneously with the Construction Plans for the subject project component or phase.

3.3.2.3. All revised MUPs must be submitted with a letter specifying the proposed revisions to the MUP, in addition to the signed and sealed plan drawings submitted in accordance with the aforementioned Guidelines for Preparation and Submittal of Master Utility Plans. Note that changes made on the MUP that are not described in the cover letter or otherwise brought to PCU's attention, either through clouding or other graphical methods, may not be deemed as reviewed and/or approved.

3.3.3. Pasco County Changes

3.3.3.1. From time to time Pasco County may update its standards, specifications, guidelines, and other documents including, but not limited to, the aforementioned Guidelines for Preparation and Submittal of Master Utility Plans, incorporated herein as Appendix A. To the extent such changes by Pasco County materially impact an existing MUP by affecting main sizes, or the number, location, and/or depth of wastewater pump stations, PCU, at the sole discretion of the Director or designee, may require that an approved MUP be revised and resubmitted to account for the County-imposed changes.

3.3.3.2. Any phase or component of the development that possesses Construction Plan approval and has commenced construction is exempt from the update requirement described in the previous section, as is any phase or component of the development that possesses a Construction Plan approval and a LOC less than six months old, consistent with PCC Section 110-31(d)(2).

3.3.4. System Changes

3.3.4.1. To account for changes in the County's existing system flows or demands that might impact pressures at a project's points of connection, a MUP for a project with undeveloped or incomplete phases or components must be updated if the pressure and/or flow determinations at its points of connection are greater than eighteen (18) months old. The MUP update must be submitted, reviewed and approved prior to the approval of any SCA submitted after any of the system connection pressures have reached their 18-month expiration.

3.3.4.2. Prior to submitting a MUP update reflecting current system pressures at the project's points of connection, the Developer shall contact PCU to obtain updated system connection pressures for force mains and reclaimed water mains, and updated fire hydrant flow tests for water mains, and shall pay associated testing fees.

3.4. Effect of Approval

3.4.1. PCU's approval of a MUP allows the Developer to proceed with submittal and review of Construction Plans for a development, or components/phases thereof, along with associated SCAs. As indicated above, SCA approvals are contingent upon having an approved, current MUP.

3.4.2. MUP approval does not imply acceptance of specific easements, construction methods, wet well and/or manhole depths, or other items that may conflict with technical standards which are reviewed in the Construction Plans phase. Any proposed deviations from the standards of this Technical Manual must be approved in writing through a formal request for alternative standards as set forth more fully in Section 10.

3.4.3. No statements or figures within MUPs may be interpreted as an agreement with PCU for oversizing or other financial obligation on the part of PCU. Any such over-sizing agreement will be described solely in the special provisions section of the Utility Service Agreement. A MUP does not constitute a legal agreement with PCU. It is a conceptual planning document.

Section 4.
Utility Service Agreements

4.1. General

4.1.1. Water Supply and Wastewater Treatment Service Agreements, and Water Supply, Reclaimed Water Supply, and Wastewater Treatment Service Agreements, hereinafter referred to collectively as Utility Service Agreements, or USAs, are required for 1) any project for which the rezoning conditions of approval or other development order stipulate that a USA is required; or 2) any project requiring construction/extension of County utility infrastructure exceeding 50 linear feet of piping greater than 2-inch diameter; or 3) as otherwise required by PCC Chapter 110.

4.1.2. USAs must be approved by the BCC prior to PCU approval of the Construction Plans for a project or phase/component thereof.

4.2. Timing of Submittal

4.2.1. Pursuant to the PCC Sections 110-32 and 110-116, USAs shall be prepared after final zoning approval of the property is obtained. To avoid delays, it is recommended that USAs be prepared and submitted as soon as possible after a project is rezoned to the zoning district appropriate for the proposed development.

4.2.2. It is recommended that the draft USA be submitted not later than sixty (60) days prior to submittal of the SCA for the project or the first phase or component thereof to allow time for processing and approval by the BCC.

4.3. USA Processing

4.3.1. Current forms of the USA (one with Reclaimed Water Supply included, and one without it) can be obtained by visiting the PCU website at www.pascocountyutilities.net; or by contacting the PCU Service Commitment Division.

4.3.2. The Developer shall provide all relevant project information to PCU Service Commitment Division staff, who will prepare a draft USA.

4.3.3. Once the USA has been reviewed by the County Attorney's Office and has been determined acceptable, the developer shall provide all legal descriptions, figures, and other requested attachments to PCU staff, along with three (3) executed originals of the USA. It will be scheduled for the earliest available BCC meeting for approval.

4.3.4. Once the USA has been approved by the BCC, it will be stored in Board Records, which are maintained by the Pasco County Clerk & Comptroller.

Section 5.
Site Development Pre-Application Meeting

5.1. General

5.1.1. Pre-application meetings are a requirement of Pasco County Planning and Development Department under Section 303.5 of the Pasco County Land Development Code (LDC), although a provision of the code allows for pre-application meetings to be waived at the discretion of the County Administrator or designee. PCU typically attends these meetings.

5.1.2. Although PCU representatives will always strive to provide thorough guidance, it is important to note that silence on any issue does not imply that it is not applicable or required.

5.2. Benefits and limitations of meetings:

5.2.1. For proposed projects that do not require Master Utility Plans and/or early coordination:

5.2.1.1. This meeting typically would be the first contact with PCU to help establish points of connection.

5.2.1.2. PCU will direct the applicant to this technical manual to assist in preparation of plans and documents that comply with current standards.

5.2.1.3. Answer any questions specific to the proposed project.

5.2.1.4. While it is a key goal that this initial interaction help provide an expedited path to approval, it does not necessarily cover all requirements.

5.2.1.5. Meeting notes from Pre-application meeting tend to be brief and can easily be taken out of context. Notes from pre-application meetings are not to be construed as approval of an approach or for exemptions from standards. Exceptions from standards must be obtained from PCU by submitting a written request for approval of an Alternative Standard.

5.2.2. For projects that do require Early Coordination and/or Master Utility Plans:

5.2.2.1. PCU will supply the means to obtain this technical manual if that has not already been addressed at the early coordination stage.

5.2.2.2. PCU will answer any project-specific question the applicant may wish to ask that was not already covered, and/or will recap any guidance already given.

Section 6.
Construction Plan Processing

6.1. General

6.1.1. Construction Plans are required for all projects that receive utility service from PCU to ensure that the project complies with PCU standards, including the specifications contained in this Technical Manual, and all applicable PCC and FDEP regulations.

6.1.2. As indicated in Section 3, a MUP amendment will be required if Construction Plans for a component or phase of a project are submitted that, in the sole opinion of the PCU Director or designee, demonstrate that significant deviations from the approved current master plan are proposed. MUP amendments shall be processed as detailed in Section 3.

6.1.3. Design criteria for Construction Plans are defined in this Technical Manual, Appendix B, “Water, Wastewater, and Reclaimed Water Design Criteria.”

6.1.4. Calculations that support Construction Plans shall be consistent with the calculations that support the approved MUP. However, if appropriate on phased projects, they shall demonstrate how the system operates in accordance with PCU standards during interim conditions represented by project phases constructed to-date along with the phase that is the subject of the current Construction Plan submittal. Criteria for calculations are set forth in Appendix C, “Water, Wastewater, and Reclaimed Water Design Report/Calculations Submittal Requirements.”

6.1.5. Construction Plan preparation criteria and submission checklists are addressed in Appendix D, “Water, Wastewater, and Reclaimed Water Construction Plan Checklist.”

6.1.6. Materials and workmanship specifications are provided in Appendix E, “Specifications for Design and Construction of Water, Wastewater, and Reclaimed Water Facilities.”

6.1.7. Construction details for are provided in Appendix F, “Utilities Construction Details.”

6.2. Letter of Transmittal

6.2.1. All submittals must include a transmittal letter detailing the full contents of the submittal. The proposed project will be assigned a PCU number by PCU. This PCU number must be included on all subsequent submittals and transmittal letters, as well as email communications pertaining to the project. The PCU number must be included in the email subject line.

6.2.2. All submittals must be addressed to:

PCU Administration Building
19420 Central Blvd.
Land O’ Lakes, FL 34637
Attention: Service Commitment Division

6.3. Service Connection Application

6.3.1. A Service Connection Application (SCA) must accompany Construction Plans submittals. SCAs are required for all proposed infrastructure projects including “infrastructure only” projects. “Infrastructure only” projects are those such as road extensions that propose new utility pipelines without proposing specific customers or meters.

6.3.2. Review Process. The SCA is the mechanism for receipt and processing by PCU of Construction Plans, and is the document that prompts preparation of the LOC once PCU determines the Construction Plans comply with applicable criteria. Accordingly, the review process is described below under Construction Plan Review.

6.4. Construction Plan Review & LOC Issuance

6.4.1. Development Projects. Construction Plans for development projects (those associated with Preliminary Site Plans [PSPs] or Preliminary Development Plans [PDPs], whether previously approved or submitted simultaneously with Construction Plans) must be submitted electronically through Pasco County's Accela portal to the Current Planning Division of P&D in a manner consistent with the Pasco County LDC. Please note that this document does not address how submittals are made through Accela, as the plan submittal process is administered through P&D. Please note that a Citizen Access User Guide for Accela is available on Pasco County's website on the Current Planning page. Contact P&D for more information. Pertinent links and contact information can be discovered by visiting the P&D web page using the following link: https://www.pascocountyfl.net/260/Planning-Development

6.4.1.1. Once submitted through Accela, the Construction Plans are distributed to multiple County departments, including PCU.

6.4.1.2. After receipt of Construction Plans through Accela, PCU logs the plans, assigns a tracking number (referred to as a PCU number), and assigns plan review to a staff member in the Service Commitment Division.

6.4.1.3. PCU staff reviews the Construction Plans for conformance with applicable standards of the FDEP and PCU. If there are deficiencies in the plans, calculations, or other submitted materials, a letter requesting additional information will ask the applicant to make revisions and resubmit to PCU. Resubmitted plans must use bubbles or clouds to indicate the items that have been revised.

6.4.1.4. Once the EOR resubmits revised plans, calculations, and/or any other documentation requested as part of PCU's request for additional information, the plans and other materials are reviewed again for compliance with the standards of FDEP and PCU. If additional deficiencies are discovered, a second letter requesting additional information and/or revisions is issued. The review timelines and number of resubmissions allowed will be consistent with Chapter 125.022, Florida Statutes. Once PCU staff has determined that the plans are sufficient, approval will be issued. The form and effect of approval is fully set forth below, in Section 6.4.6, along with a description of the procedure for its issuance.

6.4.2. Stand-alone Utility Extension Projects. Utility extension projects at times are not associated with a specific development project (a project associated with a PSP or PDP). One example of a stand-alone utility extension project would be a water, wastewater, and/or reclaimed water main extension to bring service to a development project, but that is not included in the same plan set as the development project or in the PSP or PDP application for the development project. These projects may be submitted directly to PCU with a SCA.

6.4.2.1. PCU staff reviews the Construction Plans for conformance with applicable standards of the FDEP and PCU. If there are deficiencies in the plans, calculations, or other submitted materials, a letter requesting additional information will ask the applicant to make revisions and resubmit to PCU.

Resubmitted plans must use bubbles or clouds to indicate the items that have been revised.

6.4.2.2. Once the EOR resubmits revised plans, calculations, and/or any other documentation requested as part of PCU's request for additional information, the plans and other materials are reviewed again for compliance with the standards of FDEP and PCU. If additional deficiencies are discovered, a second letter requesting additional information and/or revisions is issued. The review timelines and number of resubmissions allowed shall be consistent with Chapter 125.022, Florida Statutes.

6.4.3. For all project types, applicants must submit response letters that include the exact numbered comments followed by the Engineer's response. Partial submittals or submittals without this response letter will not be reviewed.

6.4.4. All comment responses must be as specific as possible and must reference the plan sheet numbers, etc., of the action taken based on the comment.

6.4.5. Standards for Construction Plan review

6.4.5.1. Design criteria for Construction Plans are defined in Appendix B, "Water, Wastewater, and Reclaimed Water Design Criteria."

6.4.5.2. Calculations that support Construction Plans must be consistent with the calculations that support the approved MUP. However, where appropriate on phased projects, they must demonstrate how the system operates in accordance with PCU standards during interim conditions represented by project phases constructed to-date along with the phase that is the subject of the current Construction Plan submittal. Criteria for calculations are set forth in Appendix C, "Water, Wastewater, and Reclaimed Water Design Report/Calculations Submittal Requirements."

6.4.5.3. Construction Plan preparation criteria and submission checklists are addressed in Appendix D, "Water, Wastewater, and Reclaimed Water Construction Plan Checklist."

6.4.5.4. Materials and workmanship specifications are provided in Appendix E, "Specifications for Design and Construction of Water, Wastewater, and Reclaimed Water Facilities."

6.4.5.5. Applicable portions of FDEP Rules are incorporated herein by reference. For water infrastructure, refer to Rule 62-555, Florida Administrative Code (F.A.C.), "Permitting, Construction, Operation, and Maintenance of Public Water Systems;" for wastewater collection and transmission system infrastructure, refer to Rule 62-604, F.A.C., "Collection Systems and Transmission Facilities."

6.4.5.6. Applicable portions of the *Recommended Standards for Water Works* and the *Recommended Standards for Wastewater Facilities* are incorporated herein by reference. These documents are commonly collectively known and referred to as the "Ten State Standards" and are prepared by the Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers. Both documents may be obtained by visiting the Minnesota Department of Health website at: www.health.state.mn.us/communities/environment/water/tenstates/standards.html

6.4.6. Phased Projects

6.4.6.1. If the utility improvements included in the review of a particular SCA are proposed to be constructed and placed into service in phases, then a phase line(s) must be clearly indicated on the construction plans, along with all required appurtenances (blow-off devices, sanitary plugs, temporary service jumper meters, etc.).

6.4.6.2. Phased utility improvements must be designed to stand alone or to rely upon improvements previously constructed and properly placed into service.

6.4.6.3. If the applicant's project phasing intentions should change after plan approval, including while the project is under construction, revised plans must be submitted, reviewed, and approved in accordance with the procedures set forth in this section prior to any requests for phased clearances. Such changes might include imposition of additional phases, or reconfiguration of phase limits.

6.4.6.4. If approved plans for other agencies and/or departments have different phase lines from those shown in the utility plans, the phase lines shown in the utility plans approved by PCU will take precedence for all utility approvals and clearances.

6.4.7. Effect of Approval

6.4.7.1. PCU's approval of the SCA and associated Construction Plans will be confirmed through the issuance of a LOC. The LOC will set forth several project parameters and requirements, including but not limited to the following:

- A determination regarding the Service Connection Fees required and the amount of those fees
- A requirement for final plan sets for distribution, detailing the number of sets required and the format for any electronically submitted plans
- A determination whether FDEP permits are required, and if so, what forms are to be submitted
- A requirement that proof of payment of commitment fees must be submitted prior to application for FDEP permits and the Site Development Permit
- Other miscellaneous conditions of approval
- Instructions regarding whom to contact for taps and jumper meters; and
- Instructions regarding what to submit prior to requesting the final utilities inspection

6.4.7.2. Plan approval allows construction to be commenced provided applicable conditions of the LOC are satisfied, including the requirement to obtain FDEP permits, when applicable. Pursuant to PCC Sections 110-36(a)(7) and 110-121(a)(7), permits for construction must be obtained by the developer from the appropriate governmental agency.

6.4.7.3. Pursuant to the PCC Section 110-31(d) (2), Construction Plan approval is valid for a period of 12 months. If construction has not commenced within 12 months, the applicant must reapply for service. If construction has not commenced within six months and changes in the County's specifications

occur, the plans must be revised, if required, and resubmitted for approval.

6.4.7.4. Any phase or component of the development that obtained Construction Plan approval and has commenced construction is exempt from the update requirement described in the previous section, as is any phase or component of the development that has Construction Plan approval and a LOC less than six months old.

6.5. Easements

6.5.1. When easements are required for PCU facilities outside of public rights-of-way, such as meter easements, the following procedure must be followed:

6.5.1.1. Provide a draft electronic copy (.pdf) of a legal description and accompanying sketch of the subject easement, prepared by a licensed surveyor, to the Pasco County Real Property and Planning Division, email: realestatehelp@pascocountyfl.net, for review and approval.

6.5.1.2. Request the easement conveyance forms from Real Property and Planning at the email address listed above. Real Property and Planning will provide instructions on how to process the conveyance documents. The proposed easement document must be submitted to the PCU for review by the County Attorney's Office and PCU. The approved easement documents shall be executed and submitted in the number required by Real Property and Planning for review and approval. If approved, the County will record the easement before utilities are placed into service.

6.5.1.3. Provide a copy of the recorded easement document to PCU as part of project clearance / acceptance documents.

6.6. Merchant's Agreements

6.6.1. Commercial projects that include private pump station(s) must enter into Merchants agreements to share the private pump station with adjoining parcels. All commercial projects will be assumed to include this requirement unless specifically waived by PCU.

6.6.2. The draft form of agreement can be obtained by visiting the PCU web page at www.pascocountyutilities.net and navigating to the Documents and Forms link or by contacting the PCU Service Commitment Division. This form can be completed with the appropriate project information and information of each party to the agreement.

6.6.3. Provide a draft copy of the agreement for review and approval by PCU. Once approved, a recorded copy must be provided to PCU prior to plan approval.

6.7. Right-Of-Way Use Permits

6.7.1. All work proposed within Pasco County rights-of- way requires a Right-of-way Use Permit, which is issued through Pasco County P&D. Right-of-way Use Permit application forms are available on the web page of the Current Planning Division of P&D. Access can be gained through the main Pasco County website, www.pascocountyfl.net. Right-of-way Use Permit applications are submitted through Pasco County's Accela portal. As with previously described development applications, please note that this document does not address how submittals are made through Accela. A Citizen Access User Guide for Accela is available on Pasco County's website. Contact Pasco County P&D for more information.

6.7.2. Any utility work proposed within the right-of-way of the Florida Department of Transportation (FDOT) requires an FDOT Utility Permit. These can be obtained by coordinating with the Brooksville Maintenance Office of FDOT District VII. FDOT Utility

Customers in need of accessibility assistance can connect by phone through the Federal Information Relay Service at 800-877-8339 for TTY/voice communication or by visiting PascoCountyFL.net/Accessibility for other available support avenues. Customers in need of accessibility assistance specific to the renderings or content within this document may contact Pasco County Utilities Engineering, Aurybel Rivero, at 813-235-6189 Ext. 6796, or via email at arivero@mypasco.net, as well as Eric B. Patrick at 813-235-6189 Ext. 6929, or via email at epatrick@mypasco.net.

Permit applications requiring signature or action by PCU must be submitted to the PCU Permitting Technician.

Section 7.
FDEP Permit Processing

7.1. General

7.1.1. During Construction Plan review, the EOR will be informed if FDEP Permits are required for the subject utility systems. Plan review comments will indicate whether FDEP permits are required, and if plans are approved, the resulting LOC also will contain instructions regarding FDEP permits, if required.

7.1.2. Generally, FDEP permits are required if:

7.1.2.1. The public water, sewer and/or reclaimed systems are being increased in length by more than 50 lf. Note that the extension of the public infrastructure typically involves pipe parallel to the right of way, not a perpendicular tap from the existing infrastructure to a proposed meter or fire line.

7.1.2.2. The project includes a pump station (private or public).

7.1.3. In general, once FDEP permit applications and plans are submitted, the technical review of Construction Plans will already have occurred as part of Construction Plan review as described in Section 6, above. However, during review of the FDEP permit(s), PCU staff will verify that the submitted permit plans are the same as those previously approved during the Construction Plan review that formed the basis for issuance of the LOC.

7.1.3.1. If any modifications have been made that, in the sole opinion of the PCU Director or designee, are material in nature, PCU will conduct further technical review of the plans as part of FDEP permit processing.

7.1.3.2. If there are material modifications that affect the number of proposed residential units, commercial/industrial square footages, or other entitlements that impact flow/demand, the applicant may be required to submit a new SCA and request a new LOC.

7.1.3.3. If the proposed system will connect to utilities facilities not yet constructed and or cleared for use by Pasco County or the Florida Department of Environmental Protection (FDEP) or will connect to a proposed wastewater treatment plant for which a valid operating permit has not been issued, then such project will have a “dry line” status. Projects with a “dry line” status will not receive final clearance for placement into service until the connecting utilities facilities not yet constructed or cleared, receive final clearance and are placed into service. The EOR must submit a statement, which must include the PCU project number for the connecting utilities faciliites, confirming that the connecting utilities facilities have been cleared and placed into service.

7.1.4. Once review of the FDEP forms is complete and conformance of the plans to FDEP rules has been confirmed, a Construction Permit Letter will be issued including the permit number. This letter is issued by PCU in lieu of an FDEP-issued permit.

7.1.5. Please note that Pasco County only issues FDEP permits for utility lines up to 12 inches in diameter. For any utilities exceeding 12 inches in diameter, the Developer must obtain the appropriate permit(s) directly from FDEP. When this occurs, the SCA and Construction Plan review process is identical to projects with smaller diameter utilities. However, instead of submitting the FDEP applications to Pasco County for approval, the applicant shall submit them to Pasco County to sign as the utility provider. Once the applications are signed by Pasco County, the applicant, and the EOR, shall submit the

application to FDEP along with the appropriate review fees. FDEP will conduct a technical review of the plans and calculations and might generate comments that require additional plan revisions. For information regarding the FDEP permitting process, contact FDEP directly. Contact information may be obtained by visiting the FDEP website at www.floridadep.gov.

7.2. Timing of Submittal

7.2.1. FDEP Applications may be submitted only AFTER payment of Commitment Fees listed in the LOC.

7.2.2. All correspondence shall be in electronic format unless specifically directed otherwise by County staff. Requested hardcopies shall be addressed to:

PCU Administration Building
19420 Central Blvd.
Land O' Lakes, FL 34637
Attention: Service Commitment Division

7.3. Effect of Approval

7.3.1. Issuance of FDEP permit(s) by Pasco County authorizes construction of public utility infrastructure, provided other approvals have been issued as may be required.

7.3.2. FDEP permits issued by Pasco County are valid for a term of one (1) year. If construction has not been completed and accepted by Pasco County prior to expiration of the FDEP permits, the applicant shall notify PCU in writing to request an extension for up to one (1) year.

7.3.3. Note that FDEP permits issued by FDEP typically have a longer duration than those issued by Pasco County. However, PCU Construction Plan and SCA approval time frames as described in Section 6.4.6 still apply.

Section 8.
Construction Phase

8.1. General

8.1.1. Although not mandatory, it is recommended that the applicant's EOR schedule a pre-construction meeting with PCU inspection staff to address project parameters, including schedule, as well as close-out procedures.

8.1.2. The Developer, the EOR, and the contractor shall comply with all applicable state, federal, and PCU requirements, as well as other laws, codes, ordinances, and regulations that in any way affect those engaged or employed in the proposed construction, the materials or equipment used in or upon the site, or the conduct of the work.

8.1.3. The Developer, or the EOR, or the contractor shall obtain all permits and licenses, pay all charges and fees, and provide all notices necessary and incidental to the due and lawful prosecution of the work prior to the start of any construction.

8.1.4. The utility contractor shall address any Requests for Information (RFI's) regarding clarification of plans or construction processes to the EOR and not to PCU staff.

8.1.5. Many residential development projects involving the subdivision of land for fee simple sale are platted before construction of improvements is completed. For utility system construction that is not complete at the time of platting:

8.1.5.1. Completion of improvements must be secured through posting of a performance security as detailed in LDC Section 310, "Performance Security." Utility improvements are secured by such security simultaneously with (i.e., as part of the same security instrument, be it a surety bond, letter of credit, escrow agreement, or cash) as other improvements, such as public streets, drainage, landscaping, sidewalks, bikeways, drainage, etc.

8.1.5.2. Performance securities are processed by the Project Management/Engineering Inspections Division of Engineering Services, and appropriate forms can be obtained by contacting Engineering Inspections at (727) 834-3604.

8.2. On-site Documents On-Hand

8.2.1. The contractor is required to work from a set of plans stamped "approved" by PCU. Approved plans must be available on-site so they may be produced upon request.

8.2.2. A copy of the FDEP permit(s) must be available on-site so they may be produced upon request.

8.3. Inspection

8.3.1. All work must be inspected by PCU inspection personnel.

8.3.2. The contractor shall notify the PCU inspection team a minimum of 48 hours prior to starting construction.

8.3.3. For additional information regarding inspections and testing, particularly with regard to testing of compaction within utility trenches, refer to the Pasco County LDC, Section 309, "Construction and Inspection of Improvements," and the *Pasco County Engineering Services Department Testing Specifications for Construction of Roads, Storm Drainage, and Utilities,* which can be obtained by contacting the Pasco County

Engineering Inspections Division at (727) 834-3604 or by visiting the Engineering Inspections page of the Pasco County website at www.pascocountyfl.net.

8.3.4. Nothing contained herein should be construed to be in conflict with aforementioned LDC Sections 309 or 310. In the event of any apparent discrepancies, the language in LDC Sections 309 and 310 will prevail.

8.3.5. For additional information regarding FDEP clearance procedures and final acceptance of utility systems, refer to Section 9, Post Construction / Final Acceptance Phase below.

Section 9.
Post Construction / Final Acceptance Phase

9.1. General

9.1.1. Acceptance of Developer-constructed projects occurs in essentially two major phases: FDEP clearance and placement of facilities into service, and final system acceptance.

9.1.2. FDEP clearance and placement into service generally occurs immediately after the system(s) is (are) constructed, subject to meeting the requirements outlined below. Final acceptance generally occurs after a one-year warranty period has been satisfied and after the system has been successfully re-inspected. During the one-year warranty period, the integrity of the system is secured by a maintenance guarantee instrument.

9.1.3. Acceptance of systems constructed on behalf of Pasco County by contractors under contract with the County (Capital Improvements) is not addressed in this document.

9.2. FDEP Clearance and Placement of Facilities into Service

9.2.1. FDEP Clearance

9.2.1.1. Utility facilities (water distribution systems, reclaimed water distribution systems, and/or wastewater collection/transmission systems) constructed pursuant to FDEP permits issued by Pasco County, (refer to FDEP Permit Processing section above), must receive clearance letters issued by PCU on behalf of the FDEP, prior to being placed into service.

9.2.1.2. If the project includes FDEP wastewater collection/transmission system and/or reclaimed water distribution system permits in addition to an FDEP water distribution permit, Pasco County, with exception of a “Partial Water Clearance for Fire Safety,” shall not issue the water distribution clearance without also issuing the wastewater collection/transmission system and reclaimed water distribution system clearance; accordingly, the Developer’s EOR shall ensure that all systems are constructed in accordance with permit plans and are ready to be cleared, and shall request clearance for all constructed systems (water, sewer and/or reclaimed water) simultaneously;

9.2.1.3. If the Developer desires the ability to begin construction of structures that require use of combustible materials prior to all utility systems being ready for FDEP clearance, PCU offers a “Partial Water Clearance for Fire Safety,” which is generally available if construction of the water system is complete, but other elements, such as a wastewater pump station, are not complete. To obtain a Partial Water Clearance for Fire Safety, the Developer’s EOR shall submit the appropriate FDEP water clearance form, available via the Documents and Forms link on the PCU web page at www.pascocountyutilities.net, with a notation that the requested clearance is a “Partial Fire Safety Clearance,” and include bacteriological testing results for two consecutive days for the portion of the system to be cleared, a hydrostatic pressure test report, and a record drawing indicating the portion of the system for which fire clearance is requested, along with a depiction of sample point locations.

9.2.1.4. If the proposed system will connect to utilities facilities not yet constructed and or cleared for use by Pasco County or the FDEP or will connect to a

proposed wastewater treatment plant for which a valid operating permit has not been issued, then such project will have a "dry line" status. Projects with a "dry line" status will not receive final clearance for placement into service until the connecting utilities facilities not yet constructed or cleared, receive final clearance and are placed into service. The EOR must submit a statement confirming that the connecting utilities facilities have been cleared and placed into service which will include the PCU project number for the connecting utilities facilities.

9.2.1.5. Prior to obtaining full FDEP clearance, the Developer's EOR shall request a final inspection from the PCU inspection team. Prior to scheduling a final inspection, the EOR shall:

- conduct hydrostatic pressure tests as required on all pressure pipe facilities (water mains, wastewater force mains, reclaimed water mains) and document pressure test results in accordance with American Water Works Association (AWWA) criteria; hydrostatic pressure tests must be completed a maximum of six (6) months prior to placement of the system into service;
- obtain from the contractor electronic media containing footage of closed-circuit television testing of all gravity sewer systems to demonstrate that pipe installation workmanship is acceptable;
- obtain from the contractor the results of bacteriological tests conducted on all drinking water mains at the frequency and locations appropriate to meet applicable regulatory criteria; bacteriological tests must be conducted on two consecutive days and must be completed a maximum of 60 days prior to placement of the system into service;
- prepare Record Drawings for the entire utilities system; record drawings must depict, as a minimum, field-determined horizontal and vertical locations of all piping, valves, bends, fittings, hydrants and appurtenances, and must indicate the constructed elevations of all gravity sewer and pumping station rims/lids, structure and piping inverts;
- prepare a Certificate of Cost Estimate in the appropriate format per PCU for all costs associated with utility construction in the public right-of-way or public utility easements;
- prepare a Bill of Sale, including exhibits and signed by the Developer/owner, to transfer the ownership of system assets to PCU;
- record any required easements and obtain copies of the recorded instrument(s); refer to Section 6.5 for more information regarding easements;
- prepare a CD, DVD, or USB flash drive containing Record Drawings in AutoCAD and PDF formats showing the entire utility system; PDF Record Drawings shall have color-coded lines, i.e., water – blue, sewer – green, reclaimed water – magenta; AutoCAD drawings shall conform to the Florida State Plane Coordinate System;
- prepare FDEP Clearance forms for all utility systems; FDEP clearance forms can be obtained by contacting PCU or by downloading them from PCU's web page on Pasco County's website at

www.pascocountyutilities.net; and

- submit the above-referenced items to the PCU Service Commitment Division a minimum of 48 hours prior to the date when the inspection is desired.

9.2.1.6. To schedule a final utility inspection, the EOR shall obtain from the Pasco County Project Management/Engineering Inspections Division of the Engineering Services Department a "Request for Site Inspection" form. The EOR shall fill out the form in its entirety, and check all of the items to be included in the requested inspection, including Utilities. Once the request form has been submitted to Engineering Inspections, the EOR or EOR's representative shall contact the PCU Service Commitment Division to coordinate directly with the project Utility Inspector regarding the date and time of the inspection.

9.2.1.7. When the final inspection is conducted, the PCU inspector will note any observed deficiencies in the utility systems that prevent them from meeting FDEP and/or PCU standards. These deficiencies will be documented in the form of a punch list to be provided to the EOR. Once the contractor has corrected all deficiencies, the EOR shall request a re-inspection. This process must be repeated, as necessary, until all deficiencies are corrected.

9.2.1.8. While inspections and re-inspections are being scheduled and conducted, PCU Service Commitment staff will review all submitted documents, including CAD files, and will provide a list of documentation deficiencies, if any, to the EOR so that documentation can be corrected and resubmitted as part of the project acceptance process.

9.2.1.9. Once PCU staff is satisfied with the EOR's Certificate of Cost Estimate, PCU will send the EOR a copy of the approved cost estimate so that the Developer/owner can obtain a defect security (Maintenance Guarantee) in the form of a maintenance surety bond or letter of credit. The maintenance bond or letter of credit shall:

- warranty the utility systems for a period of one year;
- be submitted in the prescribed form (standard maintenance bond and letter of credit forms can be obtained by contacting PCU or visiting PCU's web page on Pasco County's website at www.pascocountyutilities.net;
- meet applicable criteria of Pasco County LDC Section 311 – "Defect Security," and shall be in an amount equal to fifteen (15) percent of the actual costs of all required utility improvements, for the purpose of correcting any construction, design or material defects or failures;
- be approved by the BCC or designee; once the Maintenance Guarantee instrument has been found by PCU staff and the Pasco County Risk Management Division to meet the appropriate criteria of the LDC, PCU will place the Maintenance Guarantee on the earliest available BCC agenda or otherwise approved pursuant to delegated authority;

9.2.1.10. Please note that, if 15 percent of the amount of the approved Certificate of Cost Estimate is less than $5,000, no Maintenance Guarantee instrument is required.

9.2.1.11. If the project includes one or more wastewater pump stations to be dedicated to Pasco County, a pump station start-up testing session shall be

scheduled by contacting PCU's Service Commitment Division. At the start-up test, the EOR or EOR's representative shall submit a certified as-built survey of the pump station site, prepared by a licensed professional land surveyor showing dimensions for all pump station-related structures, appurtenances, underground piping, and surface elevations of the pump station slab, manhole cover, curb, driveway, etc., as measured from the property line, formatted on legal sized paper. The parcel shall be in a location and grade acceptable to PCU, with proper access, and shall not be less than 50' x 50' in size. In cases in which a triplex pump station is used a 100' x 100' parcel is required. All wastewater pump stations to be owned and maintained by the Pasco County Utilities Services Branch must be constructed on a dedicated site, which must be formally conveyed to the County by warranty deed as a fee-simple parcel or conveyed by plat as a tract; no pump station easements will be accepted. No quit claim deeds will be accepted.

9.2.2. Placement of Facilities into Service

9.2.2.1. Subdivisions

9.2.2.1.1. Where land is subdivided into fee simple lots or parcels that are proposed for individual water and reclaimed meters, the following process applies.

9.2.2.1.2. Once all project deficiencies identified on the punch lists have been satisfactorily addressed, including corrections to physical system infrastructure as well as to documentation, PCU will issue FDEP clearance letters for the water, wastewater, and reclaimed systems, as applicable, or in the case of systems where FDEP permitting is not required, PCU will issue a notification that all punch list items have been satisfied. Once these documents have been issued, meter(s) can be requested by the contractor, and the systems can be used.

9.2.2.1.3. Individual meters can be requested by the owner or the owner's contractor by contacting the PCU Service Commitment Division once the FDEP clearance has been issued, or where FDEP permits are not required, when PCU issues the equivalent notification that punch list items have been satisfied.

9.2.2.2. Multifamily, Commercial, Industrial, or other Master Metered Sites

9.2.2.2.1. Where a permitted site is proposed for master metering, such as the types of sites listed above, the following process applies.

9.2.2.2.2. Once all project deficiencies identified on the punch lists have been satisfactorily addressed, including corrections to physical system infrastructure as well as to documentation, PCU will authorize the installation of the project's water meter, which will be locked by PCU Operations & Maintenance staff;

9.2.2.2.3. Final inspections, including inspection of the backflow prevention device, occurs once the meter is in place and locked;

9.2.2.2.4. Once the final inspection is completed and any remaining deficiencies, including deficiencies in the installation of the backflow prevention device, are satisfactorily corrected, PCU will issue FDEP clearance letters for the water, wastewater,

and reclaimed systems, as applicable, and will remove the lock from the meter; or in the case of systems where FDEP permitting is not required, PCU will simply remove the lock from the meter.

9.2.2.2.5. Once the above-described steps have occurred, the systems can be placed into service.

9.2.3. Phased Clearances / Phased Placement of Facilities into Service

9.2.3.1. If utility improvements included in an approved LOC and/or FDEP permit are to be placed into service in phases, then the approved construction plans must have addressed phasing as set forth in subsection 6.4.6.1. If the construction plans do not address project phasing, or if the applicant's proposed phasing intentions have changed since the issuance of the plan approval instrument (LOC and/or FDEP permit), then the plans must be revised to depict the proposed phasing configuration and must be reviewed and approved as indicated in subsection 6.4.6.3. The phase configuration in the record drawings submitted in support of the request to place facilities into service must depict the same phasing configuration as the approved construction plans.

9.2.3.2. The request to place a phase or phases of a phased construction plan into service must follow the procedures set forth in subsections 9.2.1 and 9.2.2.

9.2.3.3. Clearance requests must not include improvements from multiple projects (i.e., contained in multiple LOCs). Each phased clearance request, if from different projects, requires separate clearance forms, record drawings, bacteriological test results, maintenance guarantees, bills of sale, etc.

9.3. Release of Maintenance Guarantee and Final Acceptance of System Improvements

9.3.1. Final acceptance of a water distribution system, water main extension, reclaimed water distribution system, reclaimed water main extension, and/or wastewater collection/transmission system, including pump stations, and release of the Maintenance Guarantee will be made only after:

- the Maintenance Guarantee instrument has been in effect for a period of one (1) year; for purposes of this policy, the one-year term shall begin on the date that the Maintenance Guarantee is accepted by the BCC or designee;
- all inspections have been conducted;
- the utility improvements have been found to be in conformance with the applicable regulations of PCU, the FDEP, and the standards contained herein;

9.3.2. When the Maintenance Guarantee approaches the completion of its one-year term, PCU will notify the Developer or the Developer's EOR of the impending bond release and PCU will inspect all utility facilities covered by the Maintenance Guarantee

9.3.2.1. The PCU inspector(s) will note any observed deficiencies in the utility systems that prevent them from meeting FDEP and/or PCU standards. These deficiencies will be documented in the form of a punch list to be provided to the EOR or other representative of the Developer. Once the Developer's contractor has corrected all deficiencies, the Developer shall request a re-inspection. This process must be repeated, as necessary, until all deficiencies are corrected.

9.3.2.2. Once all deficiencies are corrected, PCU staff will prepare a request to the BCC or designee to release the Maintenance Guarantee.

9.3.2.3. After County approval of the release of the Maintenance Guarantee, the original guarantee instrument will be returned to the Developer by the Pasco County Clerk and Comptroller.

Section 10.
Alternative Standards

10.1. General

10.1.1. The intent of an alternative standard is to provide for design alternatives to the technical or design requirements of this Technical Manual or provide relief when no feasible engineering or construction solutions can be applied to satisfy the regulation.

10.1.2. The PCU Director or designee is authorized to approve alternative standards with conditions.

10.2. Application Procedure

10.2.1. Requests for alternative standards may be made in conjunction with the filing of a SCA. Alternatively, an application may be filed prior to submittal of an application. In that circumstance, sufficient information must be submitted to permit a reasoned consideration of the request.

10.2.2. The PCU Director or designee will consider the following criteria when reviewing a request for alternative standards. Either 1 or 2 must be met, and all of 3, 4, and 5 must be met:

1. The alternative standard meets or exceeds the intent and purpose of the Technical Manual requirement at issue.
2. No feasible engineering or construction solutions can be applied to satisfy the requirement.
3. The alternative standard does not adversely affect compliance with other Technical Manual or Code provisions, development order(s), or permit(s).
4. The alternative standard is not in conflict with other mandatory substantive requirements of local, state, or federal law.
5. The alternative standard is consistent with the applicable provisions of the Comprehensive Plan.

10.2.3. Denial of Alternative Standards. Any request for an alternative standard which does not meet the criteria above will be denied, and the applicant shall comply with this Technical Manual.

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Appendix A Table of Contents

APPENDIX A
GUIDELINES FOR PREPARATION AND SUBMITTAL OF MASTER UTILITY PLANS

A1. General

A1.1. Master Utility Plans (MUPs) are required for all projects proposing public utilities that meet certain thresholds. For thresholds that trigger MUP requirements, refer to Section 3 of the main text of this Technical Manual. Also refer to Section 3 for MUP submission and review procedures.

A1.2. MUP's must address potable water distribution, wastewater collection and transmission, and reclaimed water distribution. As indicated in Section 2.3.2 of the main text of this Technical Manual, provision of reclaimed water will be assumed to be required as a condition of wastewater service unless otherwise determined by the PCU Director or designee. Also, as indicated in above-mentioned Section 2.3.2 of this Technical Manual, the applicant and PCU should have discussions about whether reclaimed water is required as part of early coordination.

A1.3. MUP's must contain two major components: A Narrative Report (containing a system description and hydraulics calculations), and Master Utility Plan Drawings depicting the proposed utility systems.

A1.4. Narrative Report Requirements. The narrative report or calculation booklet must include:

A1.4.1. A narrative describing the development including the project location, number of residential units, commercial parcels, and a schedule for the construction of the development to build-out.

A1.4.2. Consideration must be given to the nature of adjacent vacant tracts at build-out and reasonable assumptions as to water and reclaimed water demands and wastewater flows must be made such that any main extensions to them are appropriately sized to address anticipated growth. Refer to requirements for adjacent tracts in the discussion of MUP Drawings requirements, below.

A1.4.3. Hydraulic modeling assumptions, input values, and results.

A1.4.4. The MUP Narrative Report must be signed and sealed by a Professional Engineer licensed in the State of Florida.

A1.5. MUP Drawings Requirements.

A1.5.1. Each MUP System Map (water, wastewater, and reclaimed water) must have a vicinity map showing the location of the project. Vicinity maps must include a scale bar and a north arrow.

A1.5.2. MUP Drawings must be a plan sheet, up to 36" x 48" in size, and must be submitted for each system (water, wastewater, and reclaimed water) at such a scale that the MUP Drawings clearly show the layout.

A1.5.3. The MUP Drawings must be signed and sealed by a Professional Engineer licensed in the State of Florida.

A1.5.4. The MUP Drawing for each system must include the following:

A1.5.4.1. Existing and proposed facilities,

A1.5.4.2. Existing and proposed parcels,

A1.5.4.3. Proposed phase boundaries, if applicable;

A1.5.4.4. Design criteria and unit flows,

A1.5.4.5. North arrow and scale,

A1.5.4.6. Signature block,

A1.5.4.7. Hydraulic network with boundary conditions,

A1.5.4.8. Labeled/annotated pipes and nodes, consistent with the pipe and node designations used in the submitted hydraulic modeling.

A1.5.5. Where developments that are the subject of a MUP are located immediately adjacent to undeveloped tracts, the MUP Drawings must include a conceptual plan for extension of potable water, wastewater, and/or reclaimed water service to those tracts.

A1.5.6. Off-site infrastructure must include an extension of the transmission main in the right-of-way to the furthest boundary of the proposed development. For additional information regarding main extension requirements for new developments, refer to Section 2.3.3 of the main text of this Technical Manual and the Pasco County Code of Ordinances, Section 110-35(b)(4).

A1.6. If changes are made to the MUP, a revised MUP must be submitted with changes clouded on plan sheets and a letter that clearly lists the proposed changes. Please refer to Section 3.3 of the main text of this Technical Manual for various conditions that trigger the requirement to change or update the MUP, including Developer-proposed changes, County-imposed changes, or changes in the surrounding utility system(s).

A1.7. Requirements described herein are subject to change and must not be assumed to be all-inclusive. PCU stresses the importance of communication and early coordination, as well as coordination when the Developer proposes significant changes or implementation of new phases.

A2. Potable Water

A2.1. Between the water MUP Drawing and the water section of the Narrative Report, the following items must be addressed:

A2.1.1. Calculations for maximum potable water demand based on full or projected ultimate development build out of residential, commercial, or other uses, or

gross acreage and land use. Fire flow condition analysis must be evaluated as maximum day demand plus fire flow.

A2.1.2. Proposed point(s) of connection to the existing PCU system.

A2.1.3. Pipe diameters and materials.

A2.1.4. Clear delineation of existing versus future units or tracts.

A2.1.5. Proposed building types and square footage for non-residential uses.

A2.1.6. Notations on MUP Drawing and/or Narrative Report indicating if non-residential fire flow reductions as allowed in the Florida Fire Prevention Code, Chapter 18, are being used.

A2.1.7. Hydraulics calculations or modeling.

A2.2. Hydraulics Calculations/Modeling

A current hydrant flow test is required at or near the point(s) of connection to establish the boundary condition. A hydrant test must be ordered by contacting PCU O&M Department. For phased projects with extended build-out schedules, this test may need to be updated to provide current data for later phases. Refer to Section 3.3 of the main text of this Technical Manual for update criteria. The EOR should verify with PCU Planning staff after hydrant test data at the point of connection are available to discuss how to interpret the data. The point of connection must be reviewed and approved by PCU staff.

A2.2.1. Calculations must be submitted for the pipe network to operate under both conditions below. The more conservative result will be used as a basis for the pipe network design:

A2.2.1.1. Peak Hour Demand with system pressures maintained at no less than 35 psi. Use 2.6 as the Peak Hour Factor.

A2.2.1.2. Maximum Day Demand plus Fire Flow with system pressure maintained at no less than 20 psi. Use 1.67 as the Maximum Day Factor.

A2.2.2. Consideration must be given to total potable water flow for each unit, tract, or phase stating: type of use (single family residential, master-metered residential, commercial, etc.), Unit Flow Factors, and Peaking Factors.

A2.2.3. Assumptions, input parameters, a labeled hydraulic network, and a summary of results must be included.

A2.2.4. For projects with multiple phases, hydraulics calculations must consider project phasing and must include interim analyses to address system conditions at various phases of project implementation.

A2.3. Fire flow demand is defined as 1,000 gpm for residential areas. For commercial and other non-residential uses, refer to the *Florida Fire Prevention Code*, Chapter 18 latest edition.

A2.4. Refer to Appendix B of this Technical Manual for additional system design criteria.

A3. Wastewater

A3.1. Between the wastewater MUP Drawing and the wastewater section of the Narrative Report, the following items must be addressed:

A3.1.1. Total wastewater flow (both average daily flow and peak flow) to each proposed pump station. A summary of each unit, tract, or phase, including the contribution to each pump station, stating: Type of use (single family residential, master-metered residential, commercial, etc.), Unit Flow Factors, and Peaking Factors.

A3.1.2. Proposed point(s) of connection to the existing PCU system.

A3.1.3. Pipe diameters and materials (both force mains and gravity lines).

A3.1.4. Pump Station locations.

A3.1.5. Clear delineation of existing versus future units or tracts.

A3.1.6. If the project includes one or more pump stations, hydraulic modeling must be included in the narrative report. Assumptions, input parameters, and a summary of results must be included. Pressure tests results will be valid for a maximum of 12 months.

A3.2. Hydraulics Calculations/Modeling

A3.2.1. A current force main pressure test for system pressure at or near the point(s) of connection is required. The EOR must request the data from the PCU O&M Department. For phased projects with extended build-out schedules, this test may need to be updated to provide current data. Refer to Section 3.3 of the main text of this Technical Manual for update criteria.

A3.2.2. Hydraulic calculations must address existing flow and pressure in receiving force main(s). The EOR should verify with PCU Planning staff after force main pressure test data at the point of connection are available to discuss how to interpret the data and to determine what existing flow and/or pressure information should be used as a basis for design, as informed by the pressure test data and/or current County system modeling. The point of connection must be reviewed and approved by PCU staff.

A3.2.3. The pipe network hydraulic analysis must address flow and pressure for approval. The analysis must evaluate peak proposed flow plus existing flow in the receiving force main to the next downstream hydraulically significant component (e.g., manhole, pump station, etc.) of the existing system.

A3.2.4. Uninterrupted pumping capabilities, including an in-place emergency generator, are required for pump stations receiving flow from one or more pump stations through a force main or pump stations discharging through pipes 12 inches or larger (F.A.C. 62-604.400). For future phases, the force main must be installed to the next phase line to prevent the repumping of the wastewater through the collection system of the first phase.

A3.2.5. For projects with more than two pump stations, hydraulics calculations must consider project phasing and must include interim analyses to address system conditions at various phases of project implementation.

A3.3. Refer to Appendix B of this Technical Manual for system design criteria.

A4. Reclaimed Water

A4.1. Between the reclaimed water MUP Drawing and the reclaimed water section of the Narrative Report, the following items must be addressed:

A4.1.1. Calculations for reclaimed water demand. Demand calculations are included in the design criteria addressed in Appendix B of this Technical Manual.

A4.1.2. Plan of proposed major reclaimed water mains within the entire development, proposed point(s) of connection to the County's reuse system and existing reclaimed water system components within 1/4 mile of the project boundaries, if applicable.

A4.1.3. Pipe diameters and materials.

A4.1.4. Clear delineation of existing versus future units or tracts.

A4.1.5. Hydraulics calculations or modeling.

A4.2. Hydraulics Calculations/Modeling

A4.2.1. Contact PCU O&M Department to obtain a current pressure test on the PCU Reclaimed Water system. Pressure test data must be gathered at or near the point(s) of connection. For phased projects with extended build-out schedules, this test may need to be updated to provide current data for later phases. Refer to Section 3.3 of the main text of this Technical Manual for update criteria.

A4.2.2. The EOR should verify with PCU Planning staff after reclaimed distribution main pressure test data at the point of connection are available to discuss how to interpret the data and to determine what existing flow and/or pressure information should be used as a basis for design, as informed by the pressure test data and/or current County system modeling. The point of connection must be reviewed and approved by PCU staff.

A4.2.3. For approval, the pipe network analysis must address flow and pressure using the computed reclaimed water demands.

A4.2.4. Assumptions, input parameters, a labeled hydraulic network, and a summary of results must be included.

A4.3. Refer to Appendix B of this Technical Manual for additional system design criteria.

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APPENDIX B

Water, Wastewater, and Reclaimed Water Design Criteria

B1. Potable Water:

B1.1. Required Reference: The plans must comply with the design and installation requirements as specified in the *Recommended Standards for Water Works* (a/k/a "Ten States Standards"), latest edition; the applicable requirements of the Pasco County Land Development Code and Code of Ordinances; Rule 62-555, Florida Administrative Code (F.A.C.); and the criteria contained herein. In the event of apparent discrepancies, the PCU Director or designee will provide clarification on a per request basis.

B1.2. Line Sizing Criteria:

B1.2.1. The pipe sizing design criteria for water distribution systems must as a minimum provide for at least 100% of the combined maximum day demand rate, based on Table B-1, plus fire flow. The allowable minimum service pressure under the design condition must not be less than 20 psi. Design computations must be by the "Hardy Cross" procedure for networked systems, or modeled using software such as EPANET, KYPIPE, WaterCAD, or other generally accepted water network hydraulics software packages as may be approved by the PCU Director or designee. Refer to Appendix A, "Guidelines for Preparation and Submittal of Master Utility Plans," for additional information and requirements for modeling in the context of Master Utility Plan preparation.

B1.2.2. If the County determines that a line needs to be "oversized," the procedures for sizing and reimbursement, as outlined in the Utility Service Agreement, must be followed. Refer to Sections 2 and 4 of the main text of this Technical Manual for additional information regarding oversizing and Utility Service Agreements.

B1.2.3. Minimum Line Size: The minimum pipe size for distribution mains is two inches, with the exception that the minimum size for distribution mains serving fire hydrants and fire hydrant branches is six (6) inches in diameter for residential developments and eight (8) inches in diameter for lines serving fire hydrants at multifamily, commercial, industrial, or other non-residential uses.

B1.2.4. Water transmission and distribution mains must be sized such that the maximum velocity at project build-out under peak hour flow does not exceed 6.5 feet per second (fps).

B1.2.5. The minimum size for residential service lines is one inch.

B1.3. Distribution Main Routing:

B1.3.1. The primary feed for the water distribution system for a residential or commercial subdivision must be routed within County road right-of-way (ROW), or in the case of subdivisions with non-County streets, within a non-County ROW or an easement wherein Pasco County has been granted easement rights to operate and maintain its utility facilities and appurtenances. Subject to the review and approval of the PCU Director or designee, a secondary feed may be routed within a water, wastewater, or reclaimed water utility easement that is dedicated to the County, only if there is no road ROW available.

B1.3.2. Multiple points of connection may be required in order to minimize service outage in emergencies, repairs, etc., and to improve fire protection and water quality.

B1.3.3. Design plans must show a Temporary Construction Water Service (Jumper Meter) at each point of connection. The plans must include a detail for the jumper meter. Refer to Detail W1 in Appendix F. If the plans indicate phased construction, then a Temporary Construction Water Service must be shown at the points of connection for each phase.

B1.3.4. Refer to Section E.1.24 of Appendix E of this Technical Manual for easement width requirements.

B1.3.5. Water mains to be accepted by Pasco County for maintenance must be installed a minimum of two and one-half (2.5) feet plus the depth to the top of the pipe away from building foundations, but in no case less than seven and one-half (7.5) feet from building foundations. Distances measured horizontally.

B1.3.6. At any termination point or “dead end,” including along mains that are looped around cul-de-sacs, a two-inch blow-off assembly must be provided. Also note that temporary blow-off assemblies must be provided at the termination of each phase of phased projects. It must remain in place until the succeeding phase of construction is constructed and placed into service.

B1.3.7. Off-site infrastructure must include an extension of the transmission main in the ROW to the furthest boundary of the proposed development. For additional information regarding main extension requirements for new developments, refer to Section 2.3.3 of the main text of this Technical Manual and the Pasco County Code of Ordinances, Section 110-35(b)(4).

B1.3.8. For commercial, industrial, or other non-residential uses, or for multiple family projects where either one or more on-site fire hydrants are required and/or where building fire sprinklers are required, there must be separate, private, on-site distribution lines for potable water and fire protection service. The private potable water service must be the distribution line(s) located downstream from the meter and extending to the building(s) and

must be appropriately sized by the Engineer to deliver the computed domestic water needs of the on-site uses based upon the plumbing fixtures proposed. The fire protection service line must be unmetered and appropriately sized by the Engineer to provide adequate fire flow as computed based upon the requirements of the *Florida Fire Protection Code,* Chapter 18. The potable distribution and fire protection water mains must be located downstream of backflow prevention devices meeting the requirements of the Cross-Connection Control Policy included in Appendix E of this Technical Manual.

B1.4. Horizontal and Vertical Spacing from Other Utilities / Sanitary Hazards:

B1.4.1. Water mains must be separated at least ten (10) feet horizontally from gravity sewers and sanitary sewer force mains, as measured from outside of pipe to outside of pipe (i.e., surface-to-surface).

B1.4.2. Water mains must be separated at least three (3) feet horizontally from stormwater and reclaimed water lines, as measured from surface-to-surface.

B1.4.3. Water mains must be separated at least six (6) inches vertically from gravity sewer and stormwater lines and should be above the sanitary and/or storm lines. Where there is no feasible alternative to placing water mains below sanitary and/or stormwater piping, the minimum separation must be 12 inches. Distance is measured from surface-to-surface.

B1.4.4. Water mains must be vertically separated at least 18 inches from wastewater force mains and reclaimed water mains and must be located above force mains. Distance is measured from surface-to-surface.

B1.4.5. Water mains that cross other pipes must be centered on the other pipe so that the water pipe joints are as far as possible from the other utility pipe.

B1.4.6. Potable water meters must be separated a minimum of ten feet (center-to-center) from reclaimed water connections.

B1.4.7. Potable water meters must be separated a minimum of ten feet (center-to-center) from any wastewater services.

B1.5. Depth of Cover:

B1.5.1. Cover as measured from finished grade to top of the pipeline must be a minimum of 36 inches for pipe diameters up to and including 12 inches.

B1.5.2. Depth of cover for pipes 16 inches or greater in diameter must be a minimum of 48 inches.

B1.5.3. For pipe in FDOT ROW, or on County arterial road ROW, the minimum depth of cover must be 48 inches.

B1.6. Valve Locations:

B1.6.1. Valves must be provided for all branch connections, loop ends, fire hydrant stubs, or other locations, as required to provide an operable, easily maintained and repaired water distribution system.

B1.6.2. In-line valves are to be placed so that the maximum allowable length of water main required to be shut down for repair work will be 500 feet in

commercial, industrial, or high-density residential districts, or 1,000 feet in other areas.

B1.6.3. Water mains ending as stub-outs, intended for future expansion, must terminate with a line size gate valve and a blow-off assembly, so designed such that water service is not interrupted during tie-in. Valve locations must be marked as specified in the Specifications located in Appendix E. A two by four wooden stake, painted blue, must temporarily mark valve boxes during construction.

B1.7. Air Release Valve Locations:

B1.7.1. Potable Water Mains: In general, air release valves must be installed at all high points in water mains 12 inches in diameter or greater. On water mains of any size, air release valves must be placed at the high points of locations where abrupt profile changes occur, such as on both ends of horizontal directional drill locations or subaqueous crossings. In addition, the PCU Director or designee may determine during plan review other locations where air release valves are appropriate. Refer to the Specifications located in Appendix E of this Technical Manual for potable water air release valve specifications.

B1.7.2. Wastewater Force Mains: Combination air release/air vacuum valves must be placed at the high points in the force main profile where the elevation change is two feet or greater. Air release valves must be located above ground. In addition, the PCU Director or designee may determine during plan review other locations where air release valves are appropriate. Locating air release valves in close proximity to residences must be avoided when possible. Refer to the Specifications located in Appendix E of this Technical Manual for wastewater air release/air vacuum valve specifications.

B1.7.3. Reclaimed Water Mains: Air release valves must be placed at high points in reclaimed water transmission mains where service connections are limited. In addition, the PCU Director or designee may determine during plan review other locations where air release valves are appropriate. Refer to the Specifications located in Appendix E of this Technical Manual for potable water air release valve specifications.

B1.8. Flow criteria:

Table B-1. Average Day Water Demand

Residential	Single Family	215 gpd/ERU
	Multi- Family	175 gpd/ERU
Commercial	Office/Industrial	0.15 gpd/sf
	Schools	10 gpd/student

*All other demands are described in Rule 64E-6, F.A.C.

Maximum day demand for potable water is obtained by multiplying the average day demand by 1.67.

B1.8.1. Fire Flow: Fire flows must be calculated in accordance with the fire flow requirements specified by the latest edition of the *Florida Fire Protection Code,* Chapter 18, "Fire Department Access and Water Supply."

B1.8.2. Fire Flow Availability Calculations: to determine if adequate flow at 20 psi is available at the point of connection to meet project fire flow requirements, prepare the following computation using data from the fire hydrant flow test:

$$Q_R = Q_F * (\frac{H_R}{H_F})^{0.54}$$

where,

Q_R = Flow predicted at the desired residual pressure of 20 psi, gpm (this flow must be greater than the required fire flow plus maximum day demand)

Q_F = Total flow measured during the hydrant test, gpm

H_R = Pressure drop to the desired residual pressure, (i.e., static pressure minus 20 psi), psi

H_F = Pressure drop measured during the test (i.e., static pressure minus residual pressure), psi

B1.8.3. Further fire flow requirements are defined by the Fire Marshal and any variances must be addressed with the Fire Marshal.

B1.9. Temporary Water Service for Construction:

B1.9.1. If requested by PCU, the Developer must submit a temporary water plan (Plan). The Plan must describe how peak water demand will be provided and metered for construction needs and, if applicable, fire demand.

B1.9.2. Water service for construction must be supplied using a temporary construction assembly as described in the PCU Standard Details, Appendix F of this Technical Manual, by Detail W1, "Temporary Construction Water Service (Jumper Meter)".

B1.10. Backflow Prevention: For detailed information on placement and construction of backflow prevention devices, refer to the Cross-Connection Control Policy included in the Specifications, located in Appendix E of this Technical Manual.

B1.11. Materials Specifications: For detailed materials, installation, and workmanship specifications, refer to Appendix E of this Technical Manual.

B1.12. Standard Details: For standard detail drawings of various water system components and appurtenances, refer to Appendix F of this Technical Manual.

B1.13. Service Locations: For new installations, water services must not be located in the rear of residential lots. Refer to Appendix F of this Technical Manual for water service details.

B2. Wastewater:

B2.1. Required References: The plans must comply with the design and installation requirements as specified in the *Recommended Standards for Wastewater Facilities*

(a/k/a "Ten States Standards"), the applicable requirements of the Pasco County Land Development Code and Code of Ordinances, Rule 62-604, F.A.C., and the criteria contained herein. In the event of apparent discrepancies, the PCU Director or designee will provide clarification on a per request basis.

B2.2. Flow Criteria: Average Day Flows (ADFs) for wastewater (gravity sewers, force mains and wastewater pumping stations) will be interpreted to mean the maximum month average daily flow (MMADF), which will be interpreted as 75 gallons per capita-day, which normally is presumed to include some groundwater infiltration. However, if conditions in a particular location are known to be unfavorable, additional allowances must be included. For a typical single-family residence having an average occupancy of 2.67 occupants, the estimated flow is 200 gallons per day (gpd).

B2.2.1. Residential. Table B-2, below, addresses residential ADFs:

Table B-2. Wastewater Flow (ADF)

Design Flow – Residential	**Housing Type**	**Estimated ADF Gallons per Day (gpd)**
Single-Family Unit	Typical Non-Retirement	200
Single-Family Unit	Retirement Subdivision	170
Multifamily Unit	Typical Non-Retirement	170
Multifamily Unit	Retirement Villas/Apts./Condos	120

B2.2.2. Nonresidential. Flow estimates for commercial, industrial, institutional, or other non-residential uses must be established from use of existing records, or by estimated projections using best available data, such as the flow information found in Rule 64E-6, F.A.C.

B2.2.3. Peak Design Flows. Peak design flows for wastewater collection/transmission systems must be obtained by multiplying the ADF flows estimated from Sections 2.2.1 and 2.2.2 above, by the peak factors in Table B-3.

Table B-3. Wastewater Peak Design Flow Factors

Design ADF (MGD)	Peak Factor
0.00 - 0.200	3.00
0.201 – 0.500	2.85
0.501 – 0.750	2.70
0.751 – 1.00	2.60
1.00 – 3.00	2.50
>3.00	2.00

B2.3. Pipe Routing: Gravity Sewers and Wastewater Force Mains

B2.3.1. The wastewater collection system (gravity sewers) and the transmission system (pressure force mains) for a residential or commercial subdivision must be routed within County road ROW, or in the case of subdivisions with non-County streets, within a non-County ROW or an easement wherein Pasco County has been granted easement rights to operate and maintain its utility facilities and appurtenances.

B2.3.2. Depending on the geography and configuration of the project and the capacity of the County's nearby receiving force mains, more than one point of connection to the County's force main(s) may be required.

B2.3.3. Refer to Section E.1.24 of Appendix E of this Technical Manual for easement width requirements.

B2.3.4. Gravity sewer mains and/or force mains to be accepted by Pasco County for maintenance must be installed a minimum of two and one-half (2.5) feet plus the depth to the top of the pipe away from building foundations, but in no case less than seven and one-half (7.5) feet from building foundations. Distances measured horizontally.

B2.3.5. Off-site infrastructure might need to be constructed to accommodate the flows from the project. For additional information regarding off-site infrastructure extension requirements for new developments, refer to Section 2 of the main text of this Technical Manual and the Pasco County Code of Ordinances, Section 110-118(b)(4).

B2.4. Depth of Cover.:

B2.4.1. Cover as measured from finished grade to top of the pipeline must be a minimum of 36 inches for pipe diameters up to and including 12 inches.

B2.4.2. Depth of cover for pipes 16 inches or greater in diameter must be a minimum of 48 inches.

B2.4.3. For pipe in FDOT ROW, or on County arterial road ROW, the minimum depth of cover must be 48 inches.

B2.5. Gravity Collection Systems:

B2.5.1. Sanitary Sewer Piping:

B2.5.1.1. Design flows for gravity sewers must be in accordance with Section 2.2, “Flow Criteria,” contained herein.

B2.5.1.2. Minimum Size of Gravity Mains: Gravity sewer mains must be sized to accommodate peak flow rates at a velocity not less than two feet per second when flowing full or 1/2 full, as computed using the Manning’s Equation with a roughness coefficient (“N”) not less than 0.013. No gravity sewer main may be less than eight inches in diameter. Service laterals must be a minimum of six inches. Gravity mains must not be oversized to accommodate a reduced slope. In general, the following minimum slopes must be provided for sewer sizes to 24 inches:

Table B-4. Minimum Gravity Sewer Slopes

Sewer Size (Inches)	Minimum Slope, % (ft/100ft)
8	0.40
10	0.28
12	0.22
14	0.17
15	0.16
16	0.14
18	0.12
20	0.11
21	0.10
24	0.08

B2.5.1.3. Alignment: All gravity mains must be laid with straight alignment between manholes. Gravity mains with alignments that do not pass appropriate lamping, laser alignment, closed-circuit television testing, or other applicable testing for straight alignment must be replaced at the Owner’s expense.

B2.5.2. Manholes:

B2.5.2.1. Manholes must be installed at the end of each line, at all changes in gravity sewer main grade, size or alignment, and at all line intersections.

B2.5.2.2. The distance between manholes must not be greater than 400 feet for segments of pipe with no service connections. Cleanouts must not be substituted for manholes.

B2.5.2.3. Design: The minimum diameter of manholes must be 48 inches. A minimum access diameter of 24 inches must be provided.

B2.5.2.4. The minimum depth of standard manholes is five feet. Shallower manholes may be allowed, but not at a depth less than that required such that the gravity sewer line(s) entering and/or exiting the manholes have the minimum cover per the criteria contained herein. Manholes shallower than five feet in depth must be constructed in accordance with the Standard Shallow Manhole Detail provided in Appendix F of this Technical Manual.

B2.5.2.5. Manhole depths must not exceed 16 feet from the rim elevation to the lowest invert elevation unless otherwise approved in writing by the PCU Director or designee.

B2.5.2.6. If the entrance pipe elevation exceeds two feet above the effluent gravity sewer, an inside drop manhole connection must be provided in accordance with the appropriate detail provided in Appendix F of this Technical Manual.

B2.5.2.7. Flow direction changes in excess of 90 degrees within manholes is not permitted.

B2.5.2.8. The flow line elevation of all manholes with entering and exiting pipes must drop a minimum of 0.1 feet from the lowest entering pipe to the exiting pipe.

B2.5.2.9. Service connections must not be made into manholes.

B2.5.2.10. Where a manhole receives flow from a wastewater pump station via the direct connection of a force main into the manhole, an inside drop connection must be employed in accordance with the construction detail provided in Appendix F. Further, the manhole receiving the force main as well as four (4) manholes upstream, and four (4) manholes downstream of the receiving manhole, must be lined. Refer to the Specifications in Appendix E and the construction details in Appendix F for specific information regarding the lining material.

B2.5.2.11. The manhole immediately upstream of a wastewater pump station (commonly called the “king” manhole) as well as four (4) manholes upstream (each invert) must be lined. Refer to the Specifications in Appendix E and the construction details in Appendix F for specific information regarding the lining material.

B2.5.2.12. Manholes requiring lining as set forth in this section must be fitted with a composite frame and cover. Refer to Appendix F for specifications.

B2.5.2.13. Mechanical plugs must be installed between the last collector manhole (“king” manhole) and the pump station and, for phased projects, at each manhole used to isolate future phases of construction. At these locations, the plans must bear the notation “the contractor shall install mechanical sanitary sewer plugs at the beginning of construction and they must remain in place until the system has been cleaned, TV tested, inspected, and approved by PCU. When the system has been approved, the contractor shall be responsible for removal of the plugs.”

B2.6. Force Mains:

B2.6.1. Design flows for force mains must be in accordance with Section 2.2, "Flow Criteria," contained herein.

B2.6.2. Minimum Size of Force Mains: The Developer shall install the largest size force main that will achieve a minimum cleansing velocity of two feet per second (fps). The minimum size force main constructed within County road ROW or dedicated easements shall not be less than six inches in diameter, unless approved by the PCU Director or designee.

B2.6.3. System Design: Force mains must be sized to efficiently transmit the total ultimate peak operational flows, applied by the connected sewage pumping station(s), to the point of discharge. Consideration must be given to possible future connecting pumping stations, and this probability must be reviewed with PCU. Capacity computations must be coordinated with the proposed pumping systems(s), along with any future flow requirements, if applicable. When multiple pumping station systems and/or or phased development is proposed, the cleansing velocity requirement may not be possible to achieve during interim conditions, and the system design must receive special attention regarding cleaning and maintenance. These issues must be discussed during early coordination on proposed projects and/or during Master Utility Plan preparation, if applicable. Refer to Sections 2 and 3 of the main text of this Technical Manual as well as Appendix A for additional information regarding early coordination and MUP submission.

B2.6.4. Peak design flows must be accommodated without producing excessive pressure, i.e., not to exceed 100 feet Total Dynamic Head (TDH) anywhere in the system. For cases where the existing condition (pre-development) already exceeds 100 feet of TDH at the time of plan submittal, the allowable increase in pressure must be evaluated on a case by case basis.

B2.6.5. Valve Locations: New force mains connecting to existing force mains must include a shutoff valve at the point of connection. The distance between in-line (isolation) valves must not exceed 1,000 feet, on proposed 16" diameter force mains and smaller, and 2,500 feet on 24" diameter force mains and larger. In addition, in new developments, where new manifolded force mains are proposed on the interior of the development, PCU may require valves at all tee branches to facilitate operational flexibility.

B2.7. Wastewater Pumping Stations:

B2.7.1. Relevant provision included in Sections 2.5, "Gravity Collection Systems" and 2.6, "Force Mains" are applicable to this section unless otherwise indicated herein.

B2.7.2. On projects where PCU is or will be the Owner, pumps, appurtenances, and controls must be supplied by the same supplier.

B2.7.3. PCU, in its sole discretion, may allow new developments to connect to existing nearby pump stations if sufficient capacity exists and is not committed to other developments and/or project phases. However,

developers of such new developments shall not rely upon the ability to connect to existing pump stations. It is recommended that, prior to design, the developer coordinate closely with PCU if information is desired regarding the availability of existing adjacent or nearby infrastructure. Please refer to the main text of this Technical Manual in Section 2, "Early Planning and Coordination" for information on early coordination with PCU staff.

B2.7.4. Flows:

B2.7.4.1. Design flows for gravity sewers must be in accordance with Section 2.2, "Flow Criteria," contained herein.

B2.7.4.2. Wastewater pumping stations must be designed to accommodate the full development flow from all contributing areas at peak flow, except as described in Section 2.6.4 concerning manifolded systems. Also refer to Appendix A regarding wastewater master planning for additional detail regarding modeling. The contributing area must include the immediate gravity system, subsidiary sources, and known or projected future development within the designated station service area.

B2.7.5. Wet Well Design:

B2.7.5.1. The wet well structure must provide a capacity, between operational water levels (i.e., between the ALL PUMPS OFF elevation and the LEAD PUMP ON elevation), sufficient to allow a minimum of six minutes between successive starts of the pumps (i.e., ten [10] starts per hour), under the following conditions: Influent rate of one-half the maximum one pump capacity; and one pump running at the maximum. The formula for computing this volume is as follows:

$$V_{min} = (\theta_{min} * Q_{out})/4$$

where:

V_{min} = Minimum operational wet well volume*

Θ_{min} = Minimum number of minutes between successive starts

Q_{out} = Design pumping rate at build-out of all contributing flows

**Note: if the minimum volume computed by this formula results in an operational depth of less than 24 inches, the operational depth must be set at 24 inches.*

B2.7.5.2. Wet wells must provide sufficient space for installed equipment, required suction pipe submergence and spacing, and must not be less than six feet in minimum horizontal dimension or provide less than 24 inches between shutoff (low water) and lead pump start levels. Low water level must be set to allow pumps to remain completely submerged at shut-off. Low water must be set no

lower than the top of the lifting bale on the pump or the minimum submergence to prevent vortexing, whichever is higher. In general, the normal operational water level must provide a positive suction head for the sewage pumps.

S = D + 0.574Q/D^1.5

S = Minimum submergence to prevent vortexing, in inches

D = Pump suction inlet diameter (available from the pump manufacturer), in inches

Q = Pump design flow rate, in USGPM

B2.7.5.2. Operational maximum or high-water levels must not exceed the invert elevation of the lowest influent pipe, with high water alarm no higher than the invert of that pipe.

B2.7.5.3. A minimum size hopper bottom must be provided, with the wet well floor sloping to the bottom at a slope of not less than one to one (1:1).

B2.7.5.4. Total wet well depths must not exceed 21 feet unless otherwise approved by the PCU Director or designee.

B2.7.6. The following may require the addition of an in-place emergency generator, per Rule 62-604.400(2)(a)1, F.A.C.:

B2.7.6.1. Pump stations that receive flow from one or more pump stations through a force main; or

B2.7.6.2. pump stations discharging through pipes 12 inches or larger.

B2.7.7. For pump stations not addressed in Section 2.7.5 above, emergency pumping capability may be accomplished by connection of the station to at least two independent electric utility substations, by providing a connection for portable or in-place engine-driven generating equipment, or by providing portable pumping equipment.

B2.7.8. Pump Selection:

B2.7.8.1. Pump stations must have a minimum of two pumps per unit. Where the peak design flow exceeds 1,000 GPM, three or more pumps may be required in the facility. In all cases, standby pumping capability must be provided, such that if any one pump is out of service, an alternate pump is available at equal or greater capacity.

B2.7.8.2. The selected sewage pump system must have the minimum capability of pumping the design peak flow at the appropriate computed system Total Dynamic Head (TDH) requirements, except for manifolded systems as described in Section 2.6.4 and addressed in Appendix A. In addition, the EOR must coordinate with PCU regarding the TDH requirements to better ensure that appropriate, representative existing head conditions are utilized as a basis for modeling and design.

B2.7.8.3. Head-capacity curves must be prepared for the proposed pumping system in order to determine the various operational conditions.

Hydraulic computations must be in accordance with good engineering practice, with pipe friction loss calculated by the "Hazen-Williams Formula", using standard friction factors based on the material utilized; however, not greater than "C = 130", unless the justification for higher values is authorized by PCU. The system head capacity analysis must provide the following and be subject to review by the PCU:

- System operation under peak flow conditions, with one pump or multiple parallel pumping, as designed. Should the receiving force main system be interconnected to additional pumping stations, hydraulic design conditions must also include the pumping systems operating at rated capacity. Refer to Section 2.6.4 and Appendix A of this Technical Manual for additional instructions regarding manifolded systems.
- Pumping capability with one pump station running, all units operating in parallel and other combinations, if applicable; the scenario of one pump station operating with system head conditions at minimal levels must be evaluated to ensure that the selected pump is not operating too close to the right-hand side of the pump curve and that the operating point is within the selected motor's power capabilities.
- Note that, at the sole discretion of the PCU Director or designee, an interim pump may be required on multi-phase projects if interim conditions are unfavorable to selection of build-out pumps.

B2.7.8.4. The list of pump manufacturers from which wastewater pumps must be selected is included in the Specifications contained in Appendix E of this Technical Manual.

B2.7.9. A Supervisory Control and Data Acquisition (SCADA) data collection system and telemetering transmission system must be provided. Refer to Appendix E for technical specifications of the system to be furnished and installed.

B2.7.10. Siting Requirements:

B2.7.10.1. Pump Stations must be sited to consider the potential for damage or interruption of operation because of flooding. Pump station structures, electrical, and mechanical equipment must be designed to be protected from physical damage by the 100-year flood.

B2.7.10.2. Pump stations must be designed to remain fully operational and accessible during the 25-year flood unless otherwise approved by the PCU Director or designee. Plans must show compliance with this requirement by demonstrating that the pump station is a minimum of 1.0 foot above adjacent road pavement.

B2.7.10.3. Pump stations must be placed on readily accessible sites that do not require trespassing through or onto private property to gain access. Pump station site locations must be approved by PCU at the time of plan review.

access. Pump station site locations must be approved by PCU at the time of plan review.

B2.7.10.4. Pump station(s) to be dedicated to PCU must be on a parcel and must be in a location and grade acceptable to PCU with proper access (minimum 45 feet from back of curb to pump station slab) and must not be less than 50' X 50' in size, including a chain-link fence enclosure 50' X 50' (minimum). Note that triplex stations must be sited on a larger site. Refer to details provided in Appendix F.

B2.8. Materials Specifications: For detailed materials, installation, and workmanship specifications for all wastewater collection/transmission infrastructure, including gravity sewers, force mains and pump stations, refer to Appendix E of this Technical Manual.

B2.9. Standard Details: For standard detail drawings of various wastewater system components and appurtenances, refer to Appendix F of this Technical Manual.

B2.10. Service Locations: For new installations, wastewater services must not be located in the rear of residential lots. Refer to Appendix F of this Technical Manual for wastewater service details.

B3. Reclaimed Water:

B3.1. Required References: The plans must comply with the design and installation requirements as specified in the applicable requirements of the Pasco County Land Development Code and Code of Ordinances, Rule 62-604, F.A.C., and the criteria contained herein. In the event of apparent discrepancies, the PCU Director or designee will provide clarification on a per request basis.

B3.2. Line Sizing Criteria:

B3.2.1. The minimum size of distribution system mains is four inches. Pipes must be sized to maintain a minimum distribution main pressure of 45 psi during peak conditions, based upon the Flow Criteria addressed herein. The Engineer must request that PCU provide the pressure reading at the proposed point(s) of connection (refer also to Appendix A of this Technical Manual).

B3.2.2. A Hazen Williams Roughness Coefficient (C) of 130 must be used for PVC pipe and for cement lined DIP; 140 must be used for Polyethylene (HDPE) pipe.

B3.2.3. The minimum residential service line size is one-inch in diameter to avoid high velocities and head losses for simultaneous irrigation at 15 - 20 gpm.

B3.2.4. Reclaimed water transmission and distribution mains must be sized such that the maximum velocity at build-out conditions does not exceed 6.5 fps.

B3.3. Distribution Main Routing:

B3.3.1. The primary feed for the reclaimed water distribution system for a residential or commercial subdivision must be routed within County road ROW, or in the case of subdivisions with non-County streets, within a non-County ROW or an easement wherein Pasco County has been granted easement rights to operate and maintain its utility facilities and appurtenances. Subject to the review and approval of the PCU Director or designee, a secondary feed

easement that is dedicated to the County, only if there is no road ROW available.

B3.3.2. Multiple points of connection may be required in order to provide required service on larger projects.

B3.3.3. Refer to Section E.1.24 of Appendix E of this Technical Manual for easement width requirements.

B3.3.4. Reclaimed water mains to be accepted by Pasco County for maintenance must be installed a minimum of two and one-half (2.5) feet plus the depth to the top of the pipe away from building foundations, but in no case less than seven and one-half (7.5) feet from building foundations. Distances measured horizontally.

B3.3.5. Off-site infrastructure must include an extension of the transmission main in the ROW to the furthest boundary of the proposed development and terminate with a restrained valve and blow-off assembly. For additional information regarding main extension requirements for new developments, refer to Section 2 of the main text of this Technical Manual.

B3.4. Depth of Cover:

B3.4.1. Cover as measured from finished grade to top of the pipeline must be a minimum of 36 inches for pipe diameters up to and including 12 inches.

B3.4.2. Depth of cover for pipes 16 inches or greater in diameter must be a minimum of 48 inches.

B3.4.3. For pipe in FDOT ROW, or in County arterial road ROW, the minimum depth of cover must be 48 inches

B3.5. Valve Locations: New reclaimed mains connecting to existing reclaimed mains must include a shutoff valve at the point of connection. The distance between in-line (isolation) valves must not exceed 1,000 feet, on proposed 16” diameter and smaller, and 2,500 feet on 24” diameter and larger.

B3.6. Flow Criteria:

B3.6.1. For subdivisions with more than 100 single family detached homes (or the single family detached equivalent in terms of irrigable area), irrigation demand must be computed as follows:

B3.6.1.1. Assumptions:

- Based upon the Pasco County watering restrictions for reclaimed water customers, customers may irrigate two days per week. Based upon the established schedule, 20 percent to 40 percent of addresses can water on a given day.
- Assume the maximum residential irrigation zone demands reclaimed water at a rate of 20 gpm
- Reclaimed water may be applied during 14 hours of any authorized watering day (between midnight and 8 a.m. and between 6 p.m. and midnight)
- Assume that 25 percent of homes will be watering at any given time during the 14-hour allowable watering window

B3.6.1.2. Computations:

Peak Demand (gpm) = 40% X # of homes X 20 gpm X 25%

B3.6.2. For subdivisions with less than 100 single family detached homes or equivalent, irrigation demand computations must be similar to that above, except the 25 percent overlap of homes simultaneously watering must be increased to 33 percent.

B3.6.3. For multifamily, commercial, industrial, institutional, and other non-residential uses, the irrigation demand must be computed as follows:

B3.6.3.1. Assumptions:

- Based upon the Pasco County watering restrictions for reclaimed water customers, customers may irrigate two days per week.
- Assume that the supplemental irrigation required during the driest month is 1.5 inches per week, and that this amount is applied on the two watering days at a rate of 0.75 inches on any given watering day.
- Reclaimed water may be applied during 14 hours of any authorized watering day (between midnight and 8 a.m. and between 6 p.m. and midnight)
- Assume the user does not spread the irrigation quantity over the entire available 14 hours; assume the 0.75 inches is applied during the shortest available time frame (6 p.m. to midnight).

B3.6.3.2. Computations:

Peak Demand (gpm) = A_{Irr} X 0.75 in/day X 1 day/6 hours X 1 hour/60 minutes X 43,560 SF/Ac X X 1 ft/12 in X 7.48 gal/cu-ft

where: A_{Irr} = Irrigated area (Acres)

Note that the aggregation of unit conversion values results in a composite conversion from Acre-inches per day to gallons per minute of 75.4. The result is the following, simplified formula:

Peak Demand (gpm) = 75.4 X A_{Irr} X 0.75 in/day, or 56.55 gpm/Ac

B3.6.4. Note: before submittal of any submission documents containing reclaimed water demand calculations (whether as part of a MUP or a Construction Plan), contact PCU to ensure that the watering restriction assumptions are valid, as the Board of County Commissioners may change the watering restrictions from time to time.

B3.7. Materials Specifications: For detailed materials, installation, and workmanship specifications for all reclaimed water infrastructure, refer to Appendix E of this Technical Manual.

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B3.8. Standard Details: For standard detail drawings of various reclaimed water system components and appurtenances, refer to Appendix F of this Technical Manual.

Appendix C Table of Contents

APPENDIX C

Water, Wastewater, and Reclaimed Water Design Report/Calculations Submittal Requirements

C1. General

C1.1. All Construction Plan submissions that contain one or more wastewater pump stations must include a design report in booklet form.

C1.2. PCU reserves the right during plan review to request hydraulics and/or other calculations for any water transmission/distribution, wastewater collection/transmission, and/or reclaimed water transmission/distribution system for which Construction Plans and a Service Connection Application have been filed.

C1.3. Calculations, if required and/or requested, must demonstrate that the design criteria set forth in Appendix B of this Technical Manual are met by the submitted Construction Plans.

C1.4. For applications that represent all or a subset of a project for which a Master Utility Plan (MUP) has been approved, the calculations must demonstrate that the design is consistent with the approved MUP. Such calculations might include interim condition subsets of the approved MUP system modeling, as applicable.

C2. Wastewater Pump Station Design Report

C2.1. All Construction Plan submissions that contain one or more wastewater pump stations must include a design report formatted as an 8-1/2" X 11" booklet. The Design Report must demonstrate that the design criteria set forth in Appendix B of this Technical Manual are met by the submitted Construction Plans.

C2.2. The calculation book must include the following:

C2.2.1. A narrative of the development or phase thereof that is the subject of the current Construction Plan and Service Connection Application submittal, including the number of residential units, commercial parcels, and a schedule for the construction of the development to build-out.

C2.2.2. Total wastewater flow (both average daily flow and peak) to each pump station. A summary of each unit, tract, or phase, including the contribution to each pump station, stating: type of use (single family residential, master-metered residential, commercial, etc.), Unit Flow Factors, and Peaking Factors. Refer to Appendix B "Water, Wastewater, and Reclaimed Water Design Criteria" for unit flow generation and peak factors to use in sizing wastewater systems.

C2.2.3. A current force main pressure test for system pressure is required. The EOR shall request the data from the PCU Operations & Maintenance (O&M) Department. A force main pressure test will be deemed current if it was performed within the previous 12 months. A copy of the pressure chart provided by PCU must be included in the Design Report.

C2.2.4. Hydraulic modeling results and assumptions. If the pump station is part of a phased system, interim conditions modeling must be provided to demonstrate the operating conditions of the pumps during interim conditions, as well as at ultimate build-out of all phases.

C2.2.5. Pump selection information: based upon the results of hydraulic modeling, the selected pump must be presented in the report, with copies of catalog cut-sheets that include the pump curve. A depiction of the system curve plotted on the pump curve with the operating point identified must be provided for both interim and build-out conditions, if applicable.

C2.2.6. As indicated in Appendix B under “Pump Selection,” the scenario of one pump station (the subject pump station with the selected pumps) operating with system head conditions at minimal levels must be evaluated to ensure that the selected pump is not operating too close to the right-hand side of the pump curve and that the operating point is within the selected motor’s power capabilities. This “low system curve” analysis must be presented in the Design Report, along with other applicable scenarios, including the build-out, high-head scenario.

C2.2.7. Wet well sizing calculations must be included to demonstrate that the wet well design meets the criteria set forth in Appendix B of this Technical Manual. Proposed elevations of the “all pumps off,” “lead pump on,” “lag pump on,” and “alarm” switches must be addressed, and the operation volume must be computed based upon the formula presented in aforementioned Appendix B.

C2.2.8. Calculations must be provided to demonstrate that the wet well as designed is of adequate weight to counteract buoyant forces if groundwater elevations should rise to the elevation of the ground surface. If the wet well weight, inclusive of barrel, lid, poured invert hopper bottom, and the net weight of the saturated soil column bearing on the wet well base is insufficient to counteract buoyant forces, the calculations must demonstrate the amount of poured ballast concrete, if any, required to be poured around the wet well base to achieve the necessary weight. Ballast, if required, must be indicated on the Construction Plans in an amount consistent with the submitted calculations. A minimum safety factor of 20% above the computed buoyancy forces must be achieved by the combined weight of the wet well components, soil column, and ballast, if applicable.

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APPENDIX D

Water, Wastewater, and Reclaimed Water Construction Plan Checklist

ALL PLANS

- ☐ Plans must be submitted electronically. If hard copy plans are requested, they must be submitted on 24-inch by 36-inch or 11-inch by 17-inch paper.
- ☐ When requested, a CD, DVD, or USB flash drive must be submitted containing electronic versions of the plans in both DWG and PDF format. CAD files must be formatted in AutoCAD 2013 or later. (No conversion from Microstation or other CAD based programs is acceptable).
- ☐ Plans must be electronically signed, sealed, and dated by the Florida Registered Engineer of Record (all sheets).
- ☐ Plans must reflect the approved point of connection (P.O.C.).
- ☐ The cover sheet must show the project's PCU number as assigned by PCU. Note that this number may not be available upon initial plan submittal.
- ☐ The cover sheet must include a project location map with sufficient surrounding context to allow the project location to be easily identified; a north arrow must be included.
- ☐ Each sheet must have a title block identifying the Engineer of Record, firm, Certificate of Authorization, telephone number, and page content. Include North Arrow, as appropriate, and scale.
- ☐ After October 1, 2011, the submittal must be based on the North American Vertical Datum of 1988 (NAVD 88).
- ☐ One or more overall utility plan sheets must be included at a readable scale of showing existing and proposed improvements.
- ☐ The horizontal scale for utility construction plans sheets may range from 1" = 20' to 1" = 60' depending on the size of the project; plans drawn at smaller scales must be legible.
- ☐ For profile drawings, the horizontal scale may range from 1" = 20' to 1" = 50' and the vertical scale must be larger by a factor of 10 (i.e., ranging from 1" = 2' to 1" = 5').
- ☐ A magnified inset detail at a large scale (1" = 10' or larger) must be provided for the P.O.C. and must include labeling for all pipes and appurtenances, including tapping sleeves, saddles, valves, tees, bends, etc.
- ☐ On phased projects, it is preferred that only the phase that is the subject of the Service Connection Application (SCA) associated with the subject plans be shown and that phases outside of the scope of the application be removed. Alternatively, the plans must, at a minimum, have any phases not included "screened" or "grayed out" to clearly indicate that they are not included in the requested approval.
- ☐ If the utility improvements included in a particular SCA are proposed to be constructed and placed into service in phases, phase line(s) must be clearly indicated on the construction plans.
- ☐ The width and center line of each right-of-way must be indicated.
- ☐ The width of pavement must be shown for all streets.
- ☐ All underground utilities, storm drains, or other structures which cross or are located close to proposed pipelines and structures must be shown on the drawings in both plan and profile views. In the case of crossings that, in the opinion of PCU, are complex as a result of multiple utilities crossing at various elevations, or other complicating field conditions, PCU may ask for a cross-section detail of such complex crossing locations.
- ☐ Size, type, material, and length of pipes must be shown for all proposed water, wastewater, and reclaimed water lines, both on-site and off-site.

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- ☐ Schematic diagrams and designs for all equipment and structures must be provided if not otherwise clearly indicated on the plans.
- ☐ Street names or identifiers indicated (correct location on plan) must be included.
- ☐ Subdivision name, lot, and block numbers must be included.
- ☐ All County-maintained utilities in close proximity to the project must be shown in plan view in their reported locations.
- ☐ Clearance distances as measured from outside-to-outside of pipes must be labeled for all water, wastewater, and reclaimed water lines crossing other utilities.
- ☐ The method of pipe crossing under existing pavement must be specified, i.e., jack and bore, horizontal directional drill, or open-cut.
- ☐ The invert elevations of all intersecting utilities must be shown on the profile views.
- ☐ Depth of cover must be labeled at various locations in profile to verify that minimum cover criteria required in the Pasco County Design Criteria are met.
- ☐ Add a notation to the utility plan: "All utility system-design materials and workmanship must comply with the *Technical Manual for Design and Construction of Water, Wastewater, and Reclaimed Water Facilities*, latest edition."
- ☐ Add a notation to the utility plan: "Connections into an existing County-owned system must be via wet tap. Wet taps must be performed exclusively by the PCU at the Developer's expense. Excavation, backfill, and surface restoration is the contractor's responsibility. Material for wet taps larger than two inches must be provided and installed by the project contractor."
- ☐ Add a notation to the utility plan: Contractor's Responsibilities regarding wet taps two inches and larger must be as follows:

  - **2" Only** the excavated trench must be dry, or the trench will require rock and a pump to be in place. The minimum distance from the face of the valve to the wall of the trench must be six feet. The County will provide the tapping saddle, corporation stop, stainless steel nipple, and iron body valve.
  - **3" and Larger** The contractor must supply an epoxy-coated tapping saddle, a tapping valve with mechanical joint, and the equipment and personnel to conduct a pressure test. County personnel will witness the pressure test, which must be conducted at a pressure of 150 psi for a duration of thirty minutes.
  - Pasco County personnel will not enter an excavated area until the contractor has completely excavated, dewatered, and ensured its compliance with safety regulations. If the trench is four feet in depth or deeper, a trench box or sloping is required, as well as a ladder according to Occupational Safety and Health Administration (OSHA) standards.
  - The tapping valve will require a blocking device made of suitable material or device. This blocking device or material must be placed under the valve and must remain in place until the tap machine is removed and the tap is completed.
  - Note: If the contractor has not fulfilled his responsibilities, as stated above, prior to the arrival of PCU O & M tapping crew, there will be an additional charge of $96.00.
  - If you have any questions regarding this information, contact the PCU Operations & Maintenance Department at (813)235-6189.

- ☐ Add a notation to the utility plan: "The Pasco County Utilities Department will not own or maintain on-site waterlines, sewer lines, or facilities," unless otherwise approved by PCU.

POTABLE WATER

- ☐ For commercial projects, the utility plan must show backflow preventers for proposed fire lines (double-

detector, check-valve assembly) and proposed domestic water lines (Reduced Pressure Zone). Show backflow preventer locations and include detail drawings from the County website at www.pascocountyfl.net without modification.

- ☐ The proposed meter must be shown on the private property side of the right of way in a minimum 15-ft x15-ft easement.
- ☐ For all commercial and master metered developments, the utility plan must show a split system (potable/fire).
- ☐ All points of connection must specifically call out a temporary service connection jumper meter and plans must show the detail for the jumper meter.
- ☐ Temporary service connection jumper meters must be shown at the points of connection for each phase within a phased project.
- ☐ The plans must clearly show the proposed meter size. Plans must show one potable meter per parcel ID.
- ☐ Potable water mains must be shown as appropriately spaced from reclaimed mains, gravity sewers, wastewater force mains, stormwater lines, stormwater structures, and other sanitary hazards as outlined in the Design Criteria. Where water mains are located 10 feet or less horizontally from other such pipes or structures, dimension call-outs must be shown on the plans to indicate appropriate horizontal separation.
- ☐ For all projects except single-family residential, the plans must include the completed fixture count table from the Service Connection Application.
- ☐ Include on the plans the note “Fire hydrants must be flow-tested and color-coded based on flow results. Results must be submitted to Pasco County Fire Rescue and Pasco County Utilities.”
- ☐ Joint restraints must be shown at all water main bends, fittings, valves, fire hydrants, and tapping sleeves.
- ☐ Plans must include a joint restraint detail that conforms to County standards.
- ☐ Valves must be shown as required in the PCU Design Criteria .
- ☐ Valve spacing must be shown as required in the PCU Design Criteria .
- ☐ Air release valves must be shown as required in the PCU Design Criteria.
- ☐ Fire hydrant spacing must be shown in accordance with Florida Fire Protection Code requirements.
- ☐ Sleeve locations must be shown at far side water services.
- ☐ Backflow prevention device(s), as required.
- ☐ Location of blow-offs must be shown, as required. Blow-offs must be shown at all locations required in Subsection E.4.1.3.8 of Appendix E, as well as at the terminations of each phase in the case of phased projects, as required in Appendix B, Subsection B1.3.6.
- ☐ The plans must show a water main extended along a minimum of one entire property boundary abutting the road or street as required per Section 110-35 of the Pasco County Code of Ordinances.

RECLAIMED WATER

- ☐ Plans must clearly show proposed meter location and size.
- ☐ Plans must include a note indicating the proposed maximum irrigation flow.
- ☐ The meter must be shown on the private property side of the right of way in a minimum 15x15 easement.
- ☐ Reclaimed water mains must be shown as appropriately spaced from potable water mains as outlined in the Design Criteria. Where reclaimed water mains are located 10 feet or less horizontally from water mains, dimension call-outs must be shown on the plans to indicate appropriate horizontal separation.
- ☐ Joint restraints shown at all main bends, fittings, valves, fire hydrants, and tapping sleeves.

- ☐ Plans must include a joint restraint detail that conforms to County standards.
- ☐ Valves must be shown as required in the PCU Design Criteria.
- ☐ Valve spacing must be shown as required in the PCU Design Criteria.
- ☐ Air release valves must be shown as required in the PCU Design Criteria.
- ☐ Sleeve locations must be shown at far side reclaimed water services.
- ☐ Location of blow-offs must be shown, as required. Blow-offs must be shown at all locations required in Subsection E.5.1.3.7 of Appendix E, as well as at the terminations of each phase in the case of phased projects.

GRAVITY SEWER SYSTEM

- ☐ Gravity sewer profiles must depict the pipe size and type, slope, and distance between manholes.
- ☐ Sufficient labeling and dimensioning must be included on the plans to verify that horizontal and vertical spacing between sewer and other types of pipes meets design criteria.
- ☐ Invert elevation and direction must be depicted shown for each pipe entering and/or exiting a manhole.
- ☐ Manhole rim elevations must be labeled.
- ☐ All manhole stubs and connections must be shown on both the plan and profile view.
- ☐ Manhole and manhole connection details must be shown.
- ☐ Drop manholes and details are required for drops of two feet or more.
- ☐ For phased projects, plugs must be shown as required in the PCU Design Criteria
- ☐ Plans must depict/label all manholes that are to be lined in accordance with the PCU Design Criteria.
- ☐ If the project requires a grease trap and/or an oil/grit separator, the appropriate details and calculations must be shown. A copy must be submitted to the PCU Environmental/Hazardous Manager.

FORCE MAINS

- ☐ Joint restraints must be specified at all force main bends, valves, fittings, and tapping sleeves.
- ☐ Plans must include a joint restraint detail that conforms to County Standards.
- ☐ Wastewater force mains must be shown as appropriately spaced from potable water mains as outlined in the Design Criteria. Where force mains are located 10 feet or less horizontally from water mains, dimension call-outs must be shown on the plans to indicate appropriate horizontal separation.
- ☐ Air release-air/vacuum valves must be shown as required in the PCU Design Criteria.
- ☐ In-line valves must be shown as required in the PCU Design Criteria.
- ☐ Where a proposed force main from a proposed pump station crosses a roadway, the plans must show proposed force main with a gate valve on both sides of the roadway as required in the PCU Design Criteria.

JACK AND BORE CROSSINGS

- ☐ Jack and bore crossings must show the casing pipe on both the plan and profile view. County Standard jacking detail must be included.
- ☐ The PCU standard Jack & Bore detail must be included on the plans.

PRIVATELY OWNED WASTEWATER PUMP STATIONS

Customers in need of accessibility assistance can connect by phone through the Federal Information Relay Service at 800-877-8339 for TTY/voice communication or by visiting PascoCountyFL.net/Accessibility for other available support avenues. Customers in need of accessibility assistance specific to the renderings or content within this document may contact Pasco County Utilities Engineering, Aurybel Rivero, at 813-235-6189 Ext. 6796, or via email at arivero@mypasco.net, as well as Eric B. Patrick at 813-235-6189 Ext. 6929, or via email at epatrick@mypasco.net.

- ☐ Plans must depict the location of the pump station, which must be on private property.
- ☐ Design capacity (average daily/peak flows) and system response/curve calculations must be provided.
- ☐ Pump identification, including all nameplate data must be provided on the plans. Pump curve for selected pump with design point must be noted.
- ☐ Wet well operating elevations, inverts, and slab elevations must be shown.
- ☐ Identification of fittings and valves on private property must be shown.
- ☐ An air release valve must be shown immediately on the private property side of the right of way line.
- ☐ Wash down water supply, including ¾" potable meter and RPZ must be clearly shown on the drawings.
- ☐ Drawings must clearly demonstrate that the top of the pump station is 1 foot above adjacent pavement and/or the 100-year flood elevation, whichever is highest.
- ☐ The utility plan must show a battery-backup alarm system for the proposed pump station.
- ☐ Where a merchant's agreement is required, the proposed private pump station must be located adjacent to the property line of the adjoining parcel. Provide a sanitary-sewer stub-out at a depth suitable for service to the adjacent parcel and located within a private utility easement.

WASTEWATER PUMP STATIONS TO BE COUNTY OWNED AND MAINTAINED

- ☐ Plans must show the location and size of site to be dedicated to County.
- ☐ A to-scale site plan must be provided showing the pump station slab, access driveway, elevations, setbacks from property lines, surrounding buildings, and lot grading details.
- ☐ Valve and piping identification must be labeled on the plans.
- ☐ Backflow prevention device must be shown on potable water service to station.
- ☐ Pump identification, including all nameplate data must be provided on the plans.
- ☐ Design capacity (average daily/peak flows) and system response/curve calculations must be provided.
- ☐ Wet well design criteria and pump control level settings must be provided.
- ☐ Wet well depth must be shown as required in the PCU Design Criteria.
- ☐ Pump curve for selected pump must be provided with design point noted.
- ☐ Electrical sheet must include load calculations, breaker coordination study and short circuit analysis.
- ☐ Wash down water supply, including ¾" potable meter and RPZ must be clearly shown on the drawings.
- ☐ Drawings must clearly demonstrate that the top of the pump station is 1 foot above adjacent pavement and/or the 100-year flood elevation, whichever is highest.
- ☐ Drawings must clearly show a 50x50 parcel dedicated to the County with chain link fence. The access must provide a 45-ft minimum distance from back of curb to pump station slab.

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APPENDIX E

SPECIFICATIONS FOR DESIGN AND CONSTRUCTION

OF

WATER, WASTEWATER, AND RECLAIMED WATER FACILITIES

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Appendix E Table of Contents

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SECTION E.1

GENERAL CONDITIONS

E.1.1 INTRODUCTION

The specifications and standards presented herein are to ensure uniformity and quality of construction of potable water, wastewater, and reclaimed water facilities within Pasco County. These specifications must be used in the design and construction of such systems to be installed in Pasco County, and applicable provisions herein must be incorporated into all plans and specifications for new systems or connections to existing systems. In case of conflicts, the following precedence will apply: County ordinance, County-approved contracts, these design standards, specifications, and drawings.

E.1.1.1Terminology

Contractor - The Owner, Developer, Builder, Contractor, or other individual, company, or corporation responsible for the construction of potable water and/or sanitary sewer facilities covered by these standards.

County - The County of Pasco, governed by the Board of County Commissioners (BCC), whose offices are located at 37918 Meridian Avenue, Dade City, Florida 33525.

Developer Project(s) – Projects where an entity other than PCU is constructing utility assets to be dedicated to PCU for operation and maintenance.

Director - The Director of the Pasco County Utilities Construction and Contract Management Department or his authorized representative.

Department - The Pasco County Utilities Department (PCU).

Engineer - Engineer of Record.

PCU - The Pasco County Utilities Department.

Specifications – When capitalized, refers to this Appendix E, *Specifications for Design and Construction of Water, Wastewater, and Reclaimed Water Facilities.*

E.1.2 COMMENCEMENT OF WORK

E.1.2.1 No utility construction work may be started prior to approval of the plans and specifications by PCU and by other interested agencies having jurisdiction. No work may be started until a "Notice to Proceed" has been issued by PCU when the owner will be Pasco County. Refer to the main text of the Technical Manual for Design and Construction of Water, Wastewater, and Reclaimed Water Facilities, of which these Specifications are a component, for approval procedures and requirements for Developer Projects.

E.1.2.2 On projects for which Pasco County is the owner, no work may commence until a project sign has been installed as directed by PCU. For sign details, refer to Appendix F, “Utility Construction Details.”

E.1.3 USE OF COUNTY RIGHT-OF-WAY

Permission for use of County right-of-way must be obtained from the Planning & Development Department through completion of a Right-of-Way Use Permit application available from Planning & Development at www.pascocountyfl.net.

E.1.4 OTHER STANDARDS

These standards and specifications contain certain abbreviated references to standards or specifications of various organizations including, but not limited to, the following:

AASHTO, American Association of State Highway Traffic Officials

ANSI (USASI, ASA), American National Standards Institute (formerly United States of America Standards Institute, formerly the American Standards Association)

ASTM, ASTM International (formerly American Society for Testing and Materials)

AWWA, American Water Works Association

CSI, Construction Standards Institute

DIPRA, Ductile Iron Pipe Research Association

EPA, Environmental Protection Agency, United States

FAC, Florida Administrative Code

FDEP, Florida Department of Environmental Protection

FDOT, Florida Department of Transportation

FM, Factory Mutual

NEC, National Electrical Code

NEMA, National Electrical Manufacturers Association

OSHA, Occupational Safety and Health Administration (U.S. Department of Labor)

SWFWMD, Southwest Florida Water Management District

TSS(S), Ten State Standards; i.e., *Recommended Standards for Wastewater Facilities*, latest edition*

TSS(W), Ten State Standards; i.e., *Recommended Standards for Water Works*, latest edition*

UL, Underwriters Laboratories

*Available from the Minnesota Department of Health, www.health.state.mn.us/communities/environment/water/tenstates/standards.html

When standards or specifications are indicated herein by reference, the referenced portion will apply to the most recent edition of the publication and will have the same force and effect, to the extent indicated by the references thereto, as if they were included herein in their entirety.

E.1.5 SAMPLING AND TESTING

E.1.5.1 Except as otherwise provided, sampling and testing of materials, and the laboratory methods and testing equipment used, when required, must be in accordance with the latest published standards (including published tentative editions) or methods of ASTM, AASHTO, AWWA, or other such organizations recognized as authoritative for the type of test required.

E.1.5.2 On projects for which PCU is Owner, the testing of samples and materials must be made at the expense of the Contractor, unless otherwise specifically authorized or approved in writing by PCU. For Developer Projects, all testing must be at the Developer's expense. All test results must be submitted to the Engineer. Engineer shall submit all test results to PCU, as appropriate, per the procedures contained in Section 9 of the main text of this Technical Manual, and/or upon request by PCU.

E.1.6 LEGAL RESTRICTIONS AND PERMITS

The Contractor at all times shall observe and comply with all Federal, State, County, and other laws, codes, ordinances, and regulations in any manner affecting the conduct of the work. The Contractor shall further procure all permits and licenses, pay all charges and fees, and give all notices necessary and incidental to the due and lawful prosecution of the work. Pasco County will be responsible for State, regional, and Federal permits on projects for which the County is the owner.

E.1.7 PUBLIC CONVENIENCE AND SAFETY

E.1.7.1 Materials stored at the site of the work must be so placed and the work must at all times be so conducted as to cause no obstruction to vehicular or pedestrian traffic. No roadway may be closed except by express permission of the County Administrator, or his designee, or such other authorized public agency having jurisdiction.

E.1.7.2 Precaution must be exercised at all times for the protection of persons and property. The safety provisions of applicable laws, building codes and construction codes must be observed. Machinery, equipment and other hazards must be guarded in accordance with the safety provisions of OSHA, and the Manual of Accident Prevention in Construction, published by the Associated General Contractors of America.

E.1.7.3 Explosives, Blasting, and Blasting Agents. Refer to the Pasco County Code of Ordinances, Section 18-42, as amended.

E.1.8 CHEMICAL USAGE

All chemicals used during project construction or furnished for project operations, whether herbicide, pesticide, disinfectant, polymer, reactant, or of other classification, must show approval of either U.S. Environmental Protection Agency or U.S. Department of Agriculture. Use of all such chemicals and disposal of residues must be in strict conformance with environmental regulations.

E.1.9 PROTECTION OF PROPERTY

E.1.9.1 The Contractor shall not enter upon private property for any purpose without first obtaining permission, and he shall use every precaution necessary to prevent damage or injury to any public or private property, trees, fences, monuments, and underground structures, etc., on and adjacent to the site of the work. If work is to be performed in an easement on private property, then affected property owners must be notified 24 hours in advance of construction.

E.1.9.2 The Contractor shall not do any work that would affect any railway track, pipeline, telephone, power transmission line, or other utilities or structure, or enter upon the right-of-way or other lands appurtenant thereto, until authority therefore has been secured from the proper persons. Utility location agencies, such as Sunshine811, must be given sufficient notice prior to construction. Sunshine811 may be reached by calling 8-1-1.

E.1.9.3 On projects for which PCU is Owner, the Contractor shall be responsible for all damage or injury to property of any character resulting from any act, omission, neglect, or misconduct in his manner or method of executing the work, from his non-execution of the work, or from defective work or materials, and he shall not be released from this responsibility until the work has been completed and accepted and the Warranty requirements fulfilled. For Developer Projects, any damage to private property not under ownership or control of the Developer is the Developer's responsibility, and any damage to public rights-of-way or other public property must be restored by the Developer or contractors in the Developer's employ. Failure to properly restore rights-of-way or other properties may affect the Developer's ability to obtain clearances for utility lines and/or Certificates of Occupancy or other agency acceptance documents as may be applicable.

E.1.9.4 On projects for which PCU is Owner, when or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work, or in consequence of the non-execution thereof on the part of the Contractor, he shall restore such property, at his own expense, to a condition equal to that existing before such damage or injury was done by repairing, rebuilding, or otherwise restoring, as may be directed, or he shall make good such damage or injury in a manner acceptable to the damaged or injured party. For Developer Projects, the same restoration efforts are required of the Developer, at the Developer's expense.

E.1.10 RESTORATION OF PROPERTY

E.1.10.1 Responsibility: All damage as a result of construction work done to existing structures, wetland areas, roadway pavement, driveways, other paved areas, fences, utilities, traffic control devices, and any other obstruction not specifically named herein, must be repaired, restored, or replaced by the Contractor unless otherwise specified. Refer to Sections E.1.9.3 and E.1.9.4 above.

E.1.10.2 Temporary Repairs: All damage named in Subsection E.1.10.1 above must be at least temporarily repaired, restored, or replaced immediately following construction efforts at that location. Temporary restoration means putting the affected area back into a safe, usable condition. In no case may trenches remain open overnight within a street right-of-way unless specific approval is granted by the County Administrator, or his designee.

E.1.10.3 Permanent Repairs: All damage named in Subsection E.1.10.1 above must be permanently repaired, restored, or replaced not later than the 30th calendar day following the completion of construction at that location unless otherwise stipulated. Permanent repairs must be accomplished in a professional workmanship-like manner in accordance with specifications

contained herein, or contract documents, if addressed. The Contractor may be relieved of the 30-day time limit above only by specific written agreement with the Director or a higher authority.

E.1.10.4 County Right to Repair: On projects for which PCU is Owner, in the event that the Contractor fails to make the permanent repairs within the time specified in Subsection E.1.10.3 above, the County, at its option, may, with its own resources or by contract with others, cause the repair, restoration, or replacement of the affected area to be accomplished. The costs of such work will then be deducted either from the next pay request or from any other monies owed the Contractor by the County.

E.1.10.5 Protection and Restoration of Easements on Private Property and/or Road Right-of-Way: During the course of construction, the Contractor shall take special care and provide adequate protection in order to minimize damage to vegetation, surfaced areas, and structures within the construction right-of-way, easement, or site, and shall take full responsibility for the replacement or repair thereof. The Contractor shall immediately repair any damage to private property created by encroachment thereon. Should the removal or trimming of valuable trees, shrubs, or grass be required to facilitate the installation within the designated construction area, this work must be done in cooperation with the County and/or local communities in which the work takes place. This valuable vegetation removed or damaged, must be replanted, if possible, or replaced by items of equal quality, and maintained until growth is re-established. Topsoil damaged in the course of work must be replaced with at least a four-inch layer of suitable material. Following construction completion, the work area along the route of the installation must be finish graded to elevations compatible with the adjacent surface, with grassing or hand raking required within developed areas.

E.1.10.6 Sidewalk and Driveway Restoration: Existing sidewalks and driveways removed, disturbed, or destroyed by construction must be replaced or repaired. The finished work must, as a minimum, be equal in all respects to the original.

E.1.10.7 Cleanup: Work site cleanup and property restoration must follow behind construction operations without delay. In order to facilitate an acceptable construction site, debris and waste materials must be removed from the site daily and trenching length versus pipe laying must be coordinated to preclude overnight trench opening. Construction site maintenance, along with ongoing cleanup and final property restoration acceptance, must be as directed and approved by the Engineer, or the County if necessary.

E.1.11 WORK IN STREETS

E.1.11.1 Traffic Control: The Contractor shall provide bypasses, crossings, and other means for the maintenance of one-way traffic in all streets, and two-way traffic wherever possible, in all streets where work is in progress. Construction operations may be carried on only between 7:00 a.m. and 7:00 p.m., Monday through Friday, except for operations specified for alternate times or in cases of emergency. The Contractor shall plan and schedule his operations to impose the least possible interference with normal traffic flow. The Contractor is required to have a County-approved traffic control plan for each situation which may occur during the course of construction. This applies to State-controlled right-of-way as well as County right-of-way. The traffic control plan must be submitted to the "Traffic Operations Manager" more than 48 hours prior to any activity for his review and approval.

E.1.11.2 Guardrails and Barricades: The Contractor shall provide, erect, and maintain effective barricades, danger signals, and signs on all intercepted streets or highways and in other locations where required for the protection of the work and the safety of the public. Barricades

or obstructions which encroach on, or are adjacent to, public rights-of-way must be provided with lights which must be kept burning at all times between sunset and sunrise. Conformity with State, County, and local laws and regulations is required in the use of streets and highways. The Contractor shall be responsible for all damages resulting from any neglect or failure to meet these requirements. Watchmen must be provided as required by local regulations or as necessary to fulfill the requirements stated herein.

E.1.11.3 Traffic and Services: Adequate means of access to all public and private properties during all stages of construction must be provided. Unless approval in writing is secured from the utility company or County, there must be no interruption of service to present customers of such utilities requiring repairs, changes, or modifications caused by the construction work.

E.1.11.4 Applicable Codes: The FDOT Standard Specifications for Road and Bridge Construction, the FDOT Standard Plans for Road and Bridge Construction, the Manual on Uniform Traffic Control Devices, and the Pasco County Right-of-Way Ordinance must be followed as applicable. For each standard or publication listed, the latest edition must be followed.

E.1.12 DISRUPTION TO EXISTING SYSTEM OPERATION:

E.1.12.1 General: The Contractor shall perform operations necessary for connecting to the existing system(s) at times of minimum flow rate. These operations must be accomplished expeditiously in order to minimize service disruption. All schedules must be coordinated with, and approved by, PCU. A plan for connection must be submitted to PCU a minimum of 72 hours prior to connection, and in the case where more complex methods, such as construction of bypasses, are required to facilitate connection, the timeframe for coordination will be significantly longer.

E.1.12.2 Force main shutdowns: In cases where it is necessary to conduct a shutdown of an active wastewater force main, the contractor shall schedule shutdowns as necessary for the work and shall coordinate shutdowns with PCU Operations and Maintenance Department.

E.1.12.2.1 The Contractor shall notify the Engineer and PCU representative at least two (2) weeks prior to beginning each scheduled shut down and shall reconfirm the shutdown 48 hours prior to work commencement. The shutdowns must be approved by PCU.

E.1.12.2.2 The Contractor shall coordinate with PCU the disposal of sewage or wastewater removed from the pipelines.

E.1.12.2.3 The Contractor shall supply all pumping equipment and sewage hauling trucks for the removal and transport of sewage or wastewater as may be necessary.

E.1.12.2.4 The Contractor shall maintain water and sewer service to all customers at all times, except for approved outages. The Contractor shall provide written notice to all affected customers a minimum of 48 hours prior to a proposed shutdown or outage.

E.1.13 MINIMIZING SILTATION AND BANK EROSION

During all dewatering or other operations involving the use and disposal of water, suitable means must be provided by the Contractor to minimize soil erosion, siltation, and sedimentation of natural or artificial ditches, drainage channels, streams, lakes, or other waterways. The Engineer must approve such means proposed by the Contractor prior to any dewatering, pumping, or other water-involved operations in the above areas. If required, in the opinion of the

Engineer, methods such as stilling basins, baffles, siltation basins, matting, spread-disposal, recharge pits, etc., must be used by the Contractor to minimize siltation and bank erosion, with the methods in full compliance with FDEP and SWFWMD standards and requirements. A Notice of Intent (NOI) application for a Generic Permit for Stormwater Discharge from Large and Small Construction Activities (CGP) must be filed with the FDEP National Pollutant Discharge Elimination System (NPDES) Stormwater Notices Center for all projects. For all dewatering activities and all other construction activities that may cause erosion and/or siltation, Best Management Practices (BMPs) must be employed consistent with the State of Florida *Erosion and Sediment Control Designer and Reviewer Manual*, latest edition. Copies of all approved applicable permits from Federal, State, and local agencies must be in the possession of the Contractor prior to commencing any work.

E.1.14 SURVEY AND CONSTRUCTION STAKES

It is the responsibility of the Contractor to provide and set in place all construction stakes and marks for lines, grades and measurements necessary or required for the proper prosecution and control of the work. He is responsible for the accuracy and preservation of the stakes and marks. The plans must also show or describe the reference points or monuments from which the Contractor shall lay out the work and the Contractor shall scrupulously preserve these reference points. He shall immediately restore any damaged, dislodged, or lost reference points at his expense.

E.1.15 BENCHMARKS AND MONUMENTS

The Contractor shall carefully maintain all benchmarks, monuments, and other reference points. Survey monuments or benchmarks which must be disturbed by this construction work must be carefully witnessed before removal and replaced upon completion of the work by a Professional Land Surveyor, registered in and by the State of Florida.

E.1.16 NAMEPLATES

With the exceptions noted, each piece of equipment must be provided with a substantial nameplate of non-corrodible metal, securely fastened in place and clearly and permanently inscribed with the manufacturer's name, model or type designation, serial number, principal rated capacities, electrical or other power characteristics, and similar information as appropriate. This requirement does not apply to standard, manually operated valves, or accessories and specialties not having an electrical drive or connection. However, all valves must be permanently identified as to type, size, and direction and number of turns to open.

E.1.17 CHARACTER OF WORKMEN, SUPERINTENDENTS, AND EQUIPMENT

E.1.17.1 Superintendents and Workmen: The Contractor shall employ superintendents, foremen, and workmen who are careful and competent. When Pasco County is the owner, PCU may demand the removal of any person or persons employed by the Contractor on the work who is incompetent, unsafe, or negligent in the proper performance of their duties, or neglects or refuses to comply with the directions given.

E.1.18 SANITARY PROVISIONS

The Contractor shall provide and maintain in a neat and sanitary condition such accommodations for the use of his employees as may be necessary to comply with the requirements and regulations of OSHA, State, local health department, or other agencies having jurisdiction.

E.1.19 CONFORMITY WITH PLANS AND ALLOWABLE DEVIATIONS

The entire installation and each part thereof must be constructed in the position required, the finished surfaces of structures must conform to the elevations and gradients specified, and all parts of both substructures and superstructures must be in proper alignment and adjustment. The Contractor shall provide all frames, forms, falsework, shoring, guides, anchors, and temporary structures that may be required to ensure these results. Any deviation from the plans and working drawings that may be required must have prior approval of the Engineer. The Engineer shall obtain authorization from PCU for all deviations, and the deviations must be documented on the Record Drawings for the project. Refer to Section 9 of the main text of this Technical Manual for Record Drawing requirements.

E.1.20 SUBSTITUTIONS OR "APPROVED EQUALS"

Whenever a material or article required is specified or shown on the approved plans by using the name of the proprietary product or of a particular manufacturer or vendor, it will be considered that this was done only for the purpose of establishing a standard of quality for the specified materials. Any material or article which will perform the function imposed by the general design will be considered equal and satisfactory, provided PCU agrees the material or article so proposed is of like substance, form, and function. Such substitutions must not be purchased or installed without written approval from the PCU Director or designee. Substitution may be restricted due to inventory control.

E.1.21 INSPECTION BY OTHER AGENCIES

The U.S. Environmental Protection Agency, the U.S. Department of Labor, the Florida Department of Environmental Protection, and other authorized governmental agencies having legal interest in the project must have free access to the site for inspecting materials and work, and the Contractor shall afford them all necessary facilities and assistance for doing so. Any instructions to the Contractor resulting from these inspections must be given through the Engineer. These rights of inspection may not be construed to create any contractual relation between the Contractor and these agencies.

E.1.22 DEFECTIVE AND UNAUTHORIZED WORK

E.1.22.1 All work that has been rejected or condemned must be repaired, or, if it cannot be satisfactorily repaired, must be removed and replaced at the Contractor's expense. Materials not conforming to the requirements of the specifications must be removed immediately from the site of the work and replaced with satisfactory material by the Contractor at his own expense.

E.1.22.2 Upon reasonable cause, and at the request of PCU, the Contractor shall, at any time before final acceptance of the work, remove or uncover such portions of the finished work as may be directed. After examination, the Contractor shall restore those portions of the work to the condition required by the approved plans and specifications.

E.1.22.3 Failure to reject any defective work or material during construction will not prevent later rejection upon discovery prior to acceptance or obligate the County to final acceptance.

E.1.23 WARRANTY

E.1.23.1 One-Year Warranty Period: If, within one year after the date of substantial completion

or such longer period of time as may be prescribed by laws or regulations, or by the terms of any applicable special guarantee required by the contract documents, or by any specific provision of the contract documents, any work is found to be defective, the Contractor shall promptly, without cost to the County and in accordance with written instructions from the Engineer, either correct such defective work, or if it has been rejected by the County, remove it from the site and replace it with non-defective work. If the Contractor does not promptly comply with the terms of such instructions, the County may have the defective work corrected or the rejected work removed and replaced, and all direct, indirect, and consequential costs of such removal and replacement (including, but not limited to, fees and charges of engineers, architects, attorneys, and other professionals) must be paid by the Contractor. In special circumstances where a particular item of equipment is placed in continuous service before substantial completion of all the work, the warranty period for that item may start to run from an earlier date if so provided by the specifications or by written amendment.

E.1.23.2 Emergency Repairs: During the time that a utilities construction project is either under construction or under a warranty period, emergencies which arise must be handled as the situation dictates. Inasmuch as each situation is unique due to time, place, and circumstance, the following guidelines will be used to the extent possible:

(1) An emergency is defined as a situation which develops suddenly and demands immediate action to halt a worsening condition.

(2) Upon notification of an emergency situation, PCU will respond as rapidly as possible to bring the situation under control; i.e., to terminate the emergency. The Contractor will be notified of the situation as soon as practical by PCU, and PCU will endeavor to make this notification within 12 hours. Repairs which must be affected in the aftermath of an emergency are the responsibility of the Contractor.

(3) Those nonemergency-type repairs must be complete or at least in progress within seven calendar days of notification by PCU.

(4) Any repairs accomplished under this section by PCU may be billed to the Contractor.

E.1.24. UTILITY EASEMENTS

E.1.24.1. Required minimum utility easements in subdivisions, residential and commercial, are as follows:

(1) Along streets - 10 feet.

(2) Between lots – the greater of twenty (20) feet or the combination of:

- the outside diameter(s) of the pipe(s), plus
- all spacings between pipe(s), plus
- two and one-half (2.5) feet on both sides of the pipe(s), plus
- the depth to the top of the lowest pipe

From the outer edge of any pipe in the easement, the easement must be at least two and one-half (2.5) feet plus the depth to the top of the pipe.

E.1.24.2. Sidewalks and fences must not be constructed within utility easements.

E.1.24.3. If a developer or private landowner fences or causes to be fenced any portion of a PCU utility easement, the developer or landowner must remove the fence or, if approved by the PCU Director, must provide a gate to allow access to PCU personnel.

E.1.24.4. Trees or landscaping must not be installed within utility easements.

E.1.25. INSTALLING NEW WATER METERS

E.1.25.1. The following items are required by PCU prior to water meter installation:

(1) A request letter and Letter of Certification from the Engineer of Record, stating all lines or lift stations, etc., have been inspected, tested, and installed according to the Engineer of Record's specifications and as-built drawings. The Letter must show calculations and test results according to AWWA standards.

(2) All inspections of the water system and/or sanitary sewer system and/or reclaimed water system must be completed and approved by PCU. The approval letter from PCU must be included with the request.

(3) If the water and/or wastewater system and/or reclaimed water system construction was permitted through FDEP, a letter from FDEP stating that the facilities have been approved and may be put into service must be provided.

(4) If the water and/or wastewater system construction was permitted through PCU, a request for letter of release to place water supply system into service and/or a domestic wastewater collection/transmission system's certification of completion of construction form must be provided. The request letter must also include all drawings, test results, etc., required under the original permit application.

(5) For more detail on clearance/acceptance procedures and on the specific requirements for submissions, such as Record Drawings, calculations, and test reports, refer to Section 9 of the main text of this Technical Manual.

SECTION E.2

TECHNICAL REQUIREMENTS

SECTION E.2.1

UTILITY EXCAVATION, TRENCHING, AND BACKFILLING

E.2.1.1. GENERAL

The provisions set forth in this section are applicable to all underground sewer and water piping installations, regardless of location, unless prior approval is received from PCU for special design considerations.

E.2.1.2. MATERIALS

E.2.1.2.1. Sheeting and Bracing:

E.2.1.2.1.1. Wood sheeting to be left in place must be pressure-treated with preservative in accordance with the current requirements of the American Wood Preservers Association Book of Standards, latest edition.

E.2.1.2.1.2. Steel sheeting to be left in place must be as specified in ASTM Designation A328.

E.2.1.2.2. Concrete: Required concrete must have a minimum 2,500 pounds per square inch compressive strength unless otherwise specified herein.

E.2.1.3. TRENCHING

E.2.1.3.1. Trench Dimensions: The minimum width of the trench must be equal to the outside diameter of the pipe, plus 12 inches, unless otherwise shown on the drawing details or approved by the Engineer. Trench walls must be maintained vertical from the bottom of the trench to a line measured two feet above the top of the pipe. Refer to the Utility Construction Details in Appendix F of this Technical Manual.

E.2.1.3.2. Trench Grade: Standard trench grade is defined as the bottom surface of the utility to be constructed or placed within the trench. Trench grade for utilities in rock or other non-cushioning material is defined as six inches below the outside of the bottom of the utility; such six inches must be backfilled with extra utility bedding material. Excavation below trench grade that is done in error must be backfilled to trench grade with granular material and compacted.

E.2.1.3.3. Utility Bedding: The bottom of the trench must be shaped to provide firm bedding for the utility pipe. The utility must be firmly bedded in undisturbed firm soil, or hand-shaped unyielding material. The bedding must be shaped so that the pipe will be in continuous contact therewith for its full length and must provide a minimum bottom segment support for the pipe equal to 0.5 of the outside diameter of the barrel. Bedding must be installed in accordance with ANSI/AWWA C150/A21.50. Special bedding may be required due to depth of cover, impact loadings, or other conditions.

E.2.1.3.4 Unsuitable Material Below Trench Grade: Soil unsuitable for a proper foundation encountered at or below trench grade, such as clay, muck or other deleterious material, must 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 PCU. Backfilling below trench grade must conform to applicable provisions of FDOT *Standard Specifications for Road and Bridge Construction*, latest edition, unless otherwise specified herein.

E.2.1.3.5. Extra Utility Bedding Material: When rock or other non-cushioning material is encountered at trench grade, excavation must be extended to six inches below the outside of the bottom of the utility, and a cushion of granular rock material must be provided. Utility bedding material must be installed as specified under Subsection E.2.1.3.3. Granular rock must also be provided beneath the utility and to a depth not shallower than the spring line of the utility pipe where pipe is installed in wet conditions.

E.2.1.3.6. Sheeting and Bracing: In order to prevent damage to property, injury to persons, erosion, cave-ins, or excessive trench widths, adequate sheeting and bracing must be provided, as required, and/or directed by the Engineer, in accordance with accepted standard practice. Sheeting must 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. When required, to eliminate excessive trench width or other damage, sheeting, bracing, or shoring must be left in place and the top cut off at an elevation of 2.5 feet below finished grade, unless otherwise directed. All sheeting and bracing must be done in accordance with OSHA.

E.2.1.3.7. Excavated Material: Excavated material to be used for backfill must be neatly and safely deposited at the sides of the trenches where space is available. Where stockpiling of excavated material is required, the Contractor shall be responsible for obtaining the sites to be used and shall maintain his operations to provide for natural drainage and not present an unsightly appearance. All sites must be restored after fill is removed.

E.2.1.3.8. Material Disposal: Excess, unsuitable, or cleared and grubbed material resulting from the utility installation must be removed from the work site and disposed of at location(s) secured by the Contractor, unless otherwise directed by the Engineer, in which case the material will remain the property of the County. Excess excavated material must be spread on the disposal site and graded in a manner to drain properly and not disturb existing drainage conditions. This applies only to projects on which Pasco County is the owner.

E.2.1.3.9. Borrow: Should there be insufficient satisfactory material from the excavations to meet the requirements for fill material, borrow must be obtained from pits secured by the Contractor. All borrow must meet the provisions of these specifications.

E.2.1.3.10. Rock Excavation: Rock excavation is defined as excavation of any hard, natural substance which cannot be removed by a one-cubic-yard bucket and requires the use of explosives and/or special impact tools such as jackhammers, sledges, chisels, or similar devices specifically designed for use in cutting or breaking rock.

E.2.1.3.11. Dewatering: Utilities must be laid "in the dry," unless otherwise approved. Trench excavations may be dewatered by using one or more of the following methods: well point system; sumps with pumps or other method(s) as approved by the Engineer. Dewatering systems must 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. 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 may be provided at intervals at the side of the main trench excavation, with pumps used to lower the water level by taking their suction from the sumps. Discharge from dewatering must 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 form ponding. All discharge

must be in accordance with any SWFWMD issued permits. The operations must not cause injury to any portion of the work completed, or in progress, or to the surface of streets, or to private property. The proposed dewatering method(s) and schedule must be approved by the Engineer and necessary regulatory agencies prior to construction. Additionally, where private property will be involved, advance permission must be obtained by the Contractor.

E.2.1.3.12. Obstructions: It is the Contractor's responsibility to acquaint himself 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 must be coordinated with the facility owner and performed so as to cause as little interference as possible with the service rendered by the facility disturbed. All affected utilities and "Sunshine811" must be notified prior to excavation in their vicinity. Sunshine811 may be reached by calling 8-1-1.

E.2.1.3.13. Protective Concrete Slab: Protective concrete slabs must be installed over the top of trenches, where required, to protect the installed utility against excessive loads, or when insufficient cover exists.

E.2.1.3.14. Seed and Mulch: Fertilizing, seeding, and mulching operations will be carried out in accordance with FDOT *Standard Specifications for Road and Bridge Construction*, latest edition, Section 570-3. Areas designated to be seeded must first be fine graded to match the surrounding areas and must not be sown when wind velocities exceed 15 mph, or the soil is unduly wet or otherwise not in a tillable condition. The Contractor shall properly water and otherwise maintain all seeded and mulched areas until final acceptance by PCU. Any areas which fail to show a "catch" or uniform stand must be reseeded, and such reseeding must be repeated, at no additional cost, until final acceptance. Maintenance procedures must comply with the applicable requirements of FDOT *Standard Specifications for Road and Bridge Construction, latest edition*, Section 570-4. (Note: This paragraph applies to PCU projects only.)

SECTION E.2.2

CASING PIPE - BORING AND JACKING

E.2.2.1. GENERAL

E.2.2.1.1. The provisions of this section are the minimum standards for the installation of casing pipe by the boring and jacking method for placement of sewer and water pipelines.

E.2.2.1.2. In general, all underground pressure pipelines crossing existing major Pasco County and Florida State highways and railroads must be installed under these traffic ways within bored and jacked steel casing pipe. Specific crossing requirements must be obtained in advance from the authority having jurisdiction.

E.2.2.1.3. Bore and Jack installations are allowed for pressurized mains and are not allowed for gravity mains.

E.2.2.1.4. It is the responsibility of the Engineer to submit the necessary permit documents and data to the appropriate authority and receive approval thereof.

E.2.2.2. CASING PIPE MATERIALS AND INSTALLATION

E.2.2.2.1. Casing pipes crossing under County roadways must be located at suitable approved alignments in order to eliminate possible conflict with existing or future utilities and structures,

with a minimum 36-inch depth of cover between the top of the casing pipe and the surface of the roadway, or in the case of bore and jack installations under FDOT roadways, the depth of cover must be as specified in the FDOT Utility Accommodation Manual, latest edition. Casings must be new prime steel pipe conforming to the requirements of ASTM Designation A-139. The minimum casing pipe size and wall thickness must be as shown in the following table for the sewer or water carrier pipe size indicated. For sizes not included therein, or for special design considerations, approval must be obtained from the Director.

Carrier Pipe (Inches)	Casing Pipe (Inches)	Casing Wall Thickness (Inches)
4	12	5/16
6	16	5/16
8	16	5/16
10	24	3/8
12	24	1/2
16	30	1/2
20	36	1/2
24	42	1/2
30	48	1/2
36	54	5/8
42	60	5/8
48	66	5/8

NOTE: For potable water and reclaimed water mains, and wastewater force mains the carrier pipe must be DR14 AWWA C900 PVC (ductile iron pipe shall only be used where required for water and reclaimed mains), utilizing push-on joints with socket clamps, or mechanical joints with retainer type ring glands (mega-lugs) or self-restraining joints.

E.2.2.2.2. For casing pipe crossings under roadways, railroads, or other installations not within the jurisdiction of Pasco County, the Contractor shall comply with the regulations of the authority regarding design, specifications, and construction. State highway casing installations must be as specified in the Florida Department of Transportation, "Utility Accommodation Guide"; and for railroads, the American Railway Engineering Association, Part 5, Section 5.2, "Specifications for Pipelines Conveying Nonflammable Substances", is applicable. However, in no case may the minimum casing pipe diameter and wall thickness, for a specific carrier pipe size, be less than

that specified under Subsection E.2.2.2.1.

E.2.2.2.3. The boring and jacking operations must be done simultaneously, with continuous installation, until the casing pipe is in final position. Correct line and grade must be carefully maintained. Add-on sections of casing pipe must be full-ring welded to the preceding length, developing watertight total pipe strength joints. The casing installation must 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, masonry plugs must be installed at each open end. These plugs must be suitable for restraining the external earth load, while allowing internal drainage.

E.2.2.2.4. Casing pipe holes must be mechanically bored through the soil by a cutting head on a continuous auger mounted inside the pipe. The auger must extend a minimum distance beyond the end of the casing pipe to preclude formation of voids outside of the pipe shell.

E.2.2.2.5. The casing pipe must be adequately protected to prevent crushing or other damage under jacking pressures. Backstops must 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, if not in the hole, must be replaced; however, if inserted, the encasement pipe may be abandoned in place, grouted full, and suitably plugged, and an alternate installation made.

E.2.2.2.6. Required boring and jacking pits or shafts must be excavated and maintained to the minimum dimension. The excavations must be adequately barricaded, sheeted, braced, and dewatered, as required, in accordance with the applicable portions of Section E.2.1, "Utility Excavation, Trenching, and Backfilling", and OSHA requirements.

E.2.2.3. CARRIER PIPES

Water and reclaimed water mains, and wastewater force mains carrier pipes to be installed within the specified casings must be DR 14 AWWA C900 PVC (ductile iron pipe shall only be used where required for water and reclaimed mains), equipped with restrained joint connections. Pipe and fittings must comply with the applicable provisions of these Standards, with minimum Ductile Iron Pipe Class 50. Stainless steel, galvanized, or epoxy-coated casing spacers specifically designed for the size and diameter of the respective casing and carrier pipe must be installed in accordance with the manufacturer's requirements.

Carrier pipes shall be supported within the casing pipe with spacers installed according to manufacturer specifications. Spacers shall be made of High Density Polyethylene (HDPE) or Stainless Steel Spacers shall be of appropriate length to secure pipe within the casing to prevent floating of the carrier pipe should the casing become filled with water. Casing spacers shall fasten tightly onto the carrier pipe to prevent movement during installation. The span between spacers should result in conservative long-term load safety factors with the carrier pipe full of fluid. The manufacturer shall provide the load carrying capabilities of the spacer assembly and maximum spacing shall conform to the manufacturer’s recommendations.

SECTION E.2.3

HORIZONTAL DIRECTIONAL DRILLING

E.2.3.1. GENERAL

E.2.3.1.1. The provisions of this section are the minimum standards for the installation of utility pipes by the horizontal directional drilling (HDD) method, which is also referred to as directional drilling or guided horizontal boring.

E.2.3.1.2. In general, HDD installations are not allowed as a methodology to cross under County roadways or state highways in Pasco County, even if allowed by the FDOT. At the sole discretion of the PCU director or designee, HDD may be used to cross wetlands, canals, non-County or state roadways (i.e. private roadways) and driveways, or areas within public rights-of-way where the existence of other utilities makes it difficult to install piping using open trench methods.

E.2.3.1.3. HDD installations are allowed for pressurized mains and are not allowed for gravity mains.

E.2.3.1.4. HDD may be used to install PVC, ductile iron, and HDPE pressure mains. Ductile iron may be used only where required for water and reclaimed water mains. HDPE and PVC may be used for water, reclaimed water, and wastewater mains.

E.2.3.1.5. In general, HDPE may only be used in areas where conditions preclude or limit future service, as taps of HDPE pipe, once installed, are strongly discouraged. HDPE installations may be tapped only at the sole discretion of the PCU Director or designee. In no case may heat fused saddles be used.

E.2.3.1.6. It is the responsibility of the Engineer to submit the necessary permit documents and data to the appropriate authority and receive approval thereof.

E.2.3.2. DESIGN AND CONSTRUCTION

E.2.3.2.1 Piping installed by HDD must be located at suitable approved alignments to eliminate possible conflict with existing or future utilities and structures, with a minimum 36-inch depth of cover between the top of the pipe and the ground, private roadway, or drive surface; or in the case of such installations within the FDOT right-of-way, the depth of cover must be as specified in the FDOT Utility Accommodation Manual, latest edition.

E.2.3.2.2. For subaqueous crossings, a minimum cover of five feet must be maintained over the pipe.

E.2.3.2.3. HDD installations may use compound curvatures, but must not exceed maximum deflections, as set forth by the pipe manufacturer or AWWA Standards, whichever is the most stringent.

E.2.3.2.4. The pipe entry angle for HDD installations must not exceed 15 degrees. Exit angles must be between 6 and 12 degrees to facilitate pullback. Entry angle and exit angle must not exceed manufacturer's recommendations on deflection, angle, or radius of curvature.

E.2.3.2.5. Where HDD installations are proposed, the design drawings must include a cross section drawn to scale showing the bore path and all existing utilities within the directional drill corridor.

SECTION E.2.4

PIPE, FITTINGS, VALVES, AND APPURTENANCES

E.2.4.1. GENERAL

E.2.4.1.1. This section includes the material and installation standards for pipe, fittings, valves, and appurtenances, as applicable to sewerage and water installations.

E.2.4.1.2. The data included herein generally makes no reference to the service utilization for the item specified (except that ductile iron pipe must not be used for wastewater applications) and are to be used as the standards for approved materials indicated under specific facility installations, as set forth in other sections.

E.2.4.1.3. Required specialty items not included under this section must be high quality and consistent with approved standards of the industry for the applicable service installation.

E.2.4.2. PIPE AND FITTINGS

E.2.4.2.1. General: All pipe and fittings must be clearly marked with the name or trademark of the manufacturer, the batch number, the location of the plant, and strength designation, as applicable. Weight and class designation, as applicable, must also be legibly marked on the exterior surface of every pipe and fitting. Use of pipes of 10-inch and 14-inch diameter is prohibited for use in pressure piping systems. For pipe installations where pipe diameters greater than 16-inch are required to meet project hydraulic criteria, the Contractor must obtain PCU approval of the specific diameter chosen to ensure the pipe is readily available in the local market and is consistent with installed infrastructure. All pipes must be laid with a two-inch metallic tape, appropriately color coded and imprinted with the type of service, 12 inches to 18 inches below final grade, directly above the utility for identification and ease of location. The appropriate tape color codes and imprinted messages are as follows:

Green – Marked “Sewer Main Buried Below”
Blue – Marked “Water Main Buried Below”
Purple – Marked “Reclaimed Water Main Buried Below”

In addition, all non-metallic piping must be installed with tracer wiring meeting the requirements of this section and installed pursuant to the details included in this manual.

E.2.4.2.2. Ductile Iron, General:

E.2.4.2.2.1 Pipe: Pipe must conform to ANSI/AWWA C151/A21.51, *Ductile Iron Pipe, Centrifugally Cast for Water,* Class 50 (minimum), unless heavier class is required for the conditions. Ductile Iron Pipe (DIP) must be marked with a color-coded stripe or adhesive tape (blue for water, purple for reclaimed water). If tape is used, it must be a minimum of 2 inches wide, vinyl, and at least 4.5 mils thick.

E.2.4.2.2.2. Fittings: DIP fittings must be mechanical joint and restrained and must conform to ANSI/AWWA C153/A21.53 *Ductile Iron Compact Fittings for Water Service*, 250 psi minimum pressure rating. DIP fittings for potable water must bear the approval seal of the National Sanitation Foundation (NSF) for potable water pipe.

E.2.4.2.2.3. Joints:

(a) "Push-on" Joints must be single-seal gasket push-on type joints conforming to the requirements of ANSI/AWWA C111/A21.11, Rubber Gasket Joints for Ductile Iron Pressure Pipe and Fittings.

(b) Mechanical joints must consist of a bell, socket, gland, gasket, bolts and nuts and must conform to ANSI/AWWA C111/A21.11. Bolts must be high-strength, low-alloy steel, T-head type having hexagonal nuts; bolts and nuts must be machined true and nuts must be tapped at right-angles to a smooth bearing surface.

(c) Restrained joint assemblies with mechanical joint pipe must conform to the requirements of ANSI/AWWA C111/A21.11 and must be coupled with retaining-type ring glands as manufactured by EBBA, "Mega-Lug", or approved equal.

(d) Restrained "push-on" joint pipe must be designed and manufactured by American Ductile Iron Pipe Company "T. R. Flex" or approved equal.

(e) Flexible-type joints must be of the boltless type, with a maximum allowed joint deflection of 15 degrees, and must be "Flex-Lok" as manufactured by American Cast Iron Pipe Company or approved equal.

(f) Flanged pipes and connections, including all bolts, nuts, and gaskets, must be in accordance with ANSI/AWWA C115/A21.15.

(g)

E.2.4.2.2.4. Coatings and Linings:

(a) Ductile iron pipe and fittings for water and reclaimed main service must receive an exterior asphaltic coating conforming to ANSI/AWWA C151/A21.51 and must be cement mortar lined in accordance with ANSI/AWWA C104/A21.4, *Cement-Mortar Lining for Ductile Iron Pipe and Fittings for Water.*

(b) Ductile iron fittings for wastewater force main service must receive an exterior asphaltic coating and must be lined with ceramic epoxy lining conforming to ASTM A716/A746. Lining must be American Protecto 401 or equal as approved by PCU.

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

E.2.4.2.3. Polyvinyl Chloride (PVC): Water Mains, Reclaimed Water Mains, and Force Mains

(a) PVC will normally be acceptable for sewer force mains, reclaimed water mains and water mains of all sizes. Alternate pipe material may be specified by PCU if conditions so warrant.

(b) PVC pipe exceeding 3-inch diameter must meet the requirements set forth in AWWA C900. PVC pipe used for potable water service must bear the National

Sanitation Foundation seal for potable water pipe. 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 intended for potable water service must be assembled with nontoxic lubricant.

(c) Design working pressure and general specifications:

Pipe Diameter (inches)	Design Working Pressure (psi)*	General Specifications
Water Mains & Reclaimed Water Mains -		
2" to 3"	200	ASTM D2241 SDR 21
Above 4"	235	AWWA C-900 DR 18
Force Mains -		
Above 4"	235	AWWA C-900 DR-18

*Design working pressure is as determined by ASTM or AWWA as applicable and does not represent the required test pressure for water, reclaimed water, or wastewater pipe installations.

(d) Pipe color coding:

Green	-	Sanitary sewer force mains and gravity mains
Blue	-	Potable water mains
Purple	-	Reclaimed water mains

E.2.4.2.3.1. Connections for pipe two inches or greater in diameter must be rubber compression ring-type. Pipe must be extruded with integral thickened wall bells without increase in dimension ratio (DR). Rubber ring gaskets must consist of synthetic compounds meeting the requirements of ASTM Designation D1869 and suitable for the designated service. Other connections must be solvent welded sleeve-type joints.

E.2.4.2.3.2. ASTM D 2564 Specification for Solvent Cements for Polyvinyl Chloride (PVC) Plastic Pipe and Fittings.

E.2.4.2.3.3. Restraining joints utilizing set screws bearing directly on pipe barrel or utilizing grooves cut in pipe will not be permitted on PVC installations.

E.2.4.2.3.4. Joint restraints for C900 PVC pipe and fitting systems may be internal self-restraining type such as ReiberLok, or equal as approved by PCU or mechanical joint restraints such as Megalug, or equal as approved by PCU. Joint restraints must be rated for pressures that meet or exceed the rating of C900 PVC pipe being restrained. Gasket material must be SBR, EPDM or approved equal. Installation must be in accordance with ANSI/AWWA C605 and the restraint manufacturer's recommendations.

E.2.4.2.4. High Density Polyethylene (HDPE): Water Mains, Reclaimed Water Mains, and Force Mains

E.2.4.2.4.1. HDPE pipe is acceptable in locations where HDD installations are allowed. Refer to Section E.2.3, "Horizontal Directional Drilling"

E.2.4.2.4.2. Materials and Installation.

(a) HDPE pipe and related fittings must be made with prime virgin resins exhibiting a minimum cell classification as defined in ASTM D3350 and meeting the PE 3408 code designation. The maximum dimension ratio for HDPE pipe for potable water, wastewater, and/or reclaimed water is Dimension Ratio 11.

(b) HDPE pipe must be joined by means of zero leak-rate butt fusion (thermal heat) welds. Joints must provide axial pull-out resistance. Pipe must meet the requirements of ANSI/AWWA C906 and have an outside diameter dimension of ductile iron pipe.

(c) HDPE pipe must have been continuously marked by the manufacturer with permanent printing indicating at a minimum the following information:

- Nominal size (inches);
- Dimension ratio (DR);
- Pressure rating (psi);
- Trade name;
- Material classification (PE 3408);
- Plant, extruder, and operator codes;
- Resin supplier code;
- Date produced; and
- HDPE pipe used for potable water mains must bear the NSF Seal of Approval.

(d) Pipe color coding: HDPE pipe must be black in color with permanent color-coded stripes extruded into the pipe length or must be one solid color, per the applicable service, as follows:

Green	-	Sanitary sewer force mains
Blue	-	Potable water mains
Purple	-	Reclaimed water mains

(e) Installation curvature: installation curvature radii must not be less than that specified by the manufacturer based upon the outside pipe diameter.

(f) Refer to Section E.2.3, "Horizontal Directional Drilling."

E.2.4.2.5. Polyvinyl Chloride (PVC): Gravity Sewer Pipe must meet the following requirements:

(a) ASTM D-1734 and ASTM D-1784 Specifications for Rigid Polyvinyl Chloride Pipe Compounds.

(b) ASTM D-3034-73 and ASTM D-789 Specifications for (PVC) Plastic Pipe Bell and Spigot.

(c) ASTM D-3212 flexible gasketed joints for PVC sewer compression-type. The gasket must comply with ASTM F-477.

(d) All gravity sewer pipe installations must be SDR 26 conforming to the specifications listed above except for gravity sewer piping situated in an easement between houses. For such installations, AWWWA C900, DR 18 PVC piping must be employed.

E.2.4.2.6. Polyethylene Plastic Services: Water and Reclaimed Water must meet the following requirements:

(a) All main line taps must be made using either double strap cast iron service saddles or full circle brass service saddles.

(b) Corporation stops must be provided with all service saddles and taps.

(c) All one-inch service lines must be of SDR 9, 200 psi rated high molecular density polyethylene tubing - C.T.S. size (ASTM D-2737). Double services must be one-inch tubing. Single services must be 3/4-inch tubing of same specification. Water tubing must be blue in color or must be identified with a blue stripe and the words “Potable Water” imprinted at regular intervals. Reclaimed water tubing must be purple in color (Pantone Purple 522C) or identified with a purple stripe with the words “Reclaimed Water” imprinted at regular intervals.

(d) All 3/4-inch and one-inch service lines crossing under any road rights-of- way or permanently paved or concreted areas must be provided with a two-inch Schedule 40 or SDR 21 PVC casing. Casing must extend a minimum of two feet on either side of pavement.

(e) One-inch double service lines must terminate in a 3/4-inch X 3/4-inch X 1- inch compression brass wye.

(f) All service "pigtails" must be 3/4 poly tubing four foot in length terminating at property line corners.

(g) All "pigtails" must be provided with 3/4-inch brass ball valves with locking wings. Ball valves to be 3/4 CTS compression X 3/4-inch FIP.

(h) All fittings and stops must be of high-quality water works brass. No PVC fittings or adapters will be permitted.

(i) Pipe or tubing must comply with AWWA C901, ASTM D-2239 (Pipe), and D- 2737 (Tubing), be approved for potable water service by the National Sanitation Foundation and bear the NSF seal. The product must be rated for a minimum working pressure of 150 psi, and must be manufactured by ENDOT Industries, Inc., or approved equal. Fittings must be brass, equipped with compression-type connections, "Mac-Pak", as manufactured by A. Y. McDonald Mfg. Co., Dubuque, Iowa, or approved equal.

E.2.4.2.7. Special Items:

E.2.4.2.7.1. Expansion Joints: Pipe expansion joints must be suitable for the applicable service with a minimum 150 psi working pressure and must be manufactured by Ford, AY McDonald, or an approved equal.

E.2.4.2.7.2. Flanged Coupling Adapters: Units must be compatible with ANSI Standard B16.1, 125 lb. flanges.

E.2.4.2.7.3. Cast Couplings: Units must be manufactured by Ford Meter Box or approved equal. Gaskets must be suitable for the applicable service conditions.

E.2.4.2.7.4. Sleeves and Wall Pipes: Units must have integral annular ring water-stops, and conform to other requirements for cast iron fittings specified in this section. Sleeves and wall pipes to have laying length and ends required for proper installations must be "Link-Seal" or approved equal.

E.2.4.2.7.5. Tapping Saddles: Units must be fabricated of ductile iron or epoxy-coated steel with stainless steel hardware and suitable for either wet or dry installation and must be manufactured by Mueller Co., JCM Industries, or approved equal. The sealing gasket must be the "O"-Ring type suitable for the applicable service. Tie straps and bolts must be a corrosion resistant alloy steel.

E.2.4.2.7.6. Tapping Sleeves and Crosses: Units must be manufactured by JCM Industries, or an approved equal, flanged outlet, AWWA C207, ANSI 150 lbs., drilling recessed for tapping valve. Finish must be fusion applied epoxy, AWWA C213-79.

E.2.4.2.7.7. Service Saddles: Saddles must be manufactured by Mueller Co., JCM Industries, or approved equal. Saddles for pipe six inches and greater in diameter must be double strap. Saddles for pipe four inches and less in diameter must be the brass full-circle-type. Sealing gaskets must be suitable for the applicable service and straps must be corrosion resistant alloy steel.

E.2.4.2.7.8. Polyethylene Encasement: Encasement must comply with ANSI/AWWA C105/A21.5, "Polyethylene Encasement for Gray and Ductile Cast Iron Piping for Water and Other Liquids".

E.2.4.2.7.9. Tracer wire: All non-metallic pipe must be installed with two (2) insulated 10-gauge, locating wires with color-coded coating (water = blue; wastewater = green; reclaimed water = purple) attached at 10:00 and 2:00 o'clock positions. Materials specifications for wires must be appropriate for the type of installation, in accordance with the following:

(a) Open trench installation – Copperhead, or approved equal, copper-clad steel 10-AWG high strength, high carbon with minimum 450-lb break load, minimum 30 mil HDPE insulation thickness;

(b) Directional drilling/boring – Copperhead, or approved equal, copper-clad steel 10-AWG Extra High Strength, with minimum 1,150-lb break load, minimum 45 mil HDPE insulation thickness;

(c) Pipe bursting – Copperhead, or approved equal, 7X7 stranded copper-clad steel, with minimum 4,700-lb break load, minimum 50 mil HDPE insulation thickness.

(d) Tracer wire Installation must conform to the following:

- locating wires must be attached using two-inch minimum width duct tape affixed at every joint and at four-to-five-foot intervals;
- locating wires must terminate at valve box test stations with four feet (minimum) of coiled ends (pigtails) folded back inside the PVC access pipe; a continuity test must be performed by the contractor in the presence of the Engineer and PCU inspector;
- tracer wire splices must be made using an "Underground Direct Burial Splice Kit" by Tuhorse, Kit #SK4C101214, or approved equal;
- where a valve's location falls within a paved road, wires must be continuous to the next valve outside the pavement;
- (e) wires must be installed on terminal water lines leading to fire hydrants; wire access at the hydrant valve must be provided when the hydrant is more than 10 feet from the water main.

E.2.4.3. VALVES

E.2.4.3.1. General: The valve type, size, rating, flow direction arrow, if applicable, and manufacturer must be clearly marked on each unit. Valves must open left (counterclockwise), with an arrow cast in the metal of operating handwheels and nuts indicating the direction of opening. NOTE: Valves that open right/close left are specifically prohibited. In addition, butterfly valves and plug valves are specifically prohibited.

E.2.4.3.2. Gate Valves (GV):

E.2.4.3.2.1. Underground Service (General): Valves two inches and larger must be iron body, bronze-mounted, conforming to AWWA C-509 or C-515, resilient wedge, non-rising stem-type, and must be equipped with two-inch square cast iron wrench nuts. Valves two inches through three inches can be FIP-threaded connections. Valves four inches and over must be mechanical joint connections. Acceptable brands are Clow, American Valve, U.S. Valve, and Golden Anderson.

E.2.4.3.2.2. Aboveground Service (General): Valves must be iron body, bronze-mounted resilient wedge gate valves, conforming to AWWA C-509 or C-515. Valves must have cast aluminum or cast-iron hand wheels.

E.2.4.3.2.3. Tapping Valves: Valves must conform to the specifications set forth under Subsections E.2.4.3.2.1 and E.2.4.3.2.2 for the applicable service conditions. Additionally, units must be compatible with the connecting sleeve or saddle and specially designed for wet tapping installation operations.

E.2.4.3.2.4. Valves Less Than Two Inches: Valves must be bronze, wedge disc, non-rising stem-type, 150 psi minimum working pressure, equipped with wrought steel or cast aluminum operating hand wheels.

E.2.4.3.2.5. Actuators: Valves 16 inches and larger must be equipped with approved gearing actuators, with sealed enclosures for buried or submerged service, and must be furnished by the valve manufacturer. Position indicators must be furnished as required.

E.2.4.3.3. Check Valves (CV):

E.2.4.3.3.1. General Service: Water valves must be iron body, bronze-mounted, stainless steel hinge pin, outside lever and spring operated, swing non-slam-type, and equipped with removable inspection covers. Units must be rated for 150 psi minimum working pressure and must permit full flow area equal to that of the connecting pipe. Valves must be manufactured by M & H Valve and Fittings Company, Anniston, Alabama, or approved equal. Sewer valves must be lever and weight type.

E.2.4.3.3.2. Valves Two Inches and Smaller: Valves must be bronze body and disc, swing check-type, with removable inspection covers, and rated for 150 psi minimum working pressure.

E.2.4.3.4. PVC Ball Valves: Polyvinyl chloride (PVC) ball valves must be provided, as required, for chemical service installations and must be full port area, No. 8903, manufactured by Walworth Company, or approved equal.

E.2.4.3.5. Corporation Stops and Curb Stops: Units must be brass, equipped with connections compatible with the connecting service pipe-type; must have pack joint type connections for polyethylene tubing with locking collars.

E.2.4.3.6. Sluice Gates: Gates and appurtenances must comply with the provisions of AWWA Standard C501, "Sluice Gates." Type of gate design, materials of construction, method of operation, and other special considerations must be as required for the specific installation and service condition.

E.2.4.3.7. Air Release Valves - Air and Vacuum Valves:

E.2.4.3.7.1. Sewer Service: Valves must be specially adapted for raw sewage service, with stainless steel or composite body and corrosion-resistant polymer or stainless-steel parts, with minimum 150 psi working pressure. Valves must be combination type for wastewater service and must be Model No. D-025, complete with accessories, manufactured by A.R.I. USA, Inc., or equal approved by PCU. Valves must have a minimum inlet size of two inches.

E.2.4.3.7.2. Water Service: Valves must be composite body, suitable for domestic water service, rated for a minimum 150 psi working pressure, appropriately sized for the application, and must be Model D-040 manufactured by A.R.I. USA, Inc., or equal as approved by PCU. Valves must have a minimum inlet size of one inch.

E.2.4.3.7.3. Reclaimed Water Service: Valves must be composite body, suitable for reclaimed water service, rated for a minimum 150 psi working pressure, appropriately sized for the application, and must be Model D-021 manufactured by A.R.I. USA, Inc., or equal approved by PCU. Valves must have a minimum inlet size of two inches.

E.2.4.3.8. Special Items:

E.2.4.3.8.1. Valve Boxes: Units must be adjustable, ductile iron, slip-type, minimum interior diameter of five inches, with covers cast with the applicable inscription in legible lettering on the top: "SEWER", "WATER", "REUSE", and must be of the color specified in Subsection E.2.4.2.1.

Boxes must be suitable for the applicable surface loading and valve size, and must be manufactured by Clow Corporation, M & H Valve and Fitting Company, U.S. Foundry and Mfg. Corporation, or approved equal. For valve boxes located in paved areas, the concrete collar ring must be constructed of Type I (3000 psi) concrete.

E.2.4.4. INSTALLATION

E.2.4.4.1. General Requirements:

E.2.4.4.1.1. Piping, fittings, valves, and appurtenances must be installed in accordance with these Standards and with the manufacturer's recommendations for the applicable service.

E.2.4.4.1.2. Piping must be installed along straight line and grade between fittings, manholes, 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 must receive prior approval from the Engineer and all resulting design conflictions must be resolved by the Engineer prior to proceeding. Pipe joint deflection must not exceed the manufacturer's recommendation.

E.2.4.4.1.3. Materials must be cleaned and maintained clean, with all coatings protected from damage. The interior of the pipe must be free of dirt and debris, and when work is not in progress; all open ends must be plugged.

E.2.4.4.1.4. Pipe, valves, fittings, or other items must be inspected prior to installation and any items showing a fracture or other defect must be rejected. Additionally, any pipe or fitting which has received a severe blow that may have caused an incipient fracture, even though not visible, must also be rejected. However, ductile iron pipe showing an end crack, with no fracture indicated beyond that visible, may be salvaged by cutting off the damaged section 12 inches past, provided the remaining pipe is sound.

E.2.4.4.1.5. Underground piping must not be driven to grade by striking it. When the pipe has been properly bedded, enough compacted backfill must be placed to hold the utility in correct alignment. If necessary, precaution must be taken to prevent flotation.

E.2.4.4.1.6. Jointing must be by the manufacturer's approved method and must not require undue force to accomplish full satisfactory seating and assembly. Connections at structures must be cut accurately and worked into place without forcing and must align with the connecting point. Flanged joints must be made up tight, but with care taken to prevent undue strain upon equipment or other items. Suitable flange filler rings must be installed where required to provide suitable joints. The installation must be permanently watertight, with no visible leakage at joints, connections with structures, or other locations, under operational or testing conditions. Material that in jointing does not remain completely seated and/or watertight must be rejected.

E.2.4.4.1.7. Underground pressure piping systems must employ restrained joints wherever the pipe alignment changes direction. The length of pipe on each side of the change in direction or other fitting that is to be restrained must be in accordance with the Restrained Joint Tables contained within the details included in this manual. Details G10 and G11, latest revision, must be used. Concrete thrust blocks are not allowed.

E.2.4.4.1.8. Exposed systems must be supported as necessary to hold the piping and appurtenances in a firm, substantial manner to the required lines and grades indicated, with no undue piping stresses transmitted to equipment or other items. Piping within buildings must be adequately supported from floors, walls, ceilings, or beams. Supports from the floor must be by

suitable saddle stands or piers. Piping along walls must be supported by satisfactory wall brackets, or saddles, or by wall brackets with adjustable hanger rods. For piping supported from the ceiling, approved rod hangers of a type capable of screw adjustment after erection of the piping must be used. Pipe aboveground outside of buildings must be supported on concrete supports or pre-manufactured adjustable pipe supports.

E.2.4.4.1.9. Proper provision for pipe expansion or contraction must be provided by installation of expansion joints or other suitable methods. Additionally, flexible connections must be provided to expedite equipment or piping system removal.

E.2.4.4.1.10. Subaqueous pipe laying may be permitted where conditions make it impractical to lay pipe "in the dry," provided the Contractor submits his plans for laying pipe under water to the Engineer and obtains advance approval thereof. All subaqueous crossings must be made in accordance with all approved permits.

E.2.4.4.2. Ductile Iron Pipe (DIP): Installation must be performed in accordance with the applicable provisions of AWWA Standard C600. The opening cut in the pipe wall for installation of tapping saddles and sleeves must be made by a special tapping machine designed for this specific service. All pipe cutting must be accomplished by power-operated abrasive wheel or saw cutters, or other methods approved by the pipe manufacturer. Where required, Polyethylene Encasement must be installed as set forth under AWWA C105.

E.2.4.4.3. Polyvinyl Chloride (PVC) Pipe: Lubrication and/or solvent used for pipe and fitting joints must be nontoxic (NSF approved for potable water). Following installation, solvent-type joints must not be disturbed for five minutes and must not have internal pressure applied for 24 hours, or as recommended by the pipe manufacturer.

E.2.4.4.4. Valves:

E.2.4.4.4.1. General: Valves must be carefully inspected, opened wide, and then tightly closed, and all the various nuts and bolts thereon must be tested for tightness. Special care must be taken to prevent joint materials, stones, or other substances from becoming lodged in the valve seat. Valves, unless otherwise required, must be set with their stems vertically above the centerline of the pipe. Any valve that does not operate correctly must be adjusted to operate properly or removed and replaced.

E.2.4.4.4.2. Buried valves must be installed vertically where depth of cover permits. Where depth of cover does not permit, the valves must be mounted horizontally and provided with 90-degree adapters to allow vertical operation. Extension stems must be provided on all buried valves when the operating nut is deeper than three feet below the final grade, with sufficient stem extension to place the nut not more than three feet below grade. Where extension stems are required within valve boxes, approved insert stem guides must be provided. All valve locations must be marked on the roadway or curb with a neatly painted four-inch by six- inch stripe. Paint must be of a type recommended for exterior concrete surfaces. Color must correspond to the requirements of Subsection E.2.4.2.1.

E.2.4.4.4.3. Valve boxes must be carefully centered over the operating nuts of underground valves to permit a valve wrench to be easily fitted to the nut. The tops of valve boxes must be set to the required grade. The valve box must not transmit surface loads directly to either the pipe or valve. Care must be taken to prevent earth and other material from entering the valve boxes. Any valve box that becomes out of alignment or is not to grade must be dug out and adjusted. Concrete pads must be provided around boxes, two feet by two feet by six inches, with data plates providing information as to valve type and size.

Where floor stands and/or extension stems are required for exposed valves, adjustable wall brackets and extension stems must be furnished. Brackets must not be more than six feet apart, unless otherwise approved by the Engineer with floor stands and guides set so that the stems must run smoothly and in true alignment. Stands and guides must be firmly anchored to the concrete.

SECTION E.2.5

GENERAL PROVISIONS

E.2.5.1. GENERAL

The provisions of this section are to be applied, where relevant, to all sewerage and water facility installations, where Pasco County is the owner.

E.2.5.2. RELATED STANDARDS

The technical requirements included within Section E.2 are applicable to all sewer and water facility construction and/or modification, unless specifically indicated otherwise within Sections E.3 and E.4.

E.2.5.3. GENERAL REQUIREMENTS

E.2.3.1. Equipment Installation: All equipment must be installed satisfactorily and properly for the specified service, and in accordance with the manufacturer's recommendations. All required piping, electrical connections, and other necessary items must be furnished and connected in order to provide a complete operating facility.

E.2.5.3.2. Modifications to Existing Equipment: Should modifications to existing County equipment be required in order to achieve the required operational facility, the Engineer shall coordinate all designs and construction procedures with PCU and receive advance approval therefrom. Additionally, the Engineer shall consult with, and obtain the written recommendations of, the existing equipment manufacturer regarding any such modifications, and include all such information in the approval presentation.

E.2.5.3.3. Salvage: Existing equipment and materials that are to be removed during the course of modification work, including pumps, motors, and pump parts; pipe, valves, and fittings; electrical and control parts; and other salvageable items, will remain the property of Pasco County. The Contractor shall be responsible for transporting salvaged items to the storage area designated by the County. Special care must be taken for the protection and elimination of damage to the items. Material must be cleaned prior to delivery to the County.

E.2.5.3.4. Equipment Operating Tests: Following the installation and final adjustment, all equipment must be test operated under normal and full load conditions for a period of not less than two hours. Any faults or deficiencies that may appear must be promptly corrected and the system retested for satisfactory operation. The tests must be performed in the presence of the authorized representative from PCU and the Project Engineer. After completion of unit operating tests, the completed facility must be placed "on stream" and tested in operation under normal conditions for a period of not less than five days to test the suitability of each type of equipment and control, and to demonstrate that each item was properly installed, adjusted, and is functioning in accordance with requirements. During this period, the Contractor shall instruct

designated employees of the County in the proper care, operation, and maintenance of all equipment and materials. The Contractor shall furnish all electricity, gas, lubricants, water, and other materials required to make tests and shall replace or repair all material or equipment found to be defective or deficient. Timing and performance of tests must be coordinated with PCU.

E.2.5.3.5. Manufacturer Supervision: The Contractor shall require manufacturers furnishing primary equipment to provide the services of a qualified technical representative for such periods as are necessary to supervise proper installation; perform final adjustments and testing for the operational system; and instruct operating personnel in the use of the equipment. The manufacturer must certify in writing to PCU as to the correct installation and operation of their equipment.

E.2.5.3.6. Operating Instructions and Parts Lists: The Contractor shall furnish, for each piece of operating equipment, three complete, neatly bound sets giving the information listed below:

(a) Clear and concise instructions for the operation, adjustment, and lubrication and other maintenance of the equipment. These instructions must include a complete lubrication chart.

(b) List of all parts for the equipment, with catalog numbers and other data necessary for ordering replacement parts.

SECTION E.3.

SANITARY SEWER FACILITIES

SECTION E.3.1

SANITARY GRAVITY SEWERS

E.3.1.1. GENERAL

E.3.1.1.1. This section includes general technical criteria for the design and installation of sanitary gravity sewer systems.

E.3.1.1.2. The relevant provisions included in Section B, "Technical Requirements" are applicable to this section, unless otherwise indicated herein or changed in writing by the Director or designee.

E.3.1.2. DESIGN STANDARDS

E.3.1.2.1. Refer to Appendices B and C, “Design Criteria,” and “Design Report Calculations,” respectively, for system design standards and requirements.

E.3.1.3. STANDARD REQUIREMENTS

E.3.1.3.1. General: The materials of construction and general installation procedures must comply with the specific applicable standards set forth under Section E.2.1, "Utility Excavation, Trenching, and Backfilling", Section E.2.3, “Horizontal Directional Drilling”, and Section E.2.4, "Pipe, Fittings, Valves and Appurtenances", as well as Appendix F, “Utility Construction Details.”

E.3.1.3.2. Approved Pipe: Pipe materials must be as indicated in Section E.2.4, “Pipe Fittings, Valves, and Appurtenances.”

E.3.1.3.3. Sanitary Sewer Manholes: Manholes must be precast concrete, as detailed. Alternate manhole materials and designs must receive prior approval from the Engineer. The minimum inside diameter of manholes must be 48 inches for sewer sizes to 21 inches in diameter or less, with submittal of special designs for larger pipes.

E.3.1.3.3.2. Precast reinforced manholes must be in accordance with ASTM Designation C478, with preformed flexible plastic joint sealer conforming to Federal Specification SS S-210A - (GSA-FSS), "Ram-Nek", manufactured by the Henry Company of El Segundo, California, or approved equal. Installation of precast manholes must comply with the details shown in Appendix F, "Utility Construction Details" and in accordance with the manufacturer's recommendations.

E.3.1.3.3.3. Manhole frames and covers must be fashioned from compression molded reinforced composite polymer material, except when they within the pavement area. The covers must be black and must be marked with the word “SANITARY.” The cover must withstand a traffic load of 50,000 pounds and must be tested in accordance with AASHTO M-306. If the frames and covers are within the pavement area, manhole frames and covers must be grey cast iron or ductile iron heavy-duty conforming to ASTM Designation A48, Class 30, and must be U.S. Foundry and Manufacturing Corp. or approved equal. Covers must have no perforations and must be marked with the word "SANITARY." Sewer frames and covers must be fully

bedded in mortar to the correct finish grade elevation, with adjustment brick courses placed below, as detailed, for precast manholes. Frames must be suitable for the future addition of cast iron rings for upward adjustment of top elevation. All frames and covers must meet HS20-44 load requirements.

E.3.1.3.3.4. Manhole flow channels must be as shown in Appendix F, "Utility Construction Details" with smooth and carefully shaped bottoms, built-up sides and benching constructed from concrete. Channels must conform to the dimension of the adjacent pipe and provide changes in size, grade, and alignment evenly.

E.3.1.3.3.5. Except for manholes requiring lining, the interior and exterior surfaces of all manholes must be protected by the application of acrylic coatings Conseal CS-55 or Protech EW-1 Aquapoxy or an approved equal applied at the (minimum coating rate/thickness recommended by the product manufacturer). This includes walls, chimneys, floors, benches, invert channels, lids, and all joints after grouting. Surface preparation and paint application must comply with the manufacturer's recommendations. Coal tar is not allowed.

E.3.1.3.3.6. For those manholes that are required to be lined pursuant to the Design Criteria in Appendix B of this Technical Manual, the Contractor shall use a geopolymer lining material such as GeoKrete by Quadex, LLC of Houston, TX, or approved equal. Lining material may be centrifugally cast, manually sprayed, or hand troweled. The minimum thickness of the geopolymer liner system must be one inch and must be finished such that when the liner sets, the total wall thickness is homogeneous and monolithic. The minimum compressive strength of the lining system must be 8,000 psi at 28 days, and it must exhibit sufficient chemical resistance to sulfuric acid at a pH of 1.0 such that material loss is a maximum of 2% at 8 weeks in accordance with ASTM C267. Substrate preparation and liner application must be in accordance with manufacturer’s instructions.

E.3.1.3.3.7. Where additional pipe connections or modification of existing factory-made openings are required on new or existing precast concrete manholes, all cutting relative thereto must be performed only by abrasive wheel saw, and the portion of the existing structure to be removed must be confined to the smallest opening possible, consistent with the work to be done. The perimeter of all such perforations must not be closer than 12 inches to a barrel section joint. It is specifically noted that such connections to existing manholes must be installed in accordance with the details for new units shown in Appendix F, "Utility Construction Details." A flexible, resilient, watertight connector must be installed prior to pipe insertion into the manhole, such as “Kor-N-Seal” by Trelleborg Group, or approved equal. Any penetrations to a manhole liner or coating must be properly sealed. All repairs to the existing manhole invert, including any reshaping of the invert channel, must be done in a manner satisfactory to the PCU inspector.

E.3.1.3.3.8. The exterior of all manhole barrel section joints must be wrapped with Boa-Tape Extra Grip Infiltration Taping Seal System by GPT, 12 inches in width, centered on the joint, 12 inches in width. Boa-Tape must also be wrapped around the manhole frame and top of the cone section at a width of 12 inches as depicted in Appendix F, Utility Construction Details. The selected joint wrap must be installed in accordance with manufacturer’s instructions.

E.3.1.3.3.9. Manholes must be designed and constructed within road rights-of- way and must be specifically located either in the pavement or within four feet of the edge of curb. In no case will manholes be located within backyard easements or any location not readily accessible to maintenance vehicles and equipment.

E.3.1.3.4. Terminal Lamp-holes: Lamp-holes are not allowed.

E.3.1.3.5. Pipe Depth and Protection: The minimum allowable cover for gravity sewers is three feet from the top of the pipe to finish grade. However, should this depth not be feasible, where grade depressions along the alignment are unavoidable, protective concrete slabs must be provided over the pipe and/or ductile iron pipe must be installed within the limits of the lesser cover. In no case may pipe cover be less than 18 inches, unless special design considerations have been approved by PCU. Where waterways, canals, ditches, County collector or arterial roads, or driveway/road crossings within FDOT right-of-way, or other special features are crossed, ductile iron casing must be installed across and to ten feet each side of the special feature. The utility carrier pipe (SDR 26 PVC Pipe) must be installed inside the casing pipe using appropriate spacers. The size of the casing pipe must be consistent with the casing requirements for boring and jacking as specified in Section E.2.2, “Casing Pipe – Boring and Jacking.” Additionally, approved utility crossing signs must be placed on the pipe alignment at each side of the waterway. Signs must be approved by PCU. Note that crossings of County or FDOT roadways, whether by boring and jacking or by open cutting are subject to permitting criteria of the applicable jurisdiction, but in no case may casing pipe sizes and thicknesses be less than those specified herein.

E.3.1.3.6. Pipe Bedding: Special care must 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 must be computed in accordance with established design criteria and special supporting bedding or facilities must be provided as required by the Engineer (see Subsection E.2.1.3).

E.3.1.3.7. Special Exterior Protection for Corrosion: Extra protection must be provided for underground cast or ductile iron pipe and fittings within areas of severe corrosive conditions. This must be accomplished by the installation of polyethylene encasement, as specified in Subsection E.2.4.2.7.8, through the area of concern. The soil test evaluation to determine the necessity for extra protection in suspect areas must be as set forth in ANSI Standard A21.5. Additionally, where other existing utilities are known to be cathodically protected, cast or ductile iron pipe crossing that utility must be protected for a distance of 20 feet to each side; and when installed parallel to and within ten feet of same, protection must also be provided.

E.3.1.3.8. Connections at Structures: Where sanitary sewers connect to structures, pipe joints must be provided at the wall face. When it is necessary to extend sewers through structures, such as conflicting elevation storm drain bypassing chambers, the pipe must be installed within a ductile casing pipe that spans the inside of the structure. The carrier pipe (SDR 26 PVC Pipe) must be installed inside the casing pipe using appropriate spacers. The size of the casing pipe must be consistent with the casing requirements for boring and jacking as specified in Section E.2.2, “Casing Pipe – Boring and Jacking”. "Link-Seal" or equal must be used at all wet well or other structure penetrations.

E.3.1.3.9. Transition Connections: Where pipes of alternate materials (VC to CI, etc.) are to be connected between manholes, suitable approved transition couplings must be installed. Couplings must be "C-T Adapters" manufactured by Can-Tex Industries, Mineral Wells, Texas, or approved equal. Special designed units may be submitted for approval; however, concrete collars are not acceptable.

E.3.1.3.10. Pipe Cutting: The cutting of ductile iron pipe for installation length adjustment, or connections for future services to existing sewers, must be in strict compliance with the methods specified in AWWA C600.

E.3.1.3.11. Service Connections: Service laterals may not empty directly into manholes. Installation must be as shown on Detail Sheet "Service Connection Details;" including the wye branches installed in the sewer main at the point of connections, and the service pipe and required fittings extend to the property line, perpendicular to the line, terminating with stoppered ends or fittings, as indicated. The minimum service pipe size is four inches in diameter for a single service and six inches in diameter for a double service. On curbed streets, the exact location for each installed service must be marked by painting a two-inch by four-inch green stripe on the concrete curb. Paint must be of a type recommended for exterior concrete. Where no curb exists or is planned, locations must be adequately marked by a method approved by PCU. The end of the service lateral must be marked with a two-inch by four-inch wooden stake or a two-inch PVC stake extending three feet aboveground and painted green. In new developments, the Developer shall cause the cleanout pipe associated with the service to be stubbed out a minimum of 2 feet above grade and capped. Service lines to buildings, once constructed, must conform to the Pasco County Plumbing Code. At time of connecting to building, the cleanout must be adjusted to finished grade and fitted with the appropriate plug/dust cap.

E.3.1.4. TESTING

E.3.1.4.1. The Contractor shall perform testing of all sanitary gravity sewers, as set forth in the following, and shall conduct the tests in the presence of representatives from PCU with two days' advance notice provided. Testing must not proceed until all facilities are complete in place and concrete is cured.

E.3.1.4.2. The installed gravity sewers must be inspected via closed circuit television (CCTV) between manholes or other structures in order to ascertain that they are clear and in correct alignment. Prior to performing the CCTV inspection, the line must be cleaned and flushed with water to permit visual review and recording of the inside wall of the line.

E.3.1.4.3. CCTV lateral inspection recordings must be delivered on a USB flash drive storage device (“thumb drive”) and must be in color. Lighting and camera quality must be suitable to provide a clear, in focus picture of the entire inside periphery of the line for all conditions encountered during the work. The camera must be capable of measuring and indicating the depth of water and width of joint separations.

E.3.1.4.4. The camera must be moved through the line at a uniform rate not exceeding 30 feet per minute. The camera must be stopped for a minimum of 5 seconds at broken or cracked pipe defects. The camera must be stopped for a full minute at any flowing connection. Camera units must have adjustable support and must be set so the camera axis is generally at the centerline of the pipe.

E.3.1.4.5. The CCTV data view display feature must be capable of showing the following information: Physical address of the property the line serves; date and time of inspection; name of company, firm or technician performing the CCTV inspection; inside diameter of line and type of pipe material; continuous footage counter accurate within 3 percent; identification of access and starting point for video inspection such as upstream cleanout and location of cleanout.

E.3.1.4.6. The preferred direction of the video inspection is forward from upstream to downstream.

E.3.1.4.7. The CCTV video must include the entire length of the line. Inability or failure to do so because of obstructions in the line, collapsed pipe, out of alignment joint offsets, or lack of acceptable access points will result in the rejection of the CCTV inspection report.

E.3.1.4.8. The CCTV video thumb drive must be legibly labeled. The label must include the following information: Title of CCTV Inspection; street address of the property to which the line serves; date of inspection; the name of the Company, Firm or Individual responsible for the CCTV Inspection.

E.3.1.4.9. Following is a listing of sample adverse pipe conditions which should be reported in the inspection report:

- Cracked Pipe (longitudinal, radial, spiral, multiple)
- Broken Pipe, Hole in Pipe, Deformed Pipe, Collapsed Pipe
- Separation in Pipe Joint
- Pipe Obstruction
- Excessive depth of water (must be less than 1")
- Infiltration (observable, evidence of, seeps into line, runs into line)
- Debris or sediment in the Pipe (flow undisturbed or disturbed, unable to continue)
- Grease (flow undisturbed or disturbed, unable to continue)
- Scaling (flow undisturbed or disturbed, unable to continue)
- Side Connections (attempt to identify)
- Cleanouts (existing or missing and location)

  (This list is not all inclusive; other adverse conditions may exist and should also be included in the report)

E.3.1.4.10. Deflection Testing: New gravity sewer mains must undergo deflection testing at the discretion of PCU. Tests must be conducted using a 92.5 percent mandrel. The mandrel must be pulled through the sewer line by hand, using a 150-pound test line. If the mandrel cannot traverse the pipe as such, then the deficiency must be corrected. Re-rounding is not permitted.

E.3.1.4.11. Smoke Testing: New gravity sewer mains may be smoke tested by PCU at the discretion of PCU. Any defects detected as a result of the testing must be promptly repaired by the Contractor.

SECTION E.3.2

SANITARY SEWER FORCE MAINS

E.3.2.1. GENERAL

E.3.2.1.1. This section includes the general requirements for installation of force main systems serving sanitary sewer pumping stations.

E.3.2.1.2. The relevant provisions set forth in Section E.2, "Technical Requirements", and shown in Appendix F, "Utility Construction Details" are applicable to this section unless otherwise indicated herein or approved by the Director.

E.3.2.2. DESIGN STANDARDS

E.3.2.2.1. Refer to Appendices B and C, “Design Criteria,” and “Design Report Calculations,” respectively, for system design standards and requirements.

E.3.2.3. STANDARD REQUIREMENTS

E.3.2.3.1. The materials of construction and general installation procedures must comply with the specific applicable standards set forth under Section E.2, "Utility Excavation, Trenching, and Backfilling", "Casing Pipe - Boring and Jacking", and "Pipe, Fittings, Valves, and Appurtenances", as well as in Appendix F, "Utility Construction Details."

E.3.2.3.2. Approved Pipe, Fittings and Valves: Materials must be as indicated in Section E.2.4, “Pipe Fittings, Valves, and Appurtenances.”

E.3.2.3.3. Joint Restraining: Pressure piping fittings and other items requiring restraint must be restrained as specified in Section E.2.4, "Pipe, Fittings, Valves, and Appurtenances" and shown in Appendix F, “Utility Construction Details.” The restraining devices must be designed for the maximum pressure condition (testing).

E.3.2.3.4. Pipe Depth and Protection: The standard minimum cover for sewer force main systems must be three feet from the top of the pipe to finish grade. However, should this design not be feasible, protective concrete slabs must be provided over the pipe and/or ductile iron pipe installed within the limits of the lesser cover. Where waterways, canals, ditches, County collector or arterial roads, or driveway/road crossings within FDOT right-of-way, or other special features are crossed, ductile iron casing must be installed across and to ten feet each side of the special feature. The utility carrier pipe (AWWA C900 PVC pipe) must be installed inside the casing pipe using appropriate spacers. The size of the casing pipe must be consistent with the casing requirements for boring and jacking as specified in Section E.2.2, “Casing Pipe – Boring and Jacking.” Additionally, approved utility crossing signs must be placed on the pipe alignment at each side of the waterway. Signs must be approved by PCU. Note that crossings of County or FDOT roadways, whether by boring and jacking or by open cutting are subject to permitting criteria of the applicable jurisdiction, but in no case may casing pipe sizes and thicknesses be less than those specified herein.

E.3.2.3.5. Connections at Structures: Where pipes connect to structures, pipe joints must be provided at the wall face. When it is necessary to extend force mains through structures, such as conflicting elevation storm drain bypassing chambers, the pipe must be installed within a ductile iron casing pipe that spans the inside of the structure. The carrier pipe (AWWA C900 PVC Pipe) must be installed inside the casing pipe using appropriate spacers. The size of the casing pipe must be consistent with the casing requirements for boring and jacking as specified in Section E.2.2, “Casing Pipe – Boring and Jacking.” "Link-Seal" or equal must be used at all wet well or other structure penetrations.

E.3.2.3.6. Special Exterior Protection for Ductile Iron Casing Pipes: Extra protection must be provided for underground ductile iron casing pipes within areas of severe corrosive conditions. This must be accomplished by the installation of polyethylene encasement, per AWWA C109, through the area of concern. The soil test evaluation to determine the necessity for extra protection in suspect areas must be as set forth in ANSI Standard A21.5. Additionally, where other existing utilities are known to be cathodically protected, cast or ductile iron pipe crossing the utility must be protected for a distance of 20 feet to each side; and when installed parallel to and within ten feet of same, protection must also be provided.

E.3.2.3.7. Air and Vacuum Venting: Where the force main profile is such that air pockets or

entrapment could occur, resulting in flow blockage, provisions for air release must be provided. Automatic air release assemblies must be installed where venting is required on all major force mains and at critical points on lesser mains. Air and vacuum valves must be as specified under Section E.2.4, “Pipe, Fittings, Valves, and Appurtenances” and must be suitably housed as depicted in Appendix F, “Utility Construction Details.”

E.3.2.3.8. Valve Locations: Valves must be installed on all subsidiary force mains at the point of connection to the major main in order to isolate the pipeline for maintenance. Where force mains are to be extended, valves must be placed at the future connection point to preclude line shutdown at the time of extension. At future connection branches or ends, the valves must not be installed within the run of individual force mains, nor for pipe sizes in excess of 12 inches, without special consideration. Valve locations must be marked as stated in Subsection E.2.4.4.4.2.

E.3.2.3.9. Clean-Out Connections: Should force mains appear to be susceptible to sedimentation clogging, as created by depressed crossings or extended low flow (velocity) periods, suitable clean-out connections must be provided. Clean-outs, such as plugged wye or tee fittings, as detailed in Appendix F, Utility Construction Details, must be located to facilitate the subject maintenance operation. This requirement must be reviewed with PCU.

E.3.2.3.10. Terminal Discharge: Force mains must enter the terminal facility (gravity sewer manhole, pumping station wet well or other) at a point equal to or below the operational water level of the receiving unit.

E.3.2.3.10.1. Discharge into Manholes: Force mains entering gravity manholes must discharge by means of an inside drop connection in accordance with the detail provided in Appendix F, Utility Construction Details.

E.3.2.3.10.2. Discharge into Pumping Station Wet Wells: Force mains entering wet wells must be provided with a top vented drop pipe that terminates below the normal operating water level. The drop pipe must be located to avoid conflicts with pumps, floats, and other equipment and must be securely fastened to the wet well wall with stainless steel bolts and hardware.

E.3.2.3.11. Identification: All installed underground sanitary sewer force mains must be marked with a continuous tape meeting the requirements set forth in Section B.4, “Pipe, Fittings, Valves and Appurtenances.” In addition, tracer wire must also be installed in accordance with Section E.2.4.

E.3.2.4. TESTING

E.3.2.4.1. The Contractor shall perform hydrostatic testing of all sanitary sewer force mains, as set forth in the following, and shall conduct the tests in the presence of representatives from the Engineer and PCU with two days' advance notice provided.

E.3.2.4.2. Piping and appurtenances to be tested must be within sections between valves or adequate plugs, with prior approval from the Engineer. Testing must not proceed until all restraining devices are installed. All piping must be thoroughly cleaned and flushed prior to testing to clear the lines of all foreign matter. While the piping is being filled with water, care must be exercised to permit the escape of air from extremities of the test section, with additional release cocks provided if required.

E.3.2.4.3. Hydrostatic Testing – PVC Pipe

E.3.2.4.3.1. Hydrostatic testing must be performed at 150 psi for two hours. The testing must continue for an uninterrupted period of not less than two hours. Testing must be in accordance with the applicable provisions as set forth in AWWA Standard C600 and C605. The allowable rate of leakage is less than the number of gallons per hour determined by the following formula:

$$L = \frac{SD\,(P)^{1/2}}{148{,}000}$$

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 leakage test in pounds per square inch gauge

E.3.2.4.3.2. The testing procedure must include the continued application of the specified pressure to the test system, for the two-hour period, by way of a pump taking supply from a container suitable for measuring water loss. The amount of loss must be determined by measuring the volume displaced from the container.

E.3.2.4.4. Hydrostatic Testing – HDPE Pipe

E.3.2.4.4.1. For pressure pipelines, or segments thereof, laid wholly using HDPE pipe, a modified hydrostatic test is required. In the modified test, the pipeline must be cleaned, flushed, filled, vented, and otherwise prepared for testing similarly to other types of pipe materials. However, prior to performing the test, an initial expansion period at test pressure must be allowed, during which time the HDPE pipe must be allowed to stretch and assume an equilibrium volume against the applied pressure. During the expansion period, make-up water must be added to the pipeline to maintain the test pressure. If pressure testing dissimilar materials (PVC and HDPE, etc.) the test must use the PVC standard for allowable leakage. Otherwise test the HDPE individually. It is recommended that HDPE pipe segments be isolated from segments composed of other materials for testing purposes.

E.3.2.4.4.2. After the initial expansion period, the test must commence, and must proceed in accordance with the methods presented in Chapter 2, “Inspections, Tests and Safety Considerations” of the Handbook of Polyethylene Pipe, Plastics Pipe Institute, or using information provided by the pipe manufacturer for the material and class of pipe installed, and must be conducted in accordance with ASTM F2164. In the event of a test failure, locate and repair the cause of the leakage and retest the pipeline. Repair all visible leaks regardless of the amount of leakage.

E.3.2.4.4.3. As indicated in the aforementioned Chapter 2 of “Inspections, Tests and Safety Considerations” of the Handbook of Polyethylene Pipe, Plastics Pipe Institute, leakage at butt fusion joints may indicate imminent catastrophic rupture. Depressurize the test section immediately if butt fusion leakage is discovered. Contractor shall follow all safety instructions of the pipe manufacturer and the Plastics Pipe Institute and shall ensure that all crew members are familiar with these safety recommendations.

E.3.2.4.5. Tracer Wire Testing – All new tracer wire installations must be located using typical low frequency (512 Hz) line tracing equipment, witnessed by the contractor, engineer and facility owner as applicable, prior to acceptance by ownership. This verification must be performed upon completion of rough grading and again prior to final acceptance of the project. Continuity testing in lieu of actual line tracing will not be accepted.

E.3.2.4.6. Should any testing fail, necessary repairs must be accomplished by the Contractor and the test repeated until within the established limits. The Contractor shall furnish the necessary labor, water, pumps, gauges, and all other items required to conduct the required sanitary sewage force main testing and shall perform the necessary system repairs required to comply with the specified hydrostatic test.

SECTION E.3.3

LIFT STATIONS, PUMPS, AND CONTROLS

E.3.3.1. GENERAL

E.3.3.1.1. This section includes the general requirements for the installation of lift stations, pumps, and controls.

The relevant provisions included in Section E.2, "Technical Requirements", Section E.3.1, "Sanitary Gravity Sewers", Section E.3.2, "Sanitary Sewer Force Mains", and shown in Appendix F, “Utility Construction Details" are applicable to this section, unless otherwise indicated herein or approved by the Director.

E.3.3.1.3. On projects where PCU is the owner, pumps, appurtenances, and controls must be supplied by the same supplier.

E.3.3.2. DESIGN STANDARDS

E.3.3.2.1 Refer to Appendices B and C, “Design Criteria,” and “Design Report Calculations,” respectively, for system design standards and requirements.

E.3.3.2.2. Pump Selection:

E.3.3.2.2.1 Pumping stations must have a minimum of two pumps per unit. Where the peak design flow exceeds 1,000 GPM, three or more units may be required in the facility. In all cases, standby pumping capability must be provided, such that if any one pump is out of service, an alternate pump is available at equal or greater capacity. Pumps must be manufactured by one of the following companies:

(a) A.B.S.
(b) Barnes
(c) Hydromatic
(d) EBARA
(e) Myers
(f) Wilo

or approved equal. Pumps must be submersible-type.

E.3.3.2.2.2. The selected sewage pump system must have the minimum capability of pumping the design peak flow at the maximum computed system Total Dynamic Head (TDH) requirements. Additionally, final selection must be coordinated with force main systems sizing as described in Appendix B, “Design Criteria.”

GENERAL REQUIREMENTS

E.3.3.3.1 Site: Pumping stations must be installed on readily accessible sites not requiring trespassing through or onto private property to gain access and must be approved by PCU. Sites must have adequate area provided for operation and maintenance of the facility and must be well drained and not subject to flooding. Site fencing must be provided when specifically requested by PCU.

E.3.3.3.2. Structures: Where buildings and/or structures are constructed, the relevant provisions of Pasco County Building Codes will apply, with special design consideration for the following, where applicable. All State and Federal safety codes must be complied with.

E.3.3.3.2.1 Pumping station structures must be of adequate size to allow easy access to all operating equipment for service and maintenance.

E.3.3.3.2.2 Structural openings must be provided through walls or roofs to facilitate equipment removal, including pumps and motors, standby generators, comminutors or bar screens, and other large items.

E.3.3.3.2.3 Structural provisions must be made for future pumping station expansion, if anticipated or planned.

E.3.3.3.2.4. Should hoisting equipment be scheduled for initial or future installation, adequate ceiling height and structural considerations must be provided.

E.3.3.3.3 Hoisting Equipment: Where required in large installations, in order to assist in maintenance operations, hoisting equipment must be provided to lift pumps, motors, chlorine cylinders, and other heavy equipment. Hoists must be sized to accommodate the load for which provided and may be hand operated to a capacity of two tons. Those units above two-ton capacity and where one-ton chlorine cylinders are to be lifted must be motor-driven. Hoists must be trolley-mounted from a continuous beam over chlorine cylinder storage and operation areas, and at all other locations insofar as possible, to allow lateral movement of the hoisted item. Where hoisting equipment cannot be permanently installed or at minor equipment items, hoist eyes must be installed over the unit.

E.3.3.3.4 Piping System for Lift Stations:

E.3.3.3.4.1 Approved Pipe, Fittings and Valves: The following material or item must be suitable for the indicated operational service:

(a) Gravity Sewer Influent Pipe and Fittings (within the limits of the site) - PVC, as specified in Section E.2.4, “Pipe Fittings, Valves, and Appurtenances.”

(b) Sewage Pressure Pipe and Fittings –Grade 316 stainless steel.

(c) Sewage Service Valves - Gate valves (resilient wedge), with non-rising stems and operating nuts suitable for underground service with flanged end connections.

(d) Potable or Non-potable Water – Galvanized steel or polyvinyl chloride pipe and fittings, with appropriate gate valves (RE: Section E.2.4).

(e) Chlorine Solution - Schedule 80 polyvinyl chloride pipe and fittings with PVC ball valves for control.

(f) Fuel Oil or Gas - Black steel pipe and fittings with exterior protection for underground installation (RE: Section E.2.4).

E.3.3.3.4.2. Connections at Structures: Where cast or ductile iron pipes are to extend into or through structures from the exterior, flexible connections (mechanical or push-on type joints) must be provided at the exterior wall face.

E.3.3.3.4.3 Wall Pipes or Sleeves: For pipes passing through structural walls, "Link-Seal" or equal must be installed.

E.3.3.3.4.4 Piping Flexibility: In order to provide for expansion and contraction or expedite installation and maintenance, flexible connections (flanged coupling adapters, expansion joints, couplings, etc.) may be required within flanged piping systems.

E.3.3.3.4.5. Supports and Restraining: Special consideration must be given to the support and restraining for piping systems (RE: Section E.2.4, “Pipe Fittings, Valves, and Appurtenances”). This requirement applies to both interior and exterior systems, with restraining of flanged pressure piping required where flexible connections are used.

E.3.3.3.5 Station Water System: All sewage pumping stations must be provided with a station water system with adequate capacity and pressure, for wash down or pump seal water. Hose bibs must be provided as specified to facilitate maintenance, with special large capacity units installed for wet well wash down and hose provided therefor. Water system must have a hose-bib vacuum breaker. Minimum size wash-down water supply line is one inch. Supply line must be metered and must have a reduced pressure backflow prevention device installed immediately downstream of the meter.

E.3.3.3.6 Bar Screens: Type III sewage pumping stations may be required by the PCU Director or designee to be equipped with manually cleaned bar screens. The screens must be installed in readily accessible locations for cleaning, be fabricated from aluminum, and provide clear openings of not more than two inches. The facility must be of adequate flow capacity, and in most cases a bypass channel must be provided. Where the size of the installation warrants, mechanically cleaned bar screens or comminutors must be provided, as directed by PCU. Engineer of Record shall coordinate closely with PCU on the final design criteria for any Type III pump stations.

E.3.3.3.7 Pressure Gauges and Gauge Connections: Gauge connections must be provided on each sewage pump discharge pipe, inside the valve vault ahead of the check valve. One gauge will be required per lift station. The gauge must read in pounds per square inch, with a range suitable for the required service, and must be four-inch dial, stainless steel case, "Duragauge", manufactured by Ashcroft, or approved equal. Gauges must be equipped with diaphragms (neoprene or stainless steel), or other separating device, to preclude sewage from entering the mechanism.

E.3.3.3.8. Emergency Pump Connections: Connections must be provided for emergency auxiliary pumping. The connection device will normally be a male four-inch male "Cam-Loc"; however, a larger size may be specified by PCU, if necessary.

E.3.3.3.9 Sewage Pumps and Motors:

E.3.3.3.9.1 General: Sewage pumping units must be capable of handling raw, unscreened sewage and must be capable of passing a sphere of at least three inches in diameter. Pumps must be electric motor driven and of a proven design that has been in sewage service under similar conditions for at least five years. Pumps must provide the required peak design performance requirements and be suitable for operation within the total hydraulic range of operation.

E.3.3.3.9.2. Submersible Pumps: The pump design must provide easy removal and replacement for inspection or maintenance purposes, without bolts or other fastenings to be removed. The units must be non-clog, mechanical seal, submersible sewage pumps. Grinder pumps may be permitted by special approval of the PCU Director or designee.

E.3.3.3.9.3 Pump Motors: Motors must comply with the requirements set forth under National Electrical Codes and must additionally be non-overloading, excluding service factor, throughout the entire operating range of the pumps. Two or more normally closed heat sensing miniature switches connected in series and embedded within the motor windings must be provided to shut off power and initiate alarm light for motor over-temperature condition. Submersible pump motors must be capable of continuous operation under submerged as well as dry conditions without damage.

E.3.3.3.10 Variable Speed Pump Control System: The requirement for variable speed controlling of sewage pumps must be considered for all large capacity or major installations and when the hydraulic conditions dictate. The requirement for variable speed pump controls must receive prior review with the Engineer. Should such system be directed, the facility must be equal to existing County variable speed control units or as approved by PCU.

E.3.3.3.11 Telemetering System: All sewage pumping stations to be dedicated to Pasco County for operation and maintenance must be equipped for and connected with the master County remote telemetering system. The telemetering system must be compatible with existing County facilities and must be manufactured by Data Flow Systems (DFS). The cabinet must be DFS TCU Cabinet Model DFS-00275-008-05. Pump controller must be DFS Model TC4-001, installed in the TCU cabinet. NOTE: contractor shall coordinate with DFS regarding site-specific communication requirements prior to delivery of the telemetering system. A communications survey must be conducted by DFS to determine the specific placement and height of the RTU antenna and other criteria as part of system design.

E.3.3.3.12 Emergency Generators: Standby emergency generators may be required at Type II and Type III sewage pumping stations that are at critical points in the wastewater collection/transmission system. Pumping stations designed for a present capacity of 1,000 GPM or more should be discussed with PCU about the possibility of requiring such a system. In addition, pursuant to FDEP rule criteria, all pumping stations that (a) receive flow from one or more pump stations through a force main, and/or (b) that discharge through pipes 12 inches in diameter or larger, must be equipped with an in-place emergency generator. The installation must be a diesel engine generator of adequate size to automatically start and operate the pump(s) required for design flow conditions, lights, controls, and other critical items. The engine generator installation must be in accordance with all applicable codes and the manufacturer's recommendations. The facility must be manufactured by Caterpillar, Onan, or approved equal.

E.3.3.4 LIFT STATION CONSTRUCTION

E.3.3.4.1 Lift stations are divided into three categories as follows:

- Type I: Duplex Station: Two-pump station up to 14 hp range, three-phase, 230V or 480V equipment. Wet well is sized six feet in diameter minimum.

- Type II: Modified Duplex Station: Two-pump station, 10-47 hp range, three-phase, 230V or 480V equipment. Wet well is sized eight feet to ten feet in diameter.

- Type III: Triplex Station: Three-pump station, 32 hp and greater, three-phase, 480V equipment. Wet well is greater than ten feet in diameter and sized as required by the Engineer. These specifications are not intended to dictate design requirements for triplex stations; for any Type III stations that might be required, the design criteria must be closely coordinated with PCU staff.

  Type III stations are designed for future upgrade and require pipe and valve sizing for the maximum anticipated loads (voltage subject to availability at site).

E.3.3.4.2. The pumps and duplex control panels must be installed according to Pasco County requirements as shown in Appendix F, "Utility Construction Details."

E.3.3.5. RESPONSIBILITIES

E.3.3.5.1. All work must be in accordance with these Design Standards and Specifications.

E.3.3.5.2. The Engineer shall be responsible for coordinating of all design with PCU.

E.3.3.5.3. PCU will approve all designs and determine the requirements for future upgrading of all lift stations. Lift stations requiring upgrading must be designed and constructed to meet the anticipated flows of the development.

E.3.3.5.4. An overall layout of the entire development, including phasing, is required. Lift stations must be designed for the ultimate build-out. Lift stations must have an easement and access road as follows unless otherwise approved by PCU:

Easement or right-of-way with a crowned roadway with adequate drainage. Roadway must be ten feet wide with eight inches of lime rock with compaction equal to 98 percent maximum density as determined by AASHTO Specification T-180. The roadway must have a smooth finish of one-inch minimum asphaltic concrete and provide unobstructed access to the wet well. Site must be secured with a six-foot chain link fence (see Appendix F, “Utility Construction Details”) when specifically requested by PCU.

E.3.3.6. PUMPS

E.3.3.6.1. Lift stations must be designed with pumps such that each unit will be automatically connected to the discharge piping when lowered into place on the discharge connection. The pump(s) must be easily removable for inspection or service, requiring no bolts, nuts, or other fastenings to be removed for this purpose, and no need for personnel to enter pump well. Each

pump must be fitted with a stainless-steel chain of adequate strength and length to permit raising the pump for inspection and removal.

E.3.3.6.2. The pumps must be provided with a tandem double mechanical seal running in an oil bath. Conventional double mechanical seals with a spring assembly between the rotating faces, requiring constant differential pressure to effect sealing, are not acceptable.

E.3.3.6.3. The stator casing, oil casing, volute, and impeller must be of Class 30, gray iron construction, with all external parts coming into contact with sewage protected by a coating of high build epoxy, or equal, resistant to sewage. All external bolts and nuts must be stainless steel. The impeller must be non-clog design, capable of passing three-inch solids, fibrous material, heavy sludge, and constructed with long thruway with no acute turns.

E.3.3.6.4. The pump motor must be of Class F insulation, NEMA B design, watertight, and air/oil filled or positively oil cooled. The pump motor must be guaranteed to run in a totally, partially, or non-submerged condition continuously for a period of 24 hours without damages.

E.3.3.6.5. The pump shaft must be of stainless steel and supported by a double row inboard bearing for axial thrust and a single row outboard bearing for radial thrust. The impeller must be connected to a short sturdy shaft in order to minimize shaft deflection.

E.3.3.6.6. The pump conductor must be of continuous stranded cable (no splices), in compliance with industry standard for load and resistance against sewage. The conductor must enter the pump through a heavy-duty entry assembly which must 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.

E.3.3.6.7. Each pump must be supplied with a sliding bracket which bolts to the pump and must accept the discharge elbow provided by the pump manufacturer. The pump unit must be guided by no less than two stainless steel guide bars, or a single stainless-steel guide bar with a straightening vane the entire length of the guide bar. Use standard cast iron brackets as recommended by pump suppliers. Sealing of the pump to the discharge flange must be accomplished by a simple downward linear motion of the pump with the entire weight of the pump guided to and pressing against the discharge connection. No part of the pump may rest directly on the sump floor and no rotary motion to the pump must be required for sealing. Sealing of the discharge must be effectuated by a direct mating of the pump discharge and discharge connection.

E.3.3.6.8. Each pump must have heat sensors and leak detectors connected to the control panel as per manufacturer's specifications.

E.3.3.7. ELECTRICAL CONTROLS

E.3.3.7.1. Lift stations requiring 20 hp pumps or larger must be served by 480V equipment. All components must be sized to consider any future upgrading of the station.

E.3.3.7.2. Basic Control Panel:

One aluminum enclosure

One aluminum inner safety door

One main circuit breaker

One emergency circuit breaker

Two motor circuit breakers

One control circuit breaker - 15 amps

One solid state modular plug-in control unit

Two FVNR NEMA motor starters with 110V holding coils

Six overload heaters

Two overload reset buttons

One phase monitor

One lightning arrester

One ground lug

*Four 24V power relays

*One 24V power transformer

One neutral block

One generator power receptacle (Appleton Power Tite Catalog No. ADR- 1034)

One receptacle circuit breaker - 15 amp minimum

One convenience receptacle, GFI, 110V

One audible alarm (Edwards Catalog No. 876-N5)

One visual alarm (Ohio Electric Control, Inc., Model RL-3K).

*Indicates items normally incorporated into modular control unit.

NOTE: Integral plug-in control circuitry such as ELCOTEC MOD 60-12, STACON MOD 010-120-122DC, or approved equivalent will be used to incorporate the above-listed items as applicable.

All circuit breakers, modular control unit, and overload resets mounted for operation through the inner door; convenience receptacle mounted on the inner door.

E.3.3.7.3. Operation: The function of the control circuit provides for alternating operation of the lead pump under normal conditions. Should the incoming flow exceed the pumping capacity of the lead pump, the lag pump must automatically be activated, and both pumps must operate simultaneously until disengaged by float No. 1. In the event of a malfunction or an incoming flow that exceeds the pumping capacity of both pumps, an audible alarm and visual light must be energized to indicate alarm conditions. A silencing switch must discontinue the audible alarm, but the alarm light must remain activated until the high-level condition is corrected. If one pump should fail for any reason, the second pump must be activated at the "lag-pump-on" elevation. If the "turn-off" level control should fail for any reason, the control circuit must have the capability of starting the pumps and keeping the station in operation. In addition, a light must give visual indication of the regulator failure.

E.3.3.7.4. Components/Features:

E.3.3.7.4.1. Aluminum Enclosure: Enclosure must be NEMA 4X with minimum dimensions of 30" X 36" X 8", aluminum, by Hoffman or approved equivalent, heavy-duty padlock hasp.

E.3.3.7.4.2. Inner Safety Door: Panel must include one aluminum inner safety door, 12-gauge nominal thickness (minimum) with 3/4-inch, 90-degree break bend on all edges for rigidity or 1/4-inch gray-smoked Plexiglas; full length aluminum hinge; positive twist lock handle; safety latch to keep door open during maintenance.

E.3.3.7.4.3. Main and Emergency Breaker: The panel must include circuit breakers sized as required for main power and emergency power disconnect. The panel must be mounted on the subpanel with handles through inner door and must include a mechanical interlock on the handles to ensure that only one breaker can be in the "ON" position at any one time.

E.3.3.7.4.4. High Level Alarm System: The panel must include a vapor-proof red light mounted on top of the enclosure for high level alarm visual indication and a weatherproof horn mounted on the outside of the panel box. The alarm light and horn must be prewired to terminals to operate on a high-level control signal. An alarm silence push button labeled "Alarm Silence" must be mounted on the outside of the enclosure and prewired to a relay which will silence the horn under all conditions, and automatically reset when high level condition is corrected. The high-level light must have a flasher to pulse the red external visual indicator light during a high-level condition. Alarm system must automatically reset when the high-level condition is corrected.

> NOTE: Alarm light must be designed and positioned to provide unobstructed access for changing light bulb.

E.3.3.7.4.5. Convenience Receptacle: The panel must have a GFI (ground fault interrupter) type convenience receptacle mounted on the inner door to provide plug-in 120V power with ground fault protection.

E.3.3.7.4.6. Phase and Voltage Monitor Relay: The panel must have a line voltage rated phase sequence and loss monitor relay. The monitor relay must be the adjustable type to be field set for nominal available incoming voltage. The monitor relay will be prewired to take the control circuit out of service if a phase is reversed, is lost, or drops below nominal voltage or if all three phases drop below nominal voltage. The unit will automatically restore when normal conditions are restored.

E.3.3.7.4.7. Seal Failure Indicator: The panel must have a seal failure (leak detector) indicator pilot light for each pump. These pilot lights must be operated by moisture sensing monitors which are signaled by probes supplied in each pump. Momentary test switches to simulate seal failure to be included and so marked with permanent weatherproof nameplates.

E.3.3.7.4.8. Heat Sensor Indicator: Heat sensor thermostats from each pump will have an indicator light in the panel. The overheat condition will disconnect power to the motor. Test switches to simulate motor overheating are to be included and so marked with permanent weatherproof nameplates.

E.3.3.7.4.9. Lightning Arrester: The panel must have three-phase lightning arrester protection. The arresters must be wired to the point of incoming line service and must be mounted on the outside of the panel box.

E.3.3.7.3. Main Power Disconnect: The panel must include a knife switch sized as required for disconnecting main power to panel box and will be housed in a separate enclosure mounted behind the main panel box as indicated on the detail drawing. Where required by the power company, an additional disconnect will be provided prior to the meter.

E.3.3.7.6. Electrical Junction Box: A junction box (14" X 12" X 4" minimum) with non-corroding, heavy-duty type terminal strips must be installed below the panel box. The junction box must be of high-quality PVC construction with weatherproof cover and fittings. Three explosion-proof vapor seals must be installed between panel box and junction box for the float circuits, motor No. 1, and motor No. 2. Three removable vapor seals must be installed between the junction box and the wet well. Separate conduits must be provided between the wet well and the junction box for the float switch conductors, pump No. 1 conductors, and pump No. 2 conductors.

NOTE: All electrical components must be Square "D" or approved equivalent.

All wiring must be color-coded, labeled, and neatly arranged for easy maintenance and replacement.

All conduit must be PVC Schedule 40 electrical tubing (two-inch minimum diameter).

Panel box, main disconnect, and electric meter must be mounted plumb and level on two concrete posts (6" X 6" minimum) using 5/16" or larger "redhead" type concrete fasteners.

Panel box must be positioned so the operator's back is not toward the wet well when facing box.

E.3.3.8. ELECTRICAL SUPPLY

E.3.3.8.1. General

E.3.3.8.1.1. Engineer shall coordinate with electric utility supplying power to the pump station during design to ensure that pump motor selection and power supplied to the site are consistent.

E.3.3.8.1.2. Contractor shall ensure that the electric utility supplying power to the pump station is aware of the specified motor horsepower, voltage, and running current to ensure that electric power supply is appropriate, and the transformer is appropriately sized.

E.3.3.8.2. Three-phase Load Center – All three-phase motor loads over 12 HP must use a true three-phase source. Open Wye – Open Delta configurations are not allowed in these instances.

E.3.3.9. WET WELL

E.3.3.9.1. Each wet well must be provided with an access frame complete with hinged and hasp-equipped cover, upper guide holder, level sensor cable holder, and hooks for securing pump conductors. Cover must be able to support a static load equal to 300 pounds per square foot. Frame must be securely mounted above the pumps. Each door must have safety locking handle to retain doors in open position. All components must be of aluminum and/or stainless steel.

E.3.3.9.2. Doors to be sized to provide unobstructed access for removal of pumps. Minimum size door is 36” X 54” and must be a TPS300, or equal, odor reducing, cushioned-close aluminum door with debris gasket. Openings exceeding 36 inches must incorporate a double-

door design for access covers.

E.3.3.9.3. Walls must be lined with a geopolymer lining material such as GeoKrete by Quadex, LLC of Houston, TX, or approved equal. Lining material may be centrifugally cast, manually sprayed, or hand troweled. The minimum thickness of the geopolymer liner system is one inch and must be finished such that when the liner sets, the total wall thickness is homogeneous and monolithic. The minimum compressive strength of the lining system is 8,000 psi at 28 days, and it must exhibit sufficient chemical resistance to sulfuric acid at a pH of 1.0 such that material loss is a maximum of 2% at 8 weeks in accordance with ASTM C267. Substrate preparation and liner application must be in accordance with manufacturer's instructions.

E.3.3.9.4. All hardware within wet well must be stainless steel (except as provided for by manufacturer's specifications). Any non-stainless components to be coated with acrylic coatings Conseal CS-55 or Protech EW-1 Aquapoxy or an approved equal applied at the minimum coating rate/thickness recommended by the product manufacturer. Coal tar is not allowed.

E.3.3.9.5. Each pump must be equipped with a stainless-steel lifting chain (5/16-inch minimum).

E.3.3.9.6. Wet well size and depth must be designed to prevent fast cycling of pumps without surcharging of the gravity system under normal operating conditions. The wet well diameter will be six feet minimum. Refer to this manual, Appendix B, "Design Criteria."

E.3.3.9.7. All fittings within the wet well must have fabricated flange ends. Flange-type plain-end adapter fittings will not be permitted except as follows: plain-end adapters with retaining set screws may be installed at the top end of the vertical discharge pipe to facilitate field adjustments.

E.3.3.10. ABOVE GROUND DISCHARGE PIPING ASSEMBLY

E.3.3.10.1. Pump discharge piping must exit the wet well vertically through the pump station top slab and must be manifolded and configured as depicted in Appendix F, "Utility Construction Details," included in this manual. No valve vaults are permitted.

E.3.3.10.2. All above-ground pipe and fittings must be ductile iron and must be lined with American Protecto 401 lining, or equal as approved by PCU. Exterior surfaces of all piping and fittings must be primed and painted with an acceptable coating system, such as Tnemec Typoxy Series 27WB primer with Tnemec Endura Shield II 1074U exterior finish, or International Paint Intercure 200 HS primer with International Paint Interthane 990 HS exterior finish, or equal as approved by PCU.

E.3.3.10.3. All hardware, including flange bolts and nuts, must be stainless steel.

E.3.3.10.4. Check valves must be equipped with externally weighted swing arms with the arms oriented toward the outside.

E.3.3.10.5. Shut-off valves must be non-rising stem resilient wedge gate valves with two-inch square operating nuts positioned for operation from above.

E.3.3.10.6. A male cam lock fitting with dust cap to be provided and configured as depicted in Appendix F, "Utility Construction Details."

E.3.3.10.7. All above-ground fittings must have flange ends. Pipe spool pieces must have

fabricated flange ends. Flange-type plain-end adapter fittings will not be permitted except as follows: flange coupling adapters, equipped with retaining set screws, may be installed between incoming piping and check valves to provide necessary field adjustments.

E.3.3.11. WARRANTY

E.3.3.11.1. To ensure proper performance and compatibility of interacting components within the intent of these specifications, the pumps, control center, access frame, and associated appurtenances must be warranted by the same supplier.

E.3.3.11.2. The pump manufacturer must warrant the pumps and accessories being supplied to the County against defects in workmanship and materials for a minimum of two years under normal use, operation, and service. In addition, the manufacturer must replace certain parts which may become defective through normal use and wear on a progressive schedule of cost for a period of five years; parts included are the mechanical seal, impeller, pump housing, wear ring, and ball bearings. The warranty must be in published form from the manufacturer and apply to all similar units.

E.3.3.12. MANUFACTURER'S SHOP DRAWING

E.3.3.12.1. The Contractor shall provide, along with the preliminary drawings, engineering data clearly marked with the name of the project, equipment, and fabricated materials to be furnished by the manufacturer to the Engineer.

E.3.3.12.2. Shop drawings must include information on pumps, guide rails, control panel, electrical schematics, access doors, and any other requirements necessary to complete the lift station installation.

E.3.3.12.3. Data must 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 must be provided.

E.3.3.12.4. The submitted drawings and data must be published by the manufacturer and must include, but not be limited to, the following:

(a) Mechanical Equipment

(1) Assembly drawings, nomenclature, and materials list

(2) Outline dimensions and weights

(3) Drawings, method of anchoring equipment, and piping connection details sufficient to permit design of supportive structures and connections

(b) Electric Motors

(1) Name of manufacturer

(2) Type, model, and frame size

(3) Motor horsepower

(4) Full load speed

(5) Construction

(6) Temperature rise and class of insulation

(7) Service factor

(8) Voltage, frequency, number of phases

(9) Full load current

(10) Locked rotor current

(11) Motor efficiencies at 1/2, 3/4, and full load

(c) Controls and Wiring Diagram

(1) Wiring diagram of all electrical and control components

(2) Assembly drawings, nomenclature, and materials list

(3) Outline and dimensions and heights

(4) Method of anchoring control panels, and electrical connection details sufficient to permit design of supportive structures and connections

(5) Detail description of components

E.3.3.12.5. Each pump must be tested in the manufacturer's shop to demonstrate the proper operation of all components. The testing must determine overheating of bearings, motors, or other components.

E.3.3.7.3. The County will have no obligation to review or approve the pump station shop drawings. However, the Engineer shall provide shop drawings to PCU upon request only.

E.3.3.13. EVALUATION OF MATERIALS

E.3.3.13.1. The evaluation of the shop drawings will be on the basis of conformance to these specifications.

E.3.3.13.2. The evaluations will be based on manufacturer's data submitted and will include the following considerations:

(a) Equipment and materials to be provided.

(b) Owner's requirement for inventory of spare parts.

(c) Project design changes which would be required to accommodate proposed equipment and materials.

(d) Maintenance and frequency of inspection to ensure reliability and performance of the equipment.

(e) Experience and performance record of the manufacturer, and/or the manufacturer's local representative, work of comparable size and type of application.

(f) Manufacturer's service facilities, experience, and availability of qualified field service personnel.

E.3.3.14. INSPECTION

Inspection must be coordinated with PCU. The inspection will be conducted in two phases as follows:

E.3.3.14.1. Phase I: Mechanical phase, including piping, receiving manhole, wet well, and valve pit will be performed by PCU.

E.3.3.14.2. Phase II: Electrical phase, including control panel, pumps, and distribution system will be performed jointly between PCU and the County Building Inspections Division.

NOTE: General Contractor shall engage the services of a licensed Electrical Contractor during the electrical construction phase of the lift station. Contractor will be responsible for removing pumps from wet well for inspection.

E.3.3.15. START-UP/FINAL ACCEPTANCE

E.3.3.15.1. PCU must be notified one week prior to start-up of the lift station. During start-up, the manufacturer's representative must be present at the job site. The manufacturer's representative shall be responsible for delivery of the following:

(a) Three Parts Manuals

(b) Three Pump O/M Manuals

(c) Three complete sets of schematics

E.3.3.15.2. The PCU inspectors will adhere to the following lift station check list. The Contractor shall be responsible for, but not limited to, the following:

(a) Alignment of lift station, access road, control panel, and fencing must be constructed as indicated on the plot plan. Control panel doors must open such that the operator does not have his back to the wet well. Unobstructed access must be provided to wet well.

(b) The 90-degree bends located at top of the discharge line must not be installed into the grout.

(c) The ends of stainless-steel guide rails must have the threaded ends cut off. All guide rails must be attached to access lid frame with approved bracket assemblies. Intermediate guide rail supports must be provided per manufacturer's recommendations.

(d) Wet well lifting eyes must be removed below surface and grouted flush after installation to avoid any tripping hazards.

(e) Concrete work to be of professional quality with nonskid broom finish.

(f) A light pole must be mounted in the location shown on the Utility Construction Details and must have a 20-amp single-pole breaker and a pole-mounted weatherproof light switch. Pole must be Model PS4-11-15D2 manufactured by RAB or approved equal. Lamp shall be Model P/N ALEDFC52, 52-Watt LED lamp manufactured by RAB or approved equal.

(g) Stone ground covering must be AASHTO #57 aggregate with a minimum thickness of 4 inches, placed upon a fabric weed barrier.

(h) Force main check valves must be installed in the proper flow direction. Shut-off valves must be resilient wedge gate valves.

(i) All discharge elbows must be level and plumb to ensure all guide rails will work properly and pumps seat properly and can be removed easily.

(j) All adapter flanges must be installed according to drawings to allow easy removal of valves. Torque all bolts according to the manufacturer's recommendations.

(k) All conduit and fittings for conductors between the junction box and the wet well must be two-inch (minimum) PVC pipe, Schedule 40, unless otherwise noted.

(l) All electrical component penetrations of the panel box must be properly sealed to prevent water intrusion.

(m) Water service must be installed in the location shown on the Pump Station Site Plan & Access detail included in the “Utility Construction Details.” In addition to an AMR meter and backflow prevention assembly, components must include a lock-wing ball valve, hose bib, and hose bib vacuum breaker.

E.3.3.15.3. Upon completion of the work and prior to the release of any assurances of completion or performance bond, contact PCU for information on requirements for the preparation of assurances of maintenance for water and wastewater utility systems.

SECTION E.4

POTABLE WATER FACILITIES

SECTION E.4.1

WATER DISTRIBUTION SYSTEMS

E.4.1.1. GENERAL

E.4.1.1.1. This section sets forth the general requirements for installation of water distribution systems for potable service.

E.4.1.1.2. The relevant provisions specified in Section E.2, "Technical Requirements", are applicable to this section unless otherwise indicated herein or changed in writing by the Director.

E.4.1.2. DESIGN STANDARDS

E.4.1.2.1. Refer to Appendices B and C, “Design Criteria,” and “Design Report Calculations,” respectively, for system standards and requirements.

E.4.1.3. STANDARD REQUIREMENTS

E.4.1.3.1. General: The materials of construction and general installation procedures, with the exception of fire hydrants (Paragraph E.4.1.3.3, following), must comply with the specific applicable standards set forth under Section B.1, "Utility Excavation, Trenching, and Backfilling", Section E.2.2, "Casing Pipe - Boring and Jacking", and Section E.2.4, "Pipe Fittings, Valves, and Appurtenances", as well as in the "Utility Construction Details".

E.4.1.3.2. Approved Pipe, Fittings, and Valves: The types tabulated below, within the size range indicated and for the applicable service, are approved for water distribution system construction:

Pipe and Fittings		Restrictions
Ductile Iron Pipe (DIP) (CL-50) & Fittings Cement Mortar Lined	-	All sizes
Polyvinyl Chloride Pipe (PVC) – AWWA C-900, DR 18	-	4” through 12”
Polyvinyl Chloride Pipe (PVC) – SDR 21	-	2” through 3”
Polyethylene Plastic Pipe and Brass Fittings	-	Service Connections Only

Valves		Size Range
Gate Valves (GV) - Resilient Wedge	-	4" and larger
Corporation Stops and Curb Stops	-	Service connections only

E.4.1.3.3. Fire Hydrants: Hydrants and hydrant spacing must conform to the latest edition of the *Florida Fire Protection Code*, Chapter 18, "Fire Department Access and Water Supply." Fire hydrants must be manufactured by American, U.S. Pipe, Kennedy Valve Company, or Clow, and must be installed on water mains with minimum diameters as follows:

(a) Commercial area - Eight inch

(b) Residential area - Six inch

E.4.1.3.4. Joint Restraining: Pressure piping fittings and other items requiring restraint must be restrained as specified in Section E.2.4, "Pipe, Fittings, Valves, and Appurtenances" and shown in Appendix F, "Utility Construction Details". The restraining devices must be designed for the maximum pressure condition (testing).

E.4.1.3.5. Pipe Depth and Protection: The standard minimum cover for water distribution systems is three feet from the top of the pipe to finished grade. However, should this design not be feasible, protective concrete slabs may be required over the pipe within the limits of the lesser cover. Where waterways, canals, ditches, County collector or arterial roads, or driveways/road crossings within FDOT right-of-way, or other special features are crossed, ductile iron casing must be installed across and to ten feet each side of the special feature. The utility carrier pipe (PVC or ductile iron pipe as specified in Section E.2.4, "Pipe, Fittings, Valves, and Appurtenances") must be installed inside the casing pipe using appropriate spacers. The size of the casing pipe must be consistent with the casing requirements for boring and jacking as specified in Section E.2.2, "Casing Pipe – Boring and Jacking." Additionally, approved utility crossing signs must be placed on the pipe alignment at each side of the waterway. Signs must be approved by PCU. Note that crossings of County or FDOT roadways, whether by boring and jacking or by open cutting are subject to permitting criteria of the applicable jurisdiction, but in no case may casing pipe sizes and thicknesses be less than those specified herein.

E.4.1.3.6. Connections at Structures: Where pipes are to extend into or through structures, flexible joints must be provided at the wall face. When it is necessary to extend water mains through structures, such as conflicting elevation storm drain bypassing chambers, the pipe must be installed within a ductile iron casing pipe that spans the inside of the structure. The carrier pipe (AWWA C900 PVC Pipe) must be installed inside the casing pipe using appropriate spacers. The size of the casing pipe must be consistent with the casing requirements for boring and jacking as specified in Section E.2.2, "Casing Pipe – Boring and Jacking." "Link-Seal" or equal must be used at all wet well or other structure penetrations.

E.4.1.3.7. Special Exterior Protection for Corrosion: Extra protection must be provided for underground ductile iron pipe and fittings within areas of severe corrosive conditions. This must be accomplished by the installation of polyethylene encasement, AWWA C105, as specified in Section E.2, through the area of concern. The soil test evaluation to determine the necessity for extra protection in suspect areas must be as set forth in ANSI Standard A21.5. Additionally, where other existing utilities are known to be cathodically protected, ductile iron pipe crossing the utility must be protected for a distance of 20 feet to each side, and when installed parallel to and within ten feet of, protection must also be provided. Steel pipe must not be installed in

severe corrosion areas.

E.4.1.3.8. Air Venting and Blow-offs: Where the water main profile is such that air pockets or entrapment could occur, resulting in flow blockage, methods for air releases must be provided. At critical points on major mains, automatic air release assemblies must be installed, with valves as specified under Section E.2, “Technical Requirements”. Special care must be taken to preclude any cross-connection possibility in the design of automatic air release valve application. All dead-end water mains, temporary or permanent, must be equipped with a manually operated blow-off at the terminal.

E.4.1.3.9. Identification: All installed underground water mains must be marked with a continuous tape meeting the requirements of Section E.2.4, “Pipe, Fittings, Valves, and Appurtenances.” In addition, all non-metallic water main piping must be installed with tracer wiring meeting the requirements set forth in Section E.2.4, “Pipe, Fittings, Valves and Appurtenances,” and installed in accordance with the details included in Appendix F, “Utility Construction Details.”

E.4.1.3.10. Service Connections: Connections to water mains must be made by drilling the appropriate size hole and installing of service saddles. A corporation stop must be placed at the saddle or fitting, with the service line extended to the property line, perpendicular to the line, and terminating with a lock-wing ball valve curb stop, pending meter installation (RE: Section E.2.4 for material specifications and Appendix F for “Water and Reuse Lateral Service” (Detail No. G1). On curbed streets, the exact location for each installed service must be marked by neatly painting a blue two-inch by four-inch stripe in the concrete curb; where no curb exists or is planned, locations must be adequately marked by a method approved by PCU. Paint must be as recommended for exterior concrete application. Water services must terminate at property corners, secured to a two by four stake painted blue.

E.4.1.3.11. Bulk Water Meter Applications (three inch and larger): All bulk water meters to be installed to PCU specifications with appropriate backflow preventer. If the meter is for domestic water use only (i.e., if there is a separate, stand-alone fire protection line connection) a Badger E-series ultrasonic meter with nicor leads and Orion AMR ME transmitter or approved equivalent must be used. If the meter is for both domestic water use and fire protection water use, a fire service meter with low-flow turbine bypass meter must be used. All bulk water meters must be Badger AMR meters with Orion reading systems or approved equivalent. Refer to the “Utility Construction Details” for a depiction of the full assembly, along with a materials list indicating all required valves, fittings, and appurtenances.

E.4.1.3.12. Backflow Prevention – Refer to the Cross-Connection Control Policy included herein as Section E.4.2 for detailed requirements for backflow prevention.

E.4.1.4. TESTING

E.4.1.4.1. The Contractor shall perform hydrostatic testing of all water distribution systems, as set forth in the following, and shall conduct the tests in the presence of representatives of the Engineer and PCU, with two days' advance notice provided.

E.4.1.4.2. Testing may not proceed until all restraining devices are installed. All piping must be thoroughly cleaned and flushed prior to testing to clear the lines of all foreign matter. While the piping is being filled with water, care must be exercised to permit the escape of air from extremities of the test section, with additional release cocks provided, if required.

E.4.1.4.3. Hydrostatic Testing – PVC and Ductile Iron Pipe

E.4.1.4.3.1. Hydrostatic testing must be performed at 150 psi pressure, unless otherwise approved by the PCU Director or designee for an uninterrupted period of not less than two hours. Testing must be in accordance with the applicable provisions as set forth in AWWA Standard C600 and C605. The allowable rate of leakage must be less than the number of gallons per hour determined by the following formula:

$$L = \frac{SD\,(P)^{1/2}}{148{,}000}$$

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 leakage test in pounds per square inch gauge

E.4.1.4.3.2. The testing procedure must include the continued application of the specified pressure to the test system for the two-hour period by way of a pump taking supply from a container suitable for measuring water loss. The amount of loss must be determined by measuring the volume displaced from the container.

E.4.1.4.4. Hydrostatic Testing – HDPE Pipe

E.4.1.4.4.1. For water mains, or segments thereof, laid wholly using HDPE pipe, a modified hydrostatic test is required. In the modified test, the pipeline must be cleaned, flushed, filled, vented, and otherwise prepared for testing similarly to other types of pipe materials. However, prior to performing the test, an initial expansion period at test pressure must be allowed, during which time the HDPE pipe must be allowed to stretch and assume an equilibrium volume against the applied pressure. During the expansion period, make-up water must be added to the pipeline to maintain the test pressure. If pressure testing dissimilar materials (PVC and HDPE; ductile iron and HDPE, etc.) the test must use the PVC/ductile iron pipe standard for allowable leakage as described above. Otherwise, test the HDPE individually. It is recommended that HDPE pipe segments be isolated from segments composed of other materials for testing purposes.

E.4.1.4.4.2. After the initial expansion period, the test must commence, and must proceed in accordance with the methods presented in Chapter 2, “Inspections, Tests and Safety Considerations” of the Handbook of Polyethylene Pipe, Plastics Pipe Institute, or using information provided by the pipe manufacturer for the material and class of pipe installed, and must be conducted in accordance with ASTM F2164. In the event of a test failure, locate and repair the cause of the leakage and retest the pipeline. Repair all visible leaks regardless of the amount of leakage.

E.4.1.4.4.3. As indicated in the aforementioned Chapter 2 of “Inspections, Tests and Safety Considerations” of the Handbook of Polyethylene Pipe, Plastics Pipe Institute, leakage at butt fusion joints may indicate imminent catastrophic rupture. Depressurize the test section immediately if butt fusion leakage is discovered. Contractor shall follow all safety instructions of the pipe manufacturer and the Plastics Pipe Institute and shall ensure that all crew members are familiar with these safety recommendations.

E.4.1.4.5. Tracer Wire Testing – All new tracer wire installations must be located using typical low frequency (512 Hz) line tracing equipment, witnessed by the contractor, engineer and facility owner as applicable, prior to acceptance of ownership. This verification must be performed upon completion of rough grading and again prior to final acceptance of the project. Continuity testing in lieu of actual line tracing will not be accepted.

E.4.1.4.6. Should any testing fail, necessary repairs must be accomplished by the Contractor and the test repeated until within the established limits. The Contractor shall furnish the necessary labor, water, pumps, gauges, and all other items required to conduct the required water distribution system testing and perform necessary repairs.

E.4.1.5. DISINFECTING

E.4.1.5.1. Disinfection must not begin until the new water system is connected into the existing Pasco County water system with the appropriate temporary construction water service assembly (i.e., “jumper meter”) installed in accordance with the detail provided in the “Utility Construction Details” included in this manual as Appendix F. The Contractor shall disinfect all sections of the water distribution system, and receive approval thereof from the appropriate agencies, prior to placing in service. Advance notice must be provided to PCU before disinfecting procedures start. The disinfection must be accomplished in accordance with the applicable provisions of the AWWA Standards for "Disinfecting Water Mains" and all appropriate approval agencies such as FDEP.

E.4.1.5.2. Care must be taken to provide disinfection to the total system and extremities must be carefully flushed to accomplish this end. At no time during the disinfection process must pressure be applied to the system. After disinfection has been accomplished, samples of water for bacteriological analysis must be collected and submitted to and as directed by the FDEP or other appropriate approval agency. Should these samples or subsequent samples prove to be unsatisfactory, then the piping must be disinfected until a sufficient number of satisfactory samples are obtained.

E.4.1.5.3. The Contractor shall furnish all equipment and materials and perform the work necessary for the disinfecting procedures, including additional disinfection as required.

E.4.1.5.4. Refer to Section 9.2 (“FDEP Clearance and Placement of Facilities into Service”) of the main text of this Technical Manual, for the sequence of activities and other submission requirements for placement of facilities into service. Under no circumstances may the temporary construction water service assembly (jumper meter) be removed and the final segment of piping installation occur at the point of connection until either a Partial Water Clearance for Fire Safety or a final FDEP Water Clearance letter has been issued by PCU, or FDEP, as applicable.

E.4.1.5.5. After Partial Water Clearance or final FDEP Water Clearance has been issued, the contractor shall remove the temporary water service assembly and install the final length of pipe downstream of the point of connection. Because this final segment of piping is less than 50 feet in length, separate permitting and clearance procedures do not apply. However, the pipe segment must meet all PCU materials specification and installation requirements and must be installed in a workmanlike manner. After it is cut to the appropriate length, it must be swabbed prior to installation to ensure it is free from dirt and pipe cuttings and must be thoroughly flushed once installed.

SECTION E.4.2

PASCO COUNTY UTILITIES
POLICY FOR CROSS CONNECTION CONTROL

E.4.2.1. INTRODUCTION

E.4.2.1.1. Purpose and Intent: The purpose of this policy is to establish minimum requirements for the control of cross-connections and the prevention of backflow into the county's potable water systems in accordance with Pasco County Code (PCC) sections 110-37 (h), 110-77 (b) and 110-78. It is the intent of the Board of County Commissioners that no connection to any of those systems be made or maintained that would impair or threaten the quality and/or potability of the water supplies delivered by such systems.

E.4.2.1.2. Legal Authority: This policy has been enacted by the County Administrator and approved by the Board pursuant to the authority granted under Article VIII of the Constitution of the State of Florida and F.S. Ch. 125, and in furtherance of the policy and intent declared by:

a) The State of Florida in the "Florida Safe Drinking Water Act" (F.S. §§ 403.850-403.864); and

b) The 2017 Florida Building Code: Plumbing Sections 601-613; and

c) Florida Department of Environmental Protection Rule 62-550 & 62-555, Florida Administrative Code; and

d) PCC sections 110-37 (h), 110-77 (b) and 110-78; and

e) American Water Works Association (AWWA) Manual 14 (latest edition).

E.4.2.2. DEFINITIONS

This section identifies words, terms, and phrases which have been assigned definitions unique to this policy. When cited throughout the policy, such words, terms, and phrases will be construed as having the meaning assigned in this section.

Air Gap: A backflow prevention device characterized by a physical separation between the free-flowing discharge end of a public potable water system pipeline and an open or non-pressure receiving vessel. The physical separation must be at least twice the diameter of the supply pipe measured vertically above the overflow rim of the vessel but in no case less than one (1) inch. This configuration can be used to eliminate a cross-connection.

Applicant: The property owner, the duly authorized representative of the property owner, or the lessee or occupant of the property who applies for water service to and for the property and who can be bound to all legal obligations related to water service for the property.

Auxiliary Water Supply System: A pressurized or pumping-ready water supply system other than a public potable water system which is located on or available to the customer's property whether or not connected to a distribution system within the property. Such auxiliary systems include but are not limited to reclaimed water systems and private wells, as defined in Chapter 5 of the American Water Works Association Manual 14.

Backflow: The undesirable reversal of flow of water or mixtures of waters and other liquids, gases or other substances into the distribution pipes of the potable supply of water from any source(s).

Backflow Prevention Assembly: An approved, testable backflow preventer which includes two (2) shutoff valves and the required number of test cocks.

Backflow Prevention Device: A non-testable mechanical device or plumbing configuration which is designed for use to prevent backflow.

Backpressure: Condition caused when upstream water pressure beyond the service connection exceeds present water pressure within the distribution system.

Board of County Commissioners or Board: The governing body of Pasco County.

Commercial and Industrial Customer: A customer other than a residential customer.

County: Pasco County, a political subdivision of the State of Florida and Pasco County Utilities (PCU).

Cross Connection: Any physical arrangement whereby a public potable water system is connected directly or indirectly with any other water supply system, sewer, drain, conduit, pool, storage reservoir (other than for storage of potable water by a system operator), plumbing fixture, or other device which contains or may contain contaminated water, wastewater or other waste, or liquid of unknown or unsafe quality which may be capable of imparting contamination to the public potable water system as the result of backflow. By-pass arrangements, jumper connections, removable sections, swivel or changeable devices, and other temporary or permanent devices through which or because of which backflow could occur are considered to be cross-connections.

Cross Connection Control Coordinator (CCCC): A PCU employee who is responsible for implementation and the management of the requirements of this policy.

Customer: Any person receiving water service from the County for consumption or usage within his premises.

Double Check Valve Assembly: A backflow prevention assembly which includes two (2) internally spring-loaded check valves, which are installed as a unit between two (2) tightly closing resilient-seated shutoff valves and fittings with properly located test cocks.

Dual check device: A mechanical backflow preventer that is similar to a double check valve assembly in that it includes two (2) independently acting check valves. However, it usually does not include shut off valves or test connections and thus usually cannot be tested in-line to verify whether it is operating properly. It is considered less protective than a reduced pressure principle assembly or a double check valve assembly and must be replaced every five (5) years.

Hazard: A cross-connection or potential cross-connection which involves an actual or potential threat to the quality and/or potability of the water supplied by a public potable water system. The degree of hazard associated with any private water system will be determined from an evaluation of the conditions existing within that system.

Health Hazard: A hazard involving any substance that could, if introduced into the public potable water system, cause death or illness, or spread disease.

Hose connections: Sillcocks, hose bibbs, wall hydrants and other openings with a hose connection.

Inspection Personnel: PCU, county code enforcement, and county building officials involved in the implementation and enforcement of this policy.

Non-health Hazard: A hazard involving any substance that generally would not be a health hazard but would, if introduced into the public potable water system, constitute a nuisance, be aesthetically objectionable and/or cause minor damage to the system.

Non-potable Water: Water which is unsuitable for human consumption or which is of questionable potability.

Plumbing Inspection Personnel: PCU or county building official responsible for ensuring facilities are constructed as designed and permitted.

Potable Water: Water that is suitable for human consumption.

Potable Water System: All facilities utilized for the production, treatment, storage, transmission, distribution and delivery of potable water within the PCU service area.

Potential: Conditions through possible error, accident, omission, or neglect that pose an increased probability for a health hazard or non-health hazard to occur due to a cross-connection between a public potable water system and a non-potable source or substance. There is an increased probability of a cross-connection occurring when a pressurized or pumping-ready auxiliary water supply system, as defined in this policy, is on the same premises as the public potable water system, even when there is no actual connection between the auxiliary water source and the potable water system.

Pressure Vacuum Breaker Assembly: An assembly consisting of an independently operating, internally loaded check valve, an independently operating, properly located resilient-seated test cock and tightly closing resilient seated shut-off valves attached at each end of the assembly designed to be operated under pressure for prolonged periods of time to prevent back siphoning. The pressure vacuum breaker may not be subjected to any back pressure.

Private Water System: All piping and appurtenances on the customer's side of the water service connection.

Prohibited Connection: Any connection of a potable water system to a non-potable system.

Property Owner: The title holder of record for a parcel of land.

Reclaimed Water: Non-potable water derived from wastewater which has received at least secondary treatment, pursuant to state regulations, followed by high level disinfection and often used for irrigation purposes.

Reduced Pressure Principle Assembly: A mechanical backflow preventer which includes two (2) independently acting check valves; with a mechanically independent pressure differential relief valve located between the check valves, properly located test cocks and tightly

closing resilient-seated shut-off valves attached at each end of the assembly.

Residential Customer: The customer for a residential service address.

Service Address: The property which is served by one or more water service connections pursuant to a customer contract.

System Operator: The individuals and/or legal entities which own or are responsible for the operation and maintenance of a public potable water system.

Water Purveyor: Authority providing drinking water to the community.

Water Service Connection: The point of connection to the public potable water system (metered or non-metered) where the public potable water system loses jurisdiction and sanitary control over the potable water delivered to that point. Included within this definition are connections for fire hydrants and other temporary or emergency water service. For metered connections, the point of connection is the customer side of the public water supply meter.

Thermal expansion control: Where a storage water heater is supplied with cold water that passes through a check valve, pressure reducing valve or backflow preventer, a thermal expansion control device must be connected to the water heater cold water supply pipe at a point that is downstream of all check valves, pressure reducing valves and backflow preventers.

E.4.2.3. APPLICABILITY

All water service connections to the PCU potable water system must comply with the provisions of this policy.

E.4.2.4. CROSS-CONNECTION CONTROL AND BACKFLOW PREVENTION MANUAL

E.4.2.4.1. American Water Works Association Manual 14, (latest edition) (hereinafter, "Manual 14"), the Recommended Practice for Backflow Prevention and Cross-Connection Control, is hereby adopted by reference as the basis for the standards provided herein. Except as otherwise indicated, backflow protection at service connections must be at least as stringent as recommended in Chapters 2 and 5 of Manual 14.

E.4.2.4.2. The PCU Director or designee, will periodically review revisions to Manual 14 to assure compliance with applicable laws, rules, and regulations of the State of Florida including, but not limited to, Rules 62-550, 62-555 and 62-610 of the F.A.C., and of all other regulatory agencies having jurisdiction over the matters concerned therein.

E.4.2.4.3. If any conflict should exist between a provision of Manual 14 and the provisions of this policy, the county's land development codes, the state building codes as adopted by Pasco County, the Florida Safe Drinking Water Act, or any other state or county statute, ordinance, rule, or regulation applicable to public water systems, the more restrictive provision will apply.

E.4.2.5. RESIDENTIAL BACKFLOW PREVENTION REQUIREMENTS:

E.4.2.5.1. All Residential Connections

E.4.2.5.1.1. Except as provided in Subsection E.4.2.5.1.2, all PCU water supply system operators and residential customers must ensure that the appropriate type of backflow

preventer is installed at service connections. The costs associated with the installation, maintenance, and testing of backflow prevention devices is the responsibility of the customer. Refer to Subsection E.4.2.5.2 for detailed backflow prevention requirements.

E.4.2.5.1.2. A backflow preventer is generally not required at service connections to residential premises where the plumbing system meets current Florida Building Code requirements and there is no auxiliary or reclaimed water system, no fire protection system, no irrigation system, no solar hot water system, and/or no swimming pool.

E.4.2.5.2. Residential Connections with Auxiliary or Reclaimed Water Systems

E.4.2.5.2.1. For residential auxiliary water systems supplied with water from a private well or surface water auxiliary system; or reclaimed water system, any one of the following three backflow prevention options below is allowable:

(1) Reduced pressure principle assembly (Tested annually).

(2) Double check valve assembly (Tested annually).

(3) Dual check device plus the two measures:

(a) Annual premises inspections.

(b) Dual check device replacement every five years.

E.4.2.5.2.2. For those residential customers that choose the dual check device, PCU will install the device at the point of service and will invoice the customer as part of monthly billing. The monthly invoice addresses PCU's costs for annual inspections and replacement of the device every five years.

E.4.2.6. DEVICE TESTING, REPLACEMENT AND INSPECTIONS FREQUENCY

E.4.2.6.1. Replacement: A replacement backflow preventer assembly must be lead-free and on the approved list. The replacement assembly must meet the mandatory requirements and the installation criteria as adopted in this policy.

E.4.2.6.2. Certified backflow assembly tester and certified backflow assembly repair technician requirements: The testing or repair of each mandatory backflow preventer may be performed only by an individual who is currently certified through one of the comprehensive training programs further described in this Control Policy. Each individual meeting the applicable requirements of this Control Policy will be known as a "Certified Tester" or "Certified Repair Technician."

E.4.2.6.3. Test or Repair: To test or repair backflow preventers in Pasco County, testers or repair technicians must be registered with the County and be reregistered every two years.

E.4.2.6.4. Calibration: Backflow preventer testing equipment must be calibrated and registered with the County and recalibrated and reregistered annually.

E.4.2.6.5. Backflow Testing: Reduced pressure principle, double check, pressure vacuum breaker, reduced pressure detector fire protection, double check detector fire protection, and spill-resistant vacuum breaker backflow preventer assemblies and hose connection backflow preventers must be tested at the time of installation and immediately after repairs or relocation.

The testing procedure must be performed in accordance with one of the following standards: ASSE 5013, ASSE 5015, ASSE 5020, ASSE 5047, ASSE 5048, ASSE 5052, ASSE 5056, CSA B64.10 or CSA B64.10.1

E.4.2.6.6. The property owner's responsibility: Responsibility starts at the point of delivery from the public potable water system and includes all of the property's water systems. The owner is required to install, operate, test and maintain approved backflow preventer assemblies as directed by PCU in accordance with the PCC and policy, this policy, and other applicable regulations. The owner is responsible to maintain records of all testing and repairs.

E.4.2.6.7. All reduced pressure principle assemblies and double check valve assemblies must be tested annually by a certified tester that is registered with PCU.

E.4.2.6.8. All dual check devices must be overhauled or replaced by PCU at least every five (5) years at the customer's expense. Refer to Subsection D.2.5.2.

E.4.2.6.9. Premises inspections: PCC sections 110-37 (c)(7) and 110-79 authorize the county to enter the customer's property to perform the necessary inspections to implement this policy. Furthermore, through the standard deposit receipt; service application and receipt of service, the customer has agreed to such inspections. PCU has an inspection protocol and an inspection form to be signed by the inspector and completed and signed inspection forms are available for review by the Florida Department of Environmental Protection and or the Florida Department of Health, the customer, and the public upon request. Attachment (1) is [a] copy of the form to be used by PCU.

E.4.2.7. CUSTOMER AGREEMENTS: Pursuant to PCC sections 110-37 (h), 110-77 (b) and 110-78 and through the standard deposit receipt; service application and receipt of service, all customers have agreed that they are prohibited from cross-connecting the customer's auxiliary or reclaimed water system to the customer's potable water system.

E.4.2.8. MANAGED PROPERTIES: Managed properties are those under the control of a third party, with established restrictions regarding the use or modification of the property, which prohibit the customer from altering or tampering with the property's potable water system and auxiliary or reclaim water systems. The third party's legal instrument establishing the restrictions will be reviewed and kept on file by PCU and a copy must be provided to the Pasco County Cross Connection Control Coordinator.

E.4.2.9. FIRE PROTECTION SYSTEMS

E.4.2.9.1. Connections to automatic fire sprinkler system and standpipe system: The potable water supply to automatic fire sprinkler and standpipe systems must be protected against backflow by a double check backflow prevention assembly, a double check fire protection backflow prevention assembly or a reduced pressure principle fire protection backflow prevention assembly. Backflow prevention devices must be manufactured by Watts, Zurn Wilkins, or equal approved by Pasco County.

E.4.2.9.2. Fire protection systems that are also connected to an auxiliary water supply or source or have provisions for introducing chemical additives or antifreeze into the system must have a reduced pressure principle assembly. Backflow prevention devices must be manufactured by Zurn Wilkins, or equal as approved by Pasco County.

E.4.2.9.3. New closed (i.e., non-flow through) wet pipe sprinkler systems, or new closed wet stand pipe systems that have no connections to auxiliary water supplies or sources, have no

provisions for adding chemical additives or antifreeze, must have either a reduced pressure principle assembly or a double detector check valve assembly as manufactured by Watts, Zurn Wilkins, or equal approved by Pasco County.

E.4.2.9.4. Existing closed (i.e., non-flow through) wet pipe sprinkler systems, or existing closed wet stand pipe systems, that have no connection to an auxiliary water supply or source and have no provisions for introducing chemical additives or antifreeze into the system must have a reduced pressure principle assembly or double detector check valve assembly manufactured by Watts, Zurn Wilkins, or equal approved by Pasco County.

E.4.2.10. IRRIGATION SYSTEMS

E.4.2.10.1. Irrigation systems that are connected to an auxiliary water supply or source or have provisions for introducing chemicals into the irrigation system must have a reduced pressure principle assembly manufactured by Zurn Wilkins, or equal approved by Pasco County.

E.4.2.10.2. Irrigation systems that have no connections to an auxiliary water supply or source and have no provisions for introducing chemicals into the irrigation system must have a reduced pressure principle assembly or a pressure vacuum breaker assembly as manufactured by Zurn Wilkins, or equal as approved by Pasco County.

E.4.2.11. SOLAR HOT WATER SYSTEMS

E.4.2.11.1. Solar hot water systems equipped with double wall heat exchanger and leak detection, do not require additional backflow prevention devices.

E.4.2.11.2. All solar hot water systems not having double walled heat exchangers and leak detection must have a reduced pressure principle assembly.

E.4.2.12. HOSE CONNECTIONS: Sillcocks, hose bibbs, wall hydrants and other openings with a hose connection must be protected by an atmospheric-type or pressure-type vacuum breaker or a permanently attached hose connection vacuum breaker.

E.4.2.13. MULTISTORY BUILDINGS: In multistory buildings, regardless of the configurations of its internal potable water system, any loss of water distribution main pressure will cause backflow from these buildings' systems unless approved backflow prevention devices are properly installed. Therefore, buildings with three (3) or more floors must have a reduced pressure principle assembly at its point of connection, manufactured by Zurn Wilkins, or equal approved by Pasco County.

E.4.2.14. COMMERCIAL BACKFLOW PREVENTION PROGRAM REQUIREMENTS

E.4.2.14.1. All commercial and industrial customers connected to the PCU water system are required to install a reduced pressure principle assembly.

E.4.2.14.2. Any backflow prevention assembly required herein must be a model and size approved by PCU. The term approved backflow prevention assembly means an assembly that has been manufactured in full compliance with the standards established by the American Water Works Association titled: ANSI/AWWA C510-89 - Standard for Double Check Valve Backflow Prevention Assembly, and AWWA C511-89 - Standard for Reduced Pressure Principle Backflow Prevention Assembly, and meets completely the laboratory and field performance specifications of the Foundation for Cross-Connection Control and Hydraulic Research (FCCCHR) of the University of Southern California established by "Specification of

Backflow Prevention Assemblies" - Section 10 of the most current edition of AWWA Manual 14. Final approval must be evidenced by a "certificate of approval" issued by an approved testing laboratory certifying full compliance with the AWWA standards and FCCCHR specifications. Devices must be manufactured by Zurn Wilkins, or equal as approved by Pasco County.

E.4.2.14.3. PVC pipe or fittings installed above ground is prohibited.

E.4.2.14.4. All pipe and fittings above ground must be: Brass, Stainless Steel or Ductile Iron Pipe (D.I.P).

E.4.2.14.5. Copper or copper-alloy tubing to galvanized steel pipe: Joints between copper or copper-alloy tubing and galvanized steel pipe must be made with a brass fitting or dielectric fitting or a dielectric union conforming to ASSE 1079. The copper tubing must be soldered to the fitting in an approved manner, and the fitting must be screwed to the threaded pipe.

E.4.2.14.6. Stainless steel: Joints between stainless steel and different piping materials must be made with a mechanical joint of the compression or mechanical sealing type or a dielectric fitting or a dielectric union conforming to ASSE 1079.

E.4.2.14.7. Painting potable backflow preventers: The above ground portion of the assembly must be painted with an approved paint for above grade piping, fittings and valves. The assembly must be painted with one coat of rust-prohibitive primer and one coat of Safety Blue Fed-Std-595C #15102 high-grade finish paint.

E.4.2.14.8. Painting reclaim backflow preventers: The above ground portion of the assembly must be painted with an approved paint for above grade piping, fittings and valves. The assembly must be painted with one coat of rust-prohibitive primer and one coat of OSHA Safety Purple #17142 high-grade finish paint.

E.4.2.14.9. Painting fire protection backflow preventers: The above ground portion of the assembly must be painted with an approved paint for above grade piping, fittings and valves. The assembly must be painted with one coat of rust-prohibitive primer and one coat of OSHA Safety Red/ DOT (piping and valve marking #111050) high-grade finish paint.

E.4.2.14.10. Bollards:

(a) Assemblies 2 ½ inches or less, that are located within vehicle traffic area (parking lot, driveway, or within 15 feet of the edge of pavement or back of curb) must be protected by a minimum of four (4) bollards. The bollards must be 4-inch diameter steel pipe, schedule 40, filled with Type I Portland cement, 28-day, 3000 psi concrete.

(b) Assemblies 3-inches and larger, a minimum of six (6) bollards must be required and the bollards must be 4-inch diameter steel pipe, schedule 40, filled with Type I Portland cement, 28-day, 3000 psi concrete.

(c) Bollards must be painted with one (1) coat of rust-prohibitive primer and one coat of Safety Yellow (Fed-Std-595C #13591) high grade enamel.

E.4.2.14.11. Sleeving:

(a) Assemblies 2 ½ inches or less must be Cast 3-inch SCH40 PVC pipe through slab and must include expansion material between the risers and PVC sleeve.

(b) Assemblies 3-inches and larger must have ½-inch preformed expansion joint material placed between D.I.P and concrete slab.

(c) Sealing of annular spaces: The annular space between the outside of a pipe and the inside of a pipe sleeve or between the outside of a pipe and an opening in a building envelope wall, floor, or ceiling assembly penetrated by a pipe must be sealed in an approved manner with caulking material, foam sealant or closed with a gasket system. The caulking material, foam sealant or gasket system must be designed for the conditions at the penetration location and must be compatible with the pipe, sleeve and building materials in contact with the sealing materials. Annular spaces created by pipes penetrating fire-resistance-rated assemblies or membranes of such assemblies must be sealed or closed in accordance with Section 714 of the Florida Building Code, Building.315.1

E.4.2.14.12. Support Assemblies: Assemblies three inches (3") and larger must be adequately supported to prevent the assemblies from sagging.

E.4.2.15. CROSS-CONNECTION CONTROL PROGRAM RECORD KEEPING

E.4.2.15.1. PCU will keep records of service connection assessments; a record of the latest assessment questionnaire or inspection report for each service connection indefinitely; actual questionnaires or inspection reports may be kept, or information may be transferred to tabular summaries.

E.4.2.15.2. PCU will keep an up to date inventory of all backflow preventers installed at service connections and backflow preventers installed at locations where fire protection systems, irrigation systems, and solar hot water systems are connected to the customer's potable water system. For each such backflow preventer, the inventory will include such information as the location of the backflow prevention device, a description of the hazard being contained or isolated by the device, the type of backflow prevention device, the installation date and date of last repair, and also keep records of backflow prevention device testing for at least five (5) years; the record of each test will include identification of the backflow prevention device, the name of the tester, and the test results; actual test reports may be kept, or information may be transferred to tabular summaries. Also, public potable water system operators must keep annual cross-connection control program activity reports and backflow incident reports for at least ten years as required by Rule 62-555, F.A.C.

E.4.2.16. PUBLIC EDUCATION PROCEDURES.

PCU will include in its annual consumer confidence reports, required under Rule 62-550.824, F.A.C. a brief description of its cross-connection control program.

E.4.2.17. PROHIBITED CONNECTIONS

E.4.2.17.1. No individual or entity may complete or maintain any cross-connection to the PCU potable water system or cause such a cross-connection to be completed or maintained.

E.4.2.17.2. No connection to the PCU potable water system may be performed or maintained by, for, or on behalf of PCU unless the applicable on-site facilities of the customer or of the applicant for such connection are in compliance with the provisions of this policy.

E.4.2.17.3. There must be no direct or indirect prohibited cross-connections, either existing or potential, between the PCU potable water system and a non-potable supply, on the customers side of the service connection.

E.4.2.17.4. Modification of any backflow prevention assembly or use of backflow preventer test ports for any other than testing the backflow preventer is prohibited.

E.4.2.18. INSPECTIONS

E.4.2.18.1. The authorization to enter onto a customer's property during reasonable daylight hours in order to administer this policy is a condition of receiving utility service. Each customer shall acknowledge such authorization by his or her signature on the application for service form, or by accepting service from the County. Inspection personnel may inspect the private water system(s) of each customer's service address to determine the degree of hazard, if any, which exists at that service address and to ascertain compliance with the provisions of this policy and of related codes and regulations. With respect to customers whose applications did not contain such an acknowledgment, inspection personnel will provide reasonable advance notification to such customer that an inspection will be conducted pursuant to the authority of this section.

E.4.2.18.2. If the inspection conducted pursuant to Subsection E.4.2.18.1 discloses a potential hazard, the PCU operator may install, at the customer's expense, the backflow prevention assembly or device(s) required by this policy. The installation charge will be added to the customer's utility billing statement. If the customer denies reasonable access to perform such installations, the PCU operator may interrupt potable water service to any private water system connected to the public potable water system until such time that access is granted, or a licensed installation or certified inspection is provided by the customer.

E.4.2.18.3. Schedule for installation of backflow preventers:

(a) New connections with cross-connection hazards – before service is initiated.

(b) Existing connections with Manual 14, Table 3.1 hazards and other high cross-connection hazards – 30 days, 1st notice, 30 days, 2nd notice, 15 days, 3rd notice.

(c) Existing connections with other than Manual 14, Table 3.1 hazards – 30 days, 1st notice, 30 days, 2nd notice, 15 days, 3rd notice.

(d) Existing fire protection systems using chemicals or supplied by unapproved auxiliary water source – within 90 days after notification.

(e) Existing fire protection systems not using chemicals and supplied by purveyor's water - within one (1) year after notification.

E.4.2.19. BACKFLOW PREVENTION ASSEMBLY TESTING

E.4.2.19.1. Certification of backflow testers: All approved backflow testers must possess a current American Water Works Association (AWWA) and/or American Backflow Prevention Association (ABPA) backflow tester certificate.

E.4.2.19.2. Approved tester list: Any backflow tester performing testing for PCU, as an approved backflow tester, shall maintain current status on the Pasco County Cross-Connection Control Coordinator's approved tester list. To get on this list, certified testers must provide a copy of their current certification and an annual calibration report for their test equipment.

E.4.2.19.3. Test reports: Test reports from unapproved backflow testers will not be accepted by the Pasco County Cross-Connection Control Coordinator and will not meet the requirements of this policy.

E.4.2.19.4. Employees of Pasco County are prohibited from testing privately owned backflow devices in the county, except if required as part of their official duties.

E.4.2.19.5. Commercial & Industrial properties: Each testable reduced pressure principle assembly or double check valve assembly must be professionally tested at least annually. The customer is responsible for having the appropriate test conducted and for submitting the results thereof to the cross-connection control coordinator. All costs associated with such testing must be borne by the customer. The cross-connection control coordinator is responsible for providing written notice to its customers, of the requirement for the test and the date that the test results are due. All testing must be performed in accordance with the American Water Works Association Manual 14.

E.4.2.19.6. Backflow prevention assembly repair/replacement:

(a) Each testable reduced pressure principle assembly or double check valve assembly found to be functioning improperly must be repaired or replaced at the customer's expense by a state licensed contractor with a backflow testing and repair certification.

(b) If any customer fails to provide the cross-connection control coordinator with proof of a passing certified test after repair or replacement, the public potable water system operator may cause the repairs and test to be performed. Such repairs and testing will be completed at the customer's expense, which charges will be added to the customer's utility billing statement. If the customer denies reasonable access to perform such repairs and testing, the public potable water system operator may interrupt potable water service to the private water system(s) at the service address until such time that either access for or evidence of the passing certified test is provided by the customer.

E.4.2.20. EMERGENCY ACTS

E.4.2.20.1. PCU may interrupt water service to any private water system when necessary to prevent continued or potential backflow or cross-connection from a prohibited connection, until the requirements of this policy have been met.

E.4.2.20.2. When possible, PCU operators will provide advanced notice of each interruption of service required by this policy.

E.4.2.20.3. In the event of known pollution or contamination of the PCU potable water system or a customer's private water system due to backflow on or from the customer's service address, the customer shall promptly take reasonable steps to confine further pollution or contamination of the PCU potable water system and shall immediately notify PCU.

E.4.2.21. ENFORCEMENT

E.4.2.21.1. The party or parties responsible for a violation of this policy shall be liable for all expenses, losses, or damage, including attorneys' fees and legal costs, incurred by the county potable water system by reason of such violation, including all costs and expenses associated with the interruption and restoration of potable water service for the service address where the violation occurred.

E.4.2.21.2. If PCU determines that a violation of this policy has occurred, the PCU operator may (a) determine the actions necessary and appropriate to correct such violation; (b) determine the party or parties responsible either in whole or in part for such violation and require correction thereof; (c) determine the amount of any expense, loss, or damage incurred by the PCU water system as a result of such violation; (d) assess the responsible parties for such amounts.

E.4.2.21.3. In addition to any penalty or remedy provided by law for a violation of the provisions of this policy, the county may petition a court of competent jurisdiction to enjoin, restrain, or otherwise prevent any such violation or to recover expenses, losses, or damages pursuant to paragraph (a) above.

(a) If any property owner fails to provide the County with the documentation prescribed by this policy to evidence the performance of the repair or replacement of a backflow preventer where such repairs or replacement are necessary for that backflow preventer to comply with this policy, the County may cause the performance of such repairs or replacement at the property owner's expense. If the property owner or lawful occupant denies reasonable access to perform such repairs or replacement, the County may interrupt water service to the private water system at the service address until such time that either access for or evidence of such repairs or replacement is provided by the property owner or lawful occupant, as applicable.

(b) If any property owner fails to provide the County with the documentation prescribed by this policy to evidence performance of each test required hereunder for a water service connection, the County may cause the test to be performed, such testing to be at the property owner's expense. If the property owner or lawful occupant denies reasonable access to perform such testing, the County may interrupt water service to the private water system at the service address until such time that either access for or evidence of the testing is provided by the property owner or lawful occupant, as applicable.

(c) If any property owner fails to install the backflow preventer(s) required hereunder for a water service connection, the County may cause the installation of, at the property owner's expense, the required backflow preventer(s). If the property owner or lawful occupant denies reasonable access to perform such installations, the County may interrupt water service to the private water system at the service address until such time that either access for or evidence of the installations is provided by the property owner or lawful occupant, as applicable.

E.4.2.22. PENALTIES

E.4.2.22.1. The cross-connection control coordinator will send a written reminder notifying the owner or authorized agent that the backflow prevention device or devices must be tested. The first letter will give the customer's thirty (30) days for the test to be completed.

E.4.2.22.2. Upon failure of the owner or authorized agent of the owner of the building or premises to have the device tested, a second letter will be sent, via certified mail, explaining that if the test is not completed within thirty (30) days there is a possibility of discontinuance of water service.

E.4.2.22.3. Upon failure of the owner or authorized agent of the owner of the building or premises to have the device or devices tested after the second letter, a third letter will be sent. The third letter will be sent certified mail according to the conditions set forth in the County's Code Enforcement procedures. The third letter will contain a date the water service will be discontinued. Reconnection will only be allowed with the submission of the successful backflow

performance test results and payment of applicable fees.

E.4.2.23. DEVICE MAINTENANCE

E.4.2.23.1. All Backflow Preventer assemblies, and associated piping, valves and fittings must be painted. The property owner will be responsible for the initial painting and the continual maintenance of all such painted surfaces.

E.4.2.23.2. The property owner is responsible to make necessary repairs or replacement which must be completed within ten (10) Days.

E.4.2.24. PREMISES EVALUATION

E.4.2.24.1 PCU adopted the following policy for evaluating customer's premises to establish the category of the customer and the backflow protection being required at or for the service connection.

E.4.2.24.2. New connection: PCU will evaluate the customer's premises at a newly constructed service connection before PCU begins supplying water to the service connection.

E.4.2.24.3. Commercial: PCU will review the construction plans for commercial projects to ensure the level of protection provided is equal with the degree of hazard on the premise. PCU will visually inspect each premise to verify the initial

E.4.2.24.4. Residential: PCU will provide educational material for distribution to new water customers. The PCU water customer shall be required to disclose at the time of application for service any existing or proposed or auxiliary water system on the premises.

E.4.2.25. TEMPORARY CONSTRUCTION METERS AND BACKFLOW PREVENTERS

E.4.2.25.1 Hydrant meters: A temporary meter and backflow preventer (RPZ) may be installed on a Pasco County-accepted fire hydrant.

E.4.2.25.2. Construction assembly: Refer to Detail W1 in Appendix F for details regarding temporary construction water services.

SECTION E.5

RECLAIMED WATER FACILITIES

SECTION E.5.1

RECLAIMED WATER DISTRIBUTION SYSTEMS

E.5.1.1. GENERAL

E.5.1.1.1. This section sets forth the general requirements for installation of reclaimed water distribution systems for irrigation service.

E.5.1.1.2. The relevant provisions specified in Section E.2, "Technical Requirements", are applicable to this section unless otherwise indicated herein or changed in writing by the Director.

E.5.1.2. DESIGN STANDARDS

E.5.1.2.1. Refer to Appendices B and C, “Water, Wastewater, and Reclaimed Water Design Criteria,” and “Water, Wastewater, and Reclaimed Water Design Report/Calculations Submittal Requirements,” respectively, for system standards and requirements.

E.5.1.3. STANDARD REQUIREMENTS

E.5.1.3.1. General: The materials of construction and general installation procedures must comply with the specific applicable standards set forth under Section E.2.1, "Utility Excavation, Trenching, and Backfilling", Section E.2.2, "Casing Pipe - Boring and Jacking", and Section E.2.4, "Pipe Fittings, Valves, and Appurtenances", as well as Appendix F, "Utility Construction Details".

E.5.1.3.2. Approved Pipe, Fittings, and Valves: The types tabulated below, within the size range indicated and for the applicable service, are approved for reclaimed water distribution system construction:

Pipe and Fittings		Restrictions
Polyvinyl Chloride Pipe (PVC) – AWWA C-900, DR 18	-	All sizes
Polyethylene Plastic Pipe and Brass Fittings	-	Service Connections Only

Valves		Size Range
Gate Valves (GV) - Resilient Wedge	-	4” and larger

Corporation Stops and Curb Stops	-	Service connections only

E.5.1.3.3. Joint Restraining: Pressure piping fittings and other items requiring restraint must be restrained as specified in Section E.2.4, Pipe, Fittings, Valves, and Appurtenances" and shown in Appendix F, "Utility Construction Details". The restraining devices must be designed for the maximum pressure condition (testing).

E.5.1.3.4. Pipe Depth and Protection: The standard minimum cover for reclaimed water distribution systems is three feet from the top of the pipe to finished grade. However, should this design not be feasible, protective concrete slabs may be required over the pipe within the limits of the lesser cover. Where waterways, canals, ditches, County collector or arterial roads, or driveway/road crossings within FDOT right-of-way, or other special features are crossed, ductile iron casing must be installed across and to ten feet each side of the special feature. The utility carrier pipe (PVC or ductile iron pipe as specified in Section E.2.4) must be installed inside the casing pipe using appropriate spacers. The size of the casing pipe must be consistent with the casing requirements for boring and jacking as specified in Section E.2.2, "Casing Pipe – Boring and Jacking." Additionally, approved utility crossing signs must be placed on the pipe alignment at each side of the waterway. Signs must be approved by PCU. Note that crossings of County or FDOT roadways, whether by boring and jacking or by open cutting are subject to permitting criteria of the applicable jurisdiction, but in no case may casing pipe sizes and thicknesses be less than those specified herein.

E.5.1.3.5 Connections at Structures: Where pipes connect to structures, pipe joints must be provided at the wall face. When it is necessary to extend water mains through structures, such as conflicting elevation storm drain bypassing chambers, the pipe must be installed within a ductile iron casing pipe that spans the inside of the structure. The carrier pipe (AWWA C900 PVC Pipe) must be installed inside the casing pipe using appropriate spacers. The size of the casing pipe must be consistent with the casing requirements for boring and jacking as specified in Section E.2.2, "Casing Pipe – Boring and Jacking." "Link-Seal" or approved equal must be used at all wet well or other structure penetrations.

E.5.1.3.6 Special Exterior Protection for Corrosion: Extra protection must be provided for underground ductile iron pipe and fittings within areas of severe corrosive conditions. This must be accomplished by the installation of polyethylene encasement, AWWA C105, as specified in Section E.2, through the area of concern. The soil test evaluation to determine the necessity for extra protection in suspect areas must be as set forth in ANSI Standard A21.5. Additionally, where other existing utilities are known to be cathodically protected, ductile iron pipe crossing the utility must be protected for a distance of 20 feet to each side, and when installed parallel to and within ten feet of, protection must also be provided. Steel pipe must not be installed in severe corrosion areas.

E.5.1.3.7. Air Venting and Blow-offs: Where the reclaimed water main profile is such that air pockets or entrapment could occur, resulting in flow blockage, methods for air releases must be provided. At critical points on major mains, automatic air release assemblies must be installed, with valves as specified under Section E.2 All dead-end reclaimed water mains, temporary or permanent, must be equipped with a manually operated blow-off at the terminal.

E.5.1.3.8. Identification: All installed underground reclaimed water mains must be marked with a continuous tape meeting the requirements set forth in Section B.4, "Pipe, Fittings, Valves and Appurtenances." In addition, tracer wire must also be installed in accordance with Section E.2.4.

E.5.1.3.9. Service Connections: Connections to reuse mains must be made by drilling the appropriate size hole and installing of service saddles or in-line fittings. A corporation stop must be placed at the saddle or fitting, with the service line extended to the property line, perpendicular to the line, and terminating with a locking ball valve curb stop (RE: Section E.2.4 for material specifications and Appendix F for "Water and Reuse Lateral Service" (Detail No. G1). The minimum size for reclaimed water service connection is one inch. On curbed streets, the exact location for each installed service must be marked by neatly painting a purple two-inch by four- inch stripe in the concrete curb; where no curb exists or is planned, locations must be adequately marked by a method approved by PCU. Paint must be as recommended for exterior concrete application. Reclaimed water services must terminate at property corners, secured to a two by four stake painted purple.

E.5.1.3.10. Bulk Water Meter Applications (three inch and larger): All bulk water meters to be installed to PCU specifications (see detail specification sheet). A Badger E-series ultrasonic meter with nicor leads and Orion AMR ME transmitter or approved equivalent must be used.

E.5.1.3.11. Backflow Prevention: Refer to the Cross-Connection Control Policy in Section E.4.2 of this document.

E.5.1.4. TESTING

E.5.1.4.1. The Contractor shall perform hydrostatic testing of all reclaimed water distribution systems, as set forth in the following, and shall conduct the tests in the presence of representatives of the Engineer and PCU, with two days' advance notice provided.

E.5.1.4.2. Testing must not proceed until all restraining devices are installed. All piping must be thoroughly cleaned and flushed prior to testing to clear the lines of all foreign matter. While the piping is being filled with water, care must be exercised to permit the escape of air from extremities of the test section, with additional release cocks provided, if required.

E.5.1.4.3 Hydrostatic Testing – PVC and Ductile Iron Pipe

E.5.1.4.31. Hydrostatic testing must be performed at 150 psi pressure, unless otherwise approved by the PCU Director or designee for a period of not less than two hours. Testing must be in accordance with the applicable provisions as set forth in AWWA Standard C600 and C605. The allowable rate of leakage must be less than the number of gallons per hour determined by the following formula:

$$L = \frac{SD\,(P)^{1/2}}{148{,}000}$$

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 leakage test in pounds per square inch gauge

E.5.1.4.3.2. The testing procedure must include the continued application of the specified pressure to the test system for the two-hour period by way of a pump taking supply from a container suitable for measuring water loss. The amount of loss must be determined by measuring the volume displaced from the container.

E.5.1.4.4. Hydrostatic Testing – HDPE Pipe

E.5.1.4.4.1. For reclaimed water mains, or segments thereof, laid wholly using HDPE pipe, a modified hydrostatic test is required. In the modified test, the pipeline must be cleaned, flushed, filled, vented, and otherwise prepared for testing similarly to other types of pipe materials. However, prior to performing the test, an initial expansion period at test pressure must be allowed, during which time the HDPE pipe must be allowed to stretch and assume an equilibrium volume against the applied pressure. During the expansion period, make-up water must be added to the pipeline to maintain the test pressure. If pressure testing dissimilar materials (PVC and HDPE; ductile iron and HDPE, etc.) the test must use the PVC/ductile iron pipe standard for allowable leakage as described above. Otherwise, test the HDPE individually. It is recommended that HDPE pipe segments be isolated from segments composed of other materials for testing purposes.

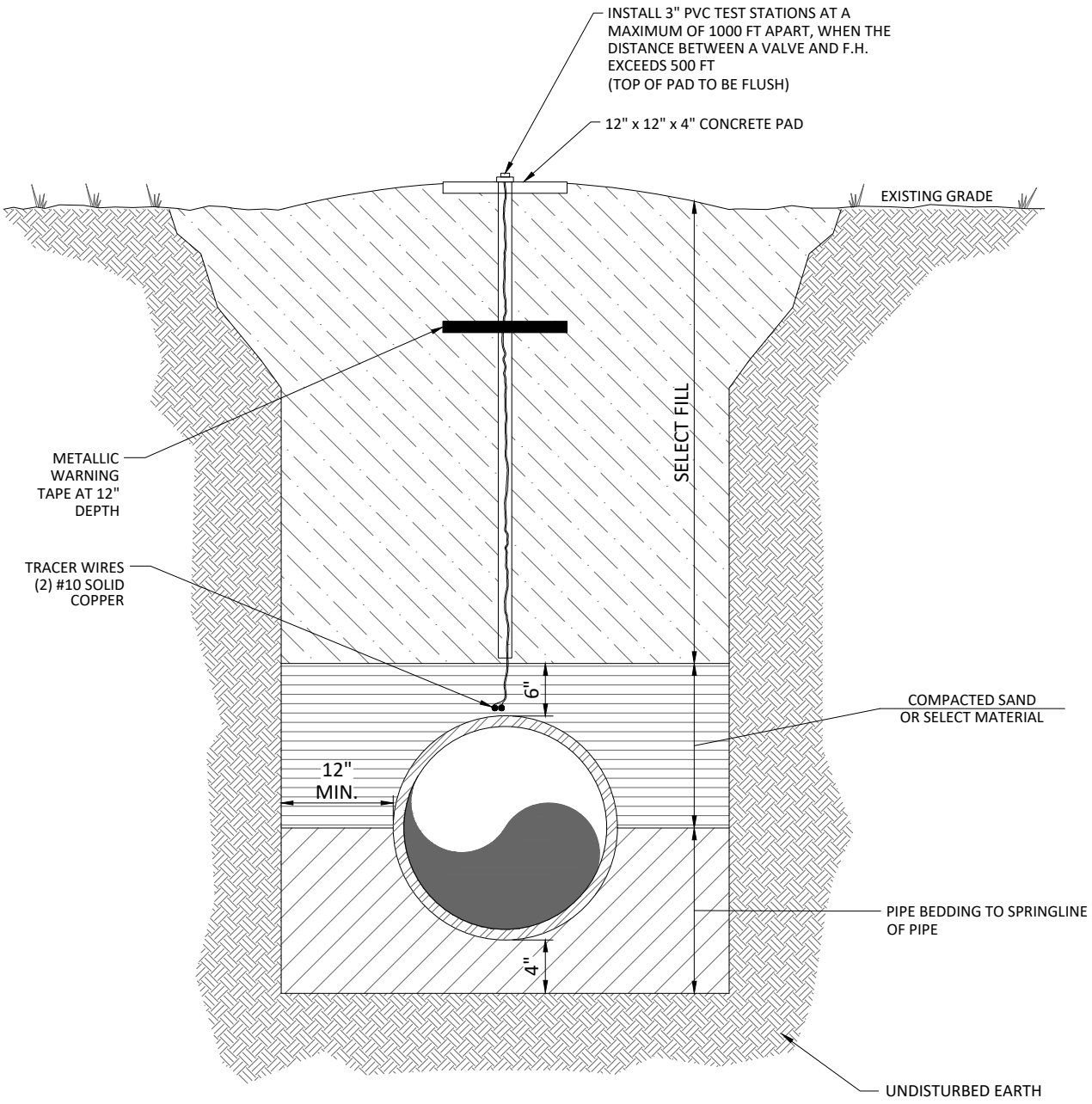
E.5.1.4.4.2. After the initial expansion period, the test must commence, and must proceed in accordance with the methods presented in Chapter 2, “Inspections, Tests and Safety Considerations” of the Handbook of Polyethylene Pipe, Plastics Pipe Institute, or using information provided by the pipe manufacturer for the material and class of pipe installed, and must be conducted in accordance with ASTM F2164. In the event of a test failure, locate and repair the cause of the leakage and retest the pipeline. Repair all visible leaks regardless of the amount of leakage.

E.5.1.4.4.3. As indicated in Chapter 2 of “Inspections, Tests and Safety Considerations” of the Handbook of Polyethylene Pipe, Plastics Pipe Institute, leakage at butt fusion joints may indicate imminent catastrophic rupture. Depressurize the test section immediately if butt fusion leakage is discovered. Contractor shall follow all safety instructions of the pipe manufacturer and the Plastics Pipe Institute and shall ensure that all crew members are familiar with these safety recommendations.

E.5.1.4.5. Should the test fail, necessary repairs must be accomplished by the Contractor and the test repeated until within the established limits. The Contractor shall furnish the necessary labor, water, pumps, gauges, and all other items required to conduct the required reclaimed water distribution system testing and perform necessary repairs.

APPENDIX F
UTILITIES CONSTRUCTION DETAILS
FEBRUARY 2021 EDITION
TABLE OF CONTENTS
All Standards & Details subject to revision and change at the sole discretion of Pasco County Utilities

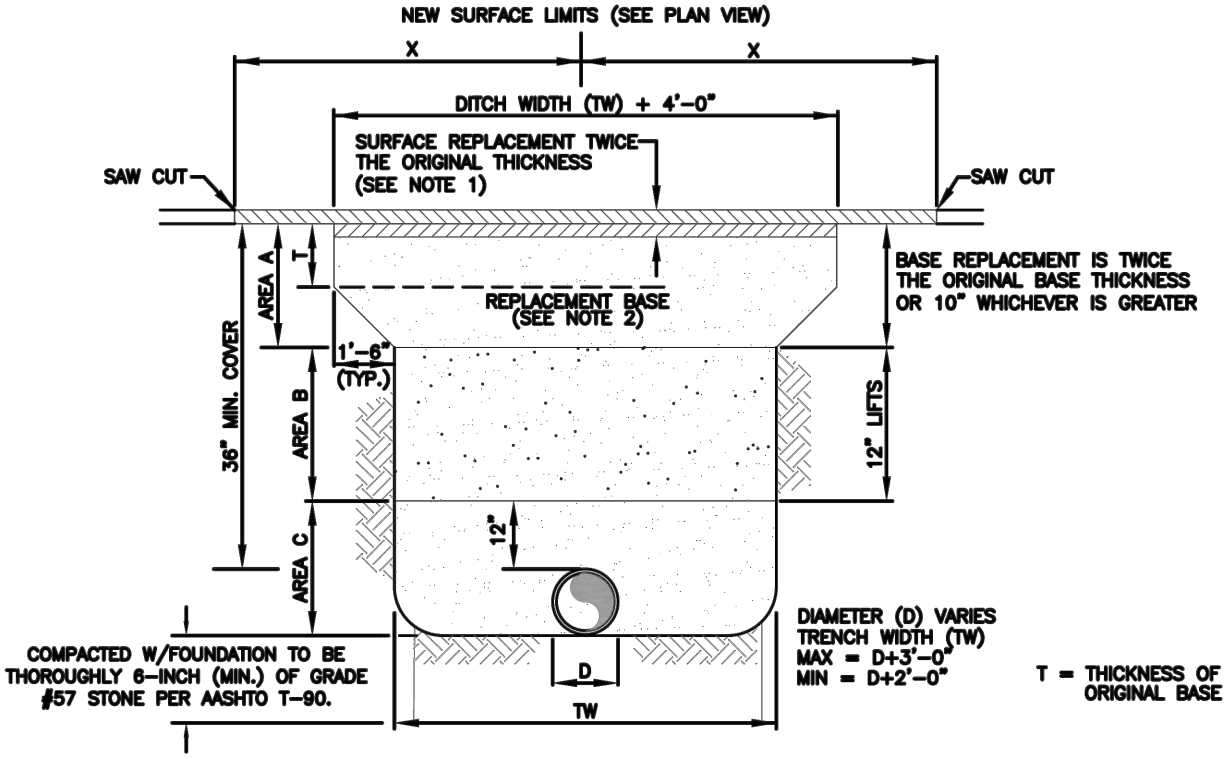
APPENDIX F
UTILITIES CONSTRUCTION DETAILS
FEBRUARY 2021 EDITION
TABLE OF CONTENTS (CONTINUED)
All Standards & Details subject to revision and change at the sole discretion of Pasco County Utilities



NOTES:
- COMPACTION TO FINISHED GRADE IS TO BE 95% MOD. PROCTOR.
- SELECT FILL TO BE PLACED AND COMPACTED IN 12" LAYERS. ROLLING EQUIPMENT SHALL NOT BE USED FOR COMPACTION UNTIL A MINIMUM OF 6" OF COMMON FILL HAS BEEN PLACED AND COMPACTED OVER THE PIPE. 18" OF FILL SHALL BE PLACED BEFORE A HYDROHAMMER MAY BE USED FOR COMPACTION.

NOTE:
ANY WIRE SPLICING SHALL USE CAMPBELL HEAT SHRINK SPLICE KIT LSK4-B OR APPROVED EQUAL

CREATED JUNE 2017 REVISED MAY 2021	PIPE LAYING CONDITIONS UNPAVED AREAS	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL G2



NOTES

PAVEMENT OPEN CUTS, EXCAVATION AND RESTORATION

1. MILLING AND RESURFACING LIMITS ARE AS FOLLOWS:

ROADWAY TYPE:	DIMENSION "X"
RESIDENTIAL	50 FT.
ARTERIAL OR COLLECTOR (MINIMUM ONE INCH)	50 FT.

2. REPLACEMENT OF ASPHALT TO BE TWICE THE ORIGINAL PAVEMENT THICKNESS OR PLACED AT A MINIMUM OF 2-INCHES AS APPROVED ON THE PLANS. ASPHALTIC CONCRETE TO BE SUPER PAVE (SP) AND PLACED WITHIN LIFTS ADHERING TO THE FDOT FLEXIBLE PAVEMENT MANUAL (LATEST EDITION).

3. BASE MATERIAL TO BE NEW AND FROM AN APPROVED FDOT SOURCE WITH MATERIAL CERTIFICATION PER PASCO COUNTY SPECIFICATION NO. 200.

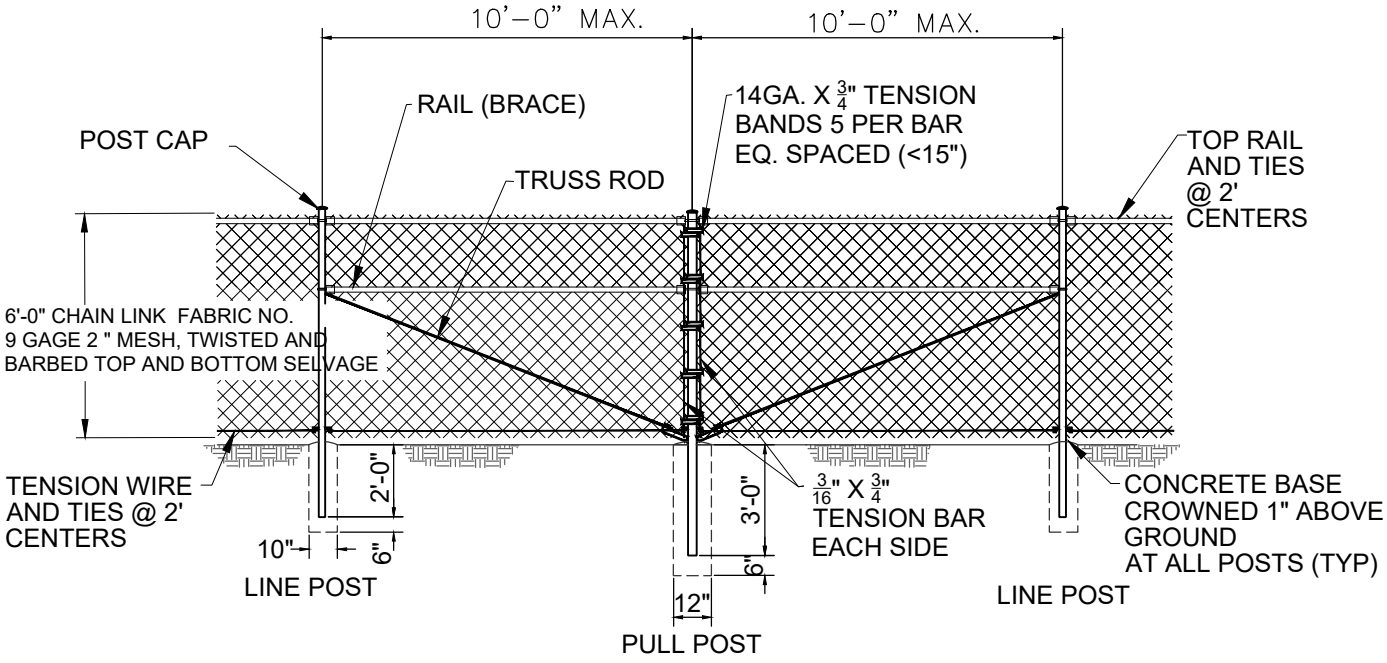
4. EXCAVATION OF EXISTING BASE MATERIALS TO BE DISPOSED OF OFFSITE BY THE CONTRACTOR AND NOT REUSED FOR THE EXCAVATED AREA.

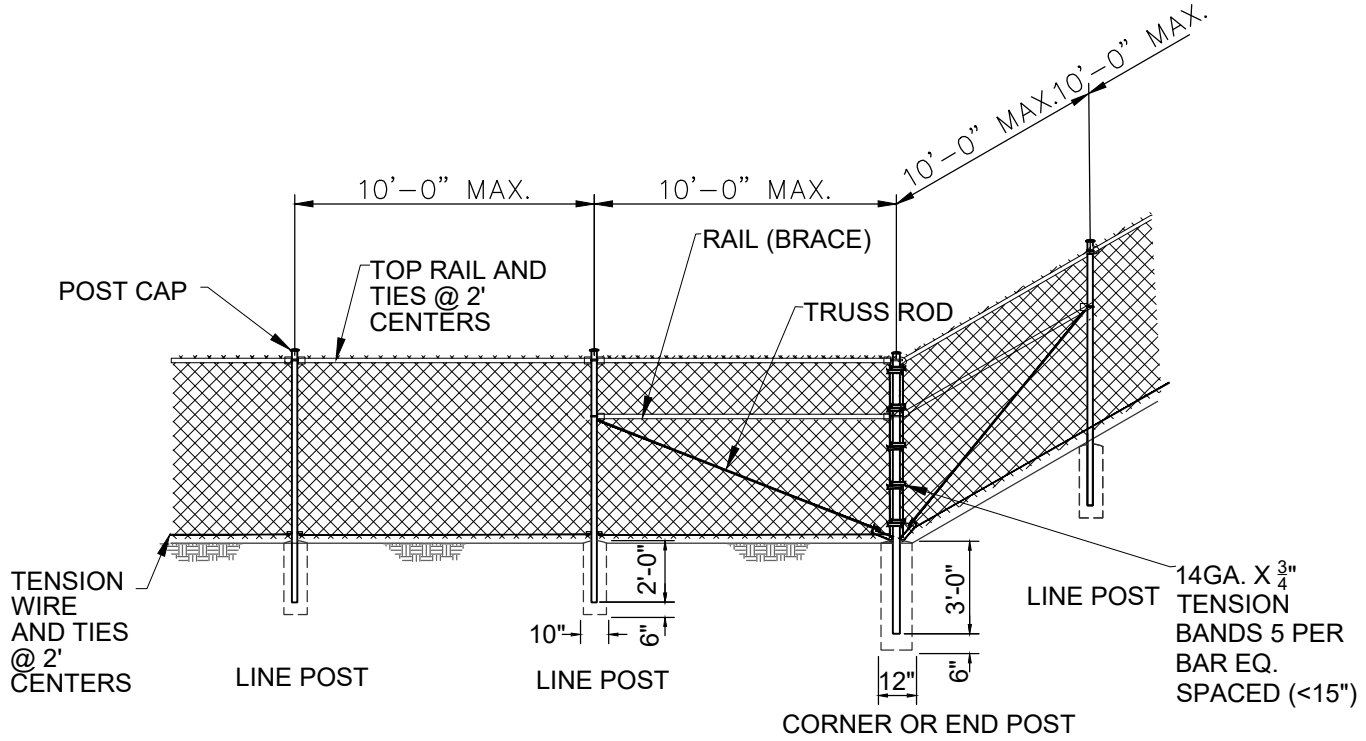
5. CONTRACTOR TO BACKFILL IN ACCORDANCE WITH THE FOLLOWING:
   a. AREA A - BACKFILL EXCAVATED AREA USING LIME ROCK (LBR 100) OR CRUSHED CONCRETE (LBR 150) PLACED IN MAXIMUM 6-INCH LIFTS.
      EACH LIFT TO BE COMPACTED TO 100% OF MAXIMUM DENSITY AS DETERMINED BY FM 1-T099.
   b. AREA B - BACKFILL EXCAVATED AREA IN MAXIMUM 12-INCH LIFTS.
      EACH LIFT TO BE COMPACTED TO 100% DRY DENSITY PER FM 1-T180.
   c. AREA C - BACKFILL EXCAVATED AREA WITH 6-INCH MAXIMUM LIFTS. EACH LIFT TO BE COMPACTED TO 100% DRY DENSITY PER FM 1-T180.
6. IN LIEU OF COMPACTED BASE MATERIAL THE CONTRACTOR CAN UTILIZE LEVEL C ASPHALTIC CONCRETE (SP 12.5) PLACED AT 2-INCH MAXIMUM LIFTS. SP12.5 ASPHALTIC CONCRETE TO MATCH THE THICKNESS OF THE EXISTING BASE AND MUST NOT BE PLACED BELOW SPRING LINE OF THE PIPE.

7. TESTING AND COMPACTION RATES MUST BE SUBMITTED TO PASCO COUNTY ENGINEERING INSPECTION VERIFYING OPEN CUT RESTORATION IS IN ACCORDANCE WITH FDOT AND COUNTY SPECIFICATIONS.

NOTE:
NO DEVIATIONS TO THIS DETAIL WILL BE PERMITTED UNLESS APPROVED BY THE COUNTY ENGINEER.
ANY PROPOSED ALTERATIONS SHALL BE CLEARLY IDENTIFIED AND HIGHLIGHTED ON DETAIL.

CREATED APR 2021 REVISED MAY 2021	PIPE LAYING CONDITIONS EXISTING PAVED AREAS	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL G3





SEE G4A FOR GENERAL NOTES

CREATED DEC 2020 REVISED	PUMP STATION FENCE SPECIFICATIONS	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL G4

GENERAL NOTES

1) CHAIN LINK FABRIC, POST, TRUSS RODS, TENSION WIRES, TIE WIRES, STRETCHER BARS, GATES AND ALL MISCELLANEOUS FITTINGS AND HARDWARE SHALL MEET THE REQUIREMENTS OF AASHTO AND ASTM SIGNIFY CURRENT REFERENCE.

2) FENCE COMPONENTS:

A. LINE POST:
BLACK VINYL COATED GALVANIZED STEEL PIPE, SCHEDULE 40- 1½" NOMINAL DIA. ZINC GALVANIZED AT THE RATE OF 1.8 OZ./FT2.: ASTM A53 TABLE 2 (Grade A or B, ASTM F1083, and AASHTO MI11.

B. CORNER, END, AND PULL POST:
BLACK VINYL COATED GALVANIZED STEEL PIPE, SCHEDULE 40-2" NOMINAL DIA. ZINC GALVANIZED AT THE RATE OF 1.8 OZ./FT2.: ASTM A53 TABLE X 2, ASTM F1083, and AASHTO MI11.

C. TOP AND BRACE RAIL :
BLACK VINYL COATED GALVANIZED STEEL PIPE, SCHEDULE 40- 1¼" NOMINAL DIA. ZINC GALVANIZED AT THE RATE OF 1.8 OZ./FT2.: ASTM A53 TABLE X 2, ASTM F1083, AND AASHTO ML 11.

D. CHAIN LINK FABRIC (2" MESH WITH TWISTED AND BARBED SELVAGE TOP AND BOTTOM):
AASHTO M181 TYPE IV- POLYVINYL CHLORIDE (PVC) COATED STEEL, NO. 9 GAGE (COATED CORE WIRE DIAMETER, CORE WIRE-ZINC COATED STEEL. BLACK PVC COATING: M181 CLASS A (EITHER EXTRUDED OR EXTRUDED AND BONDED) .

E. TENSION WIRE:
BLACK VINYL COATED STEEL WIRE NO.7 GAGE ZINC GALVANIZED AT THE RATE OF 1.2 OZ./FT .: AASHTO M181.

F. TIE WIRE AND HOG RING:
BLACK VINYL COATED STEEL WIRE NO.9 GAGE ZINC GALVANIZED AT THE RATE OF 1.2 OZ./FT

3) CONCRETE FOR BASES SHALL BE CLASS NS CONCRETE AS SPECIFIED IN SECTION 347 OF THE STANDARD SPECIFICATIONS OR A PACKAGED, DRY MATERIAL MEETING THE REQUIREMENTS OF A CONCRETE UNDER ASTM C-387. MATERIALS FOR CLASS NS CONCRETE MAY BE PROPORTIONED BY VOLUME AND/OR BY WEIGHT.

4) LINE POST SHALL BE 8'-6" LONG (STANDARD). LINE POST ARE TO BE SET IN CONCRETE AS DESCRIBED ABOVE.

END, PULL AND CORNER POST ASSEMBLIES SHALL BE IN CONCRETE AS DETAILED ABOVE FOR ALL SOIL CONDITIONS OTHER THAN SOLID ROCK. POST WITHIN ASSEMBLIES THAT ARE LOCATED ON CONCRETE STRUCTURES OR SOLID ROCK SHALL BE SET BY BASE PLATE OR BY EMBEDMENT AS PRESCRIBED UNDER (B) ABOVE FOR LINE POST.

LINE AND ASSEMBLY POSTS FOR 6' FENCE WHICH MUST BE LENGTHENED DUE TO A VARIATION IN THE NORMAL GROUND CLEARANCE, SHALL BE SET AN ADDITIONAL 3" IN DEPTH FOR EACH 1' OF OF ADDITIONAL GROUND CLEARANCE.

5) PULL POST SHALL BE USED AT BREAKS IN VERTICAL GRADES OF 15° OR MORE, OR AT APPROXIMATELY 350' CENTERS EXCEPT THAT THIS MAXIMUM INTERVAL MAY BE REDUCED BY THE ENGINEER ON CURVES WHERE THE CURVE IS GREATER THAN 3°.

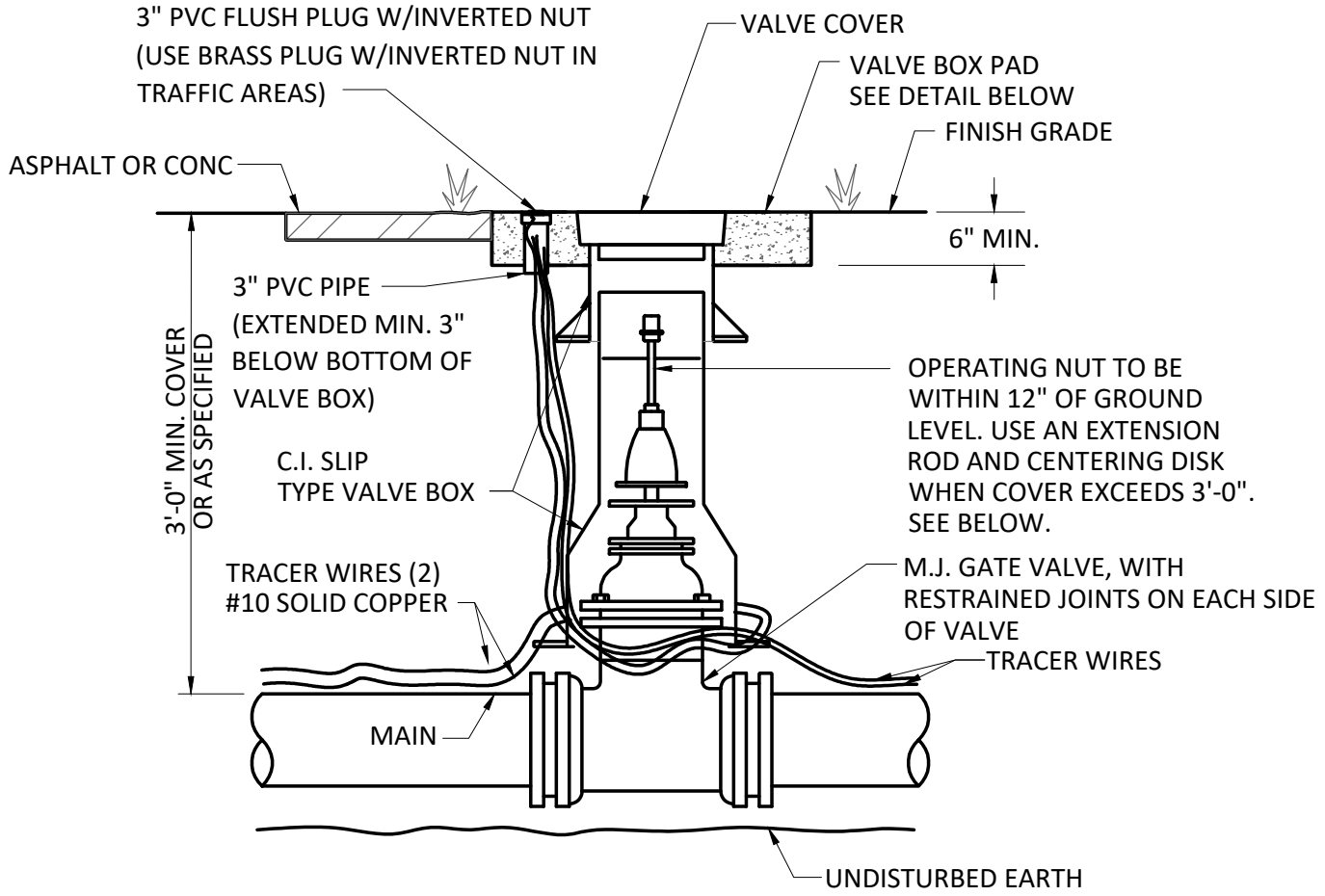
6) CORNER POST ARE TO BE INSTALLED AT ALL HORIZONTAL BREAKS IN FENCE AT 15° OR MORE AND AS REQUIRED AT VERTICAL BREAKS OVER 15° AS DETERMINED BY THE ENGINEER.

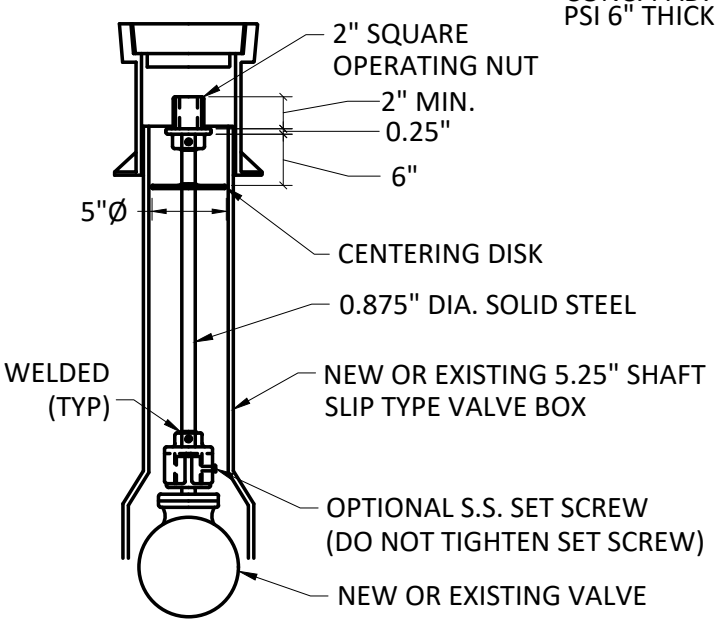
7) ALL GATES SHALL BE CHAIN LINK SWING GATES MEETING THE MATERIAL REQUIREMENTS DESCRIBED AND AS APPROVED BY THE ENGINEER.

8) FOR CONSTRUCTION PURPOSES CORNER POST ASSEMBLIES SHALL CONSIST OF ONE CORNER POST, TWO BRACES, TWO TRUSS RODS, AND ALL NECESSARY FITTINGS AND HARDWARE AS DETAILED. END POST ASSEMBLIES SHALL CONSIST OF ONE END POST, ONE BRACE, ONE TRUSS ROD AND ALL NECESSARY FITTINGS AND HARDWARE AS DETAILED.

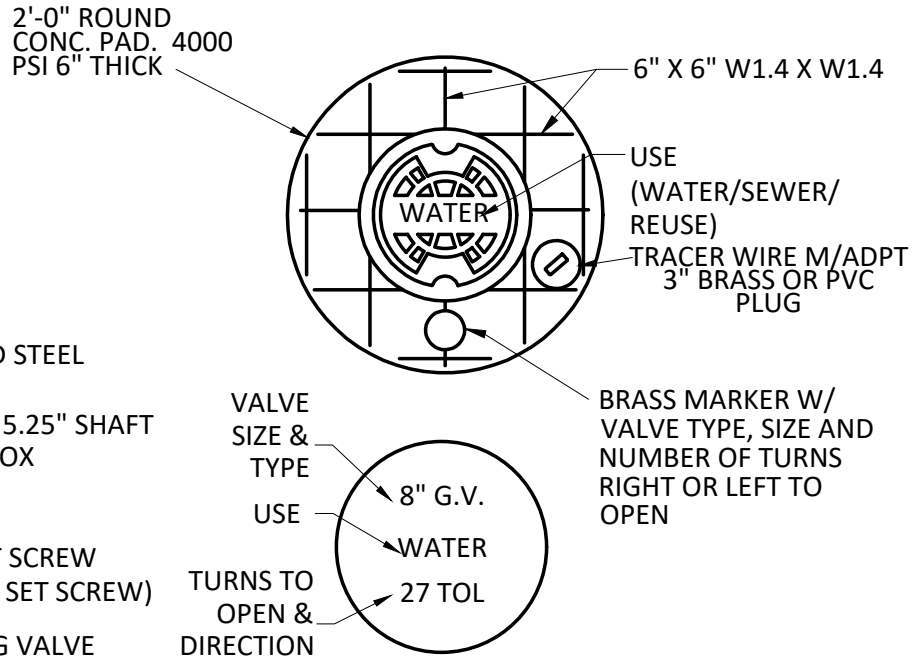
SEE G4 FOR FENCE SPECIFICATIONS

CREATED DEC 2020 REVISED	PUMP STATION FENCE GENERAL NOTES	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL G4A



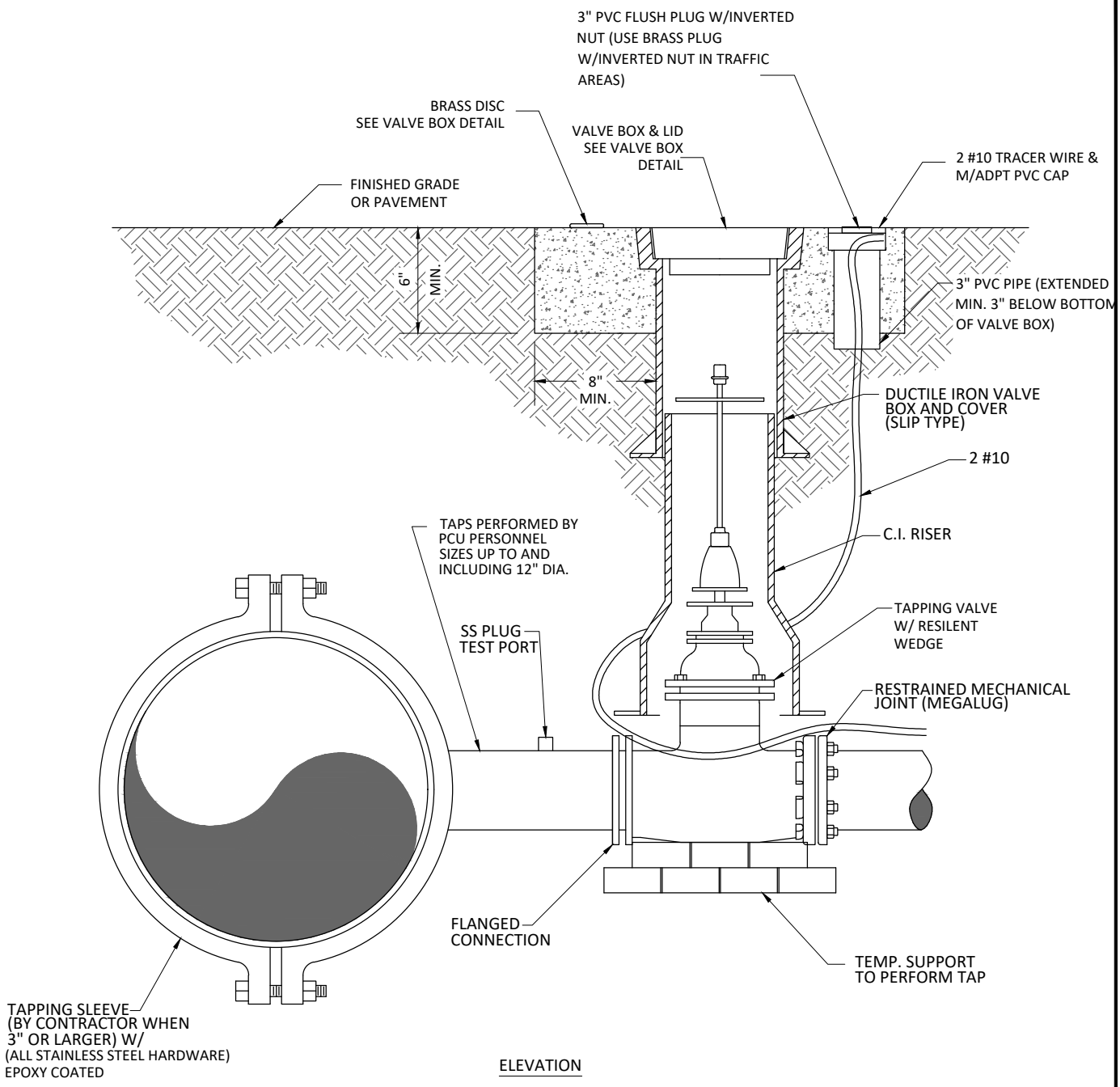


VALVE EXTENSION ROD



CONCRETE VALVE BOX PAD

CREATED DEC 2020 REVISED MAY 2021	VALVE BOX SLIP TYPE	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL G5



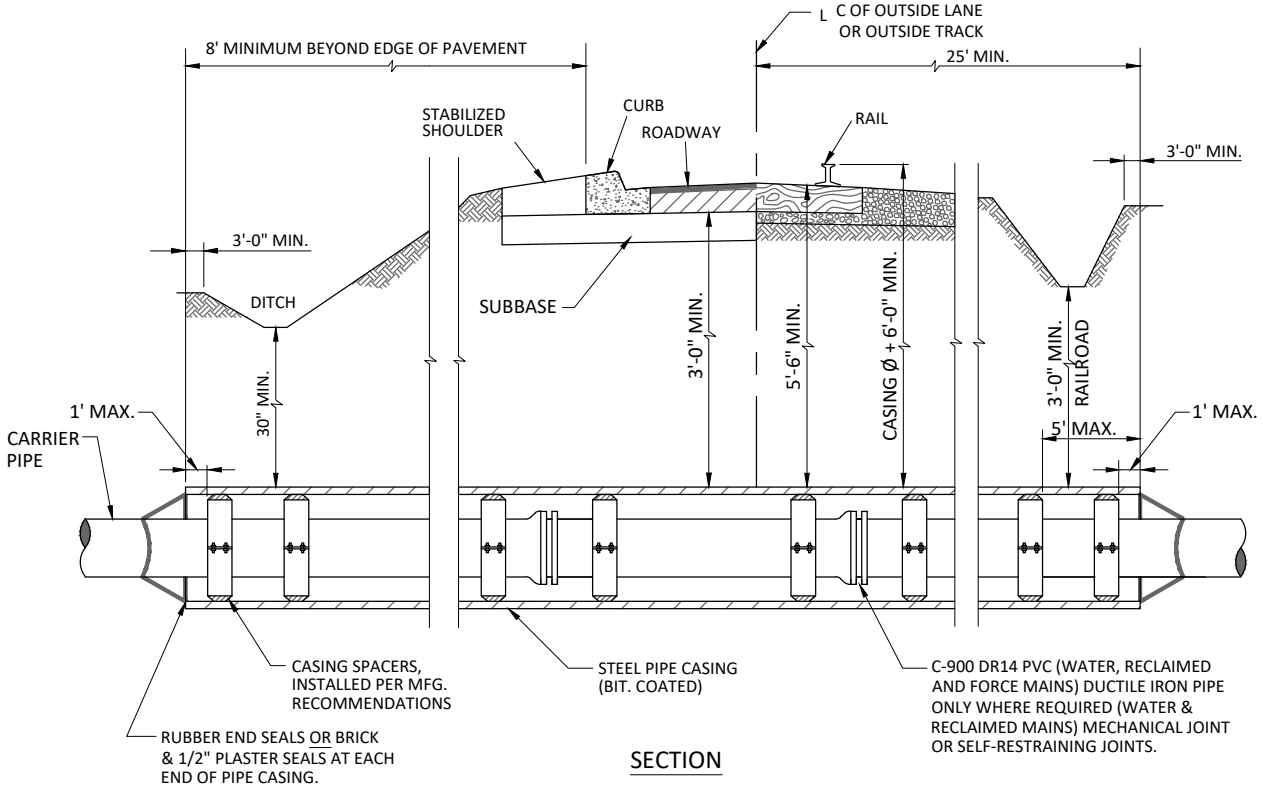
ELEVATION

NOTES:

- SADDLE TO BE INSTALLED 2'-0" MIN. FROM ANY BELL OR FITTING.
- MECHANICAL JOINTS/UNDERGROUND PIPING SHALL BE RESTRAINED AS SPECIFIED BY COUNTY/ENGINEER.
- VALVE EXTENSION ROD SHALL BE UTILIZED, AS NECESSARY, SO THAT VALVE OPERATING NUT IS A MAXIMUM OF 3' BELOW GRADE.
- AFTER SETTING OF SLEEVE, CONTRACTOR TO NOTIFY PCU MAINTENANCE DEPT. FOR WET TAP.
- PRESSURE TEST 150 PSI FOR A MIN. OF 1/2 HOUR AFTER INSTALLATION
- BACK FILL PER REQUIREMENTS OF DETAIL G-3

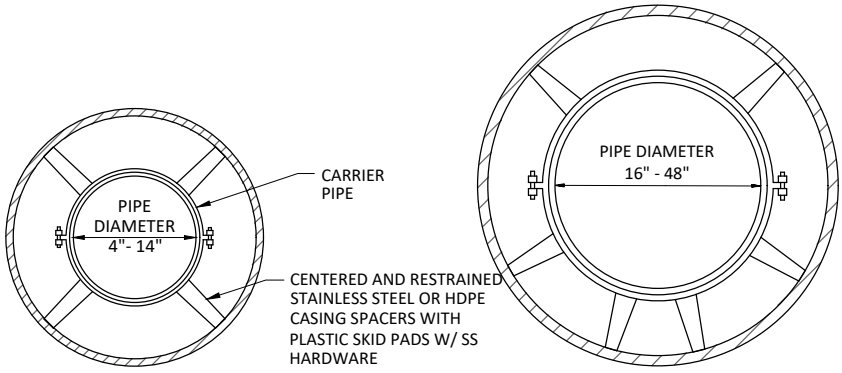
W, RW, FM

CREATED AUG 2019 REVISED MAY 2021	TAPPING VALVE AND SLEEVE	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL G6



SECTION

CARRIER PIPE (INCHES)	CASING PIPE (INCHES)	CASING WALL THICKNESS (INCHES)
4	12	5/16
6	16	5/16
8	16	5/16
10	24	3/8
12	24	3/8
16	30	1/2
20	36	1/2
24	42	1/2
30	48	1/2
36	54	5/8
42	60	5/8
48	66	5/8

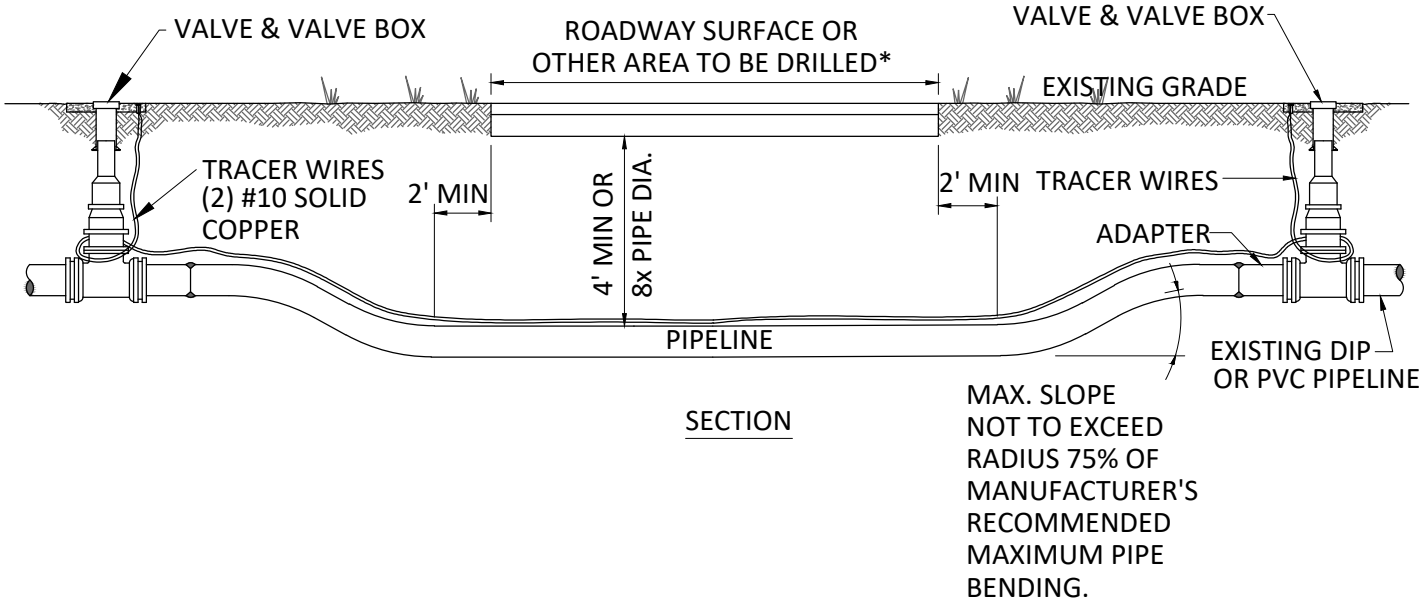


END VIEWS

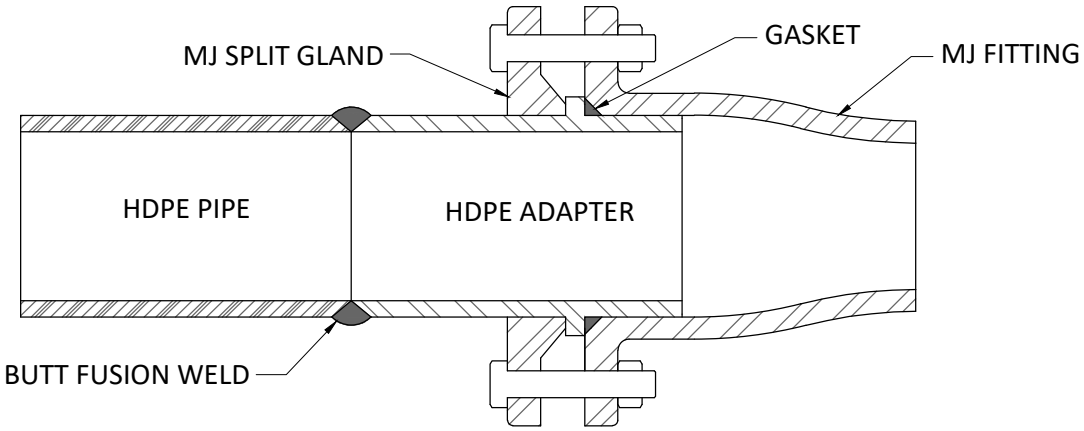
NOTES:

- CASINGS SHALL HAVE 30" MINIMUM COVER UNDER DITCH BOTTOMS AND 36" ELSEWHERE.
- F.D.O.T. OR RAILROAD AUTHORITY STANDARDS, WHERE APPLICABLE.
- MAX. DISTANCE BETWEEN SPACERS 10'-0" FOR USE ON C-900 DR14 or 75% OF MANUFACTURERS MAX. WHICH EVER IS LESS DISTANCE.
- MECHANICAL JOINT RESTRAINTS SHALL HAVE DOUBLE - NUT FOR PUSH / PULL PROTECTION OF CARRIER PIPE.
- CARRIER PIPE TO BE PVC PIPE FOR WATER MAINS, RECLAIMED WATER MAIN AND FORCE MAINS TO BE PVC. WHERE REQUIRED, WATER MAINS AND RECLAIMED MAINS SHALL BE DUCTILE IRON.

CREATED DEC 2020 REVISED MAY 2021	JACK & BORE DETAIL	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL G7



SECTION



HDPE-MJ ADAPTER

NOTES:

-FOR USE IN PASCO COUNTY RIGHT OF WAY ONLY.

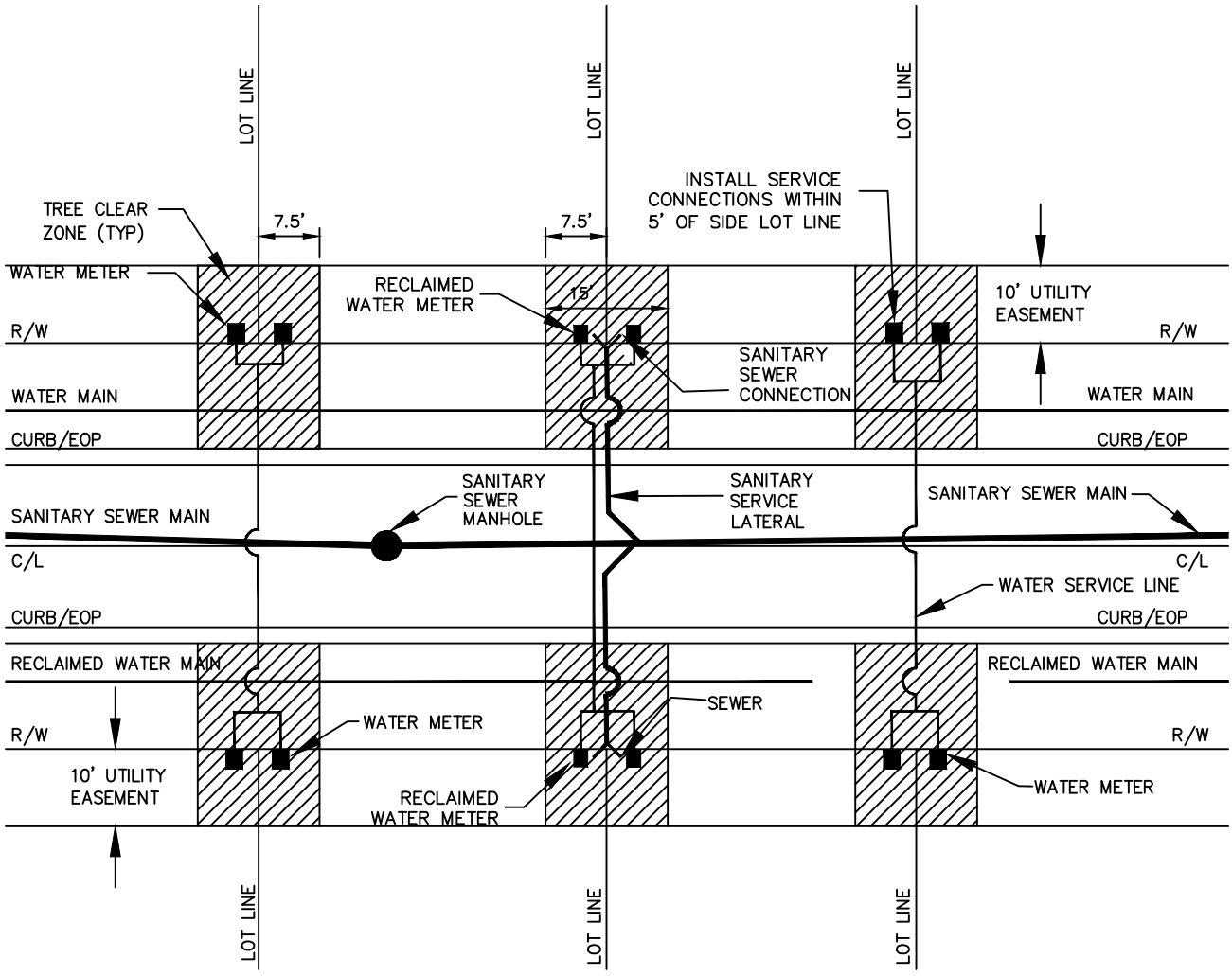
-DIRECTIONAL DRILLS SHALL BE COMPLETED USING PVC DR 14, HDPE DR 11 OR DUCTILE IRON. DUCTILE IRON SHALL BE USED ONLY FOR WATER AND RECLAIMED MAINS WHERE REQUIRED ALL HDPE MUST BE COLOR CODED (SAFETY BLUE-WATER, SAFETY GREEN FOR SEWER AND PANTONE PURPLE FOR RECLAIMED WATER); BUTT FUSION WELDED; AND CONNECTED WITH HDPE-MJ ADAPTER.

-ALL DIRECTIONAL DRILLINGS SHALL HAVE (2) #10 SOLID COPPER TRACER WIRES INSTALLED WITH PIPING.

-NO FITTINGS GREATER THAN 45° FOR TRANSITIONS.

-DIRECTIONAL DRILLING SHALL NOT BE USED UNDER COUNTY OR STATE ROADS; ONLY FOR USE UNDER PRIVATE STREETS, DRIVEWAYS, WETLANDS, OR OTHER AREAS AS DETERMINED IN THE SPECIFICATIONS.

CREATED DEC 2020 REVISED MAY 2021	DIRECTIONAL DRILLING	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL G8



LANDSCAPING CLEAR ZONE

LANDSCAPING CLEAR ZONE EXTENDS 7.5' TO EITHER SIDE OF PROPERTY LINE THAT IS PERPENDICULAR TO THE ROW LINE AND EXTENDS FROM THE EDGE OF ROADWAY PAVEMENT TO A DEPTH OF 5.0' BEYOND THE EDGE OF RIGHT-OF-WAY.

TREES AND SHRUBS MUST NOT BE PLANTED IN THE LANDSCAPING CLEAR ZONE. LANDSCAPING CLEAR ZONES ARE ESTABLISHED TO PROTECT WATER SERVICE LINES AND SEWER LATERALS FROM DAMAGE CAUSED BY GROWTH OF ROOT SYSTEMS.

REUSE AND POTABLE WATER CROSSES THE ROAD IN 2" CASING (NOT SHOWN FOR CLARITY).

CREATED FEB 2003 REVISED JAN 2014 MAY 2015 JUNE 2017	SINGLE FAMILY SUBDIVISION TYPICAL UTILITY CONNECTION DETAIL	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL G9

SEE NOTES DETAIL G–11

LARGE END	4"	6"	8"	12"	16"	18"	20"	24"	30"
6"	31(44)								
8"	55(79)	32(46)							
12"	94(134)	79(113)	57(82)						
16"		117(166)	101(144)	59(84)					
18"			120(171)	83(118)	31(44)				
20"				104(149)	58(83)	31(44)	58(83)		
24"				143(204)	106(151)	83(119)	58(83)		
30"					163(232)	145(207)	126(180)	81(115)	
36"							181(258)	145(207)	80(114)
48"							266(381)	241(345)	196(280)

REDUCER RESTRAINED JOINTS (150 PSI)

MINIMUM LINEAR FEET OF BRANCH PIPE TO BE RESTRAINED FROM JOINT TEE

TEE

RUN	BRANCH 4"	6"	8"	12"	16"	18"	20"	24"	30"	36"	48"
4"	21(29)										
6"	10(15)	38(54)									
8"	0(0)	30(43)	55(78)								
12"	0(0)	15(21)	43(62)	86(123)							
16"		0(0)	30(43)	78(111)	116(185)						
18"		0(0)	24(34)	73(104)	112(161)	130(186)					
20"		0(0)	16(23)	68(98)	109(156)	127(181)	143(205)				
24"		0(0)	1(2)	58(83)	102(145)	120(172)	128(197)	170(243)			
30"		0(0)	0(0)	42(61)	90(128)	110(157)	129(184)	163(233)	207(296)		
36"			0(0)	25(35)	77(110)	99(141)	118(169)	155(221)	201(287)	241(344)	
48"				0(0)	48(68)	73(104)	96(136)	136(194)	186(266)	229(328)	300(429)

TEE RESTRAINED JOINTS (150 PSI)

MINIMUM LINEAR FEET OF BRANCH PIPE TO BE RESTRAINED FROM JOINT TEE

PIPE SIZE	4"	6"	8"	12"	16"	18"	20"	24"	30"	36"	48"
CAPPED ENDS	–	–	–	–	–	–	–	–	–	–	–
90° BENDS	42(60)	59(85)	77(110)	108(155)	138(198)	153(218)	166(238)	194(277)	231(330)	265(379)	325(465)
45° BENDS	17(25)	25(35)	32(45)	45(64)	57(82)	63(90)	69(987)	80(115)	96(137)	110(157)	135(192)
22 1/2° BENDS	8(12)	12(17)	15(22)	22(31)	28(39)	30(43)	33(47)	39(55)	46(66)	53(75)	65(92)
11 1/4° BENDS	4(6)	6(8)	8(11)	11(15)	14(19)	15(21)	16(23)	19(27)	23(32)	26(37)	32(46)
VALVE	–	–	–	–	–	–	–	–	–	–	–

DUCTILE IRON RESTRAINED JOINTS FOR VERTICALLY ORIENTED FITTINGS (150 PSI)

MINIMUM LINEAR FEET OF PIPE TO BE RESTRAINED JOINTS TEE AT BENDS VALVE OR END CAPS

PIPE SIZE	4"	6"	8"	12"	16"	18"	20"	24"	30"	36"	48"
CAPPED ENDS	42(60)	59(85)	77(110)	108(155)	138(198)	153(218)	166(238)	194(277)	231(330)	265(379)	325(465)
90° BENDS	20(24)	29(33)	37(43)	51(60)	65(76)	72(83)	78(90)	89(104)	104(122)	120(138)	144(167)
45° BENDS	8(10)	12(14)	15(18)	21(25)	27(31)	30(35)	32(37)	37(43)	44(52)	50(57)	60(69)
22 1/2° BENDS	4(5)	6(7)	7(9)	10(12)	13(15)	15(17)	16(18)	18(21)	21(24)	24(28)	29(33)
11 1/4° BENDS	2(2)	3(3)	4(4)	5(6)	7(8)	8(9)	8(9)	9(11)	11(12)	12(14)	14(16)
VALVE	35(50)	49(71)	64(92)	90(130)	115(165)	128(182)	139(198)	160(230)	193(275)	220(320)	325(465)

DUCTILE IRON RESTRAINED JOINTS FOR HORIZONTAL FITTINGS (150 PSI)

MINIMUM LINEAR FEET OF PIPE TO BE RESTRAINED JOINTS TEE AT BENDS VALVE OR END CAPS

* NUMBER IN PARENTHESIS REPRESENTS LINEAL FEET OF RESTRAINT FOR POLY WRAP AND FOR PVC PIPE

CREATED JULY 2015
REVISED NOV. 2015
MAY 2016
JUNE 2017

RESTRAINED JOINT TABLES

PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL

PASCO COUNTY UTILITIES

DETAIL G10

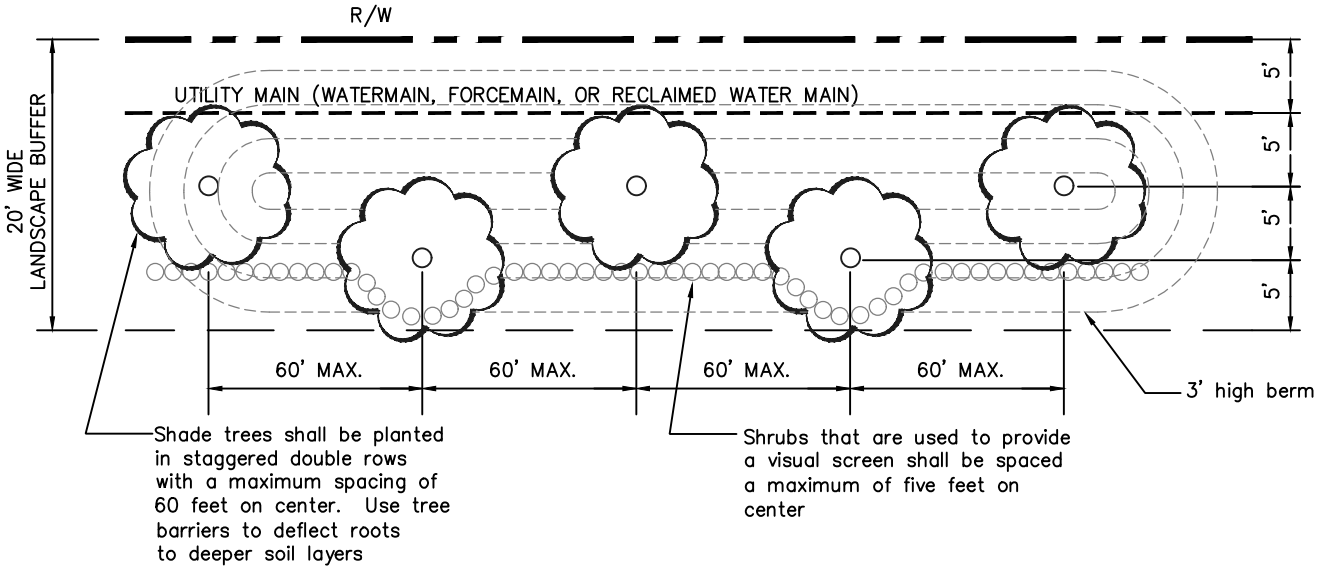
RESTRAINED JOINT NOTES

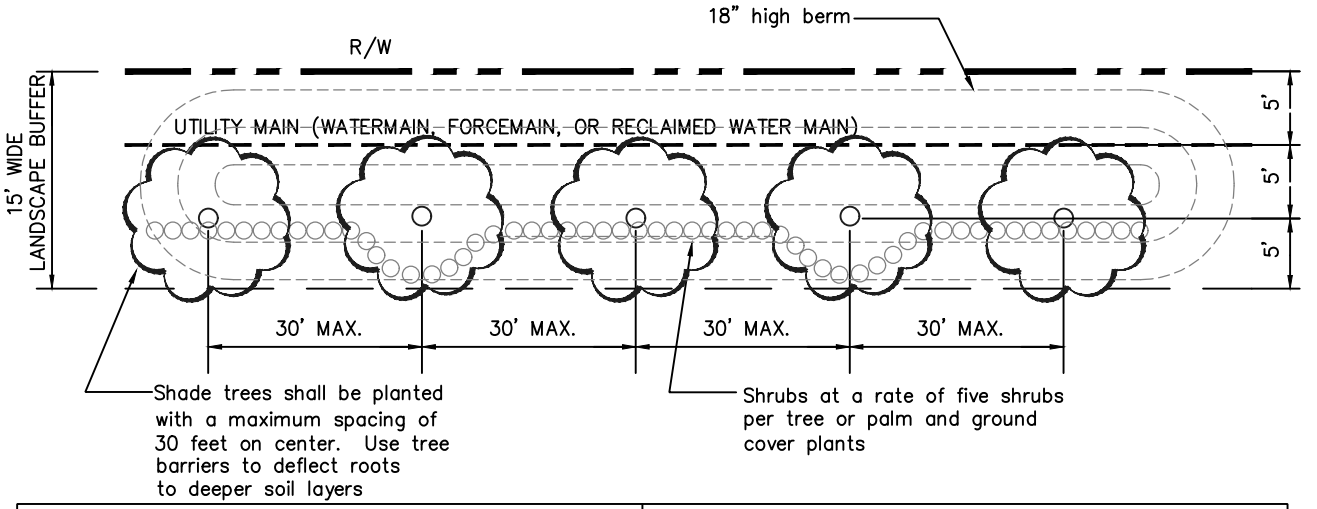
1. THE PROGRAM, "THRUST RESTRAINT" DISTRIBUTED BY THE DUCTILE IRON PIPE RESEARCH ASSOCIATION (DIPRA) WAS USED TO CALCULATE THE LENGTH OF RESTRAINED JOINTS BASED ON TYPE 3 STANDARD ANSI/AWWA C150/A21.50 LAYING CONDITIONS FOR DUCTILE IRON PIPE. SANDY/ SILTY SOIL 3.0 FT MIN. COVERAGE AND 150PSI OPERATING PRESSURE APPROPRIATE ADJUSTMENTS MUST BE MADE FOR DEVIATIONS FROM THESE ASSUMPTIONS.
2. SELECTED COMMON FILL FROM ORIGINAL EXCAVATION, SEE SPECIFICATIONS.
3. USE OF ALTERNATIVE TYPES OF PIPE BEDDING TO BE DETERMINED IN THE FIELD AS DIRECTED BY THE ENGINEER.
4. FOR COMBINED BENDS FORMING OFFSETS, THE LENGTHS QUOTED SHALL BE DOUBLED AND PROVIDED EACH SIDE OF THE CENTROID OF THE OFFSET.
5. VALVES LOCATED NEAR BENDS OR TEES SHALL TAKE ACCOUNT OF ADDITIONAL PASSIVE SOIL RESISTANCE.
6. WATER SHALL NOT BE PERMITTED IN THE TRENCH DURING CONSTRUCTION, DEWATER AS NECESSARY.
7. EXISTING CONCRETE / ASPHALT SURFACES AND BASE SHALL BE CUT SQUARE WITH CONCRETE SAW.
8. ALL FITTINGS AND VALVES SHALL BE MECHANICALLY RESTRAINED. IN ADDITION TO THE FITTING BEING RESTRAINED, THE MINIMUM LINEAR FEET TO BE RESTRAINED ON BOTH SIDES OF THE FITTING SHALL BE AS SHOWN IN THE TABLE UNLESS OTHERWISE NOTED. THE RESTRAINED JOINT LENGTH FOR DUCTILE IRON PIPE ARE AS SHOWN. APPROPRIATE ADJUSTMENTS MUST BE MADE FOR PIPE MATERIALS OTHER THAN DUCTILE IRON.
9. IF THE PIPE IS DEFLECTED, THE MAXIMUM ALLOWABLE DEFLECTION SHALL BE 75% OF THE MANUFACTURERS RECOMMENDED DEFLECTION, FOR THE JOINT TYPE USED.
10. RESTRAINED JOINTS IN CARRIER PIPES (JACK AND BORE) SHALL NOT BE INCLUDED IN RESTRAINED LENGTHS.

* NUMBERS IN PARENTHESES REPRESENT LINEAL FEET OF RESTRAINT FOR POLY WRAPPED DIP AND FOR PVC PIPE.

CREATED JULY 2015 REVISED NOV. 2015 MAY 2016 JUNE 2017	RESTRAINED JOINT NOTES	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL G11

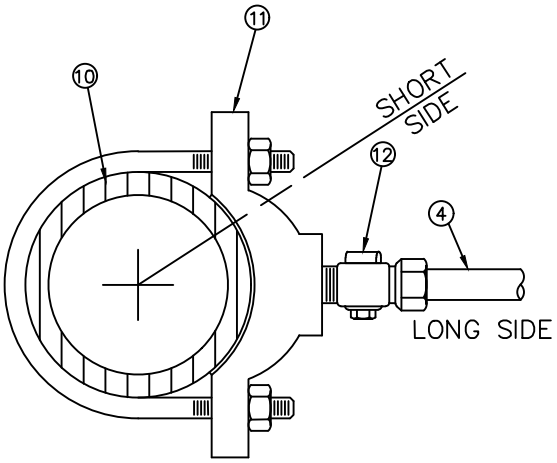
NOTE: THIS DETAIL IS PREPARED AS A GUIDE TO AVOID CONFLICT BETWEEN A UTILITY LINE AND A LANDSCAPE BUFFER. THIS UTILITY STANDARD SHALL NOT BE USED TO IMPLY COMPLIANCE WITH PASCO COUNTY LAND DEVELOPMENT CODE, SECTION 905.2, LANDSCAPING AND BUFFERING.



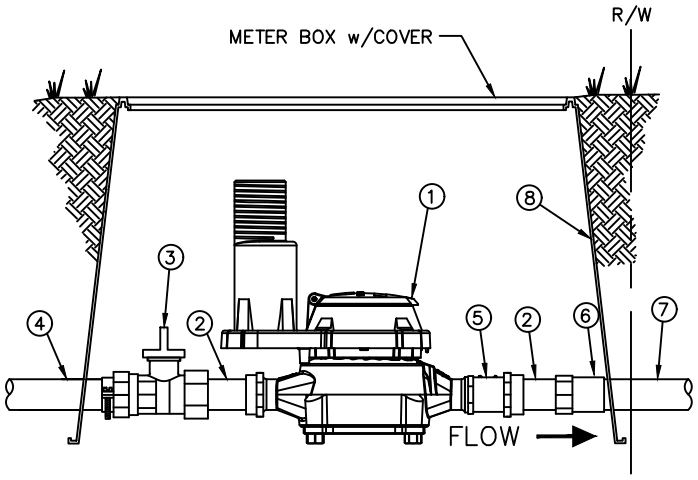


LARGE SHADE TREE LIST (TO BE AVOIDED)			SMALL SHADE TREE LIST (RECOMMENDED)	
Ash	Loblolly Bay	Hackberry	Cabbage Palm	Redbud
Bay	Magnolia	Sugarberry	Devil's Walking Stick	Swamp Dogwood
Cypress	Maple	Sweet Bay	Fringe Tree	Sweet Acacia
Dogwood	Oak	Sweet Gum	Hawthorn	Wild Olive
Elm	Red Cedar	Sycamore	Hophornbeam	Walter Viburnum
Hickory	River Birch	Tuliptree	Hornbeam/Ironwood	Black Haw
Holly	Sourwood		Plum Red Buckeye	Wax Myrtle

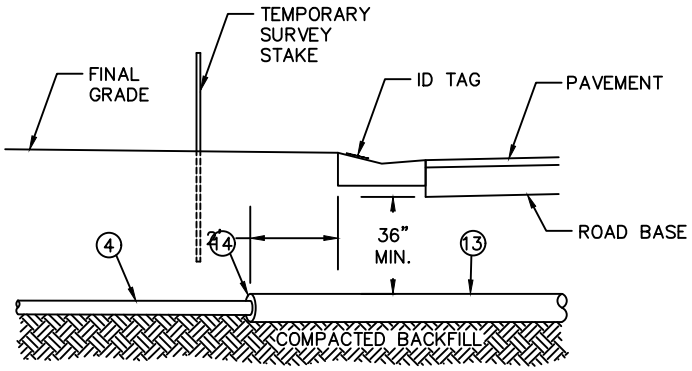
CREATED 08/10/09 REVISED AUG 2015 MAY 2016 JUNE 2017	UTILITIES IN LANDSCAPE BUFFER ADJACENT TO A STATE HIGHWAY	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL G–12



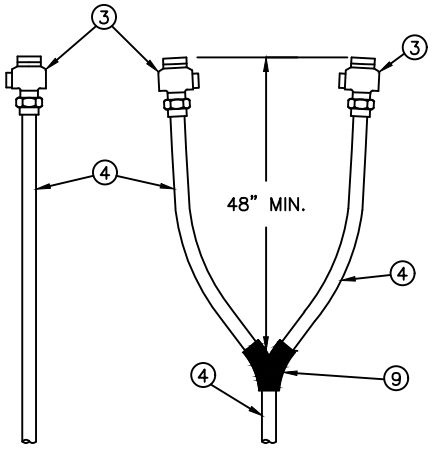
TAP DETAIL



METER BOX – SECTION



ROAD CROSSING – PROFILE



SINGLE DOUBLE

NOTES:
SERVICE LINES NEED TO BE LOCATED ON PROPERTY LINES AWAY FROM CONFLICT WITH SIDEWALKS AND DRIVEWAYS
SERVICE LINES TO BE STAKED 3'–0" FROM WYE BEND

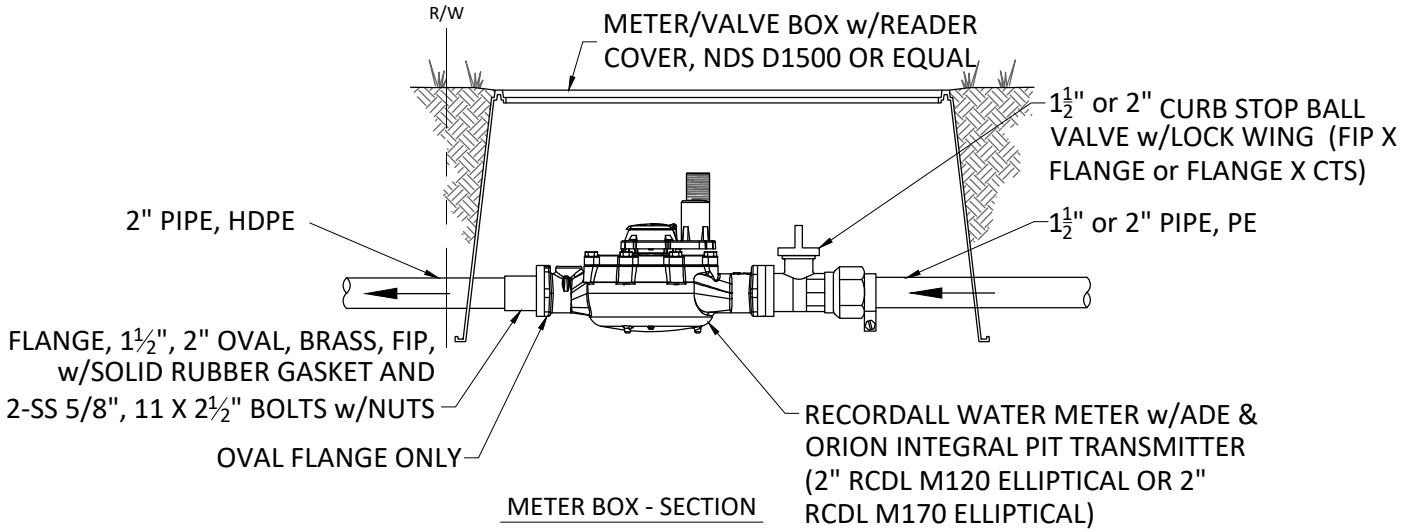
SERVICE LINES – PLAN

M A T E R I A L S		
ITEM	QUANT.	DESCRIPTION
1	1	RECORDALL WATER METER w/ADE & ORION INTEGRAL PIT
		TRANSMITTER (5/8" x 3/4" RCDL C25 OR 1" RCDL M55)
2	2	METER TAIL, 3/4" OR 1" LONG,
		BRONZE MULTISIDED, w/RUBBER WASHER
3	1	CURB STOP BALL VALVE w/LOCK WING (FIP X COMP)
4	*	WATER TUBING, POLYETHYLENE BLUE
5	1	DUAL CHECK VALVE (FMTR X MMTR)
6	1	COUPLING, PVC (TYP)
7	*	PIPE, PVC (TYP.)
8	1	METER BOX w/READER COVER, NDS D1200 OR EQUAL
9	1	1" x 3/4" WYE BRANCH (COMP. x COMP.)
10	*	PIPE, PVC (DR–18) OR D.I.P.
11	1	1" TAPPING SADDLE, DOUBLE STRAP, F.I.P., S.S.
12	1	1" CORPORATION (M.I.P. x COMP.)
13	*	2" CASING, PVC OR HDPE
14	*	SEALER, RAM–NEK

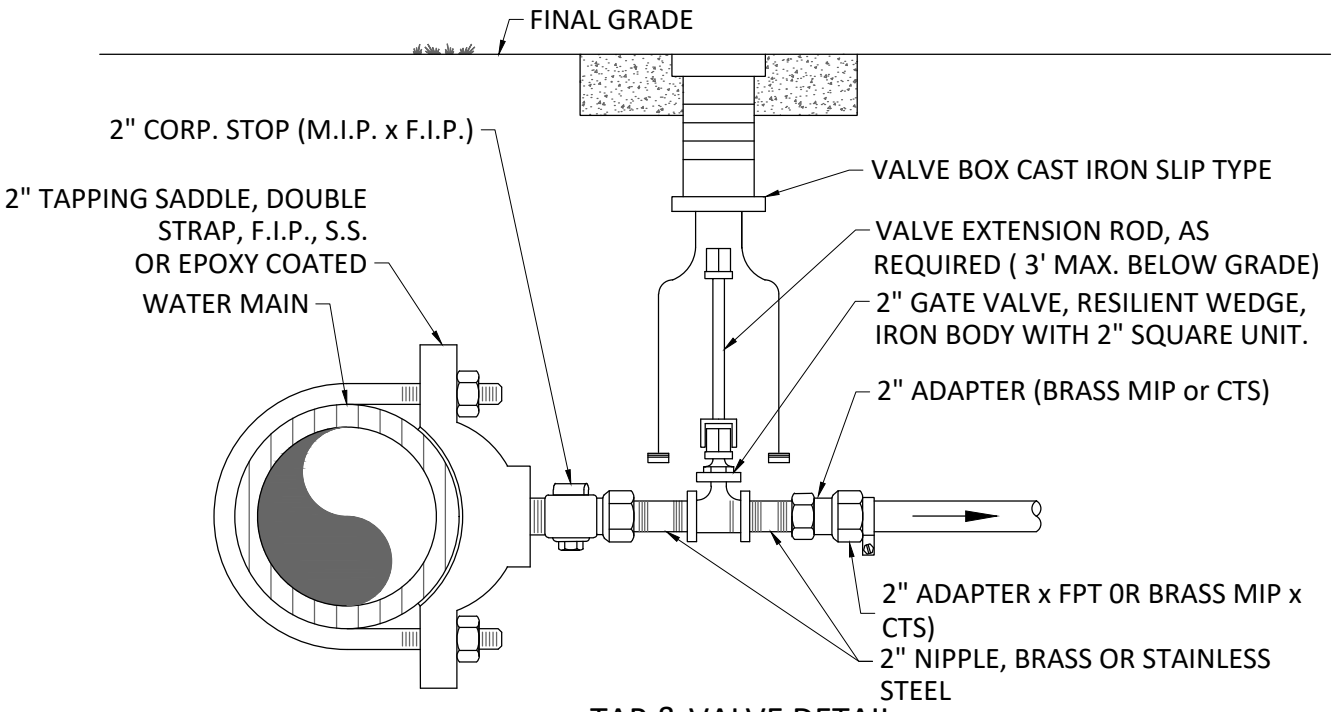
NOTES:
- A DUAL CHECK VALVE IS REQUIRED ON THE POTABLE SERVICE LINE WHEN THE CUSTOMER HAS REUSE AVAILABLE.
- METER BOX TO BE LOCATED OUTSIDE R.O.W. WITHIN UTILITY EASEMENT.
- TOP OF BOX TO BE AT FINISHED GRADE.
- ALL FITTINGS FOR POLYETHYLENE TUBING ARE BRASS COMPRESSION TYPE.
- POTABLE WATER METERS INCLUDE A GREY' REGISTER LID & SHROUD, SUPPLIED AND INSTALLED BY PCU.
- METER BOX & COVER ARE 'BLACK' FOR POTABLE APPLICATION, SUPPLIED AND INSTALLED BY PCU
- TUBING TO BE YARDLEY 3406 OR EQUAL 'BLUE'.
- SADDLES 2" – 3" TO BE BRASS FULL CIRCLE TYPE.
- SADDLES 4" AND LARGER TO BE D.I. DUAL STRAP TYPE.
- SADDLE MAY BE INSTALLED AT ANGLE (WITHIN 45° OF HORIZONTAL).
- POTABLE WATER SERVICES MUST NOT BE LOCATED IN REAR YARDS

W, RW

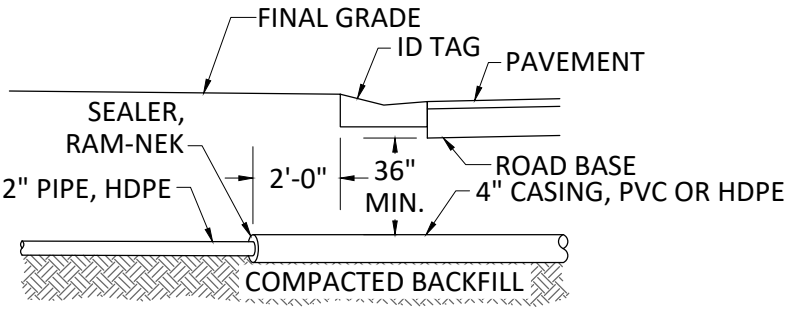
CREATED JAN 2014 REVISED AUG 2015 MAY 2016 FEB 2020	AMR METER SERVICE INSTALLATION 5/8", 3/4" OR 1"	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL G13



METER BOX - SECTION



TAP & VALVE DETAIL



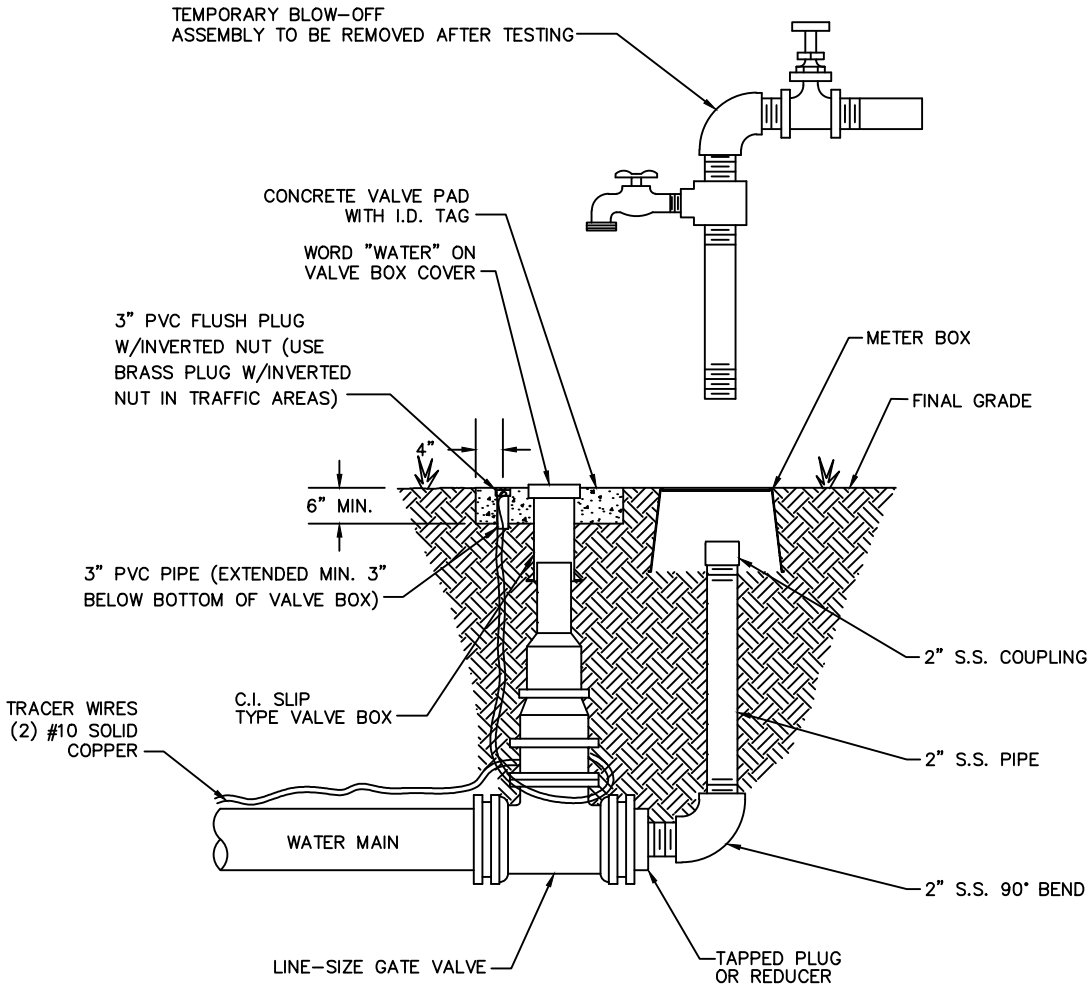
ROAD CROSSING - PROFILE

CREATED NOV 2020 REVISED MAY 2021	AMR METER SERVICE INSTALLATION 1–1/2" or 2"	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL G14

NOTES:

- ALL COMMERCIAL METERS $1\frac{1}{2}$" TO 2'' SHALL BE RPZ PROTECTED
- AN RPZ BFP IS REQUIRED ON POTABLE SERVICE SIDE (COMMERCIAL & RESIDENTIAL) WHEN CUSTOMER HAS REUSE AVAILABLE.
- METER BOX TO BE LOCATED OUTSIDE R.O.W. WITHIN UTILITY EASEMENT.
- TOP OF BOX TO BE AT FINISHED GRADE.
- POTABLE WATER METERS INCLUDE A 'BLACK' REGISTER LID & SHROUD SUPPLIED AND INSTALLED BY PCU.
- METER/VALVE BOX & COVER ARE 'BLACK' FOR POTABLE APPLICATION, SUPPLIED AND INSTALLED BY PCU.
- TUBING TO BE YARDLEY PIPE 3406 OR EQUAL.
- SADDLES 2" - 3" TO BE BRASS FULL CIRCLE TYPE.
- SADDLES 4" AND LARGER TO BE DUCTILE IRON DUAL STRAP TYPE.

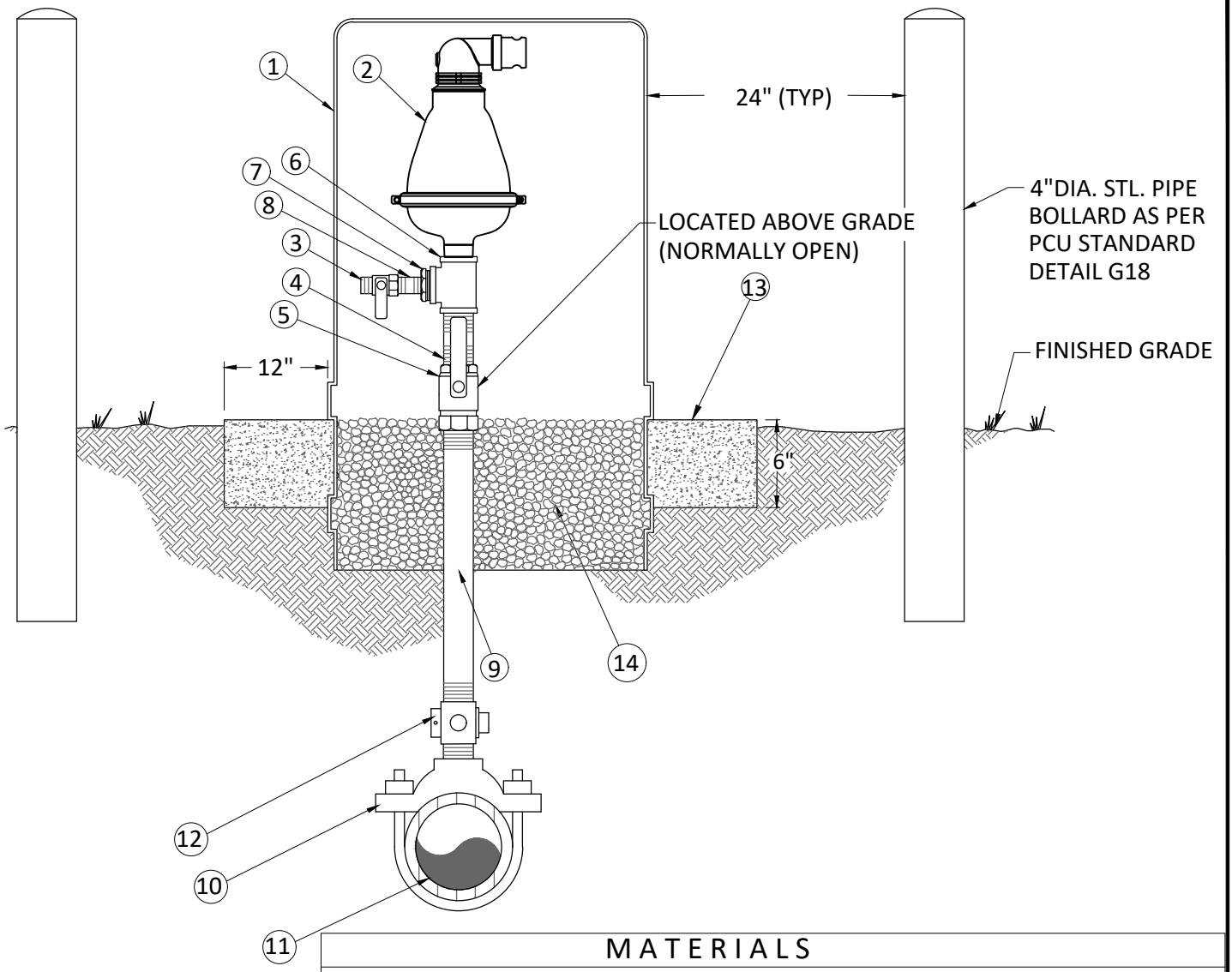
CREATED NOV 2020 REVISED MAY 2021	AMR METER SERVICE INSTALLATION 1–1/2" or 2" NOTES	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL G14A



NOTES:

- MECHANICAL JOINTS/UNDERGROUND PIPING SHALL BE RESTRAINED AS SPECIFIED IN JOINT RESTRAINT TABLE (DETAIL G10).
- VALVE EXTENSION ROD SHALL BE UTILIZED, AS NECESSARY, SO THAT VALVE OPERATING NUT IS A MAXIMUM OF 3' BELOW GRADE.
- END OF LINE SAME SIZE VALVE.
- TEMPORARY PORTION OF ASSEMBLY MAY HAVE GALVANIZED FITTINGS.

CREATED FEB 2003 REVISED JAN 2014 AUG 2015 FEB 2020	PERMANENT BLOW-OFF DETAIL	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL G15



MATERIALS		
ITEM	QUANT.	DESCRIPTION
1	1	VENTED ENCLOSURE, WATER PLUS CORP. MODEL H-30, BLUE (WATER), GREEN (FORCEMAIN) AND PURPLE (RE-USE)
2	1	AIR RELEASE VALVE 2" ARI SEE MODEL # LIST THIS SHEET
3	1	1" BALL VALVE 316 S.S.
4	1	2"X2" CLOSE NIPPLE BREAK AWAY SCH 80
5	1	2" CLOSED BALL VALVE, S.S. ABOVE GRADE
6	1	2" TEE, S.S.
7	1	2" X 1" REDUCER, S.S.
8	1	1" SHORT NIPPLE, S.S.
9	1	2" PIPE, S.S.
10	1	2" DOUBLE STRAP TAPPING SADDLE, S.S.
11	1	4" & LARGER PIPE, D.I. (DR-18)
12	1	2" CORPORATION BRASS
13	1	CONCRETE SLAB AROUND ENCLOSURE
14	*	#57 WHITE ROCK

ARI ARV MODEL#
D-040P W=WATERMAIN
D-021P RW= REUSE WATER
D-025P FM=FORCEMAIN

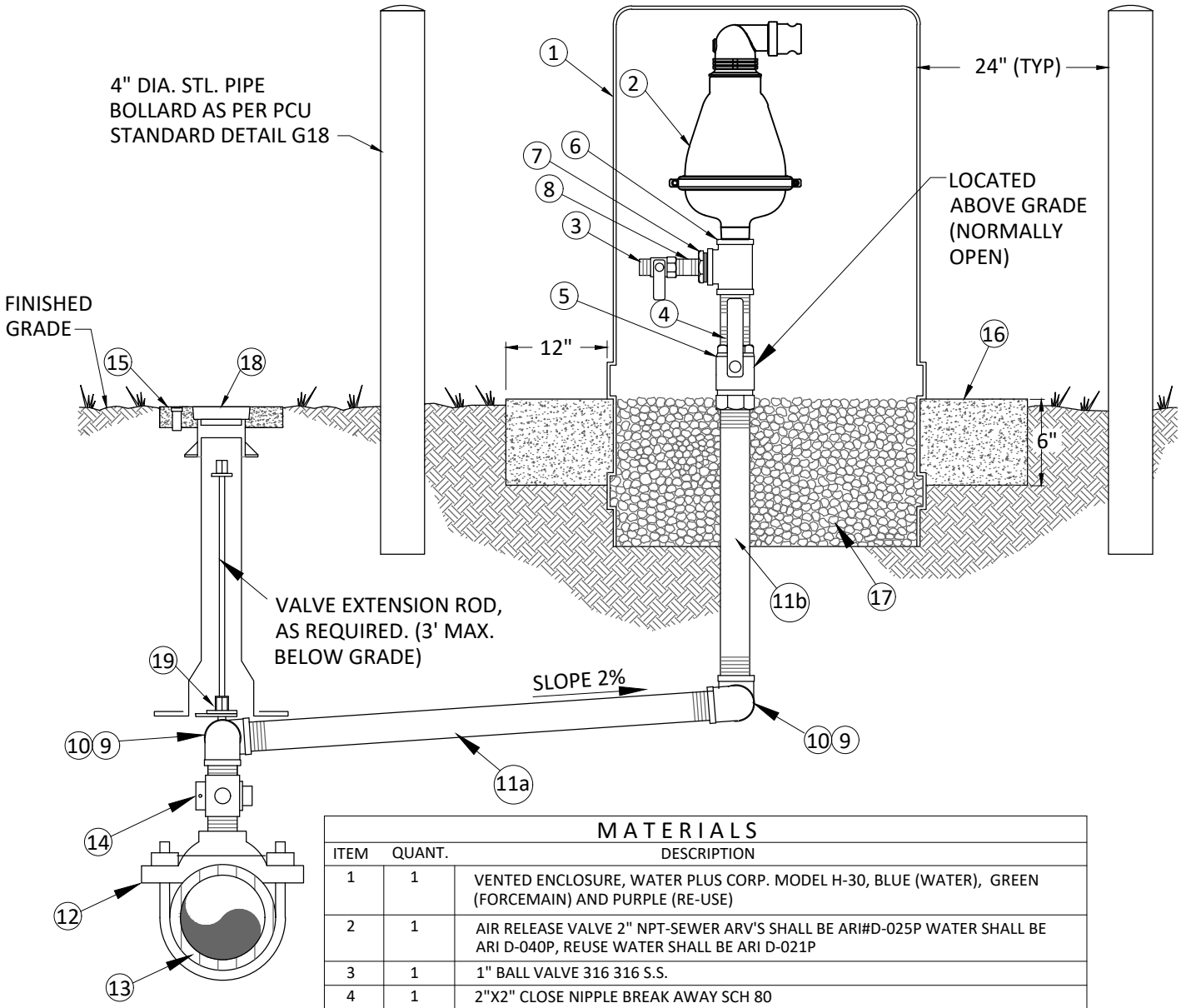
CREATED FEB 2003
REVISED MAY 2021

W, RW, FM AIR RELEASE VALVE ASSEMBLY (VERTICAL PIPE LAYOUT)

PROVIDED FOR INFORMATIONAL PURPOSES ONLY.
NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL

PASCO COUNTY UTILITIES

DETAIL G16

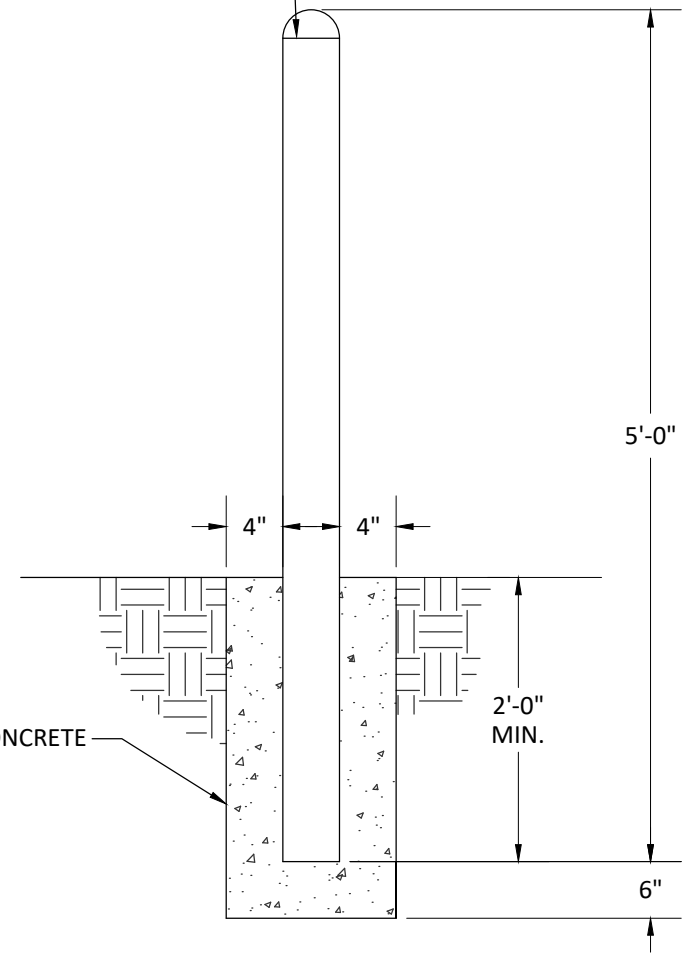


MATERIALS		
ITEM	QUANT.	DESCRIPTION
1	1	VENTED ENCLOSURE, WATER PLUS CORP. MODEL H-30, BLUE (WATER), GREEN (FORCEMAIN) AND PURPLE (RE-USE)
2	1	AIR RELEASE VALVE 2" NPT-SEWER ARV'S SHALL BE ARI#D-025P WATER SHALL BE ARI D-040P, REUSE WATER SHALL BE ARI D-021P
3	1	1" BALL VALVE 316 316 S.S.
4	1	2"X2" CLOSE NIPPLE BREAK AWAY SCH 80
5	1	2" CLOSED BALL VALVE, 316 S.S. ABOVE GRADE (NORMALLY OPEN)
6	1	2" TEE, 316 S.S.
7	1	2" X 1" REDUCER, 316 S.S.
8	1	1" CLOSE NIPPLE, 316 S.S.
9	4	2" x 90° ELBOW, 316 S.S.
10	2	2" SHORT NIPPLE, 316 S.S.
11a	2	2" PIPE, 316 S.S. 15' MAX LENGTH
11b	2	2" PIPE, 316 S.S. LENGTH AS REQUIRED
12	1	2" DOUBLE STRAP TAPPING SADDLE, 316 S.S.
13	1	4" & LARGER PIPE, D.I. OR PVC (DR-18)
14	1	2" CORPORATION BRASS
15	3	24 x 24 CONCRETE VALVE BOX COLLAR WITH DATA TAG
16	1	CONCRETE SLAB AROUND ENCLOSURE
17	*	#57 WHITE ROCK
18	2	VALVE BOX WITH LID LABELED SEWER, WATER OR RECLAIMED
19	1	2" GATE VALVE, RESILIENT WEDGE, IRON BODY WITH 2" SQUARE UNIT

ARI ARV MODELS# D-040P W=WATERMAIN,# D-021P RW= REUSE WATER,# D-025P FM=FORCEMAIN

CREATED NOV 2020 REVISED MAY 2021 - -	W, RW, FM AIR RELEASE VALVE ASSEMBLY (ABOVE GROUND OFFSET)	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL G17

4" SCH. 40 STEEL PIPE (AS INDICATED ON DETAIL DRAWINGS) PAINTED SAFETY YELLOW; FILL PIPE WITH 3000 PSI CONCRETE



TYPE 1. GENERAL PORTLAND CEMENT 28 DAYS, 3000 PSI CONCRETE

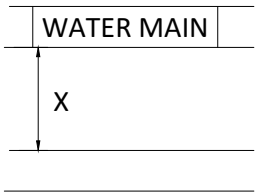
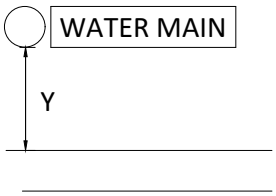
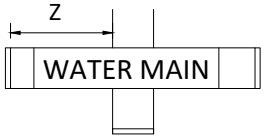
NOTE:
IF THE METER ASSEMBLY IS LOCATED WITHIN A TRAFFIC / VEHICLE AREA (PARKING LOT, DRIVEWAY, OR WITHIN 15 FEET OF EDGE OF PAVEMENT OR BACK OF CURB), ABOVE GROUND METERS UP TO 2 INCHES SHALL HAVE A MINIMUM OF FOUR TRAFFIC BOLLARD PROTECTION POSTS AND FOR ABOVE GROUND METERS 3 INCHES AND LARGER A MINIMUM OF 6 TRAFFIC BOLLARDS ARE REQUIRED.

CREATED FEB 2021 REVISED MAY 2021	BOLLARD POST DETAIL	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL G18

LOCATION OF PUBLIC WATER SYSTEM MAINS IN ACCORDANCE WITH RULE 2-555.314, F.A.C.

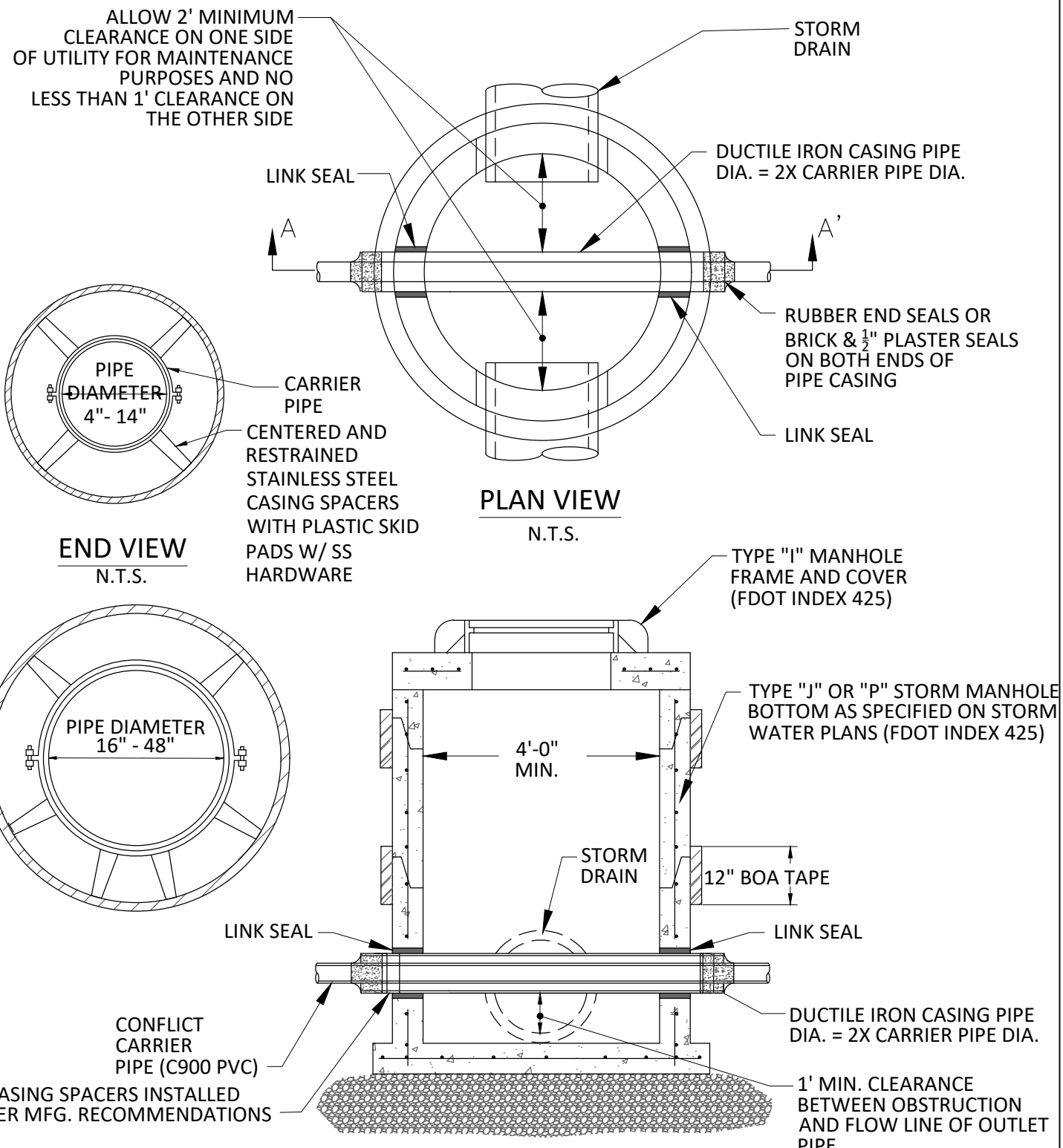
The following table summarizes the required separation distances from public water mains to other pipes as provided in rule 62-62-555.314, F.A.C.

Separation Requirements for Public Water System Mains:

Other Pipe	Horizontal Separation (X) 	Crossings Vertical Separation (Y) 	Joint Spacing (Z) @ Crossings (Full Joint Centered) 
• **Storm Sewers** • **Stormwater Force Mains** • **Reclaimed Water Pipelines regulated under Part III of Chapter 62-610, F.A.C.**	3ft. minimum	For water main installed above other pipe (preferred), 12 inches is the minimum except for storm sewer, then 6 inches is the minimum and 12 inches is preferred 12 inches minimum if water main is below other pipe	Alternate 3 ft. minimum
• **Vacuum Sanitary Sewer**	10 ft. preferred 3 ft. minimum	For water main installed above other pipe, 12 inches preferred and 6 inches minimum 12 inches minimum if water main below other pipe	Alternate 3 ft. minimum
• **Gravity or Pressure Sanitary Sewer** • **Sanitary sewer Force Main** • **Reclaimed Water Pipelines not regulated under Part III of Chapter 62-610, F.A.C.**	10 ft. preferred 6 ft. minimum (note – 3 ft. minimum for gravity sanitary sewer where the bottom of the water main is laid at least 6 inches above the top of the gravity sanitary sewer)	For water main installed above other pipe (preferred), 12 inches is the minimum except for gravity sewer, then 6 inches is the minimum and 12 inches is preferred 12 inches minimum if water main is below other pipe	Alternate 6 ft. minimum
• **On-Site Sewage Treatment & Disposal System**	10 ft. minimum	NA	NA

Disclaimer – This document is provided for your convenience only. Please refer to Rule 62-555.314, F.A.C., for exceptions and additional construction requirements.

CREATED JUNE 2017 REVISED MAY 2021	LOCATION OF PUBLIC WATER SYSTEM MAINS IN A ACCORDANCE TO 66–555.314.F.A.C.	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL G19



CREATED DEC 2020 REVISED MAY 2021	WATER AND STORM WATER CONFLICT STRUCTURE DETAIL	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL G20

NOTES:

1. THESE DETAILS ARE FOR CONSTRUCTION FIELD EXPEDIENCY TO RESOLVE UTILITY CONFLICTS THAT CANNOT BE REMEDIED BY RELOCATION. FOR CONFLICTS DETERMINED DURING DESIGN, USE THE CONSTRUCTION SHOP DRAWINGS FOR STRUCTURE DETAILS.

2. CONCRETE USED IN CONFLICT STRUCTURES SHALL BE AS SPECIFIED IN ASTM C478. 4000 PSI MAY BE USED IN LIEU OF CLASS I CONCRETE.

3. MAXIMUM OPENING FOR PIPE SHALL BE THE PIPE OD PLUS 6". MORTAR USED TO SEAL THE PIPE INTO THE OPENING WILL BE OF SUCH MIX THAT SHRINKAGE WILL NOT CAUSE LEAKAGE INTO OR OUT OF THE STRUCTURE

4. BOA TAPE SHALL BE USED ON ALL JOINTS, CASTINGS, AND RISER RINGS.

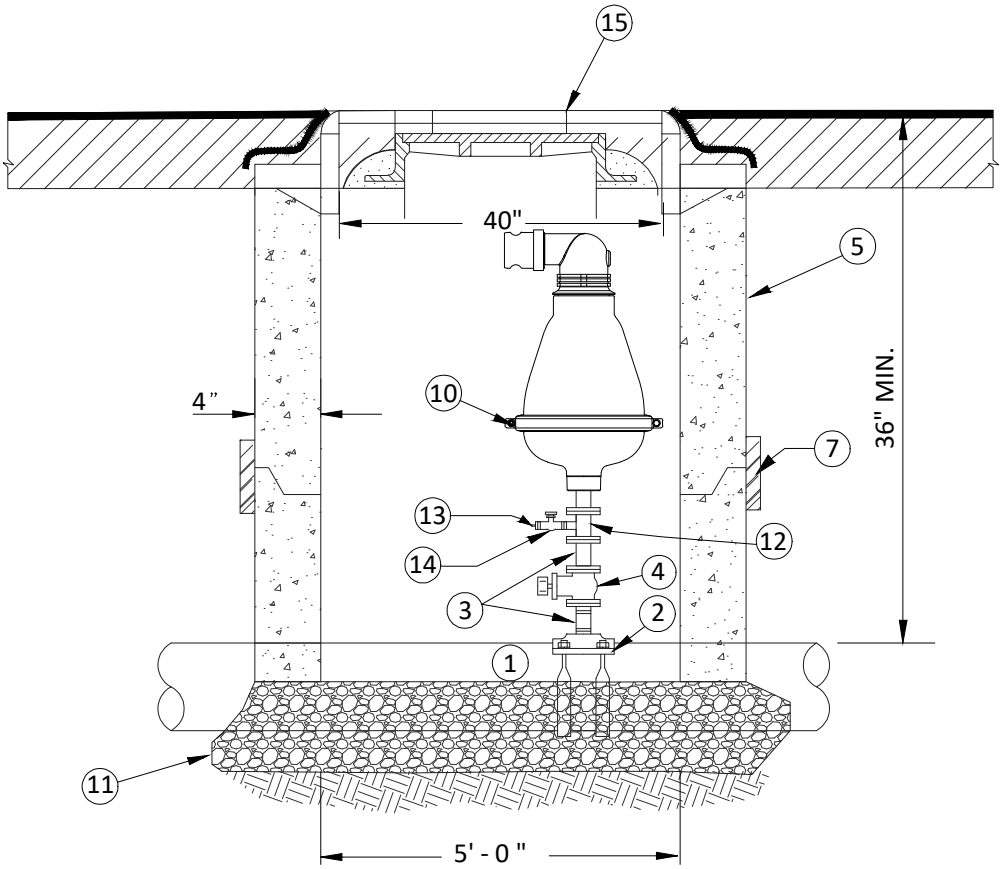
5. BOA TAPE SHALL BE USED IN ACCORDANCE WITH MFG RECOMMENDATIONS.

6. LIFT HOLES SHALL NOT PENETRATE WALLS.

7. EXTERIOR AND INTERIOR SHALL BE COATED WITH CONSEAL CS-55 OR PROTECH EW-1 AQUAPOXY OR APPROVED EQUAL AT THE MINIMUM RATE/THICKNESS RECOMMENDED BY THE MANUFACTURER. COAL TAR IS NOT ALLOWED.

CARRIER PIPE (INCHES)	CASING PIPE (INCHES)	CASING WALL THICKNESS (INCHES)
4	12	5/16
6	16	5/16
8	16	5/16
10	24	3/8
12	24	3/8
16	30	1/2
20	36	1/2
24	42	1/2
30	48	1/2
36	54	5/8
42	60	5/8
48	66	5/8

CREATED DEC 2020 REVISED MAY 2021	WATER AND STORM WATER CONFLICT STRUCTURE NOTES	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL G20A



		MATERIALS
ITEM	QNTY.	DESCRIPTION
1	*	4" & LARGER PIPE, D.I. OR PVC (DR-18) FM
2	1	2" (TAP) SADDLE, SERVICE (SEE NOTES)
3	2	2" X 2" NIPPLE, S.S.
4	1	2" BALL VALVE, S.S.
5	2	PRECAST MANHOLE CONE, DOG HOUSE STYLE
6	1	NOT USED
7	1	SEALER (RAM-NEK)
8	*	AIR RELEASE VALVE 2" ARI MODEL #LIST THIS SHEET
9	*	GRAVEL BED 6" MIN. DEPTH
10	1	2" X 1" TEE
11	*	1" BALL VALVE, S.S.
12	1	1" NIPPLE
13	1	US FOUNDRY 679 RING & QN/M-1 DOUBLE COVER (OR EQ.) W/ 35-9/16" SERVICE OPENING & 22-1/4" INSPECTION OPENING.

ARI ARV MODEL#
D-040P W=WATERMAIN
D-021P RW= REUSE WATER
D-025P FM=FORCEMAIN

CREATED NOV 2020
REVISED MAY 2021

W, RW, FM AIR RELEASE VALVE UNDERGROUND TRAFFIC STYLE

PROVIDED FOR INFORMATIONAL PURPOSES ONLY.
NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL

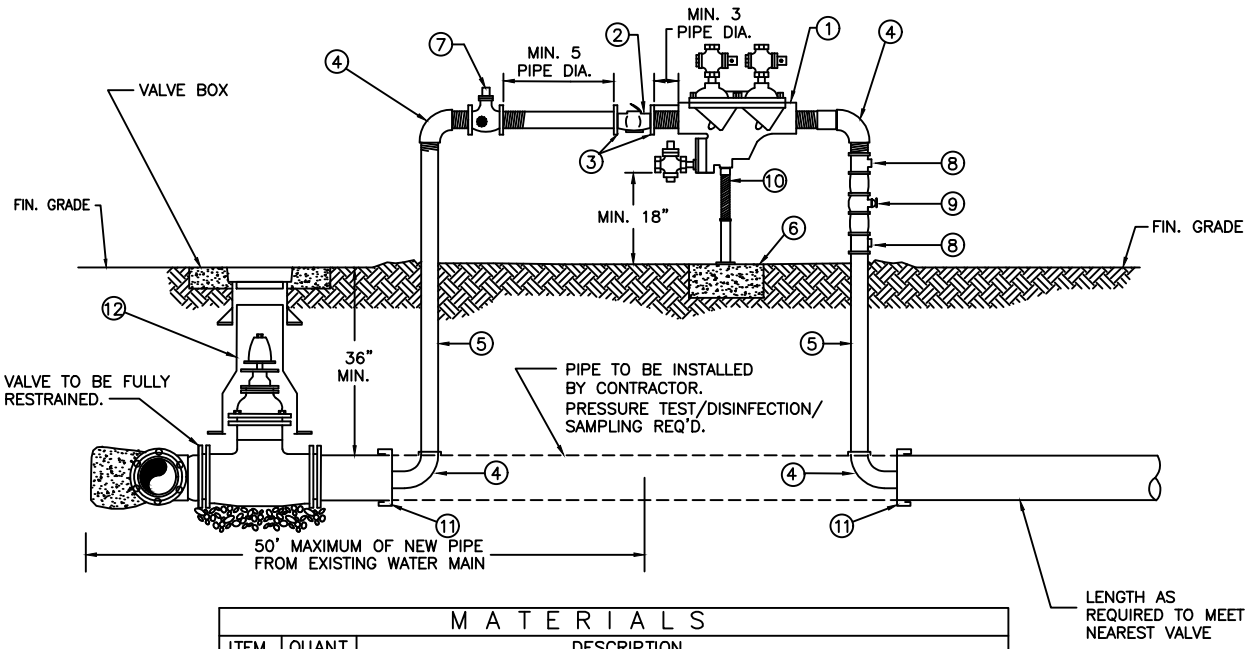
PASCO COUNTY UTILITIES

DETAIL G21

NOTES:

1. BOA TAPE SHALL BE USED ON ALL JOINTS, CASTINGS, AND RISER RINGS.
2. BOA TAPE SHALL BE USED IN ACCORDANCE WITH MFG RECOMMENDATIONS.
3. LIFT HOLES SHALL NOT PENETRATE WALLS.
4. CONCRETE USED IN PRECAST MANHOLE CONE SHALL BE AS SPECIFIED IN AST C478. 4000 PSI MAY BE USED IN LIEU OF CLASS 1 CONCRETE.
5. EXTERIOR AND INTERIOR SHALL BE COATED WITH CONSEAL CS-55 OR PRO-TECH EW-1 AQUAPOXY OR AN APPROVED EQUAL AT THE MINIMUM COATING RATE/THICKNESS RECOMMENDED BY THE MANUFACTURER. COAL TAR IS NOT ALLOWED.
6. 4" SADDLE TO BE BRASS FULL SUPPORT TYPE.
7. 6" AND LARGER SADDLES TO BE DOUBLE STRAP DUCTILE IRON
8. MANHOLE STRUCTURE TO INCLUDE NECESSARY FOOTING TO ACCOMMODATE TRAFFIC CONDITIONS.
9. THE VALVE SHALL BE OFFSET IN MANHOLE FOR MAINTENANCE PURPOSES.

CREATED NOV 2020 REVISED MAY 2021	AIR RELEASE VALVE UNDERGROUND TRAFFIC STYLE NOTES	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL G21A



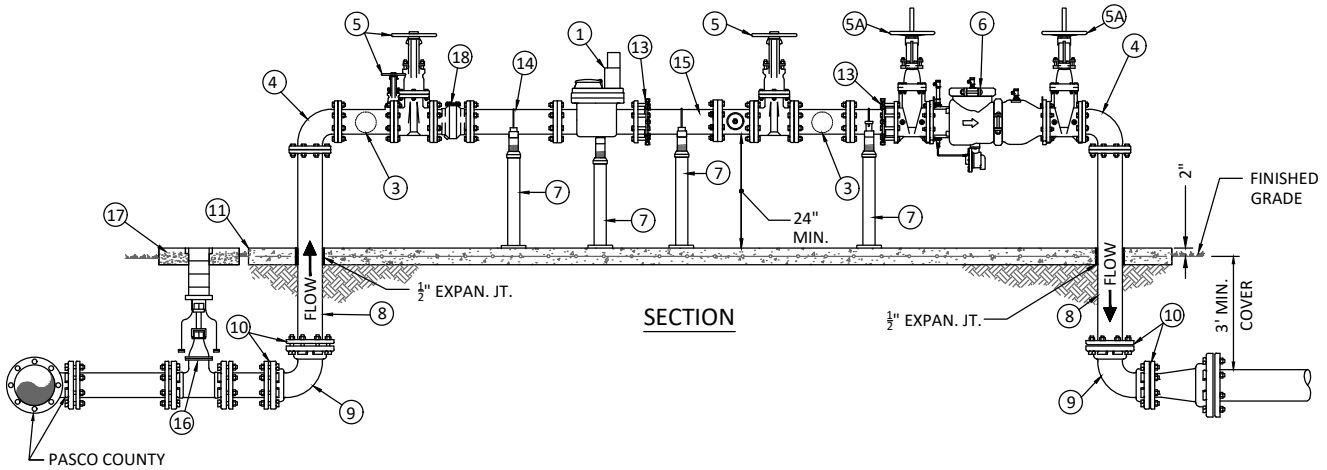
MATERIALS		
ITEM	QUANT.	DESCRIPTION
1	1	2" BACKFLOW PREVENTER ASSEMBLY, REDUCED PRESSURE ZONE
2	1	2" METER FURNISHED BY PASCO COUNTY UTILITIES
3	2	BRASS–METER FLANGES OR ADAPTORS
4	2	2" ELBOWS – BRASS OR S.S. 90° THREADED *
5	2	2" RISER – BRASS OR S.S. *
6	*	CONCRETE SLAB
7	1	2" VALVE – LOCK–WING OVAL FLANGED BALL VALVE (BRASS OR SS)
8	2	2" TEE/ VALVES – BRASS OR S.S. *
9	1	2" GATE VALVE – BRASS OR S.S. *
10	1	PIPE STAND (SUPPORT)
11	2	M.J. CAP WITH 2" TAP, 90°, THREADED, BEND
12	2	GATE VALVE AND BOX

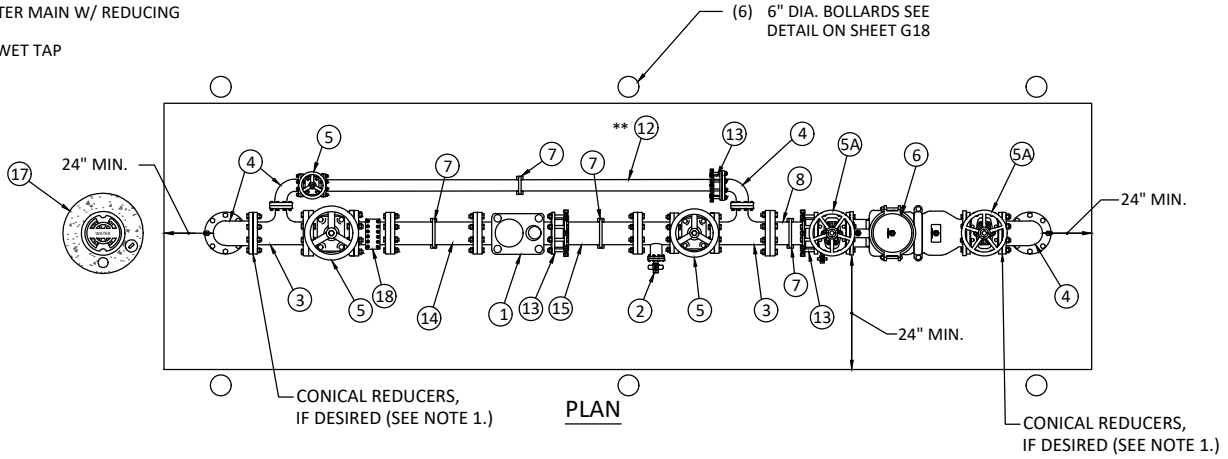
* BECAUSE ASSEMBLY IS TEMPORARY, PASCO COUNTY WILL ALLOW GALVANIZED FITTINGS AS AN ALTERNATIVE.

NOTE:

- CONTRACTOR/CUSTOMER SHALL APPLY AT PASCO COUNTY UTILITIES CUSTOMER SERVICE (727–847–8131) FOR TEMPORARY WATER SERVICE AT LEAST THREE DAYS PRIOR TO REQUIRED SERVICE DATE.
- THE METER WILL BE FURNISHED, INSTALLED AND INITIAL READING TAKEN BY PASCO COUNTY UTILITIES. ALL FITTINGS, PIPING, VALVES AND MATERIALS INCLUDING THE PASCO COUNTY APPROVED REDUCED PRESSURE BACKFLOW PREVENTION DEVICE SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR/CUSTOMER.
- CONTRACTOR/CUSTOMER FURNISHED REDUCED PRESSURE BACKFLOW PREVENTION DEVICE MUST BE INSTALLED BEFORE THE METER IS INSTALLED BY PASCO COUNTY UTILITIES. THE APPROVED BACKFLOW PREVENTION DEVICE SHALL BE TESTED AND CERTIFIED BY CONTRACTOR. UTILITIES CERTIFIED BACKFLOW PREVENTION TECHNICIAN AT TIME OF METER INSTALLATION.
- CONTRACTOR/CUSTOMER SHALL PROTECT THE JUMPER/METER ASSEMBLY FROM DAMAGE.
- CONTRACTOR/CUSTOMER IS RESPONSIBLE FOR BACTERIOLOGICAL TESTING AFTER CONNECTION OF TEMPORARY WATER SERVICE.
- TEMPORARY CONSTRUCTION JUMPER/METER ASSEMBLY SHALL NOT BE REMOVED UNTIL SYSTEM IS ACCEPTED BY PASCO COUNTY UTILITIES.
- WHEN THE NEW SYSTEM IS ACCEPTED AND THE FINAL METER READING TAKEN BY PASCO COUNTY, THE TEMPORARY CONSTRUCTION JUMPER/METER ASSEMBLY MUST BE COMPLETELY REMOVED FROM M.J CAP TO M.J. CAP AND A NEW WATER MAIN IS TO BE CHLORINATED AND INSTALLED COMPLETING THE FINAL CONNECTION.
- BY APPLYING FOR SERVICE, CONTRACTOR/CUSTOMER AGREES TO TAKE WATER SERVICE FROM PASCO COUNTY UTILITIES IN ACCORDANCE WITH THE APPROPRIATE RATE SCHEDULE AND IN ACCORDANCE WITH PASCO COUNTY UTILITIES RULES AND REGULATION.
- IF STAINLESS STEEL IS USED, CONTRACTOR IS RESPONSIBLE TO PROVIDE TRANSITION FITTINGS AND/OR DIELECTRIC UNIONS AS APPROPRIATE WHERE CHANGING FROM BRASS TO S.S.

CREATED FEB 2003 REVISED JAN 2014 MAY 2016 JUNE 2019	TEMPORARY CONSTRUCTION WATER SERVICE (JUMPER METER)	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL W1





NOTE 1. IF IT IS DESIRED TO DOWNSIZE METER, CONICAL REDUCERS SHALL BE PLACED AFTER THE 90 DEGREE VERTICAL BEND /BEFORE UPSTREAM BYPASS AND AFTER DOWNSTREAM BYPASS TEE / BEFORE BACKFLOW PREVENTION ASSEMBLY AS SHOWN; NO OTHER LOCATIONS SHALL BE ACCEPTED.

-FOR CONTINUATION OF NOTES SEE SHEET W2A -

MATERIALS		
ITEM	QUANT.	DESCRIPTION
1	1	WATER METER 3" THRU 12" w/AMR (BADGER) ORION READING SYSTEM (SEE NOTES ON PCU DETAIL W2A)
2	1	TEE FLG X FLG X FLG W/ BLIND PLATE TAPPED WITH 2" BALL VALVE MIP X FIP
3	2	TEE, FLG x FLG x FLG (ST'D)
4	4	BEND 90° FLG x FLG (ST'D)
5	3	VALVE, GATE FLG x FLG RESILIENT SEAT NRS
5A	2	VALVE, GATE FLG x FLG RESILIENT SEAT 0, S & Y
6	1	BACK FLOW PREVENTER (BFP) - R.P. PRINCIPLE
7	3	ADJ. PIPE SUPPORTS - ANVIL FIG. 265 W/ 63T STANCHION & BASE PLATE
8	2	SPOOL PIECE FLG x PE D.I.P.
9	2	BEND 90° MJ x MJ
10	4	RESTRAINED JOINT MJ (MEGALUG OR EQUAL)
11	1	CONCRETE SLAB 6" THICK W/ 6"x6" 10/10 W.W.F. OR FIBERMESH REINFORCING
** 12	1	BY-PASS PIPE D.I.P. FLG x PE
13	2	FLANGE ADAPTER (EBAA SERIES 2100 MEGAFLANGE, DRESSER 128, O/E)
14	1	SPOOL PIECE FLG x FLG - LENGTH TO BE > 5 PIPE DIAMETERS W/ STRAINER
15	1	SPOOL PIECE FLG x PE - LENGTH TO BE > 3 PIPE DIAMETERS
16	1	BELOW GRADE ISOLATION GATE VALVE W/ VAULT BOX, SLIP TYPE
17	1	VALVE BOX, SLIP TYPE AS PER PCU STANDARD DETAIL G-5
18	1	DUAL-FLANGE PLATE STRAINER

CREATED FEB 2021
REVISED MAY 2021

LARGE METER 3" AND ABOVE WITH SINGLE BACKFLOW PREVENTER

PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL

PASCO COUNTY UTILITIES

DETAIL W2

NOTES CONTINUED FROM W-2

1. IF IT IS DESIRED TO DOWNSIZE METER, CONICAL REDUCERS SHALL BE PLACED AFTER THE 90 DEGREE VERTICAL BEND /BEFORE UPSTREAM BYPASS AND AFTER DOWNSTREAM BYPASS TEE / BEFORE BACKFLOW PREVENTION ASSEMBLY AS SHOWN; NO OTHER LOCATIONS SHALL BE ACCEPTED.
2. METER & BFP ASSEMBLY TO BE INSTALLED LEVEL & PLUMB.

**3. METER BY-PASS TO BE SIZED NO LESS THAN 1/2 METER SIZE, 3" MIN.

4. ENTIRE ASSEMBLY TO BE PAINTED SAFETY BLUE.

5. BFP TO BE SIZED EQUAL TO OR GREATER THAN METER SIZE.

6. MECHANICAL JOINTS SHALL BE RESTRAINED AS SPECIFIED BY COUNTY/ENGINEER.

7. BELL JOINT RESTRAINERS SHALL BE PROVIDED ON ALL UNDERGROUND PIPING.

8. ALL ABOVE GROUND PIPING SHALL BE FLANGED DUCTILE IRON PIPE CEMENT LINED (NO GALVANIZED OR PVC)

9. PASCO COUNTY MAY REQUIRE THE ENTIRE ASSEMBLY TO BE ENCLOSED IN 6' BLACK VINYL CHAIN LINK FENCE.

10. BFP MUST BE LISTED WITH THE UNIVERSITY OF SOUTHERN CALIFORNIA FOUNDATION FOR CROSS CONNECTION CONTROL AND HYDRAULIC RESEARCH (USC APPROVED).

11. ABOVE GROUND INLET AND DISCHARGE PIPING SHALL BE SIZED IDENTICAL TO METER INLET SIZE.

12. ALL METERING EQUIPMENT SHALL BE FULLY COMPATIBLE WITH THE CURRENT PCU AUTOMATIC METER READING (AMR) SYSTEM.

13. IF METER IS PROVIDING FIRE PROTECTION AS WELL AS DOMESTIC WATER USE BY PASS MUST BE A MIN. 6" DIA D.I. PIPE FLG X PE.

14. IF METER IS FOR DOMESTIC USE ONLY (I.E. THERE IS A SEPARATE STAND-ALONE FIRE CONNECTION) A BADGER E-SERIES ULTRASONIC METER WITH NICOR LEADS AND ORION AMR ME TRANSMITTER OR APPROVED EQUAL.
15. IF METER IS USED FOR BOTH DOMESTIC AND FIRE PROTECTION USE, A FIRE SERVICE METER WITH LOW-FLOW TURBINE BYPASS METER SHALL BE USED.

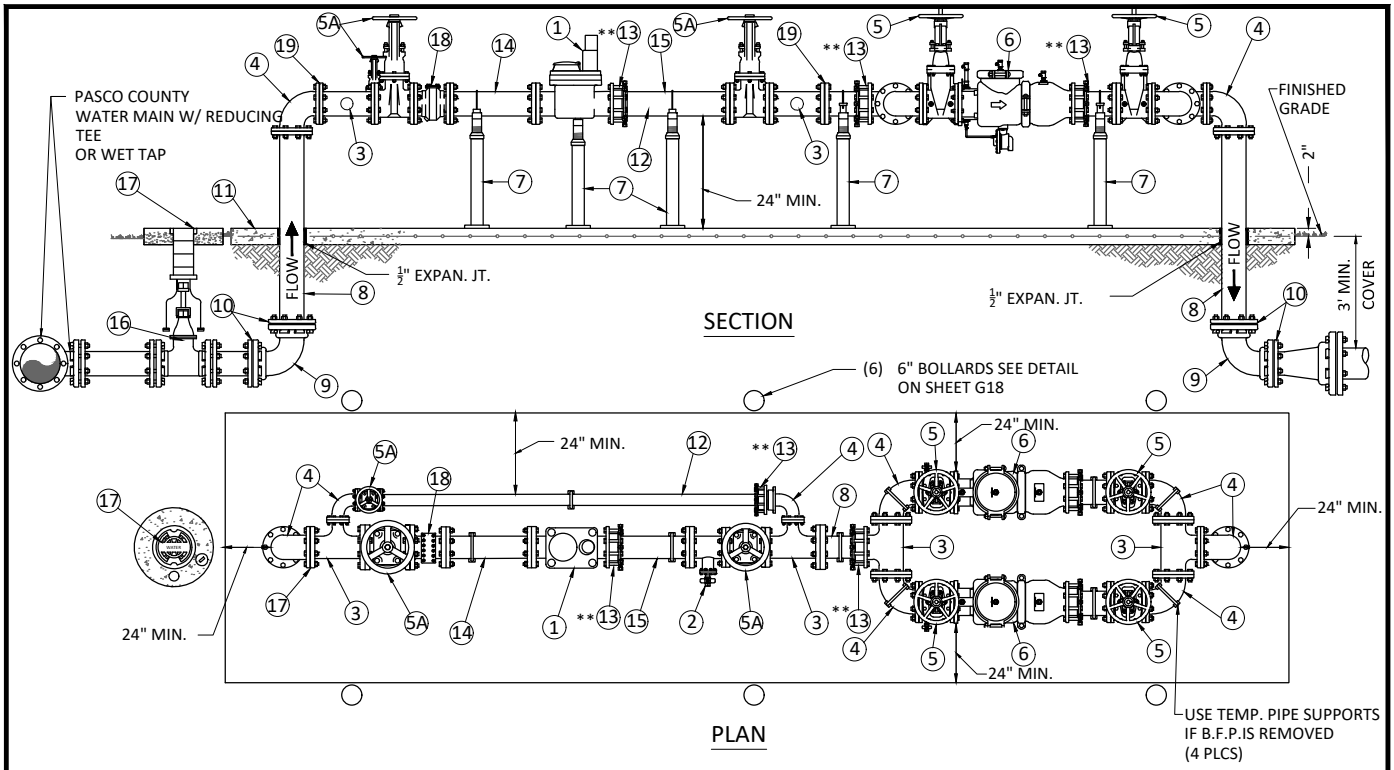
16. NO TIE RODS OR EYE BOLT RETAINERS PERMITTED ABOVE GROUND.

17. IF OTHER ASSEMBLIES ARE PROPOSED TO BE PLACED PARALLEL TO METER FOR BACKFLOW ASSEMBLY (I.E. FIRE SERVICES, IRRIGATION METERS, ETC.) THERE SHALL BE A MINIMUM OF 36IN OF SEPARATION BETWEEN ASSEMBLIES AS MEASURED FROM OUTSIDE TO OUTSIDE.

18. CONTRACTOR SHALL TEST AND CERTIFY BACKFLOW PREVENTION DEVICE.

19. FOR METERS UP TO 6 INCHES, USE BADGER PLATE STRAINER MODEL STR-PS-00058 OR EQUAL; FOR METERS GREATER THAN 6 INCHES, USE BADGER PLATE STRAINER ML-MS, MODEL NUMBER STR-PS-OOO55.

CREATED FEB 2021 REVISED MAY 2021	LARGE METER 3" AND ABOVE WITH SINGLE BACKFLOW PREVENTER NOTES CONTINUED	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL W2A



NOTE 1. IF IT IS DESIRED TO DOWNSIZE METER, CONICAL REDUCERS SHALL BE PLACED AFTER THE 90 DEGREE VERTICAL BEND /BEFORE UPSTREAM BYPASS AND AFTER DOWNSTREAM BYPASS TEE / BEFORE BACKFLOW PREVENTION ASSEMBLY AS SHOWN; NO OTHER LOCATIONS SHALL BE ACCEPTED.

- FOR CONTINUATION OF NOTES SEE SHEET W3A -

MATERIALS		
ITEM	QUANT.	DESCRIPTION
1	1	WATER METER 3" THRU 12" w/AMR (BADGER) ORION READING SYSTEM (SEE NOTES)
2	1	TEE FLG X FLG X FLG W/ BLIND PLATE TAPPED WITH 2" BALL VALVE MIP X FIP
3	4	TEE, FLG x FLG x FLG (ST'D)
4	7	BEND 90° FLG x FLG (ST'D)
5	4	VALVE, GATE FLG x FLG RESILIENT SEAT O, S AND Y (OUTSIDE SCREW AND YOKE)
5A	3	VALVE, GATE FLG x FLG RESILIENT SEAT N.R.S. (NON-RISING STEM)
6	2	BACK FLOW PREVENTER (BFP) - R.P. PRINCIPLE
7	3	ADJ. PIPE SUPPORTS - ANVIL FIG. 265 W/ 63T STANCHION & BASE PLATE
8	2	SPOOL PIECE FLG x PE D.I.P.
9	2	BEND 90° MJ x MJ
10	4	RESTRAINED JOINT MJ (MEGALUG OR EQUAL)
11	1	CONCRETE SLAB 6" THICK W/ 6"x6" 10/10 W.W.F. OR FIBERMESH REINFORCING
12	1	BY-PASS PIPE D.I.P. FLG x PE
**13	5	FLANGE ADAPTER (EBAA SERIES 2100 MEGAFLANGE, DRESSER 128, O/E)
14	1	SPOOL PIECE FLG x FLG - LENGTH TO BE 5 PIPE DIAMETERS WITH STRAINER
15	1	SPOOL PIECE FLG x PE - LENGTH TO BE 3 PIPE DIAMETERS
16	1	ISOLATION GATE VALVE
17	1	VALVE BOX, SLIP TYPE AS PER PCU STANDARD DETAIL G-5
18	1	DUAL-FLANGE PLATE STRAINER
19	2	REDUCER IF NEEDED (SEE NOTE 1.)

CREATED FEB 2021
REVISED MAY 2021

LARGE METER 3" AND ABOVE WITH PARALLEL BACKFLOW PREVENTERS

PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL

PASCO COUNTY UTILITIES

DETAIL W3

NOTES CONTINUED FROM W-3

2. METER & BFP ASSEMBLY TO BE INSTALLED LEVEL & PLUMB.

**3. METER BY-PASS TO BE SIZED NO LESS THAN 1/2 METER SIZE, 3" MIN.

4. ENTIRE ASSEMBLY TO BE PAINTED SAFETY BLUE.

5. BFP TO BE SIZED EQUAL TO OR GREATER THAN METER SIZE.

6. MECHANICAL JOINTS SHALL BE RESTRAINED AS SPECIFIED BY COUNTY/ENGINEER.

7. BELL JOINT RESTRAINERS SHALL BE PROVIDED ON ALL UNDERGROUND PIPING.

8. ALL ABOVE GROUND PIPING SHALL BE FLANGED DUCTILE IRON PIPE CEMENT LINED (NO GALVANIZED OR PVC)

9. PASCO COUNTY MAY REQUIRE THE ENTIRE ASSEMBLY TO BE ENCLOSED IN 6' BLACK VINYL CHAIN LINK FENCE.

10. BFP MUST BE LISTED WITH THE UNIVERSITY OF SOUTHERN CALIFORNIA FOUNDATION FOR CROSS CONNECTION CONTROL AND HYDRAULIC RESEARCH (USC APPROVED).

11. ABOVE GROUND INLET AND DISCHARGE PIPING SHALL BE SIZED IDENTICAL TO METER INLET SIZE.

12. ALL METERING EQUIPMENT SHALL BE FULLY COMPATIBLE WITH THE CURRENT PCU AUTOMATIC METER READING (AMR) SYSTEM.

13. IF METER IS PROVIDING FIRE PROTECTION AS WELL AS DOMESTIC WATER USE BY PASS MUST BE A MIN. 6" DIA D.I. PIPE FLG X PE.

14. IF METER IS FOR DOMESTIC USE ONLY (I.E. THERE IS A SEPARATE STAND-ALONE FIRE CONNECTION) A BADGER E-SERIES ULTRASONIC METER WITH NICOR LEADS AND ORION AMR ME TRANSMITTER OR APPROVED EQUAL.

15. IF METER IS USED FOR BOTH DOMESTIC AND FIRE PROTECTION USE, A FIRE SERVICE METER WITH LOW-FLOW TURBINE BYPASS METER SHALL BE USED.

16. NO TIE RODS OR EYE BOLT RETAINERS PERMITTED ABOVE GROUND.

17. IF OTHER ASSEMBLIES ARE PROPOSED TO BE PLACED PARALLEL TO METER FOR BACKFLOW ASSEMBLY (I.E. FIRE SERVICES, IRRIGATION METERS, ETC.) THERE SHALL BE A MINIMUM OF 36IN OF SEPARATION BETWEEN ASSEMBLIES AS MEASURED FROM OUTSIDE TO OUTSIDE.

18. CONTRACTOR SHALL TEST AND CERTIFY BACKFLOW PREVENTION DEVICE.

19. FOR METERS UP TO 6 INCHES, USE BADGER PLATE STRAINER MODEL STR-PS-00058 OR EQUAL; FOR METERS GREATER THAN 6 INCHES, USE BADGER PLATE STRAINER ML-MS, MODEL NUMBER STR-PS-OOO55.

CREATED FEB 2021 REVISED MAY 2021	LARGE METER 3" AND ABOVE WITH PARALLEL BACKFLOW PREVENTERS NOTES	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL W3A

605.24 JOINTS BETWEEN DIFFERENT MATERIALS

JOINTS BETWEEN DIFFERENT MATERIAL SHALL BE MADE WITH A MECHANICAL JOINT OF COMPRESSION OR MECHANICAL–SEALING TYPE. OR AS PERMITTED IN SECTION 605.24.1, 605.24.2 AND 605.24.3. CONNECTORS OR ADAPTERS SHALL HAVE AN ELASTOMERIC SEAL CONFORMING TO ASTM F477.
JOINTS SHALL BE INSTALLED IN ACCORDANCE TO MANUFACTURER'S INSTRUCTIONS.

605.24.1 COPPER OR COPPER–ALLOY TUBING TO GALVANIZED STEEL PIPE.

JOINTS BETWEEN COPPER OR COPPER–ALLOY TUBING AND GALVANIZED STEEL PIPE SHALL BE MADE WITH A BRASS FITTING OR DIELECTRIC UNION CONFORMING TO ASSE 1079. THE COPPER TUBING SHALL BE SOLDERED TO THE FITTING IN AN APPROVED MANNER, AND THE FITTING SHALL BE SCREWED TO THE THREADED PIPE

605.24.2 PLASTIC PIPE OR TUBING TO OTHER PIPING MATERIALS

JOINTS BETWEEN DIFFERENT TYPES OF PLASTIC PIPE AND OTHER PIPING MATERIALS SHALL BE MADE WITH APPROVED ADAPTERS OR TRANSITION FITTINGS

605.24.3 STAINLESS STEEL

JOINTS BETWEEN STAINLESS STEEL AND DIFFERENT PIPING MATERIALS SHALL BE MADE WITH A MECHANICAL SEALING TYPE OR A DIELECTRIC FITTING OR DIELECTRIC UNION CONFORMING TO ASSE 1079

607.3 THERMAL EXPANSION CONTROL

WHERE A STORAGE WATER HEATER IS SUPPLIED WITH COLD WATER PASSING THROUGH A CHECK VALVE. PRESSURE REDUCING VALVE OR BACKFLOW PREVENTER, A THERMAL EXPANSION CONTROL DEVICE SHALL BE CONNECTED TO THE WATER HEATER COLD WATER SUPPLY AT A POINT THAT IS DOWNSTREAM OF ALL CHECK VALVES, PRESSURE REDUCING VALVE AND BACKFLOW PREVENTER. THERMAL EXPANSION CONTROL DEVICES SHALL BE SIZED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND SIZED SUCH THAT THE PRESSURE IN THE DISTRIBUTION SYSTEM SHALL NOT EXCEED THAT REQUIRED BY SECTION 604.8

305.7 PROTECTION OF COMPONENTS OF PLUMBING SYSTEM

COMPONENTS OF A PLUMBING SYSTEM INSTALLED ALONG ALLEYWAYS, DRIVEWAYS, PARKING GARAGES OR OTHER LOCATIONS EXPOSED TO DAMAGE SHALL BE RECESSED INTO THE WALL OR OTHERWISE PROTECTED IN AN APPROVED MANNER.

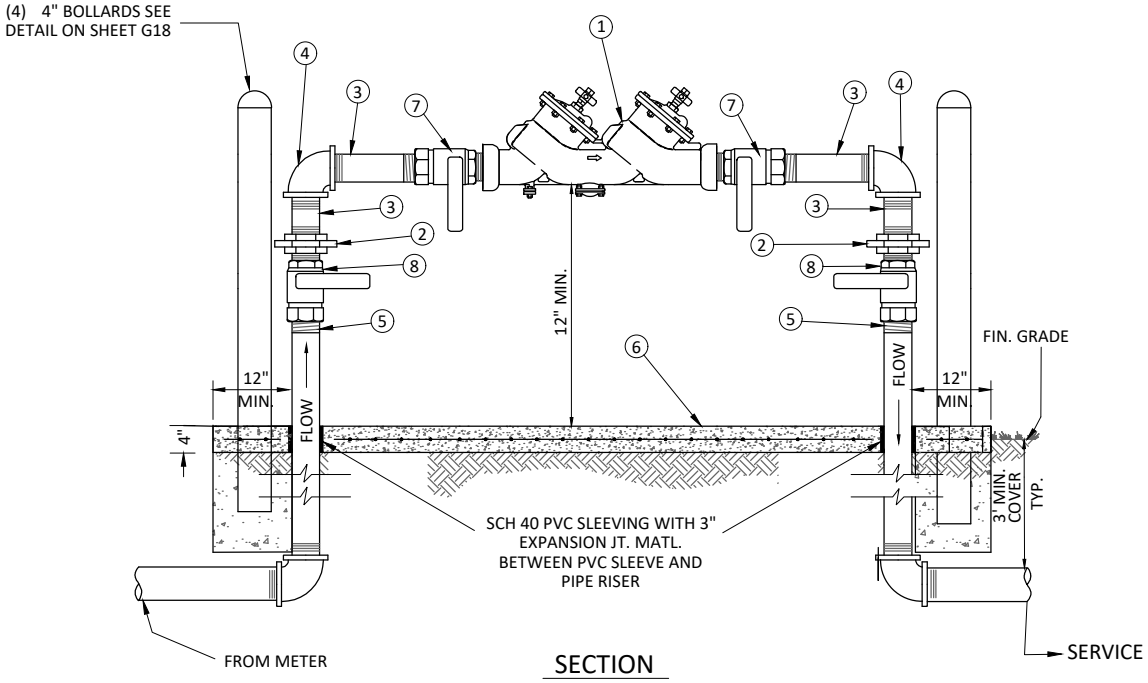
608.14 LOCATION OF BACKFLOW PREVENTER

ACCESS SHALL BE PROVIDED TO BACKFLOW PREVENTER AS SPECIFIED BY THE MANUFACTURERS SPECIFICATIONS

605.2.1 LEAD CONTENT OF DRINKING WATER PIPE AND FITTINGS.

PIPE, PIPE FITTINGS, JOINTS, VALVES, FAUCETS AND FIXTURE FITTINGS UTILIZED TO SUPPLY WATER FOR DRINKING OR COOKING PURPOSES SHALL COMPLY WITH NSF 372 AND SHALL HAVE A WEIGHTED AVERAGE CONTENT OF 0.25% OR LESS

CREATED FEB 2003 REVISED JAN 2014 AUG 2015 AUG 2019	NOTES (FLORIDA PLUMBING CODES)	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL W4

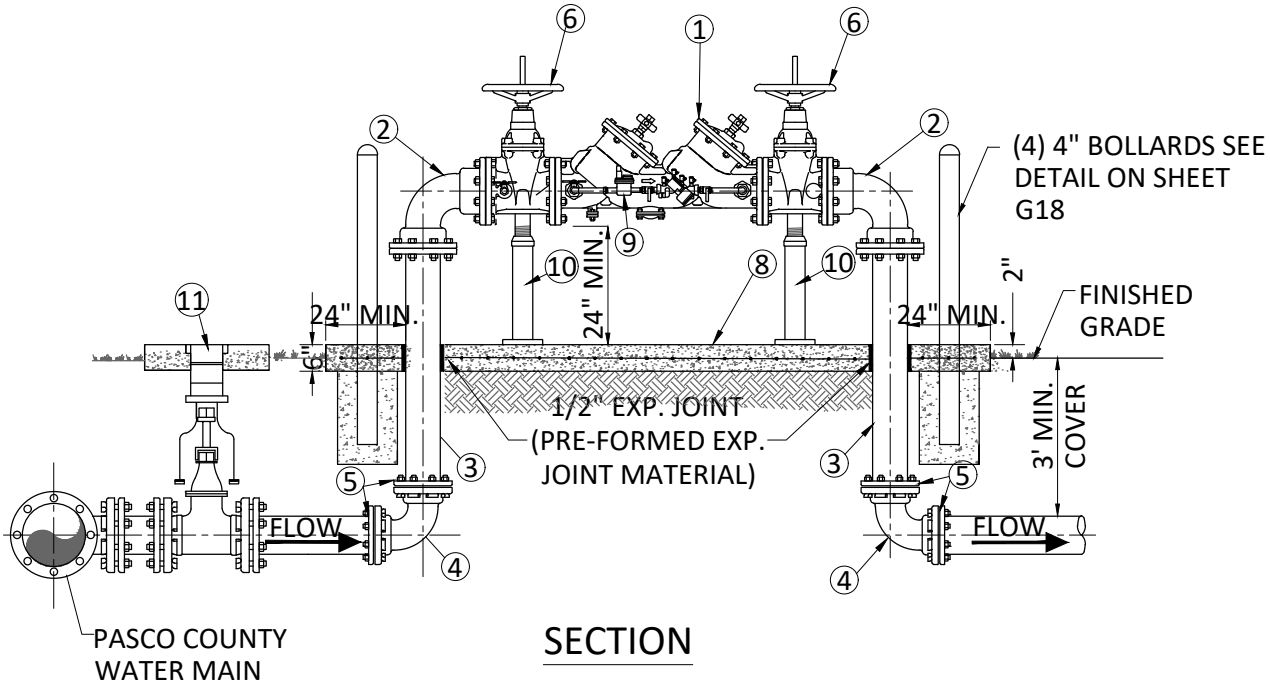


SECTION

MATERIALS		
ITEM	QUANT.	DESCRIPTION
1	1	BACKFLOW PREVENTER ASSEMBLY, DOUBLE CHECK OR REDUCED PRESSURE-BRASS
2	2	UNIONS - BRASS
3	4	NIPPLES - BRASS
4	2	ELBOWS - BRASS 90°
5	2	RISER - S.S.
6	*	CONCRETE SLAB
7	2	BALL VALVES - BRASS (PROVIDED WITH BFP ASS'Y)
8	2	BALL VALVES - BRASS (PROVIDED WITH BFP ASS'Y) (OPTIONAL)

NOTE:
- FIELD ADJUST AND CUT ITEM 5 TO THE PROPER LENGTH.
- BFP DEVICE TO BE INSTALLED LEVEL AND PLUMB
- MINIMUM CLEARANCE OF 24" TO BE MAINTAINED AROUND DEVICE FOR TESTING.
- ENTIRE ASSEMBLY TO BE PAINTED SAFETY BLUE.
- CONCRETE SLAB TO EXTEND 12" MIN. AROUND ENTIRE BFP ASSEMBLY.
- DEVICE MUST BE LISTED WITH THE UNIVERSITY OF SOUTHERN CALIFORNIA FOUNDATION FOR CROSS CONNECTION CONTROL AND HYDRAULIC RESEARCH.
- JOINTS BETWEEN DIFFERENT PIPING MATERIALS SHALL BE MADE WITH A MECHANICAL JOINT OF THE COMPRESSION OR MECHANICAL-SEALING TYPE, OR AS PERMITTED IN SECTION 605.24.1, 605.24.2 AND 605.24.3. CONNECTORS OR ADAPTERS SHALL HAVE ELECTROMETRIC SEAL CONFORMING TO ASTM F477.
- JOINTS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTION.
- CONTRACTOR SHALL TEST AND CERTIFY BACKFLOW PREVENTION DEVICE.
- IF STAINLESS STEEL IS USED, CONTRACTOR IS RESPONSIBLE TO PROVIDE TRANSITION FITTINGS AND/OR DIELECTRIC UNIONS AS APPROPRAITE WHERE CHANGING FROM BRASS TO S.S..

CREATED JULY 2019 REVISED MAY 2021	BACKFLOW PREVENTER – SINGLE SERVICE DOUBLE CHECK VALVE IRRIGATION USE ONLY (3/4", 1", 1–1/2", 2")	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL W5



SECTION

MATERIALS

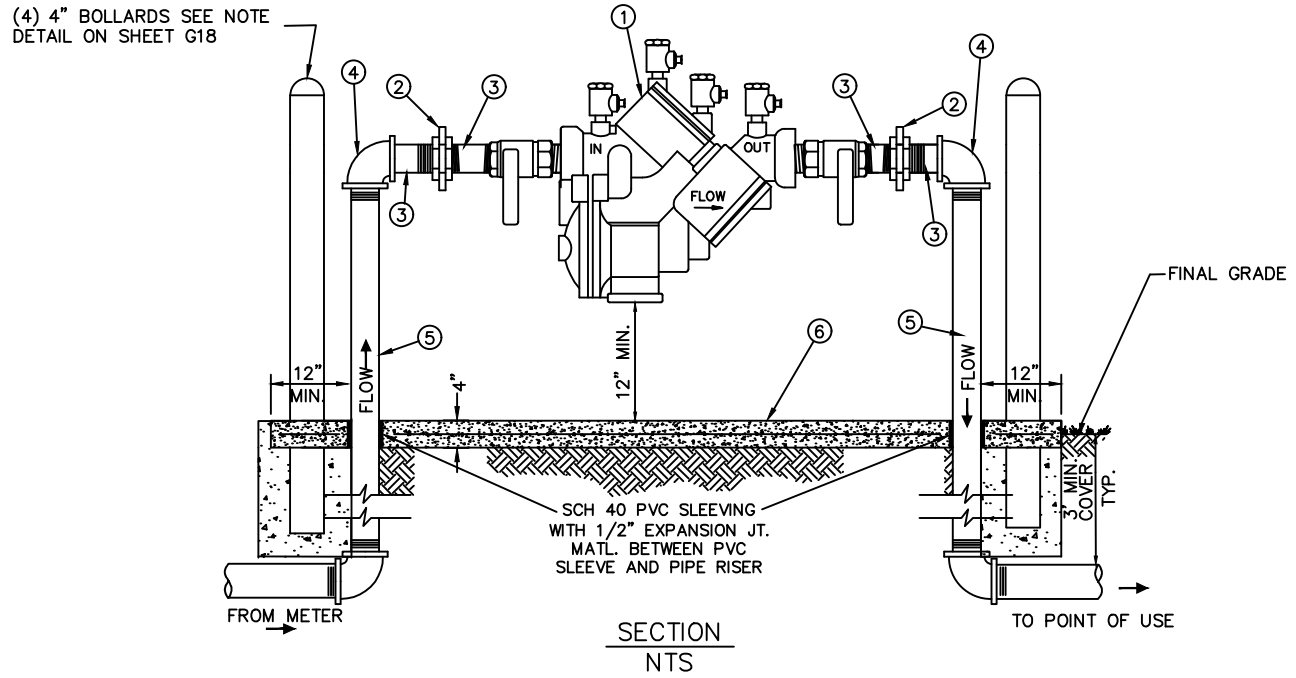
ITEM	QUANT.	DESCRIPTION
1	1	DOUBLE CHECK WITH DETECTOR ASSEMBLY
2	2	BEND, 90° FLANGE x FLANGE
3	2	SPOOL PIECE FLG. x PE. D.I.P.
4	2	BEND, 90° M.J. x M.J.
5	4	RESTRAINED JOINT MJ (MEGALUG OR EQUAL)
6	2	VALVE, GATE FLG. x FLG. RESILIENT WEDGE O.S. & Y.
7	2	SUPPORT (AS NEEDED)
8	1	CONCRETE SLAB (6" THICK - 42" WIDE MIN.)
9	1	AMR (BADGER) ORION READING SYSTEM
10	2	ADJ. PIPE SUPPORTS - ANVIL FIG. 265 W/ 63T STANCHION & BASE PLATE
11	1	ISOLATION VALVE AND VALVE BOX, SLIP TYPE AS PER PCU STANDARD DETAIL G-5 LOCATED AT BRANCH NEAREST TO COUNTY WATER MAIN.

CREATED FEB 2003 REVISED MAY 2021 – –	DOUBLE CHECK WITH DETECTOR ASSEMBLY FOR FIRE SERVICE LINES (3", 4", 6", 8", 12")	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL W7

NOTES:

- NO TIE RODS OR EYE BOLT RETAINERS PERMITTED ABOVE GROUND.
- B.F.P. ASSEMBLY TO BE INSTALLED LEVEL & PLUMB.
- MINIMUM CLEARANCE OF 36" TO BE MAINTAINED AROUND ENTIRE DEVICE FOR TESTING
- ENTIRE ASSEMBLY TO BE PAINTED SAFETY RED.
- DETECTOR BY-PASS ASSEMBLY TO BE FACTORY INSTALLED AND CERTIFIED
- ALL MECHANICAL JOINTS SHALL BE RESTRAINED WITH MEGALUGS OR APPROVED EQUAL
- ALL ABOVE GROUND PIPING SHALL BE FLANGED DUCTILE IRON PIPE CEMENT LINED (NO GALVANIZED OR PVC)
- PASCO COUNTY SHALL HAVE THE OPTION OF REQUIRING THE ENTIRE ASSEMBLY TO BE ENCLOSED IN 6' CHAIN LINK FENCE.
- BFP DEVICE MUST BE LISTED WITH THE UNIVERSITY OF SOUTHERN CALIFORNIA FOUNDATION FOR CROSS CONNECTION CONTROL AND HYDRAULIC RESEARCH.
- ALL METERING EQUIPMENT SHALL BE FULLY COMPATIBLE WITH PCU CURRENTLY EXISTING AUTOMATIC METER READING SYSTEM (AMR) ON WATER, REUSE AND SEWER METERS, AS APPLICABLE
- CONTRACTOR SHALL TEST AND CERTIFY BACKFLOW PREVENTION DEVICE.
- IF OTHER ASSEMBLIES ARE PROPOSED TO BE PLACED PARALLEL TO THIS BACKFLOW ASSEMBLY (I.E. METER ASSEMBLIES) THERE SHALL BE A MIN. OF 36" OF SEPARATION BETWEEN ASSEMBLIES, AS MEASURED FROM OUTSIDE TO OUTSIDE.

CREATED FEB 2003 REVISED MAY 2021 – –	DOUBLE CHECK WITH DETECTOR ASSEMBLY FOR FIRE SERVICE LINES (3", 4", 6", 8", 12") NOTES	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL W7A



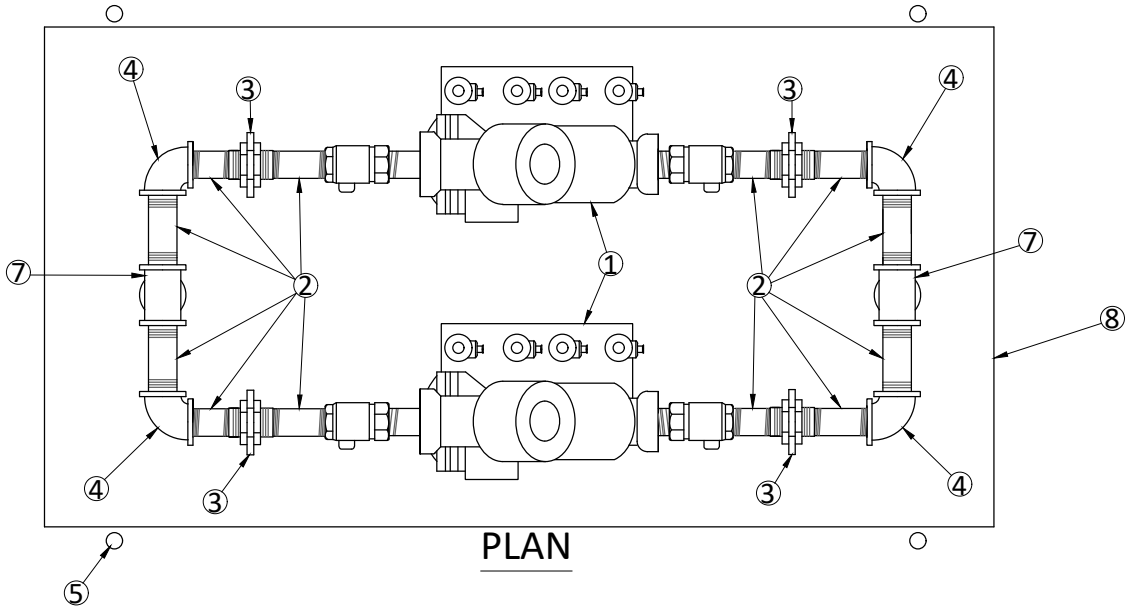
SECTION
NTS

MATERIALS		
ITEM	QUANT.	DESCRIPTION
1	1	BACKFLOW PREVENTER ASSEMBLY, REDUCED PRESSURE ZONE (RPZ) W/ 2 BALL VALVES–BRASS
2	2	UNIONS–BRASS OR S.S.
3	4	NIPPLES–BRASS OR S.S.
4	2	ELBOWS 90°–BRASS OR S.S.
5	2	RISER –BRASS OR S.S.
6	*	CONCRETE SLAB 4" THICK W/ 6"x6" 10/10 W.W.F. OR FIBERMESH REINFORCING

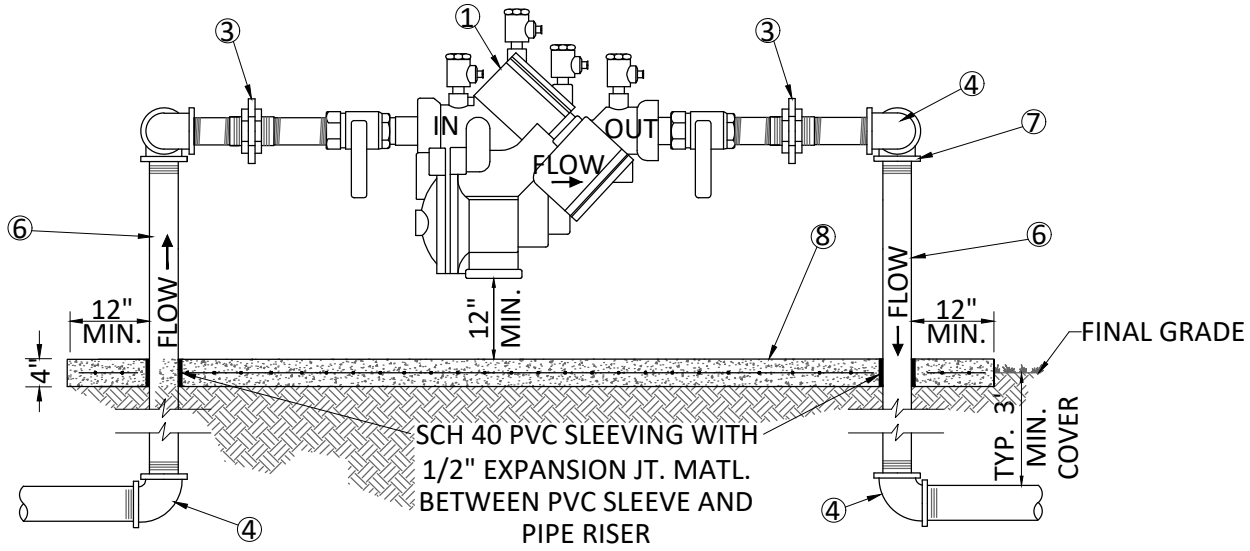
NOTES:

- MINIMUM CLEARANCE OF 12" TO BE MAINTAINED AROUND DEVICE FOR TESTING
- ENTIRE ASSEMBLY SHALL BE INSTALLED LEVEL AND PLUMB THEN TO BE PAINTED SAFETY BLUE.
- CONCRETE SLAB TO EXTEND 12" MIN. AROUND ENTIRE BFP ASSEMBLY.
- DEVICE MUST BE LISTED WITH THE UNIVERSITY OF SOUTHERN CALIFORNIA FOUNDATION FOR CROSS CONNECTION CONTROL AND HYDRAULIC RESEARCH.
- ALL MATERIALS SHALL BE N.S.F. APPROVED.
- CONTRACTOR SHALL TEST AND CERTIFY BACKFLOW PREVENTION DEVICE.
- IF STAINLESS STEEL IS USED, CONTRACTOR IS RESPONSIBLE TO PROVIDE TRANSITION FITTINGS AND/OR DIELECTRIC COUPLINGS AS APPROPRIATE WHERE CHANGING FROM BRASS TO S.S.

CREATED 02/24/03 REVISED AUG 2015 JULY 2019 AUG 2019	REDUCED PRESSURE BACKFLOW PREVENTER ASSY. (SINGLE SERVICE: 3/4", 1", 1–1/2", 2")	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL W8



PLAN



SECTION

MATERIALS

ITEM	QUANT.	DESCRIPTION
1	2	BACKFLOW PREVENTER (BFP) ASSY., REDUCED PRESSURE ZONE (RPZ) AND 2 BALL VALVES-BRASS
2	12	6" NIPPLES -BRASS OR S.S.
3	4	UNION - BRASS OR S.S.
4	4	90° ELBOWS - BRASS OR S.S.
5	4	4" BOLLARDS - SEE STANDARD DETAIL G18
6	2	RISER - BRASS OR S.S.
7	2	TEES - BRASS OR S.S.
8	*	CONCRETE SLAB 4" THICK W/ 6"x6" 10/10 W.W.F. OR FIBERMESH REINFORCING

CREATED FEB 2021
REVISED MAY 2021

REDUCED PRESSURE BACKFLOW PREVENTER ASSY.
PARALLEL INSTALLATION
(3/4", 1", 1-1/2", 2")

PROVIDED FOR INFORMATIONAL PURPOSES ONLY.
NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL

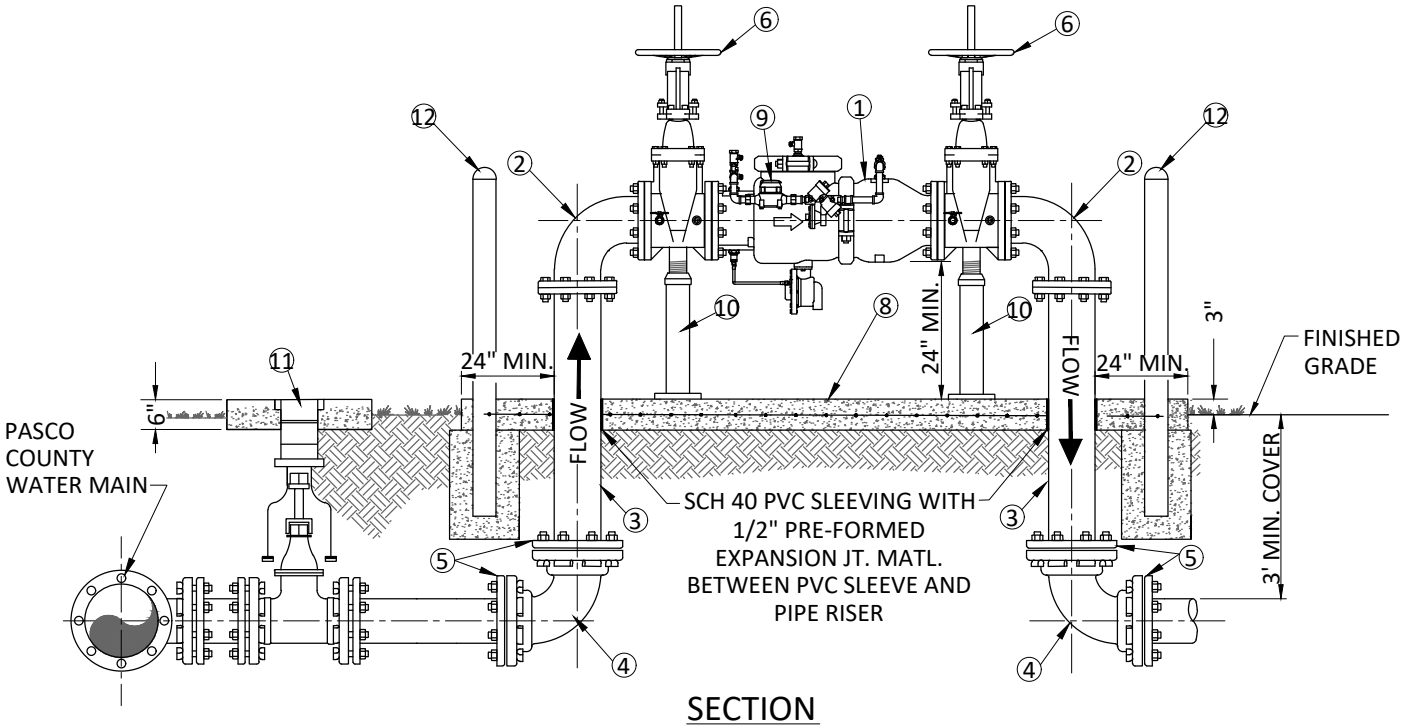
PASCO COUNTY UTILITIES

DETAIL W9

NOTES:

- FIELD ADJUST AND CUT ITEM 6 TO THE PROPER LENGTH.
- BFP DEVICE TO BE INSTALLED LEVEL AND PLUMB.
- MINIMUM CLEARANCE OF 12" TO BE MAINTAINED AROUND ENTIRE BFP ASSEMBLY FOR TESTING
- ENTIRE ASSEMBLY TO BE INSTALLED LEVEL AND PLUMB THEN PAINTED SAFETY BLUE.
- CONCRETE SLAB TO EXTEND 12" MIN. AROUND ENTIRE BFP ASSEMBLY.
- DEVICE MUST BE LISTED WITH THE UNIVERSITY OF SOUTHERN CALIFORNIA FOUNDATION FOR CROSS CONNECTION CONTROL AND HYDRAULIC RESEARCH.
- CONTRACTOR SHALL TEST AND CERTIFY BACKFLOW PREVENTION DEVICE.
- IF STAINLESS STEEL IS USED, CONTRACTOR IS RESPONSIBLE TO PROVIDE TRANSITION FITTINGS AND/OR DIELECTRIC UNIONS AS APPROPRIATE WHERE CHANGING FROM BRASS TO S.S.

CREATED FEB 2003 REVISED MAY 2021 – –	REDUCED PRESSURE BACKFLOW PREVENTER ASSY. PARALLEL INSTALLATION NOTES (3/4", 1", 1–1/2", 2")	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL W9A



SECTION

NOTES:

- NO TIE RODS OR EYE BOLT RETAINERS PERMITTED ABOVE GROUND.
- B.F.P. ASSEMBLY TO BE INSTALLED LEVEL & PLUMB.
- MINIMUM CLEARANCE OF 36" TO BE MAINTAINED AROUND ENTIRE BFP ASSEMBLY FOR TESTING
- ENTIRE ASSEMBLY TO BE PAINTED FIRE ENGINE RED.
- DETECTOR BY-PASS ASSEMBLY TO BE FACTORY INSTALLED AND CERTIFIED
- ALL MECHANICAL JOINTS SHALL BE RESTRAINED WITH MEGALUGS OR APPROVED EQUAL
- ALL ABOVE GROUND PIPING SHALL BE FLANGED DUCTILE IRON PIPE CEMENT LINED (NO GALVANIZED OR PVC)
- PASCO COUNTY SHALL HAVE THE OPTION OF REQUIRING THE ENTIRE ASSEMBLY TO BE ENCLOSED IN 6' CHAIN LINK FENCE.
- BFP DEVICE MUST BE LISTED WITH THE UNIVERSITY OF SOUTHERN CALIFORNIA FOUNDATION FOR CROSS CONNECTION CONTROL AND HYDRAULIC RESEARCH.
- CONTRACTOR SHALL TEST AND CERTIFY BACKFLOW PREVENTION DEVICE.
- IF OTHER ASSEMBLIES ARE PROPOSED TO BE PLACED PARALLEL TO THIS BACKFLOW ASSEMBLY (I.E. METER ASSY) THERE SHALL BE A MIN. OF 36" OF SEPARATION BETWEEN ASSEMBLIES, AS PER MEASURED FROM OUTSIDE TO OUTSIDE.

MATERIALS

ITEM	QUANT.	DESCRIPTION
1	1	BACKFLOW PREVENTER (BFP), REDUCED PRESSURE ZONE (RPZ) WITH DETECTOR ASSEMBLY
2	2	90° BEND, FLANGE x FLANGE
3	2	SPOOL PIECE FLG. x PE. D.I.P.
4	2	90° BEND, M.J. x M.J.
5	4	RESTRAINED JOINT MJ (MEGALUG OR EQUAL)
6	2	GATE VALVE, FLG. x FLG. RESILIENT WEDGE O.S.&Y.
8	1	CONCRETE SLAB 6" THICK W/ 6"x6" 10/10 W.W.F. OR FIBERMESH REINFORCING
9	1	AMR (BADGER) ORION READING SYSTEM OR APPROVED EQUAL
10	2	ADJ. PIPE SUPPORTS - ANVIL FIG. 265 W/ 63T STANCHION & BASE PLATE, OR EQUAL
11	1	ISOLATION VALVE AND VALVE BOX, SLIP TYPE AS PER PCU STANDARD DETAIL G-5 LOCATED AT BRANCH NEAREST TO COUNTY WATER MAIN.
12	4	4" BOLLARDS - SEE STANDARD DETAIL G18

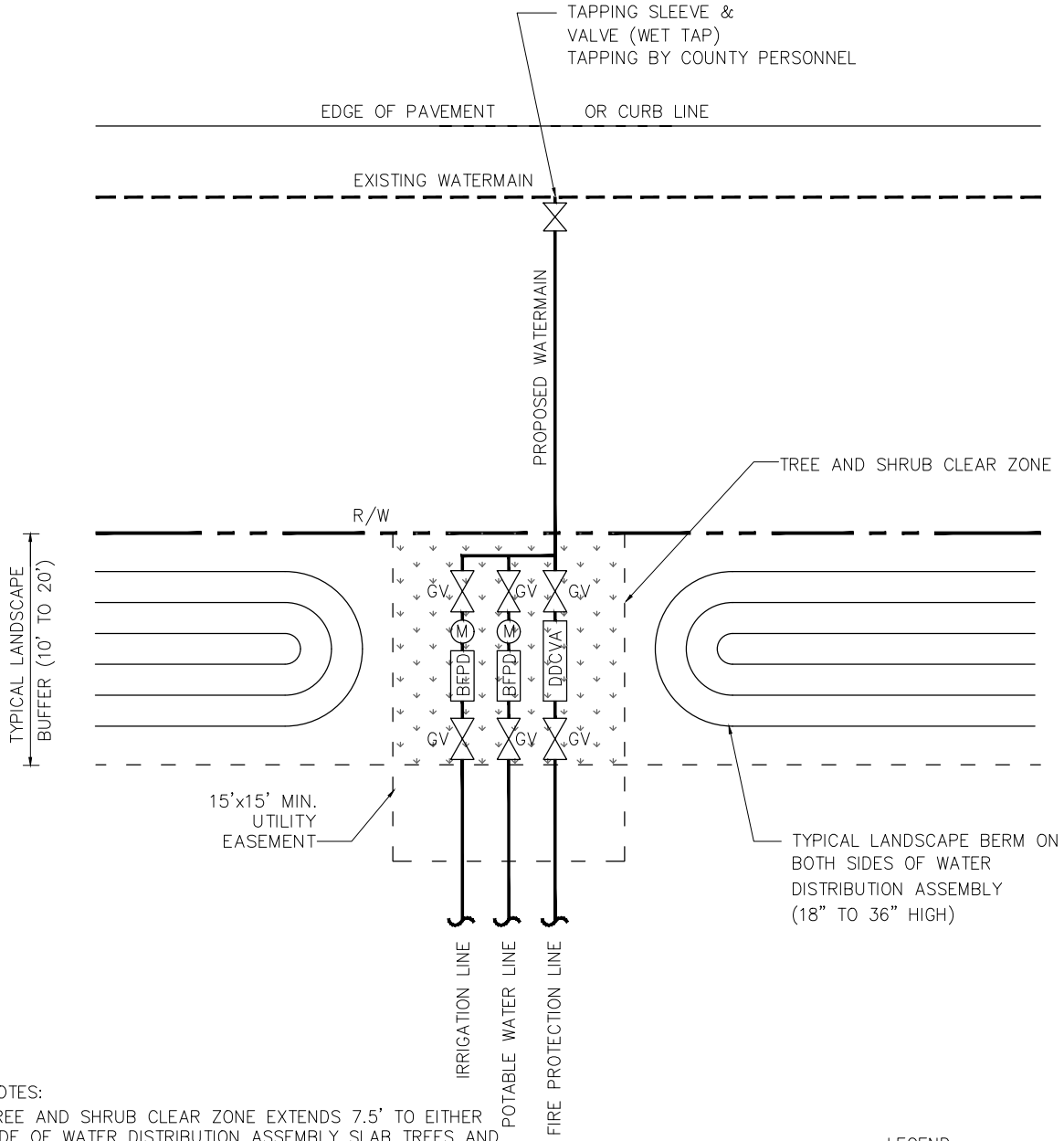
CREATED JULY 2019
REVISED MAY 2021

REDUCED PRESSURE DETECTOR
BACKFLOW PREVENTER
(SINGLE SERVICE: 3", 4", 6", 8")

PROVIDED FOR INFORMATIONAL PURPOSES ONLY.
NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL

PASCO COUNTY UTILITIES

DETAIL W10



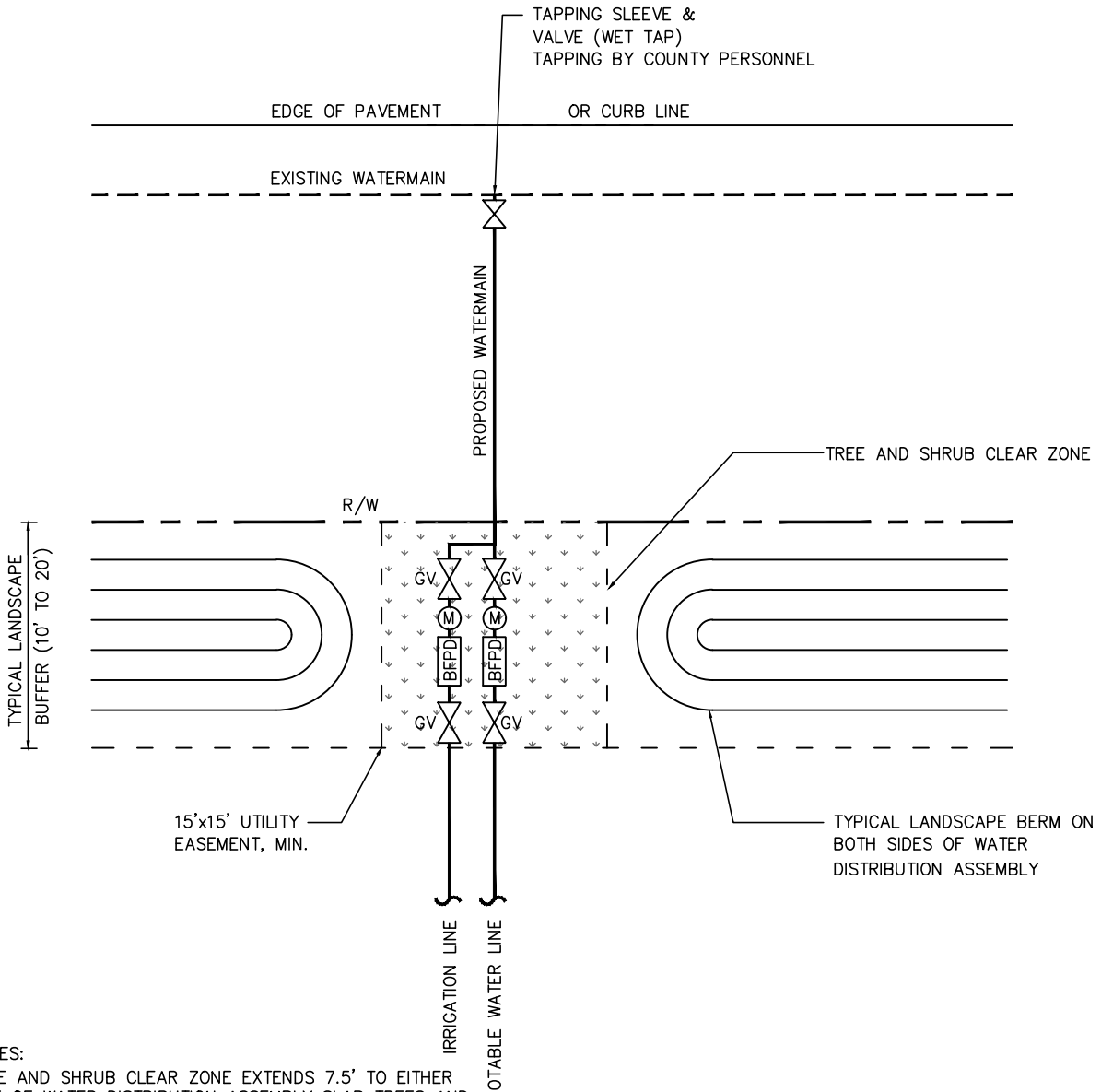
NOTES:

1. TREE AND SHRUB CLEAR ZONE EXTENDS 7.5' TO EITHER SIDE OF WATER DISTRIBUTION ASSEMBLY SLAB TREES AND SHRUBS MUST NOT BE PLANTED IN THE TREE CLEAR ZONE.
2. TREE AND SHRUB CLEAR ZONES ARE ESTABLISHED TO PROTECT WATER MAIN LINE FROM DAMAGE CAUSED BY GROWTH OF ROOT SYSTEMS.
3. REFER TO VARIOUS METER AND/OR BACKFLOW ASSEMBLY DETAILS FOR CLEARANCE / SPACING REQUIRMENTS BETWEEN PARALLEL ASSEMBLIES.
4. NOTE THAT THE MINIMUM 15' X 15' UTILITY EASEMENT MAY NEED TO BE LARGER AS NECESSARY TO ACCOMMODATE ASSEMBLY LENGTHS AND/OR WIDTHS AS REQUIRED TO MEET ASSEMBLY CLEARANCE / SPACING CRITERIA.

LEGEND

TREE AND SHRUB CLEAR ZONE

CREATED FEB 2003 REVISED JAN 2014 AUG 2015 AUG 2019	WATER CONNECTION ASSEMBLY WITH FIRE PROTECTION TYPICAL LAYOUT	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL W11



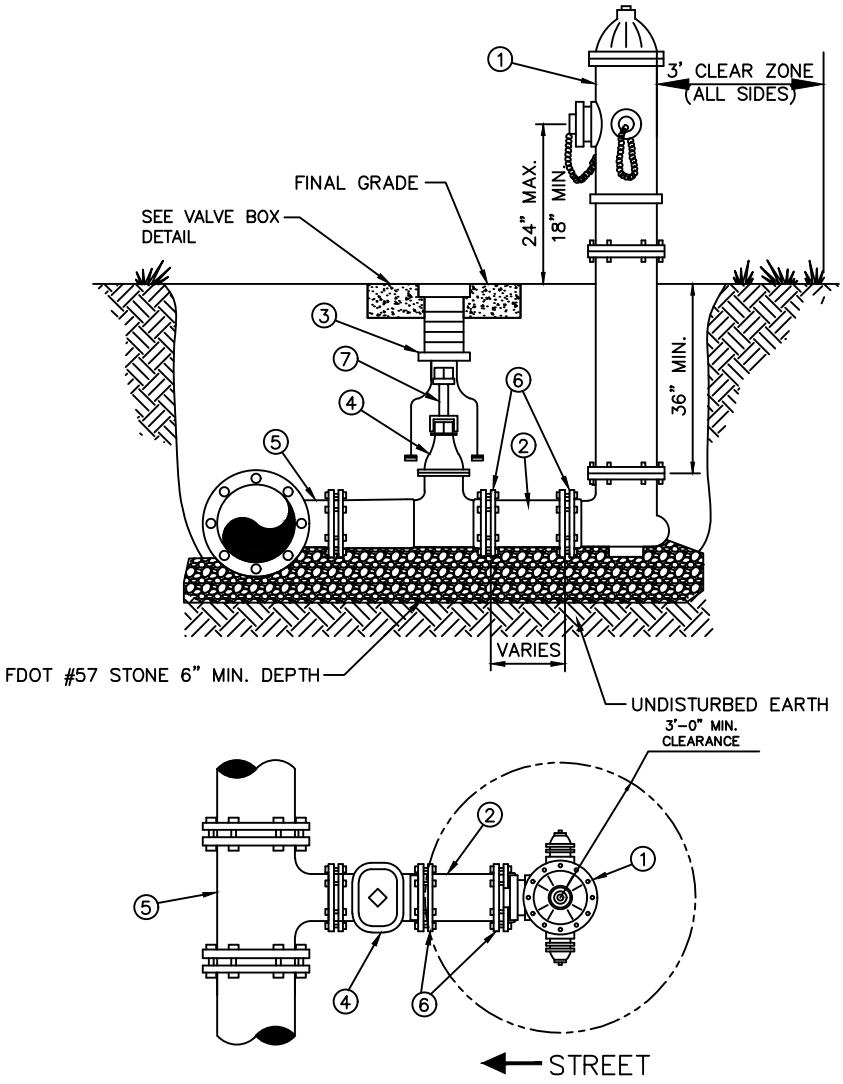
NOTES:

1. TREE AND SHRUB CLEAR ZONE EXTENDS 7.5' TO EITHER SIDE OF WATER DISTRIBUTION ASSEMBLY SLAB TREES AND SHRUBS MUST NOT BE PLANTED IN THE TREE CLEAR ZONE.
2. TREE AND SHRUB CLEAR ZONES ARE ESTABLISHED TO PROTECT WATER MAIN LINE FROM DAMAGE CAUSED BY GROWTH OF ROOT SYSTEMS.
3. REFER TO VARIOUS METER AND/OR BACKFLOW ASSEMBLY DETAILS FOR CLEARANCE / SPACING REQUIRMENTS BETWEEN PARALLEL ASSEMBLIES.
4. NOTE THAT THE MINIMUM 15' X 15' UTILITY EASEMENT MAY NEED TO BE LARGER AS NECESSARY TO ACCOMMODATE ASSEMBLY LENGTHS AND/OR WIDTHS AS REQUIRED TO MEET ASSEMBLY CLEARANCE / SPACING CRITERIA.

LEGEND

TREE AND SHRUB CLEAR ZONE

CREATED FEB 2003 REVISED JAN 2014 AUG 2015 AUG 2019	WATER CONNECTION ASSEMBLY WITHOUT FIRE PROTECTION TYPICAL LAYOUT	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL W12



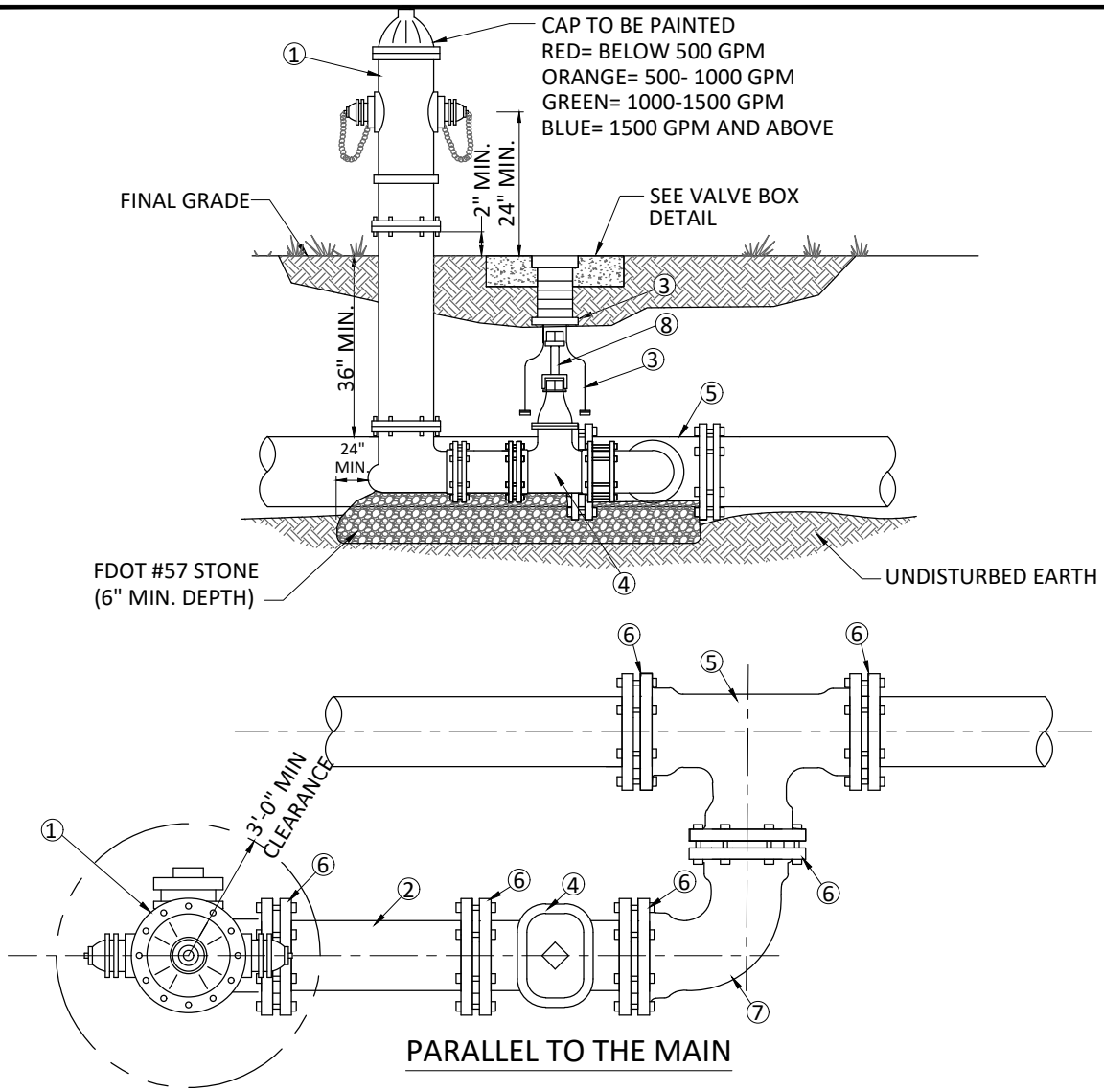
PERPENDICULAR TO THE MAIN

MATERIALS		
ITEM	QUANT.	DESCRIPTION
1	1	FIRE HYDRANT (5 1/4" VALVE MIN.), PAINTED YELLOW
2	*	RESERVED
3	1	VALVE BOX, SLIP TYPE
4	1	6" VALVE, GATE, M.J. RESILIENT WEDGE, N.R.S.
5	1	ANCHOR TEE, M.J.
6	*	6" RESTRAINED JOINT M.J. (MEGALUG OR EQUAL)
7	*	VALVE EXTENSION ROD, AS NECESSARY (3' MAX. BELOW GRADE)
8	*	6" 90° BEND, D.I., RESTRAINED

NOTES:

1. MINIMUM CLEARANCE OF 18" FROM C/L OF STEAMER NOZZLE TO FINAL GRADE, TO BE ADJUSTED BY CONTRACTOR.
2. ADD REFLECTIVE PAVEMENT MARKER (RPM, BLUE/BLUE) IN CENTER OF LANE IMMEDIATELY ADJACENT TO HYDRANT.
3. A 3-FT CLEAR ZONE SURROUNDING THE HYDRANT SHALL BE FREE OF ANY TREES, SHRUBS, AND DRIVEWAYS.
4. HYDRANT CAPS SHALL BE COLOR CODED BASED ON FLOW RATES:
   - BELOW 500 GPM: RED
   - 500-1,000 GPM: ORANGE
   - 1,000-1,500 GPM: GREEN
   - ABOVE-1,500 GPM: BLUE
5. THE FOLLOWING FIRE HYDRANTS ARE ACCEPTABLE - AMERICAN FLOW B-84-B; KENNEDY K-81 OR EQUAL

CREATED FEB 2003 REVISED SEPT 2014 AUG 2015 FEB 2020	STANDARD FIRE HYDRANT CONFIGURATION	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL W13



PARALLEL TO THE MAIN

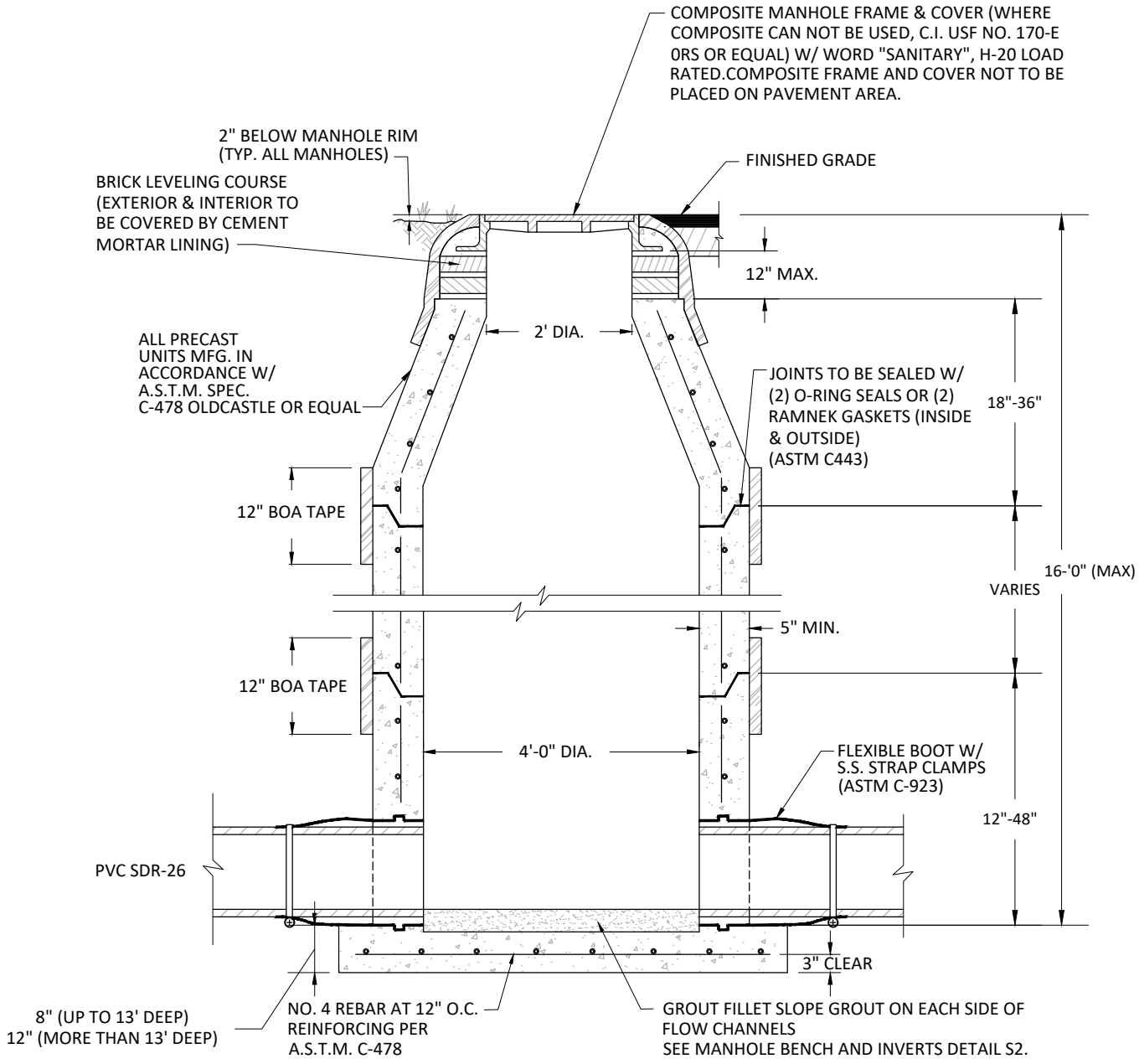
MATERIALS		
ITEM	QUANT.	DESCRIPTION
1	1	FIRE HYDRANT (5 1/4" VALVE MIN.) BODY PAINTED YELLOW
2	*	6" DIA. PIPE, P.V.C. (DR-14) MAX 20' LENGTH
3	1	VALVE BOX, SLIP TYPE
4	1	6" VALVE, GATE, M.J. RESILIENT WEDGE, N.R.S.
5	1	MJ ANCHOR TEE
6	*	6" RESTRAINED JOINT M.J. (MEGALUG OR EQUAL)
7	1	6" 90° BEND M.J. D.I. RESTRAINED
8	*	VALVE EXTENSION ROD, AS NECESSARY (3' MAX. BELOW GRADE)

CREATED MAY 2021 REVISED	FIRE HYDRANT CONFIGURATION (SPACE–CONSTRAINED)	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL W14

NOTES:

1. MINIMUM CLEARANCE OF 18" FROM C/L OF STEAMER NOZZLE TO FINAL GRADE, TO BE ADJUSTED BY CONTRACTOR.
2. ADD REFLECTIVE PAVEMENT MARKER (RPM, BLUE/BLUE) IN CENTER OF LANE IMMEDIATELY ADJACENT TO HYDRANT.
3. A 3-FT CLEAR ZONE SURROUNDING THE HYDRANT SHALL BE FREE OF ANY TREES, SHRUBS, AND DRIVEWAYS.
4. HYDRANT CAPS SHALL BE COLOR CODED BASED ON FLOW RATES:
   - BELOW 500 GPM: RED
   - 500-1,000 GPM: ORANGE
   - 1,000-1,500 GPM: GREEN
   - ABOVE-1,500 GPM: BLUE
5. THE FOLLOWING FIRE HYDRANTS ARE ACCEPTABLE - AMERICAN FLOW B-84-B; KENNEDY K-81 OR APPROVED EQUAL

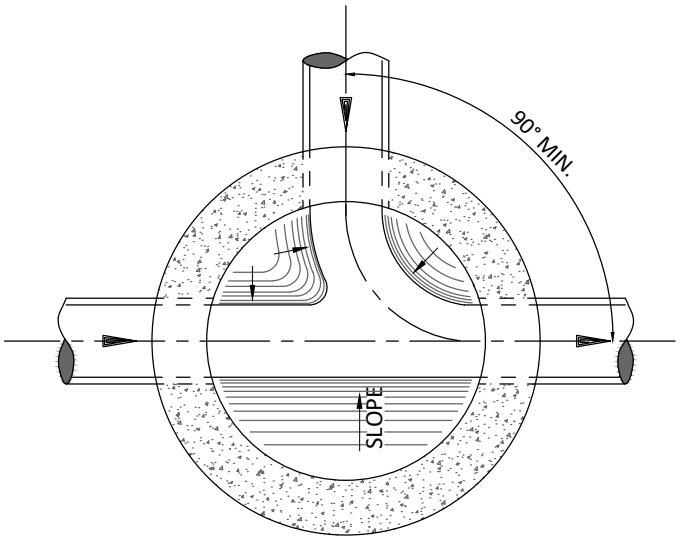
CREATED MAY 2021 REVISED	FIRE HYDRANT CONFIGURATION (SPACE–CONSTRAINED) NOTES	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL W14A



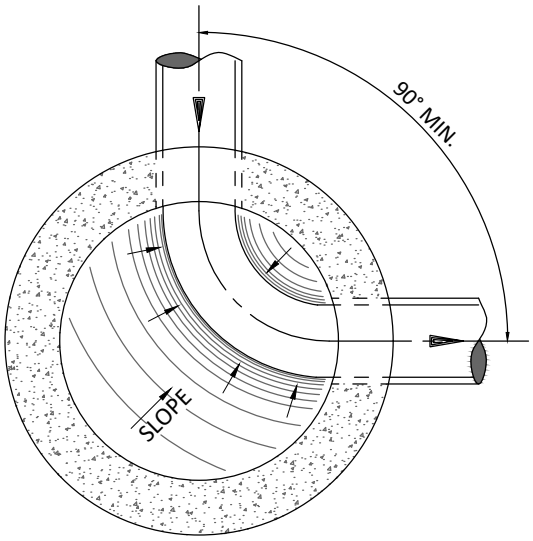
NOTES:

1. ALL CONCRETE SHALL BE TYP II CEMENT, MEETING LATEST ASTM REQUIRMENTS AND PROVIDED WITHON LABORATORY CERTIFICATION.
2. BOA TAPE MUST BE USED IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.
3. THE TYPE OF INTERIOR LINING USED SHALL BE QUADEX GEOKRETE ON ALL STRUCTURES TO BE LINED.
4. A FORCE MAIN CONNECTION REQUIRES THE RECEIVING MANHOLE AND THE FOUR DOWNSTREAM & FOUR UPSTREAM MANHOLES TO BE LINED. AT PUMP STATIONS THE "KING" MANHOLE AND 4 UPSTREAM MANHOLES (EACH INVERT) SHALL BE LINED.
5. PASCO COUNTY MAY REQUIRE ADDITIONAL MANHOLES TO BE LINED BASED ON MANHOLE SPACING.
6. PASCO COUNTY SHALL HAVE THE OPTION OF REQUIRING A NEGATIVE PRESSURE TEST PER ASTM C-1244.
7. LIFT HOLES MUST NOT PENETRATE THE WALLS.
8. PRECAST CONCRETE SHALL ATTAIN A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS.
9. USE OF ECCENTRIC CONES REQUIRES SPECIAL APPROVAL.
10. EXTERIOR AND INTERIOR COATING, CONSEAL CS-55 OR PROTECH EW-1 AQUAPOXY OR APPROVED EQUAL AT THE MINIMUM RATE /THICKNESS RECOMMENDED BY THE MANUFACTURER COAL TAR IS NOT ALLOWED
11. MANHOLE W/ CONNECTION SHALL HAVE 24 HR HYDROSTATIC LEAK TEST.
12. ALL LINED MANHOLES SHALL HAVE COMPOSITE FRAME AND COVER AS MANUFACTURED BY CAP OR EQUAL. COMPOSITE FRAMES AND COVERS NOT TO BE PLACED ON THE PAVEMENT AREA

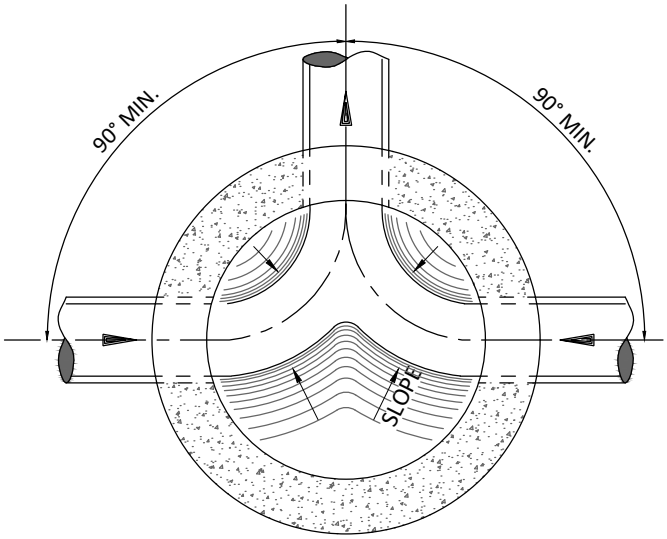
CREATED FEB 2021 REVISED MAY 2021	STANDARD MANHOLE	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL S1



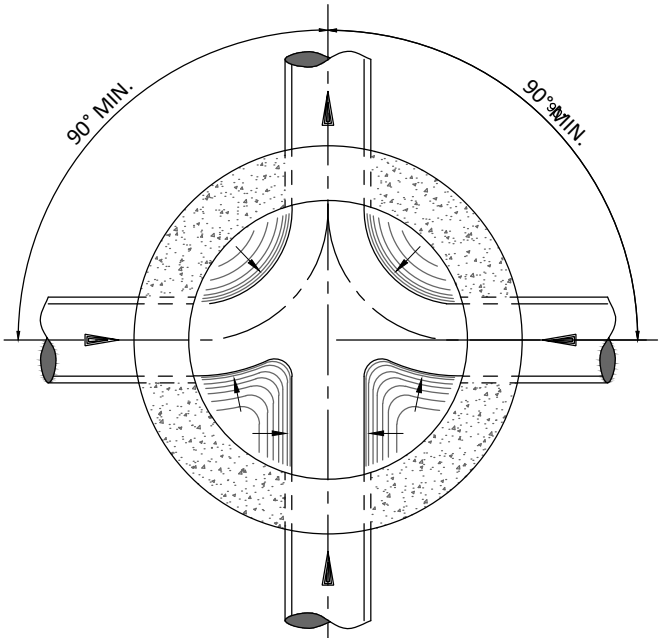
PLAN VIEW



PLAN VIEW



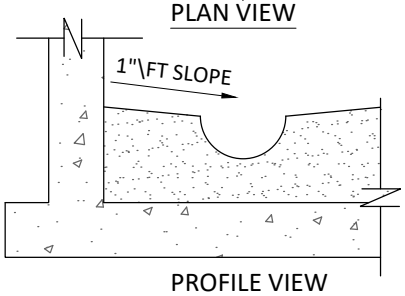
PLAN VIEW



PLAN VIEW

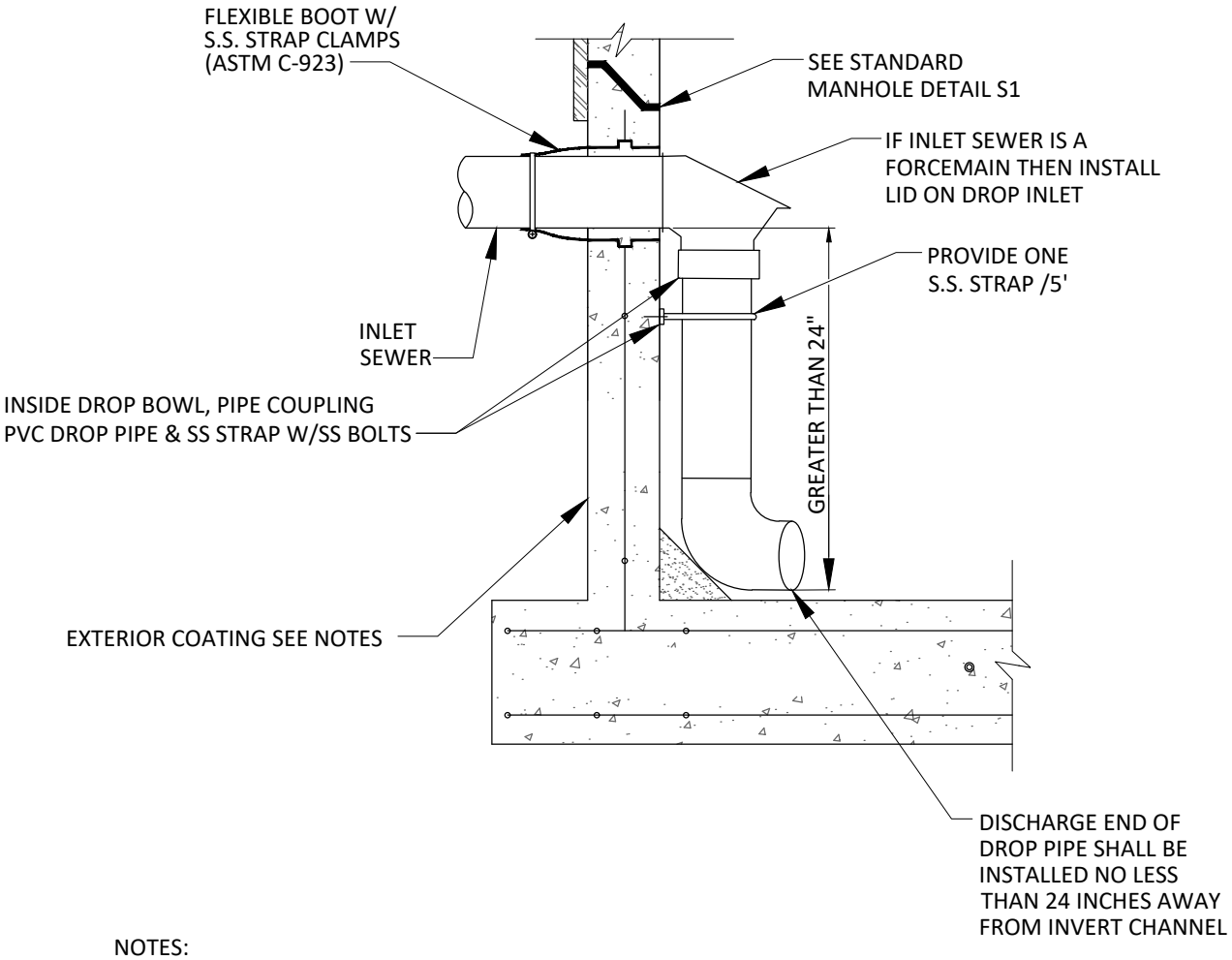
NOTES

- MANHOLE BENCH SHALL HAVE A STEEL TROWEL FINISH.
- MINIMUM DROP FROM INLET INVERT TO OUTLET INVERT SHALL BE NO LESS THAN 0.10 FEET.
- DEPTH OF CHANNELIZATION SHALL BE EQUAL TO 80% OF PIPE DIA. (MIN.)
- MINIMUM SHELF SLOPE TO BE 1"/FT FROM WALL TO CHANNEL.
- TYPE II CONCRETE FILL SHALL BE USED FOR MANHOLE BENCH.
- BENCHES AND INVERTS SHALLBE COATED WITH CONSEAL CS-55 OR PROTECH EW-1 AQUAPOXY OR APPROVED EQUAL AT THE MINIMUM RATE/THICKNESS RECOMMENDED BY THE MANUFACTURER COAL TAR IS NOT ALLOWED.



PROFILE VIEW

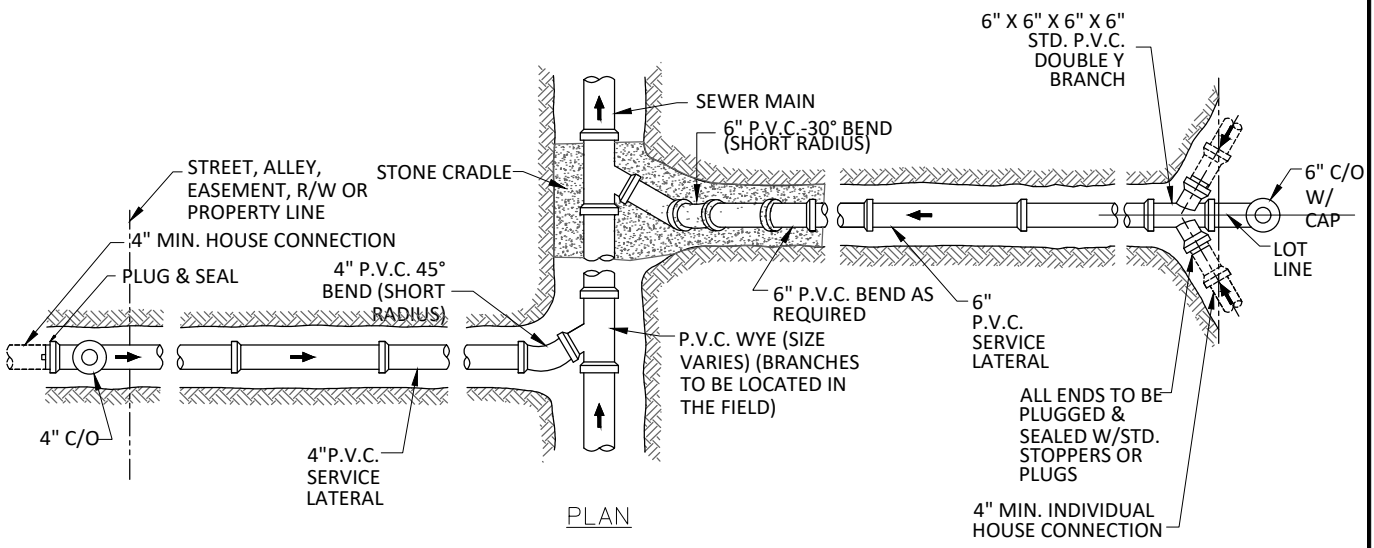
CREATED FEB 2021 REVISED MAY 2021	STANDARD MANHOLE BENCH AND INVERTS	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL S2

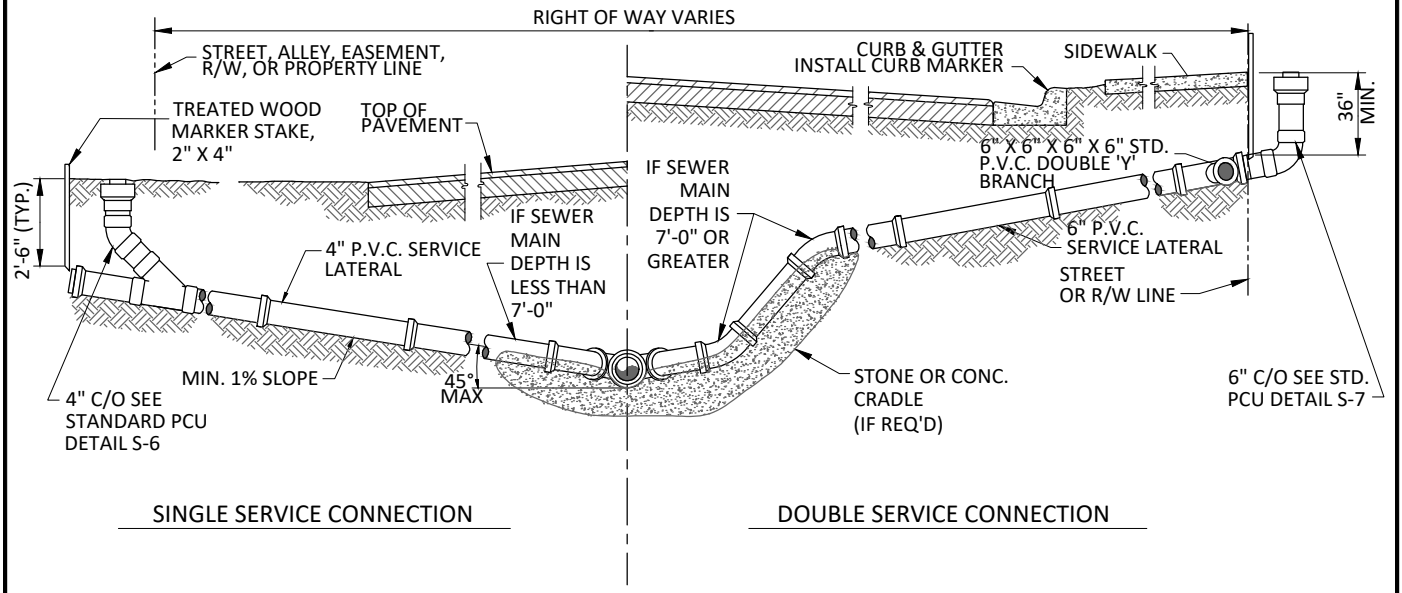


NOTES:

- DROP SECTION PIPE SIZE TO BE EQUIVALENT TO INLET PIPE SIZE.
- PASCO COUNTY SHALL HAVE THE OPTION OF REQUIRING A NEGATIVE PRESSURE TEST PER ASTM C-1244.
- LIFT HOLES MUST NOT PENETRATE THE WALLS.
- PRECAST CONCRETE SHALL ATTAIN A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS.
- MANHOLES SHALL BE COATED IN THE INTERIOR AND EXTERIOR WITH CONSEAL CS-55 OR PROTECH EW-1 AQUAPOXY OR APPROVED EQUAL AT THE MINIMUM RATE/THICKNESS RECOMMENDED BY THE MANUFACTURER COAL TAR IS NOT ALLOWED.
- DROP MANHOLE TO BE USED WHEN THE DIFFERENCE BETWEEN INLET INVERT AND OUTLET INVERT IS 24" OR MORE.
- DROP PIPE SHALL NOT BE INSTALLED WITHIN INVERT CHANNELS IN MANHOLE.

CREATED FEB 2021 REVISED MAY 2021	DROP MANHOLE CONNECTION	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL S3



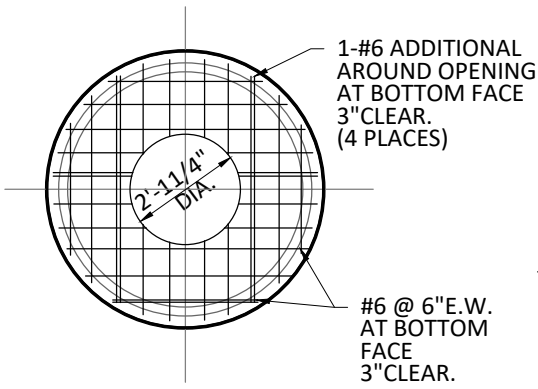


SECTION

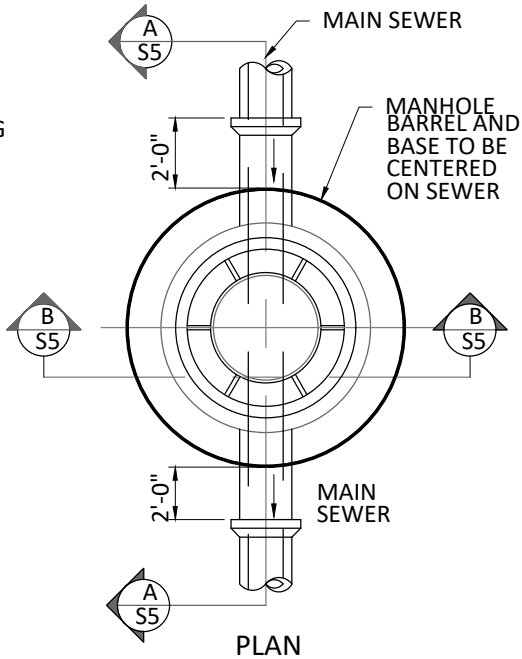
NOTES:

- CONTRACTOR SHALL MAKE, ON A CLEAN SET OF PLANS, THE FINAL STATIONING OR DISTANCE AND DIRECTION FROM MANHOLE OF EACH SERVICE LATERAL AND THEN GIVE TO ENGINEER FOR RECORD PURPOSES.
- PROVIDE 2" x 4" PRESSURE TREATED WOOD MARKER STAKE AT ALL SANITARY SERVICES (INCLUDE IN PIPE PRICE), TOP OF STAKE TO BE PAINTED WITH GREEN PAINT.
- THE MINIMUM DIAMETER OF SINGLE SERVICE LATERALS SHALL BE 4".THE MINIMUM DIAMETER OF DOUBLE SERVICE LATERALS SHALL BE 6".
- REFER TO STANDARD PCU DETAIL G-9 FOR CLEARANCE CRITERIA.
- SEWER SERVICES MUST NOT BE LOCATED IN REAR YARDS.

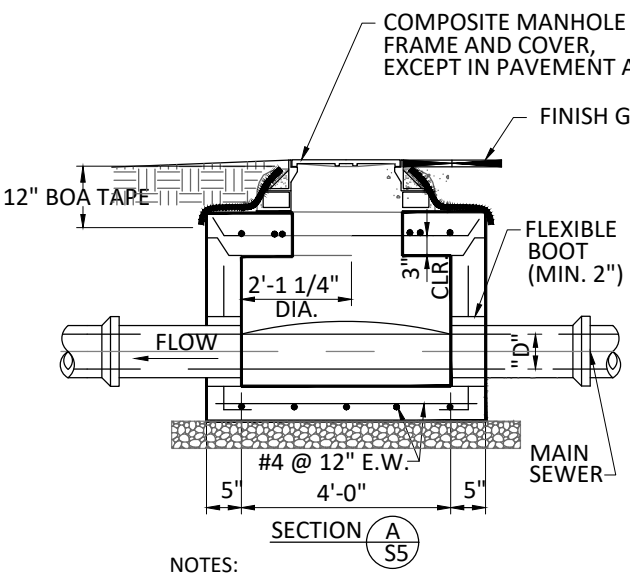
CREATED FEB 2021 REVISED MAY 2021	SANITARY SEWER LATERAL CONNECTION	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL S4



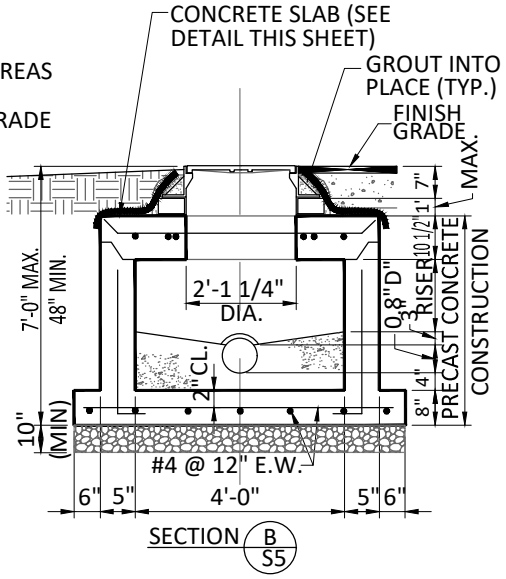
CONCRETE SLAB DETAIL



PLAN



SECTION A S5

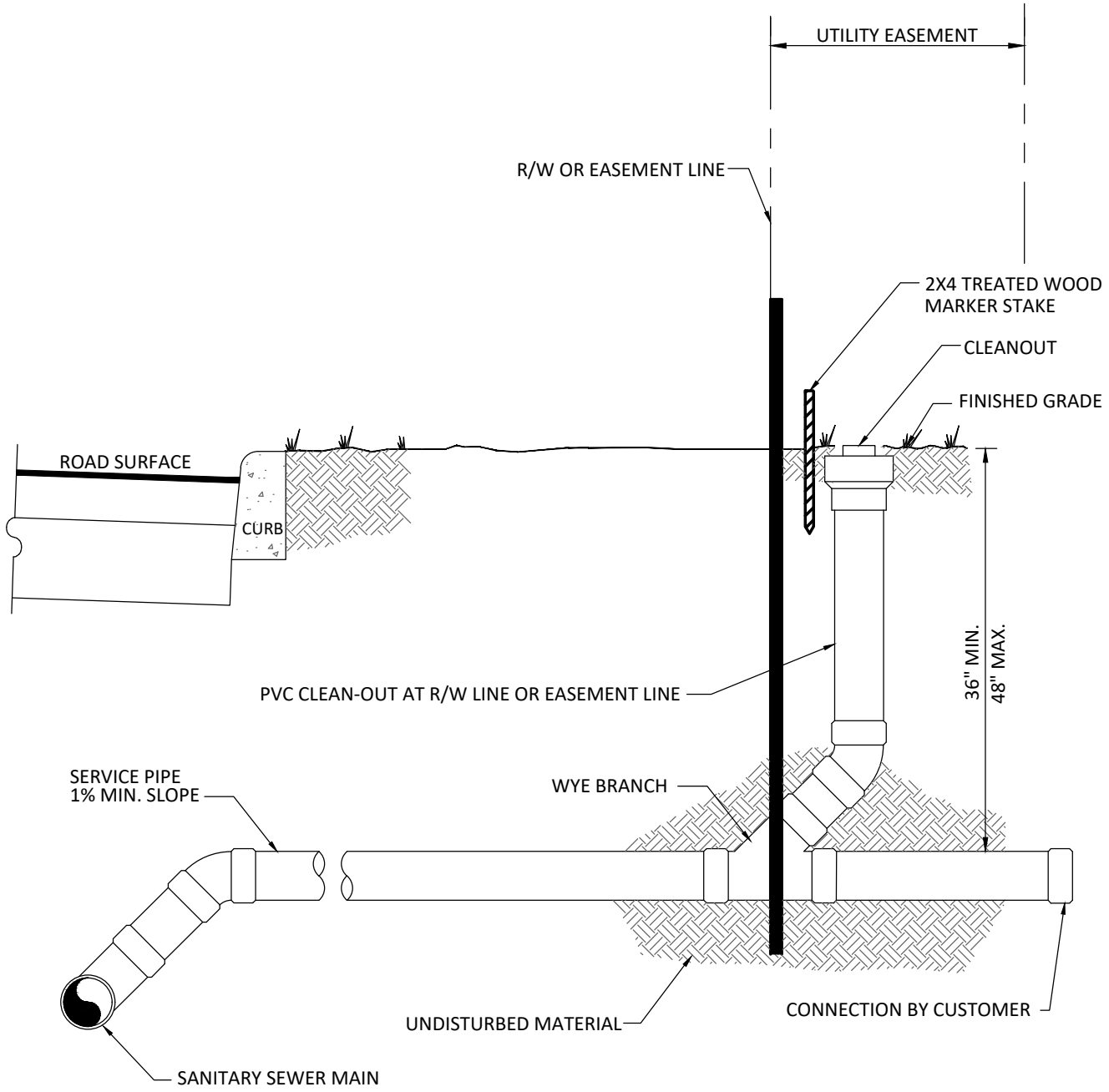


SECTION B S5

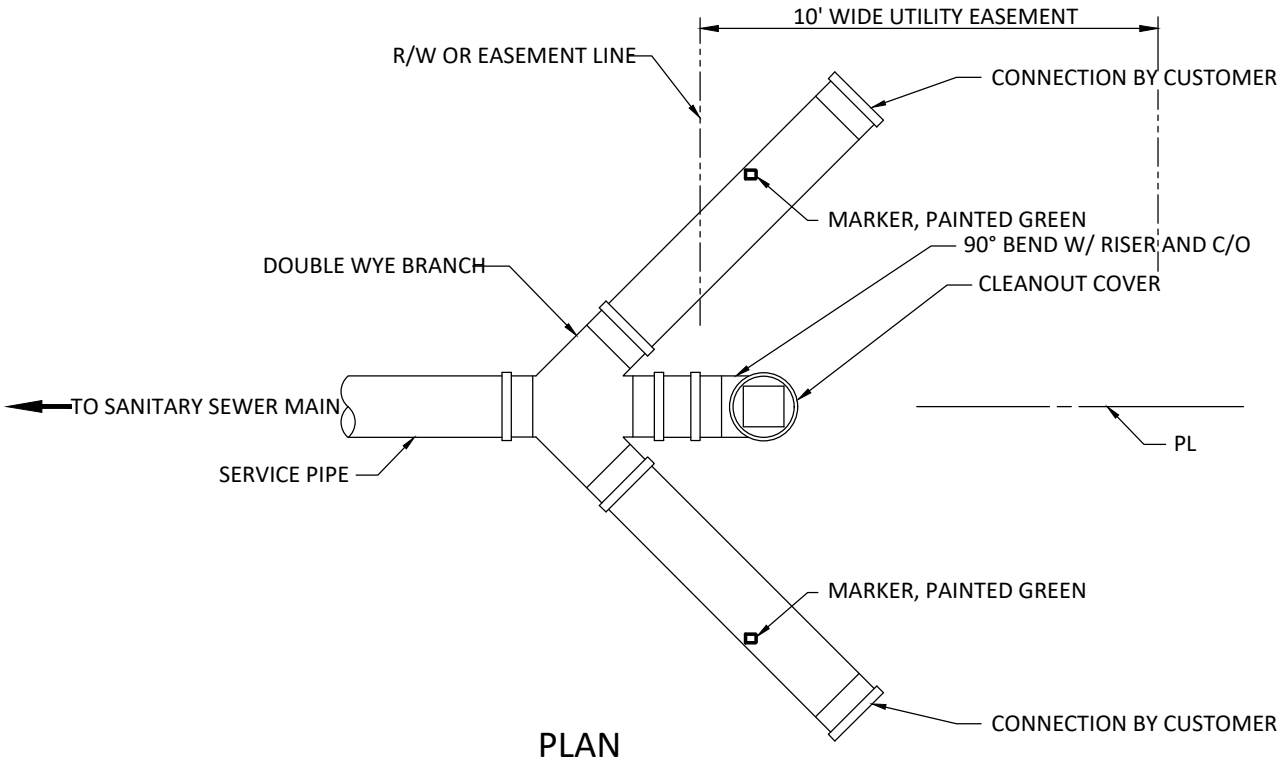
NOTES:

1. BOA TAPE MUST BE USED ON ALL JOINTS, CASTINGS AND RISER RINGS: ON ALL JOINTS ON AIR RELEASES, MANHOLES, GREASE/WATER, OIL/WATER SEPARATORS.
2. BOA TAPE MUST BE USED IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.
3. THE TYPE OF INTERIOR LINING USED SHALL BE GEOKRETE ON ALL STRUCTURES TO BE LINED.
4. A FORCE MAIN CONNECTION REQUIRES THE RECEIVING MANHOLE AND THE FOUR DOWNSTREAM & FOUR UPSTREAM MANHOLES TO BE LINED. AT PUMP STATIONS THE "KING" MANHOLE AND 4 UPSTREAM MANHOLES (EACH INVERT) SHALL BE LINED.
5. PASCO COUNTY MAY REQUIRE ADDITIONAL MANHOLES TO BE LINED BASED ON MANHOLE SPACING.
6. PASCO COUNTY SHALL HAVE THE OPTION OF REQUIRING A NEGATIVE PRESSURE TEST PER ASTM C-1244.
7. LIFT HOLES MUST NOT PENETRATE THE WALLS.
8. PRECAST CONCRETE SHALL ATTAIN A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS.
9. EXTERIOR AND INTERIOR COATING, CONSEAL CS-55 OR PROTECH EW-1 AQUAPOXY OR APPROVED EQUAL AT THE MINIMUM RATE/THICKNESS RECOMMENDED BY THE MANUFACTURER COAL TAR IS NOT ALLOWED.
10. MANHOLE W/ CONNECTION SHALL HAVE 24 HR HYDROSTATIC LEAK TEST.
11. ALL LINED MANHOLES, AS WELL AS THE LAST MANHOLE BEFORE A PUMP STATION, SHALL HAVE COMPOSITE RINGS AND COVER AS MANUFACTURED BY CAP OR EQUAL.COMPOSITE FRAME AND COVER NOT TO BE PLACED ON PAVEMENT AREA.

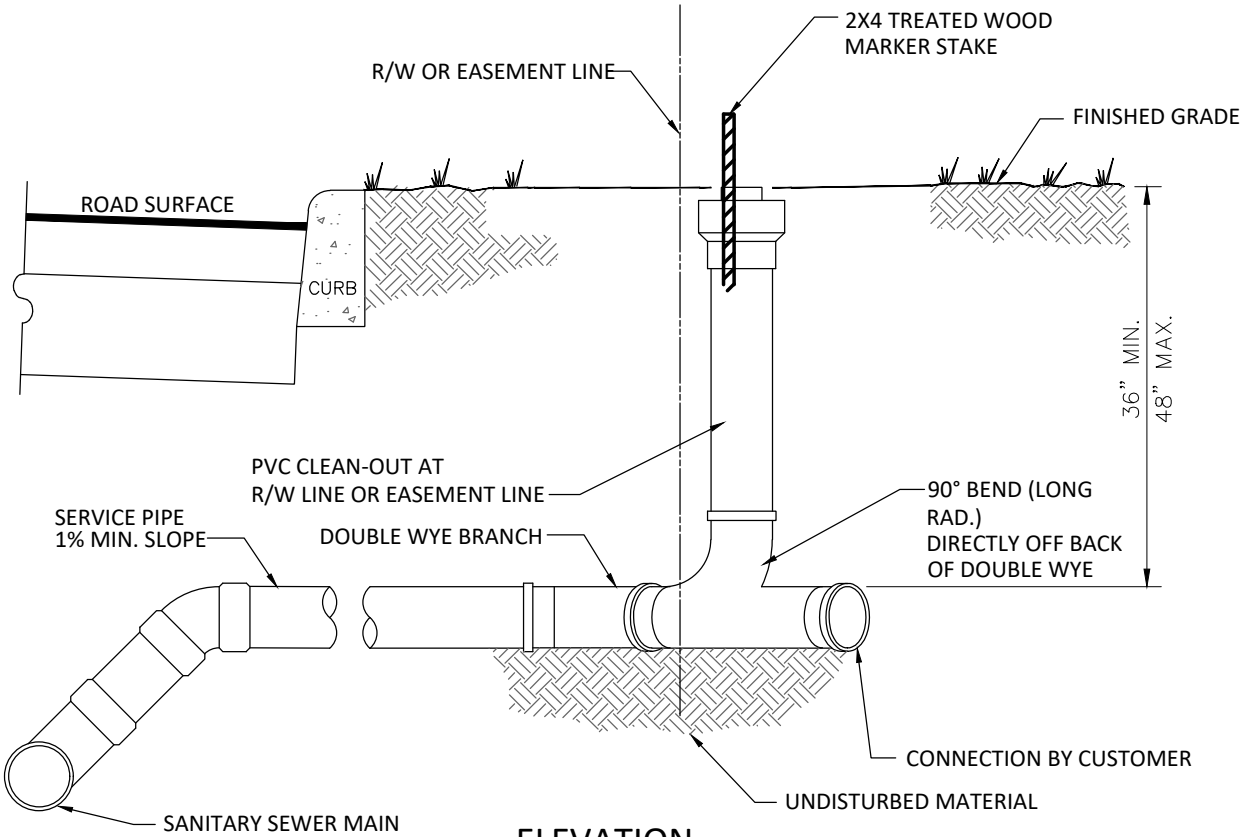
CREATED FEB 2021 REVISED MAY 2021	STANDARD SHALLOW MANHOLE	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL S5



CREATED FEB 2021 REVISED MAY 2021	SANITARY SEWER – SINGLE WYE CONNECTION AND TYPICAL CLEAN–OUT	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL S6



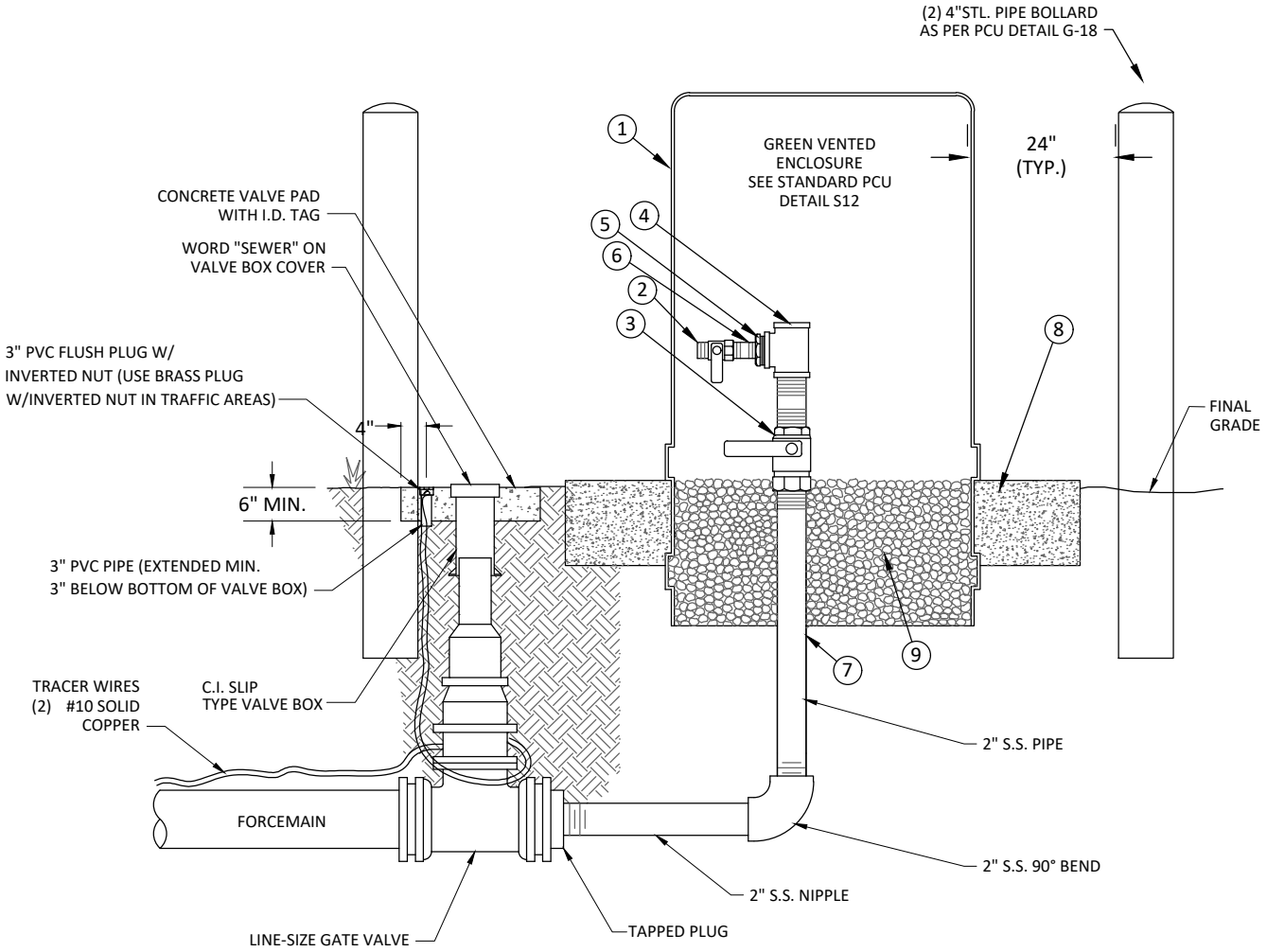
PLAN



ELEVATION

NTS

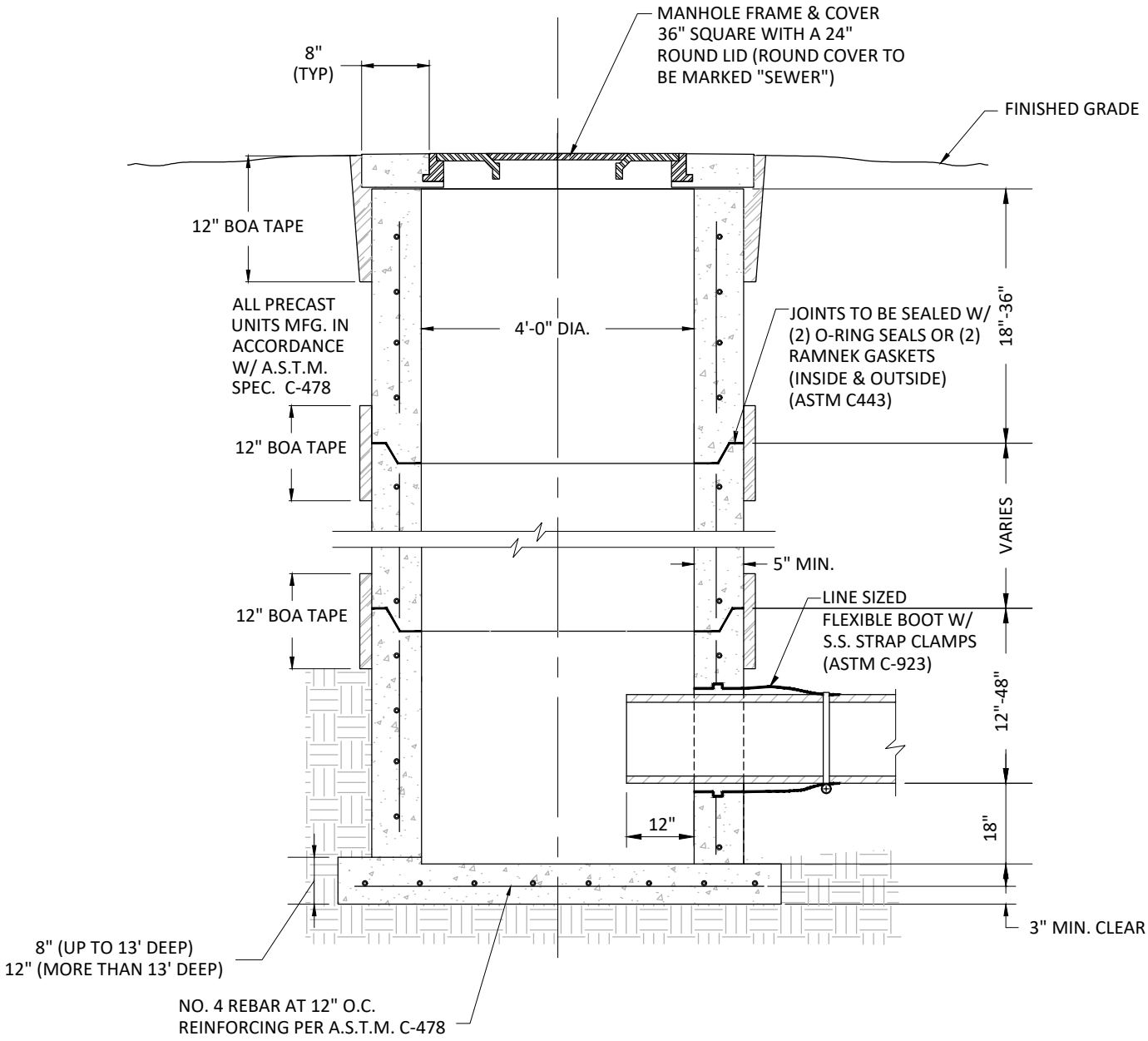
CREATED FEB 2021 REVISED MAY 2021	SANITARY SEWER – DOUBLE WYE CONNECTION AND TYPICAL CLEAN–OUT	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL S7



MATERIALS		
ITEM	QUANT.	DESCRIPTION
1	1	VENTED ENCLOSURE WATER PLUS CORP. MODEL H-30 GREEN FOR FORCE MAIN
2	1	1" BALL VALVE 316 S.S.
3	1	2" BALL VALVE S.S. ABOVE GRADE
4	1	2" TEE S.S.
5	1	2" X 1" REDUCER S.S.
6	1	1" DIA. SHORT NIPPLE S.S.
7	1	2" DIA. PIPE S.S.
8	1	CONCRETE SLAB AROUND ECLOSURE
9	*	#57 WHITE ROCK

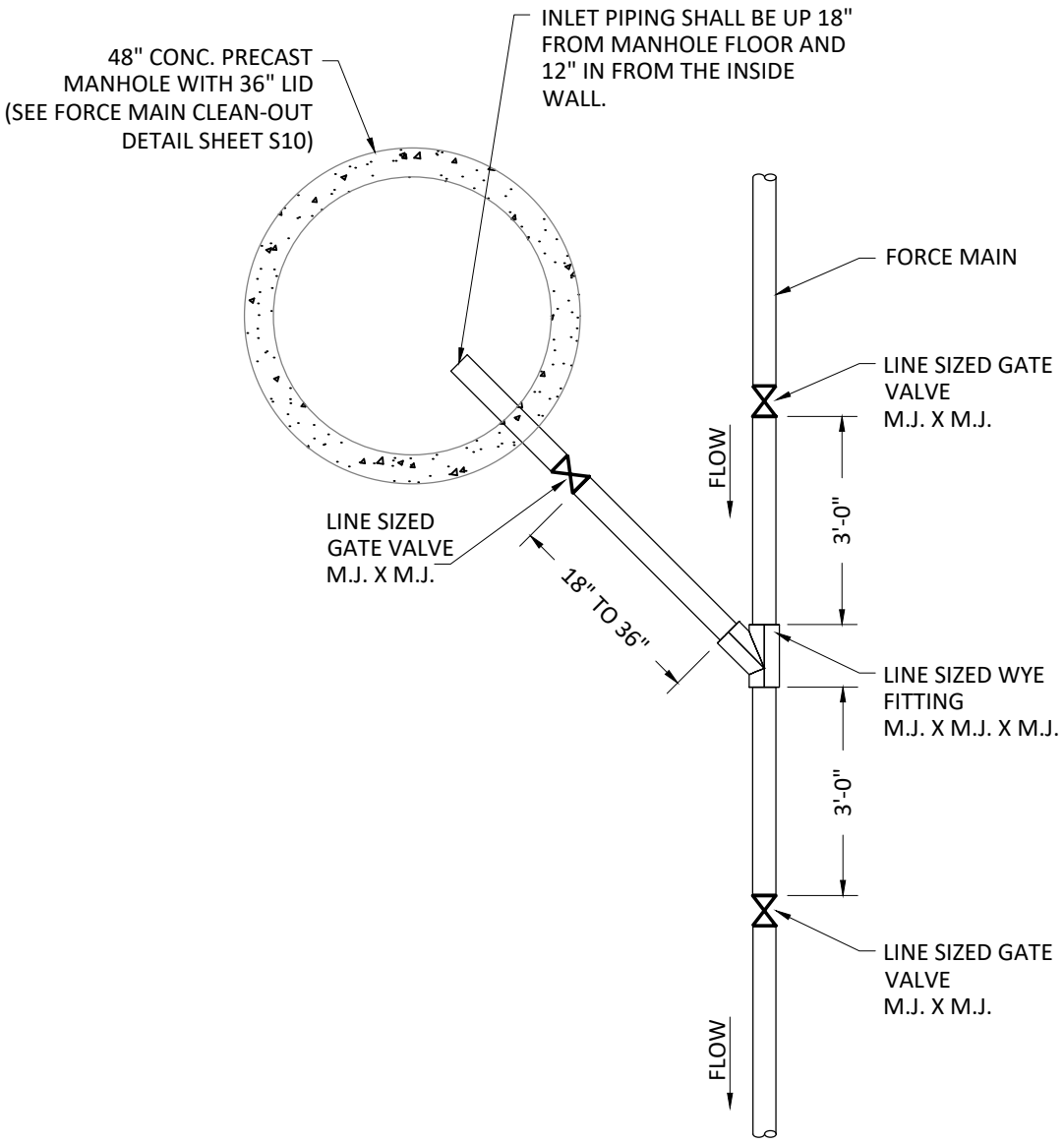
NOTES:
- MECHANICAL JOINTS/UNDERGROUND PIPING SHALL BE RESTRAINED AS SPECIFIED IN JOINT RESTRAINT TABLE (DETAIL G10)
- VALVE EXTENSION ROD SHALL BE UTILIZED, AS NECESSARY, SO THAT VALVE OPERATING NUT IS A MAXIMUM OF 3' BELOW GRADE.
- END OF LINE SAME SIZE VALVE

CREATED FEB 2021 REVISED MAY 2021	FORCEMAIN (FM) PERMANENT BLOW–OFF DETAIL	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL S9

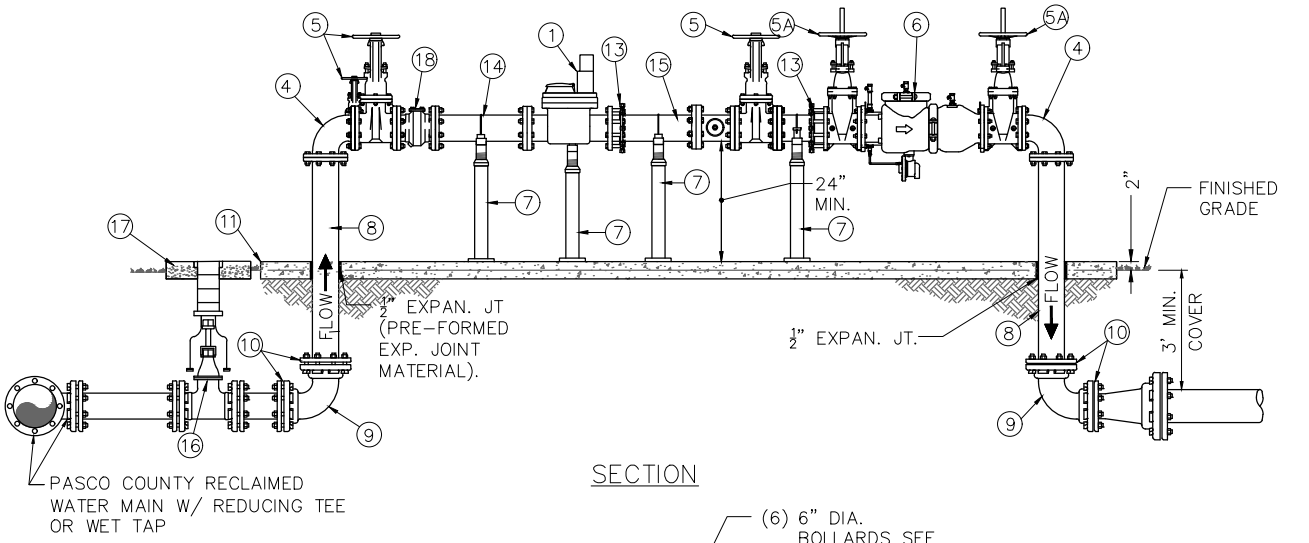


NOTES:
- BOA TAPE SHALL BE USED ON ALL JOINTS, CASTINGS, AND RISER RINGS.
- BOA TAPE SHALL BE USED IN ACCORDANCE WITH MFG RECOMMENDATIONS.
- MANHOLE SHALL BE LINED WITH QUADEX GEOKRETE.
- PRECAST CONCRETE SHALL ATTAIN A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS.
- LIFE HOLES SHALL NOT PENETRATE WALLS.
- A COMPOSITE FRAME & COVER SHALL BE USED AS MANUFACTURED BY CAP OR APPROVED EQUAL. COMPOSITE FRAME AND COVER NOT TO BE PLACED ON PAVEMENT AREA.

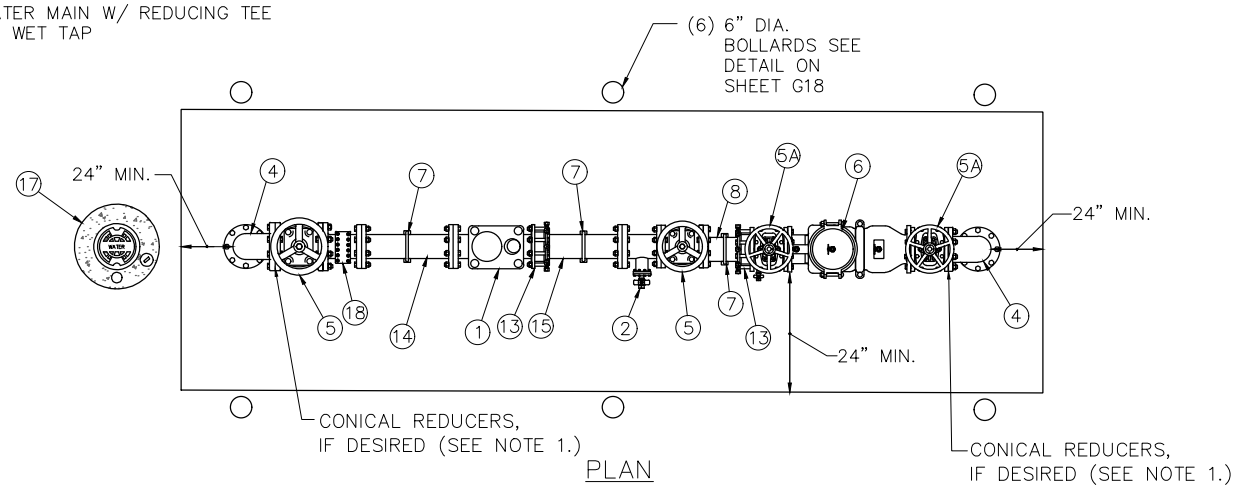
CREATED FEB 2021 REVISED MAY 2021	FORCEMAIN "CLEAN–OUT" MANHOLE	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL S10



CREATED FEB 2021 REVISED MAY 2021	FORCEMAIN "CLEAN-OUT" PIPING CONFIGURATION	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL S11



SECTION



PLAN

NOTE 1. IF IT IS DESIRED TO DOWNSIZE METER, CONICAL REDUCERS SHALL BE PLACED BEFORE AND AFTER THE METER. NO OTHER LOCATIONS SHALL BE ACCEPTED.

– FOR CONTINUATION OF NOTES SEE SHEET R1A –

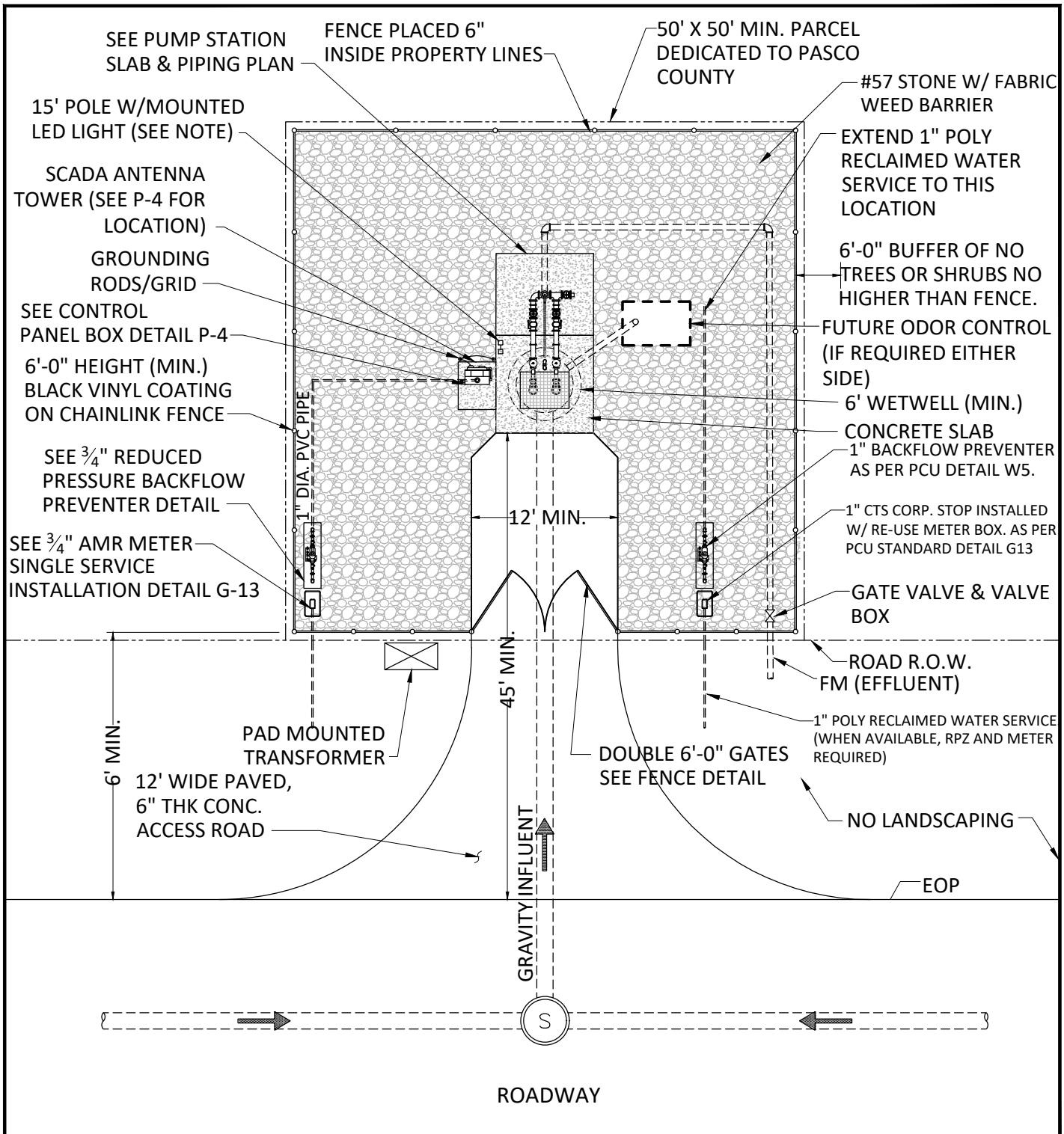
MATERIALS		
ITEM	QUANT.	DESCRIPTION
1	1	WATER METER 3" THRU 12" w/AMR (BADGER) ORION READING SYSTEM OR APPROVED
		EQUAL (SEE NOTES)
2	1	TEE FLG X FLG X FLG W/ BLIND PLATE TAPPED WITH 2" CORP STOP MIP X FIP
4	4	BEND 90° FLG x FLG (ST'D)
5	3	VALVE, GATE FLG x FLG RESILIENT SEAT NRS
5A	2	VALVE, GATE FLG x FLG RESILIENT SEAT O, S & Y
6	1	BACK FLOW PREVENTER (BFP) – RPZ
7	3	ADJ. PIPE SUPPORTS – ANVIL FIG. 265 W/ 63T STANCHION & BASE PLATE
8	2	SPOOL PIECE FLG x PE D.I.P. LENGTH = 3 PIPE DIAMETERS LENGTH
9	2	BEND 90° MJ x MJ
10	4	RESTRAINED JOINT MJ (MEGALUG OR EQUAL)
11	1	CONCRETE SLAB 6" THICK W/ 6"x6" 10/10 W.W.F. OR FIBERMESH REINFORCING
13	2	FLANGE ADAPTER (EBAA SERIES 2100 MEGAFLANGE, DRESSER 128, O/E)
14	1	SPOOL PIECE FLG x FLG – LENGTH TO BE > 5 PIPE DIAMETERS
15	1	SPOOL PIECE FLG x PE – LENGTH TO BE > 3 PIPE DIAMETERS
16	1	BELOW GRADE ISOLATION GATE VALVE W/ VAULT BOX, SLIP TYPE
17	1	VALVE BOX, SLIP TYPE AS PER PCU STANDARD DETAIL G–5
18	1	DUAL–FLANGE PLATE STRAINER

CREATED FEB 2021 REVISED	LARGE RECLAIMED METER 3" AND ABOVE WITH SINGLE BACKFLOW PREVENTER	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL R1

NOTES CONTINUED FROM R-1

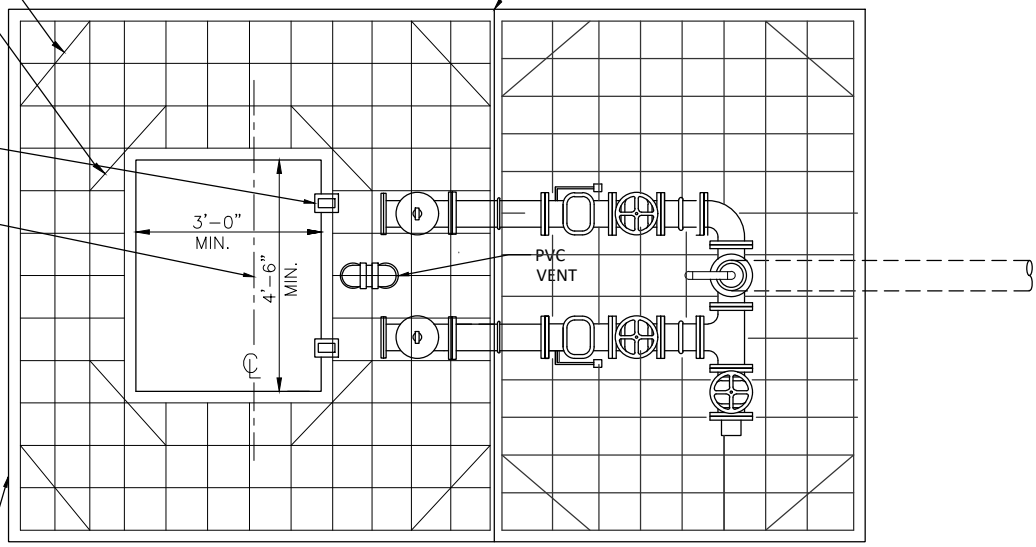
2. METER & BFP ASSEMBLY TO BE INSTALLED LEVEL & PLUMB.
3. ENTIRE ASSEMBLY TO BE PAINTED PURPLE.
4. BFP TO BE SIZED EQUAL TO OR GREATER THAN METER SIZE.
5. MECHANICAL JOINTS SHALL BE RESTRAINED AS SPECIFIED BY COUNTY/ENGINEER.
6. BELL JOINT RESTRAINERS SHALL BE PROVIDED ON ALL UNDERGROUND PIPING.
7. ALL ABOVE GROUND PIPING SHALL BE FLANGED DUCTILE IRON PIPE CEMENT LINED (NO GALVANIZED OR PVC)
8. PASCO COUNTY MAY REQUIRE THE ENTIRE ASSEMBLY TO BE ENCLOSED IN 6' BLACK VINYL CHAIN LINK FENCE.
9. BFP MUST BE LISTED WITH THE UNIVERSITY OF SOUTHERN CALIFORNIA FOUNDATION FOR CROSS CONNECTION CONTROL AND HYDRAULIC RESEARCH (USC APPROVED).
10. ABOVE GROUND INLET AND DISCHARGE PIPING SHALL BE SIZED IDENTICAL TO METER INLET SIZE.
11. ALL METERING EQUIPMENT SHALL BE FULLY COMPATIBLE WITH THE CURRENT PCU AUTOMATIC METER READING (AMR) SYSTEM.
12. A BADGER E-SERIES ULTRASONIC METER WITH NICOR LEAD AND ORION AMR ME TRANSMITTER (OR APPROVED EQUAL) WITH PURPLE REUSE LID.
13. NO TIE RODS OR EYE BOLT RETAINERS PERMITTED ABOVE GROUND.
14. IF OTHER ASSEMBLIES ARE PROPOSED TO BE PLACED PARALLEL TO METER FOR BACKFLOW ASSEMBLY (I.E. FIRE SERVICES, IRRIGATION METERS, ETC.) THERE SHALL BE A MINIMUM OF 36IN OF SEPARATION BETWEEN ASSEMBLIES AS MEASURED FROM OUTSIDE TO OUTSIDE.
15. CONTRACTOR SHALL TEST AND CERTIFY BACKFLOW PREVENTION DEVICE.
16. FOR METERS UP TO 6 INCHES, USE BADGER PLATE STRAINER MODEL STR-PS-00058 OR EQUAL; FOR METERS GREATER THAN 6 INCHES, USE BADGER PLATE STRAINER ML-MS, MODEL NUMBER STR-PS-00055.

CREATED FEB 2021 REVISED	LARGE RECLAIMED METER 3" AND ABOVE WITH SINGLE BACKFLOW PREVENTER NOTES CONTINUED	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL R1A

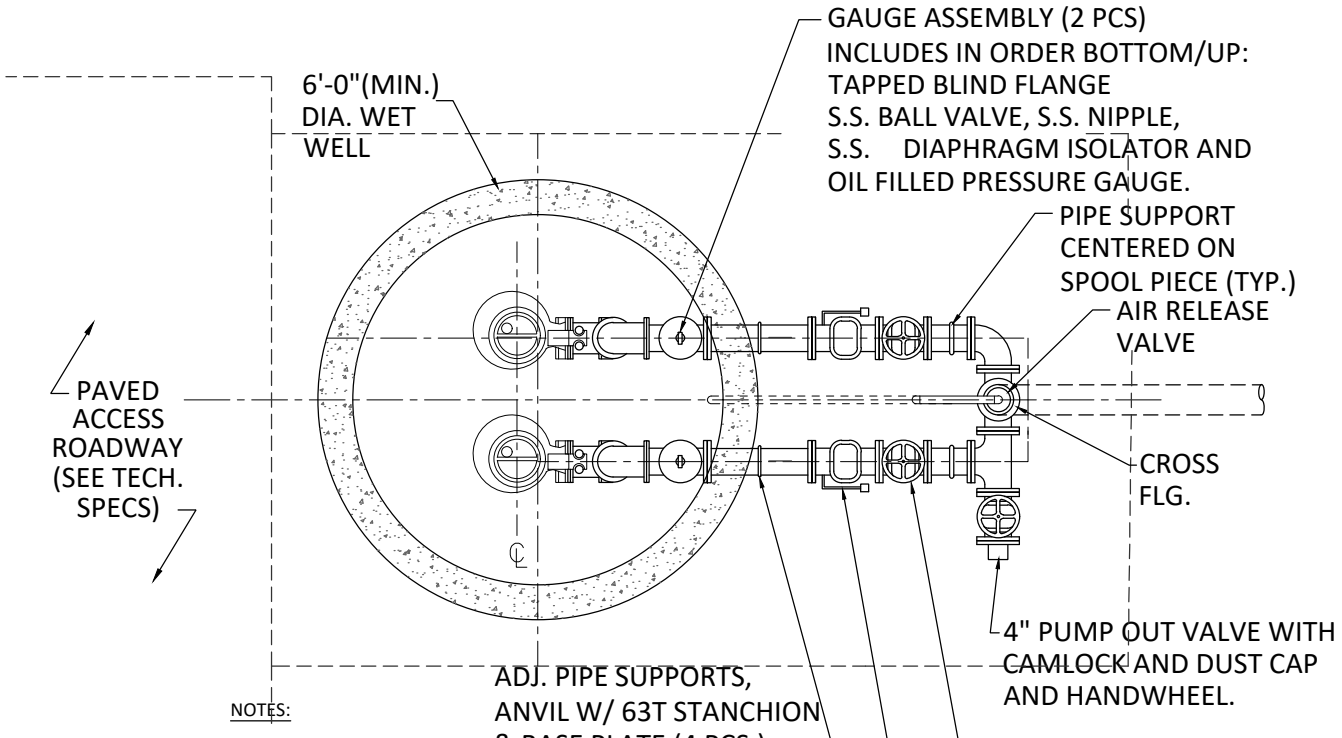


NOTE: LIGHT AND POLE RAB 15FOOT P/N/11-1502 AND RAB 52 WATT LED P/N ALEDFC52

CREATED FEB 2021 REVISED MAY 2021	PUMP STATION (DUPLEX) SITE PLAN & ACCESS	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL P1



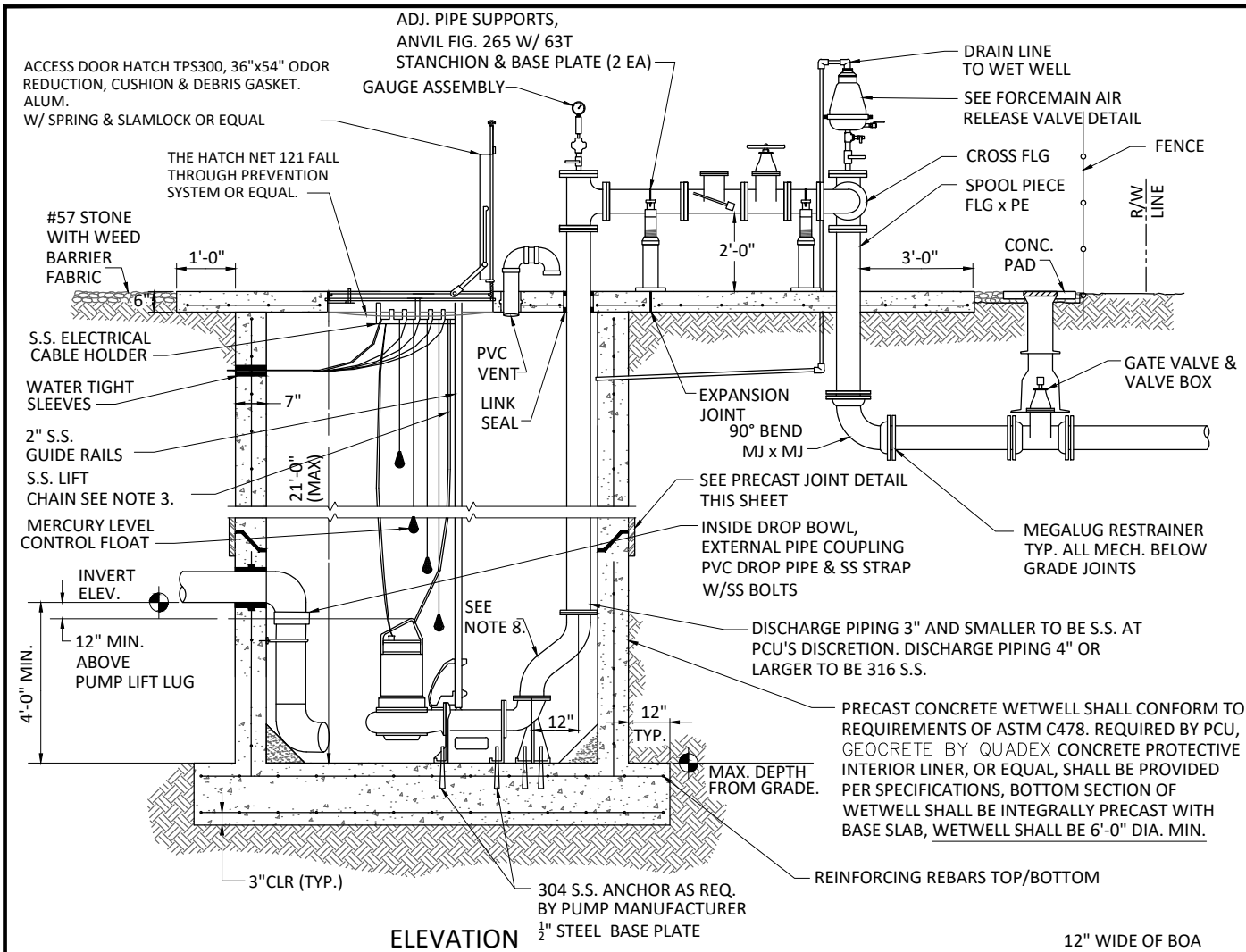
SLAB PLAN VIEW LIFT STATION & PIPING



NOTES:

1. WHEN NEW PUMP STATIONS ARE ADDED TO PCU SYSTEM, MANIFOLD, MH OR ADDED WET WELLS, THEN NEW STATION SHALL HAVE AN STAND-BY ELECTRICAL BACKUP GENERATOR.
2. PUMP OUT ASSEMBLY CAN BE PLACED ON EITHER SIDE TO BEST ACCOMMODATE PROPOSED LAYOUT FACING TOWARD DRIVEWAY w/ 90° OR 45°

CREATED FEB 2021 REVISED MAY 2021	PUMP STATION (DUPLEX) SLAB & PIPING PLAN	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL P2

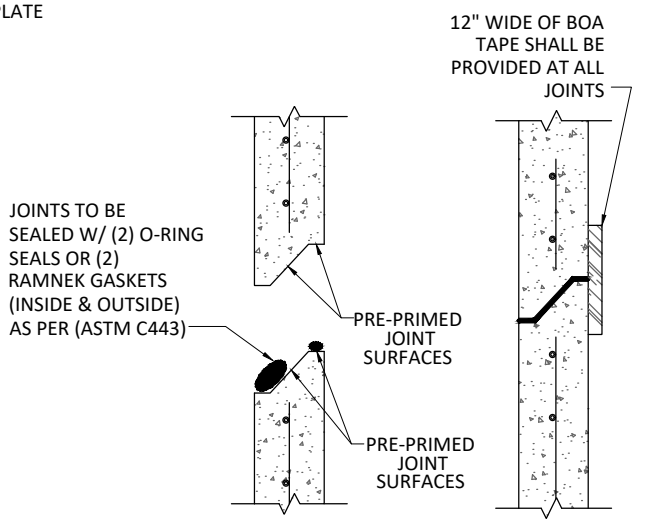


ELEVATION

NTS

NOTES:

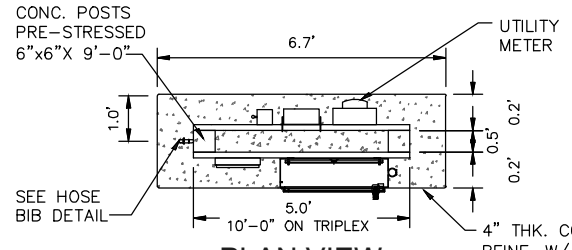
1. ALL PIPING WITHIN THE WET-WELL (LARGER THAN 3") AND ALL ABOVE GROUND PIPING SHALL BE MANUFACTURED FLANGED PIPE. FIELD FABRICATED FLANGES (UNI-FLANGE OR MANIFOLD) WILL NOT BE PERMITTED UNLESS SPECIFIED HEREIN.
2. ALL UNDERGROUND FITTINGS SHALL BE RESTRAINED MECHANICAL JOINT AND SHALL BE PROVIDED WITH PROTECTO 401 INTERIOR LINING.
3. $\frac{5}{16}$" S.S. LIFTING CHAIN.
4. INDIVIDUAL WALL PENETRATION SLEEVES SHALL BE PROVIDED FOR EACH PUMP CABLE.
5. ALL HARDWARE (INCLUDING FLANGE BOLTS & NUTS) SHALL BE STAINLESS STEEL.
6. ALL ABOVE GROUND PIPING TO BE PAINTED SAFETY FOREST GREEN.
7. SLAB ELEVATION TO BE 12 IN. ABOVE C/L OF ROADWAY OR 12 IN. ABOVE 100 YEAR FLOOD PLAIN - WHICHEVER IS HIGHER.
8. OFFSET FLG X FLG OR (2) 45° FITTINGS FLANGED W/ PROTECTO 401 COATING.



PRECAST JOINT DETAIL

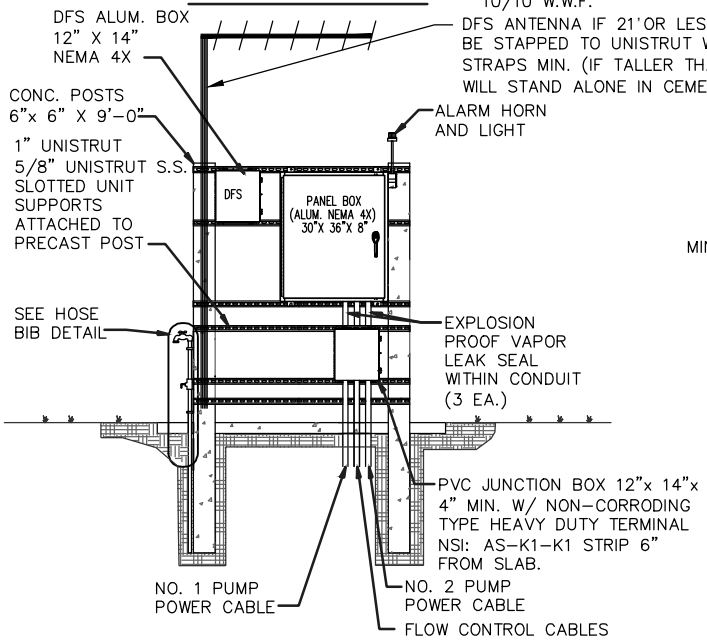
NTS

CREATED FEB 2021 REVISED MAY 2021	DUPLEX PUMP STATION ELEVATION & PIPING PROFILE	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL P3



PLAN VIEW

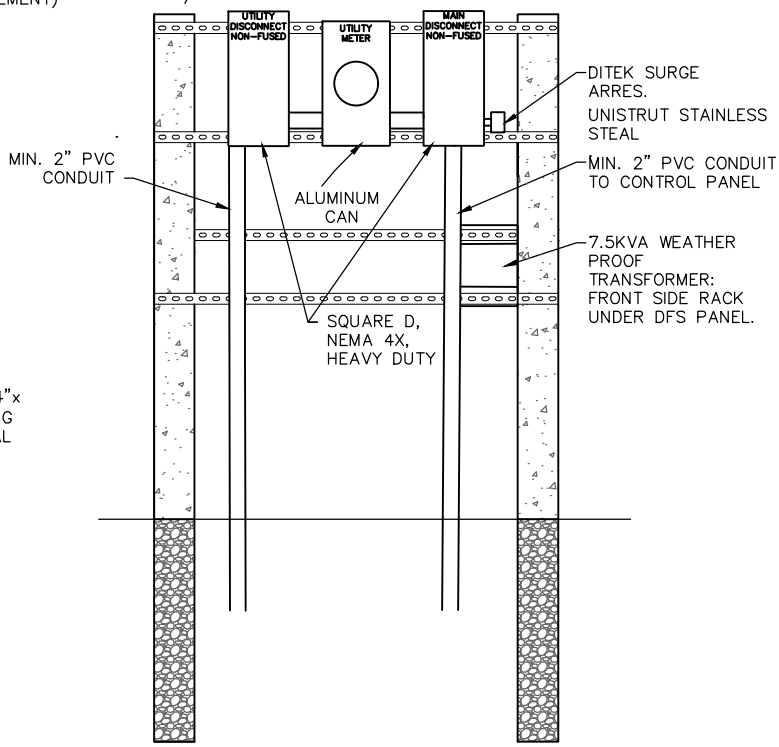
- DATA FLOW SYSTEMS TCU CABINET MODEL # DFS-00275-008-05
- DATA FLOW SYSTEMS PUMP CONTROLLER MODEL # TC4-001 (INSTALL IN TCU CABINET S.S./PAINTED WHITE)
- ALL HARDWARE SHALL BE STAINLESS STEEL, EXCEPT THE ALUMINUM UTILITY METER CAN
- USE ONLY XHHW-2 WIRE AFTER UTILITY METER
- SURGE PROTECTION TO BE DITEK DTK-4803CMXPLUS
- ALL CONDUIT TERMINATIONS SHALL BE MADE ON THE BOTTOM OF THE ENCLOSURES WITH THE EXCEPTION OF THE PUMP CORD ENCLOSURE WHERE A TOP TERMINATION WILL ALSO BE PERMITTED
- NO LB/LL/LR CONDUITES SHALL BE USED



FRONT ELEVATION
N.T.S.

REAR VIEW
N.T.S.

277/480VOLT ELECTRICAL SERVICE

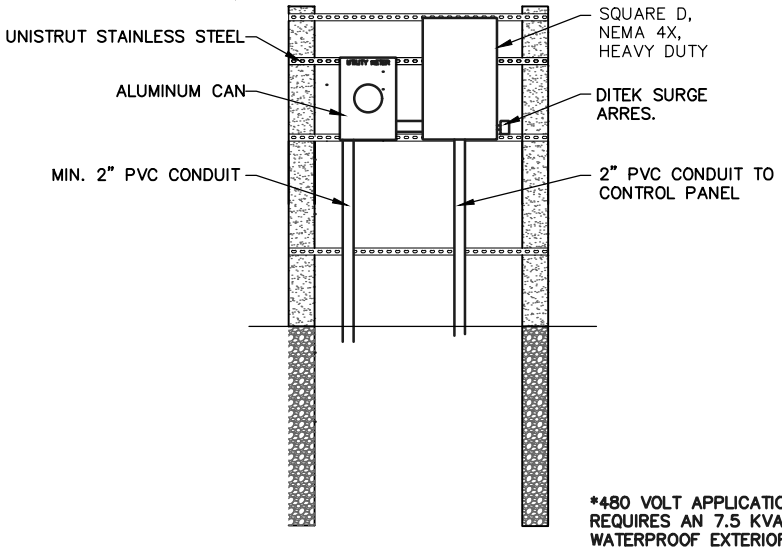


NOTES:
POSITION PANEL BOX SO OPERATOR'S BACK IS NOT TO WET WELL WHILE FACING BOX.

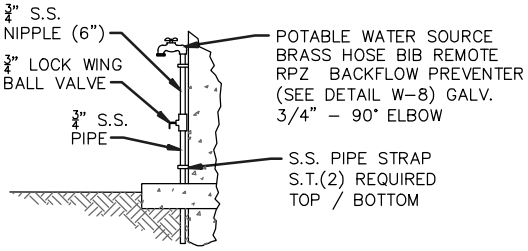
PANEL BOX TO BE LOCATED TO ALLOW UNOBSTRUCTED ACCESS TO WET WELL BY PAVED ACCESS ROAD.

PANEL ELEVATION SHALL BE INSTALLED ABOVE THE 100 YEAR FLOOD ELEV. AND MUST BE SHOWN ON PLANS.

120/240VOLT 3PHASE 5' RACK

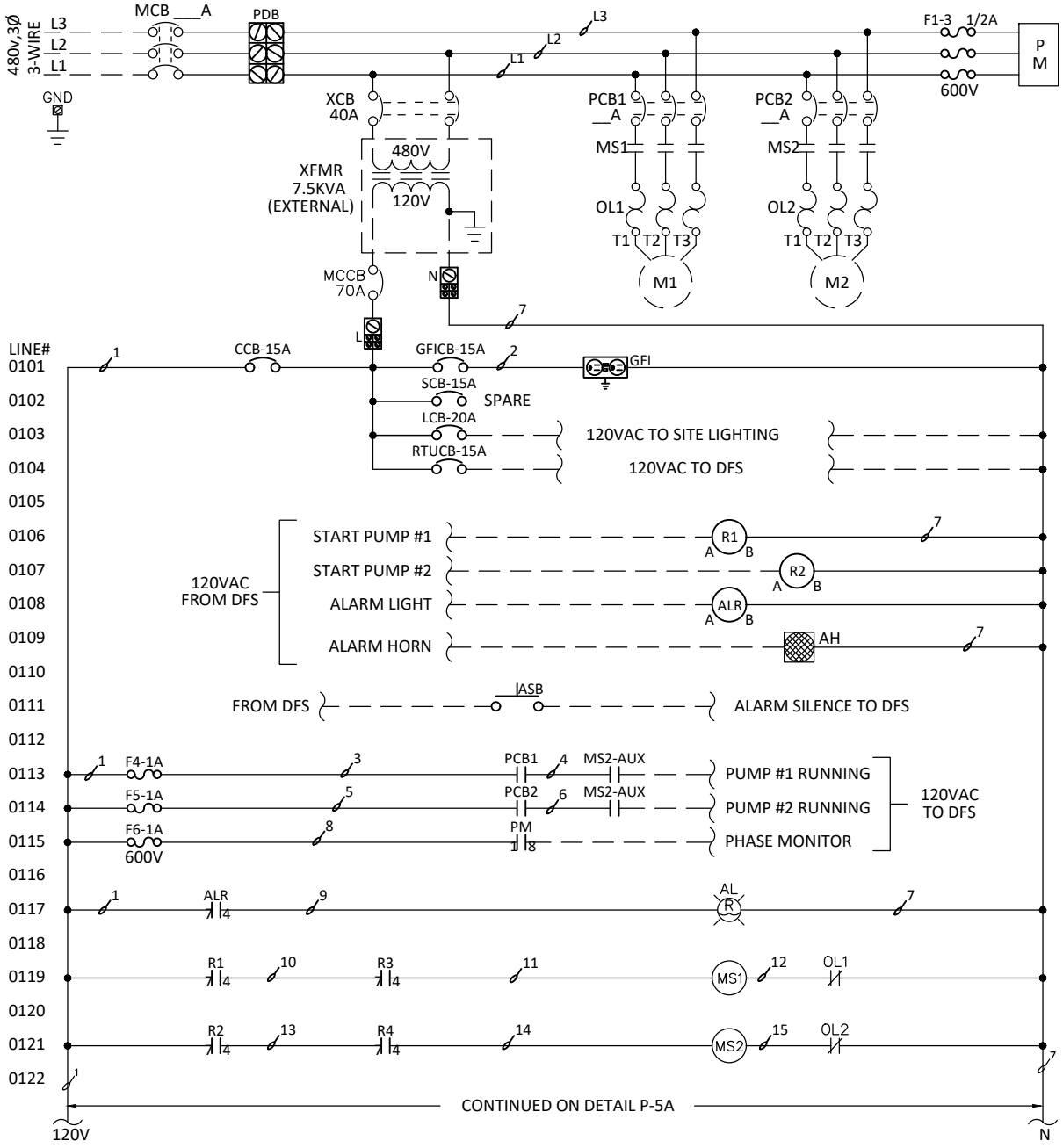


*480 VOLT APPLICATION REQUIRES AN 7.5 KVA WATERPROOF EXTERIOR TRANSFORMFR

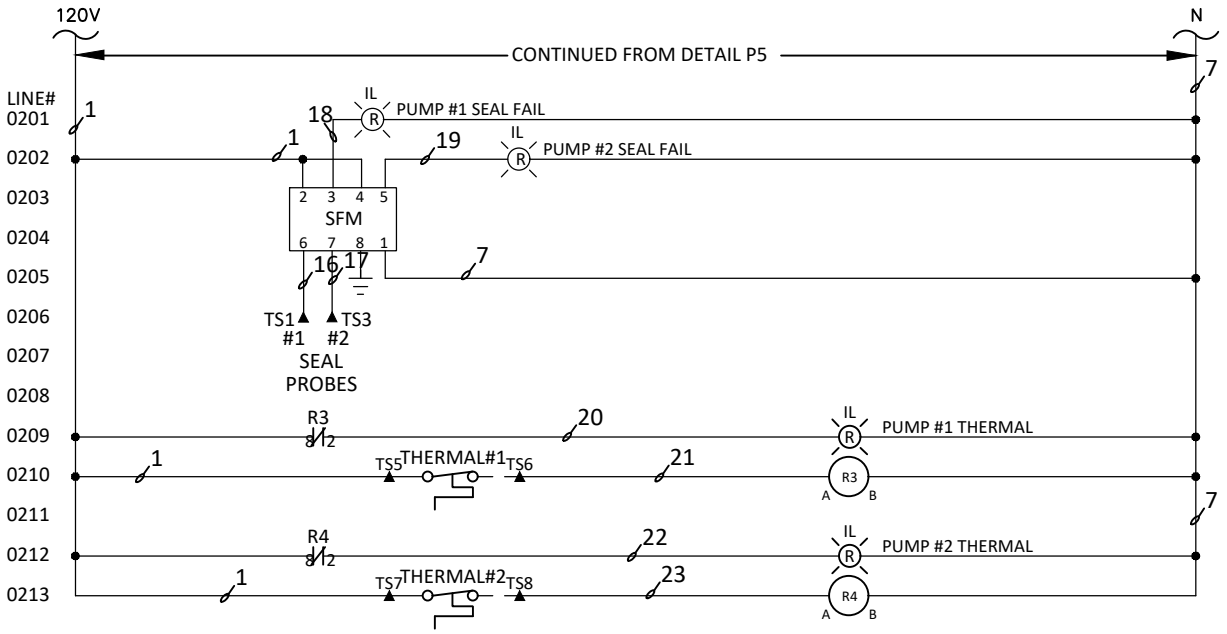


HOSE BIB DETAIL
N.T.S.

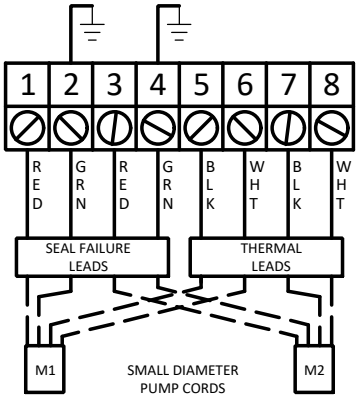
CREATED FEB 2021 REVISED	STANDARD PUMP STATION CONTROL PANEL BOX AND JUNCTION BOX INSTALLATION	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL P4



CREATED FEB 2021 REVISED MAY 2021	STANDARD PUMP STATION DUPLEX WIRING DIAGRAM (1 OF 3)	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL P5



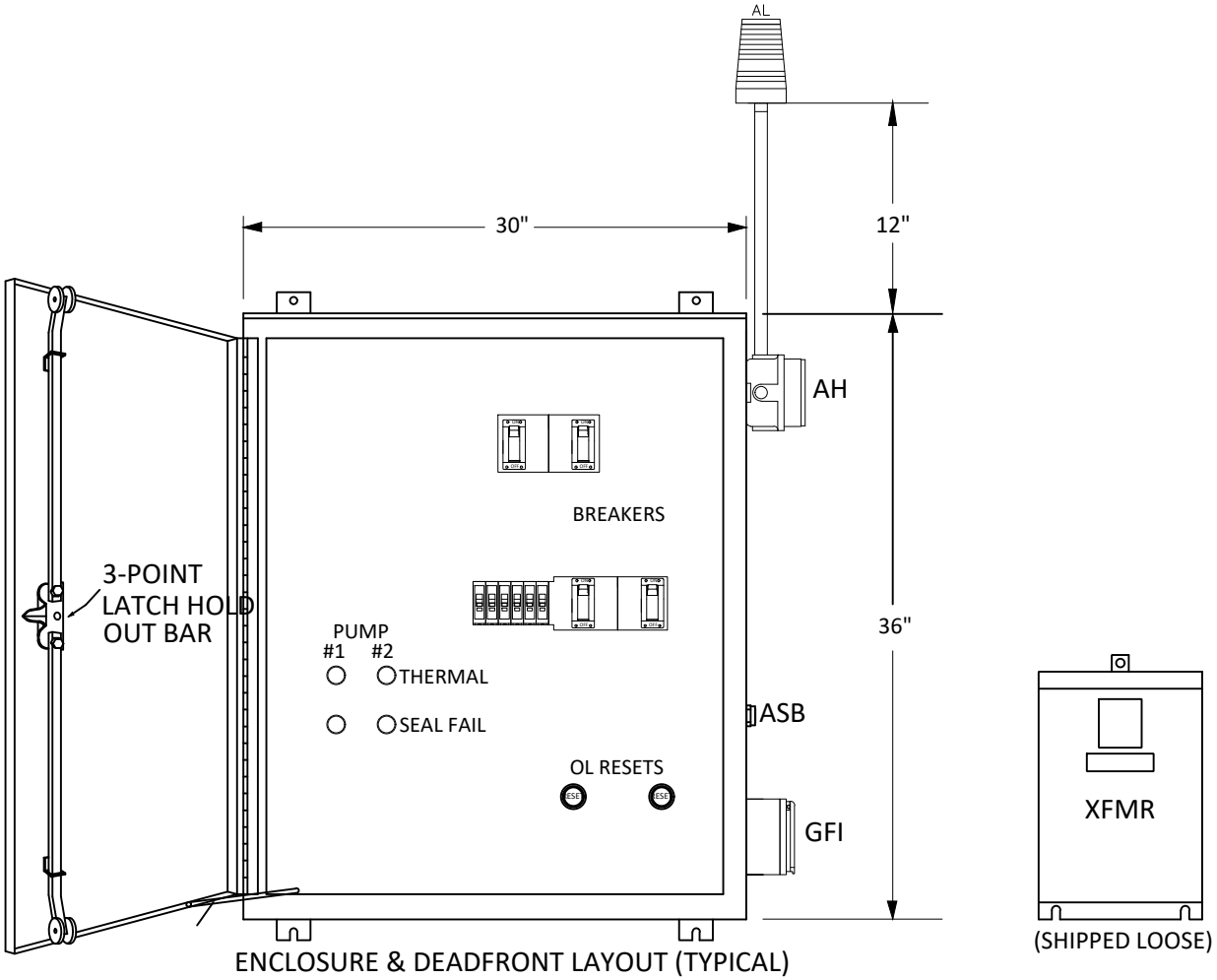
FIELD TERMINAL STRIP
(LOCATED IN JUNCTION BOX)



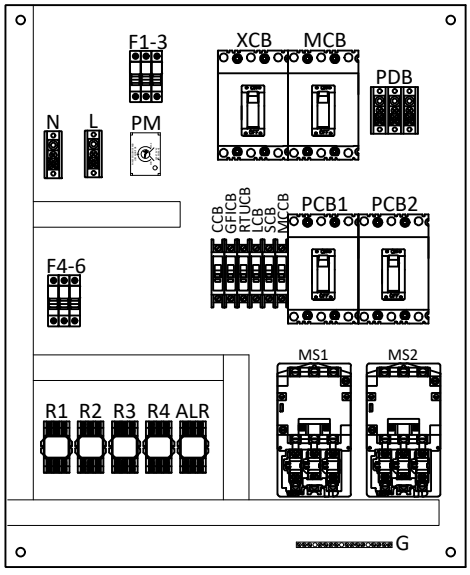
CREATED FEB 2021 REVISED MAY 2021	STANDARD PUMP STATION DUPLEX WIRING DIAGRAM (2 OF 3)	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL P5A

BILL OF MATERIALS

QTY.	ABBR.	DESCRIPTION	MANUFACTURER, PART#
1	ENC	ENCLOSURE, NEMA 4X ALUMINUM	SCHAEFER'S, SPN4AL-363012
1	MCB	MAIN CIRCUIT BREAKER	SQ.D, HGL36 (SIZE AS REQ'D)
2	PCB1,2	PUMP CIRCUIT BREAKER	SQ.D, HGL36 (S.A.R.) + S29450
1	XCB	TRANSFORMER CIRCUIT BREAKER	SQ.D, HGL26040
1	MCCB	MAIN CONTROL CIRCUIT BREAKER	SQ.D, QOU170
1	CCB	CONTROL CIRCUIT BREAKER	SQ.D, QOU115
1	GFICB	GFI CIRCUIT BREAKER	SQ.D, QOU115
1	SCB	SPARE CIRCUIT BREAKER	SQ.D, QOU115
1	LCB	SITE LIGHTING CIRCUIT BREAKER	SQ.D, QOU120
1	RTUCB	RTU CIRCUIT BREAKER	SQ.D, QOU115
2	MS1,2	MOTOR STARTER	SQ.D, 8536 (SIZE AS REQ'D)
6	OL1-2	OVERLOAD HEATER	SQ.D, B (SIZE AS REQ'D)
1	XFMR	TRANSFORMER 480V/120V 7.5KVA (EXTERNAL)	SQ.D, 7400-7S1F
3	F1-3	FUSE, TIME-DELAY, 1/2A 600V	FERRAZ, ATQR-1/2
1	PM	PHASE MONITOR	DIVERSIFIED, SUA-440-ASA
1	GFI	GFI RECEPTACLE	PASS & SEYMOUR, 1595-I
5	R1-4,ALR	CONTROL RELAY - 120VAC COIL	EATON, D5PR3A
1	AH	ALARM HORN W/ BACK BOX	FEDERAL, 350-120-30 + WB
1	AL	STROBE ALARM LIGHT	FEDERAL, LP3P-120R
1	ASB	ALARM SILENCE BUTTON	SQ.D, 9001-SKR1BH5
3	F4-6	FUSE, FAST-ACTING, 1A	FERRAZ, ATMR-1
1	SFM	SEAL FAILURE MODULE	DIVERSIFIED, SPM-120-ABA-100K
4	IL	INDICATING LIGHT	EATON, C22-L-XR-120, RED



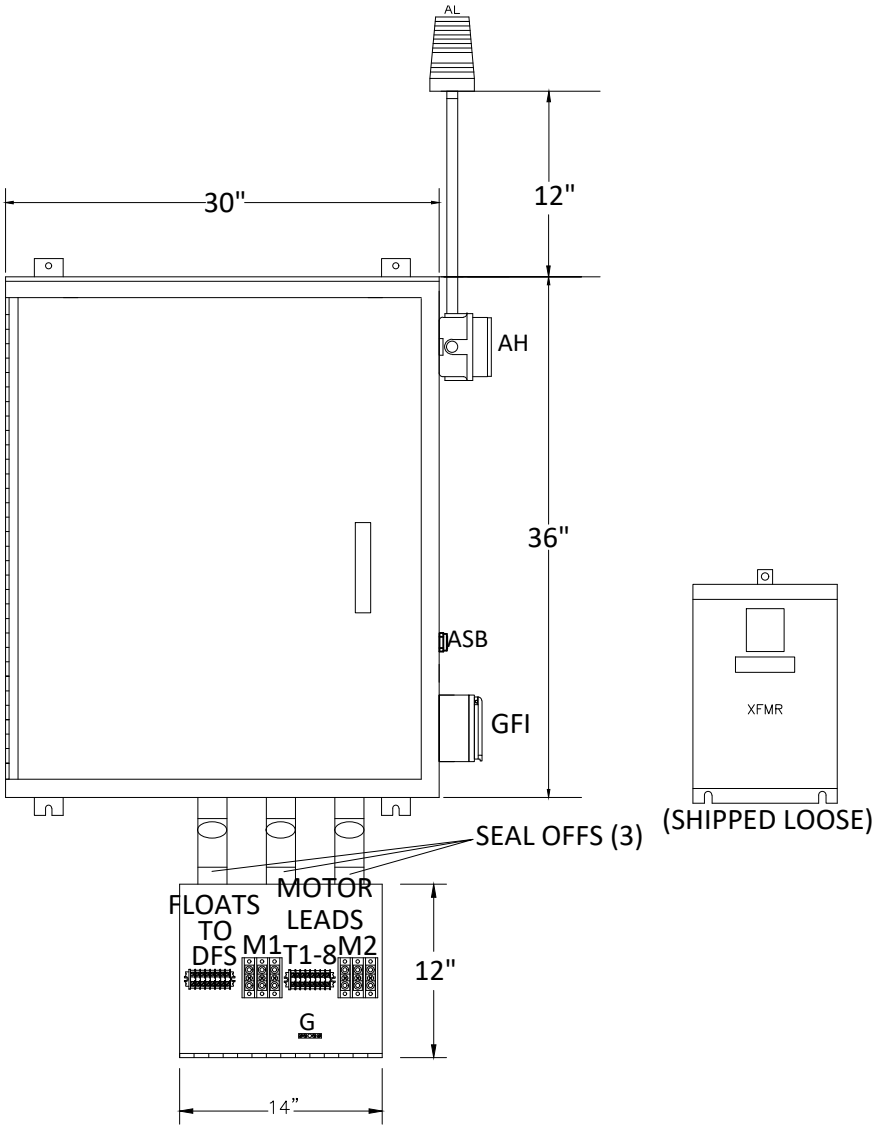
ENCLOSURE & DEADFRONT LAYOUT (TYPICAL)



BASE PLATE LAYOUT (TYPICAL)

* WHERE SOFT MOTORS STARTERS ARE REQUIRED PANEL BOX DIMENSIONS MAY VARY

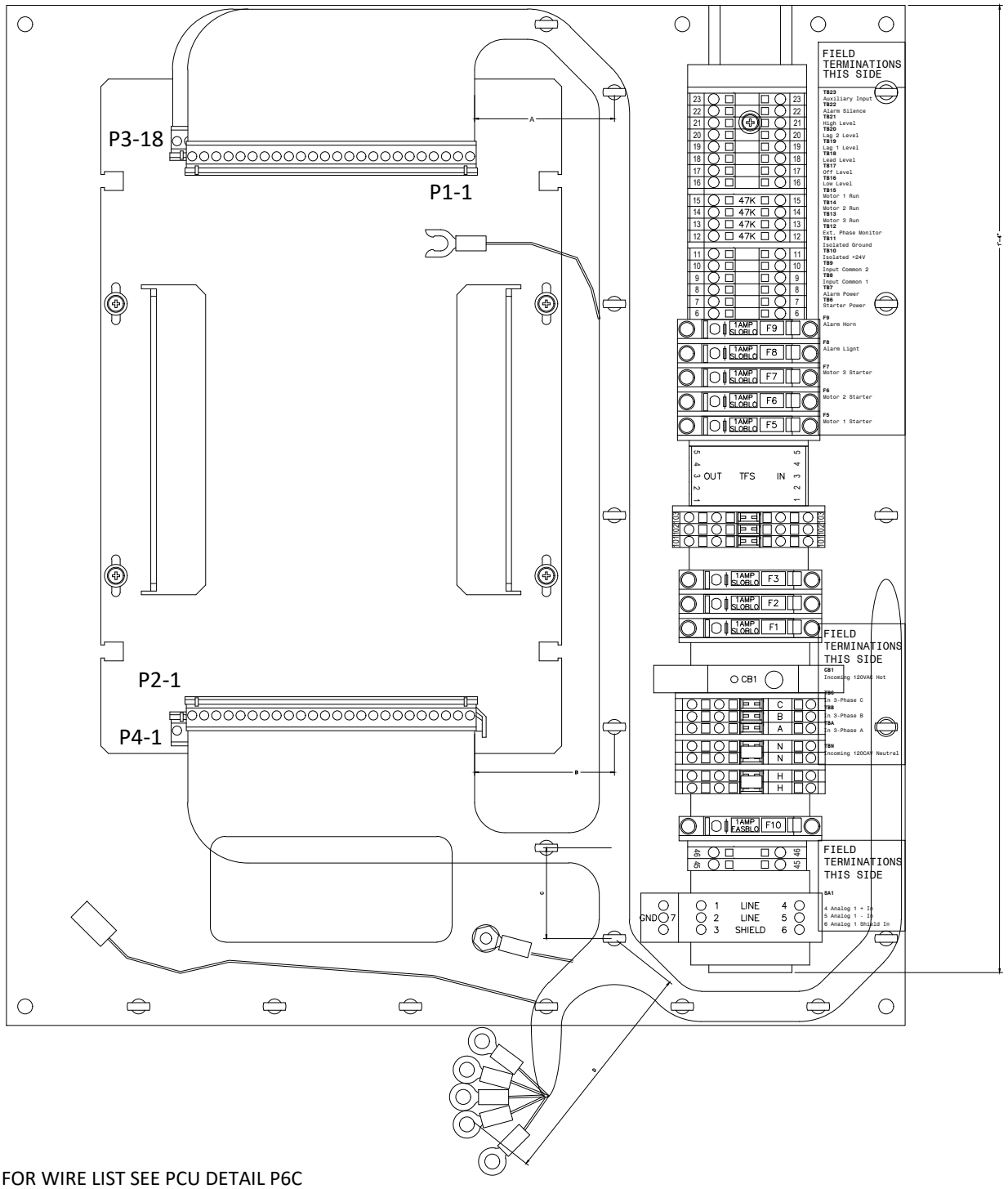
CREATED FEB 2021 REVISED MAY 2021	STANDARD PUMP STATION DUPLEX CONTROL PANEL BOX COMPONENT LAYOUT	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL P6



OUTER DOOR OF J-BOX HAS
BEEN REMOVED FOR CLARITY

JUNCTION BOX BILL OF MATERIALS		
	JUNCTION BOX	CARLON, CJ14126
TB	TERMINAL BLOCKS	SQ.D, 9080-GK6
M1,2	CONTACT BLOCK FOR MOTOR LEADS	MARATHON, 1323572
G	GROUNDING BAR	EATON, GBK5

CREATED FEB 2021 REVISED MAY 2021	STANDARD PUMP STATION JUNCTION BOX AND COMPONENT LAYOUT	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL P6A



*FOR WIRE LIST SEE PCU DETAIL P6C

CREATED FEB 2021 REVISED MAY 2021	STANDARD PUMP STATION ASSEMBLY PLATE TCU ENCLOSURE	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL P6B

Wire List

Wire	From	To	Gage	Color	Signal
001	P1-1	TB5-2	16 AWG	Blu	Phase C
002	P1-2	TB4-2	16 AWG	Red	Phase B
003	P1-3	TB3-2	16 AWG	Pnk	Phase A
004	P1-5	TB1-2	16 AWG	Blk	AC Hot
005	P1-6	TB2-2	16 AWG	Wht	AC Neutral
006	P1-7	Gnd Lug	16 AWG	Grn/Yel	Transient Ground
007	P1-8	Bat-1	16 AWG	Red	Batery +
008	P1-9	Bat-2	16 AWG	Blk	Batery -
009	P1-16	F9-2	16 AWG	Blk/Yel	Alarm Horn
010	P1-17	F8-2	16 AWG	Blk/Pnk	Alarm Lignt
011	P1-18	TB7-2	16 AWG	Blk	Alarm Power
012	P1-21	F7-2	16 AWG	Blk/Wht	Motor 3 Starter
013	P1-22	F6-2	16 AWG	Blk/Red	Motor 2 Starter
014	P1-23	F5-2	16 AWG	Blk/Vio	Motor 1 Starter
015	P1-24	TB6-2	16 AWG	Blk/Org	Starter Power
016	P2-1	TB15-2	16 AWG	VIO	Motor 1 Run
017	P2-2	TB14-2	16 AWG	Brn	Motor 2 Run
018	P2-3	TB13-2	16 AWG	Yel	Motor 3 Run
019	P2-4	TB12-2	16 AWG	Org	External Phase Monitor
020	P2-5	TB8-2	16 AWG	Wht	Input Common 1
021	P2-6	TB16-2	16 AWG	Gry/Org	Low Level
022	P2-7	TB17-2	16 AWG	Gry/Pnk	Off Level
023	P2-8	TB18-2	16 AWG	Gry/Red	Lead Level
024	P2-9	TB19-2	16 AWG	Gry/Blu	Lag 1 Level
025	P2-10	TB20-2	16 AWG	Gry/Vio	Lag 2 Level
026	P2-11	TB21-2	16 AWG	Gry/Brn	High Level
027	P2-13	TB22-2	16 AWG	Wht/Pnk	Alarm Silence
028	P2-14	TB9-2	16 AWG	Gry/Yel	Input Common 2
029	P2-15	TB11-2	16 AWG	Blu/Wht	Isolated +24V Rtn
030	P2-16	TB10-2	16 AWG	Wht/Red	Isolated +24V
031	P3-16	Gnd Lug	16 AWG	Grn/Yel	Earth Ground
032	Grn Scr	Gnd Lug	16 AWG	Grn/Yel	Chassis Ground
033	TBH-1-3	TB1-1	16 AWG	Blk	Hot to TFS
034	TBH-2-3	CB1-2	16 AWG	Blk	Hot from CB
035	TBN-1-3	TB2-1	16 AWG	Wht	Neutral to TFS
036	TBA-1-3	F1-2	16 AWG	Pnk	Phase A to Fuse
037	TBB-1-3	F2-2	16 AWG	Red	Phase B to Fuse
038	TBC-1-3	F3-2	16 AWG	Blu	Phase C to Fuse
039	F1-1	TB101-1	16 AWG	Pnk	Fused A to Jumper
040	F2-1	TB102-1	16 AWG	Red	Fused B to Jumper
041	F3-1	TB103-1	16 AWG	Blu	Fused C to Jumper
042	TB101-4	TB3-1	16 AWG	Pnk	Jumpered A to TFS
043	TB102-4	TB4-1	16 AWG	Red	Jumpered B to TFS
044	TB103-4	TB5-1	16 AWG	Blu	Jumpered C to TFS
045	Gnd Stud	Gnd Lug	16 AWG	Grn/Yel	Chassis Ground
046	P2-12	TB23-2	16 AWG	Wht/Yel	Auxiliary Input
049	TB101-2	TB101-3	16 AWG	Pnk	Jumper A
047	TB102-2	TB102-3	16 AWG	Red	Jumper B
048	TB103-2	TB103-3	16 AWG	Blu	Jumper C
049	SA1-1	F10-1	18 AWG	STP/Clr	Analog +
050	SA1-2	TB46-1	18 AWG	STP/BLK	Analog -
051	SA1-3	TB45-1	18 AWG	STP/Shld	Analog Shield
052	F10-2	P2-22	18 AWG	STP/Clr	TCU Analog +
053	TB46-2	P2-23	18 AWG	STP/Blk	TCU Analog -
054	TB45-2	N/C	18 AWG	STP/Shld	TCU Analog Shield
055	SA1-7	Gnd Lug	18 AWG	Grn/Yel	Surge Ground
066	P2-23	P2-24	18 AWG	Blk	Shunt Jumper

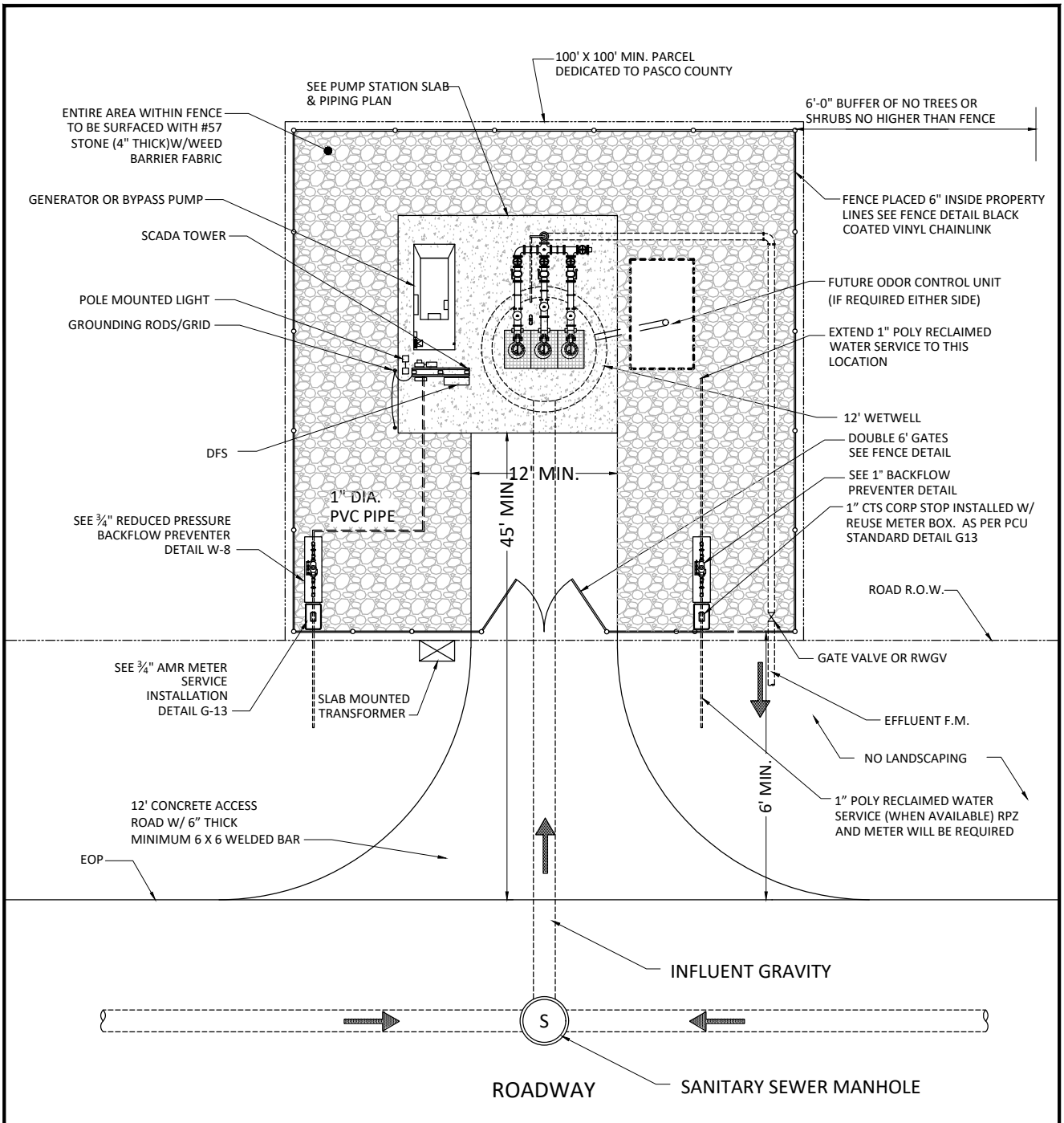
CREATED FEB 2021
REVISED MAY 2021

STANDARD PUMP STATION
ASSEMBLY PLATE TCU ENCLOSURE
WIRE LIST

PROVIDED FOR INFORMATIONAL PURPOSES ONLY.
NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL

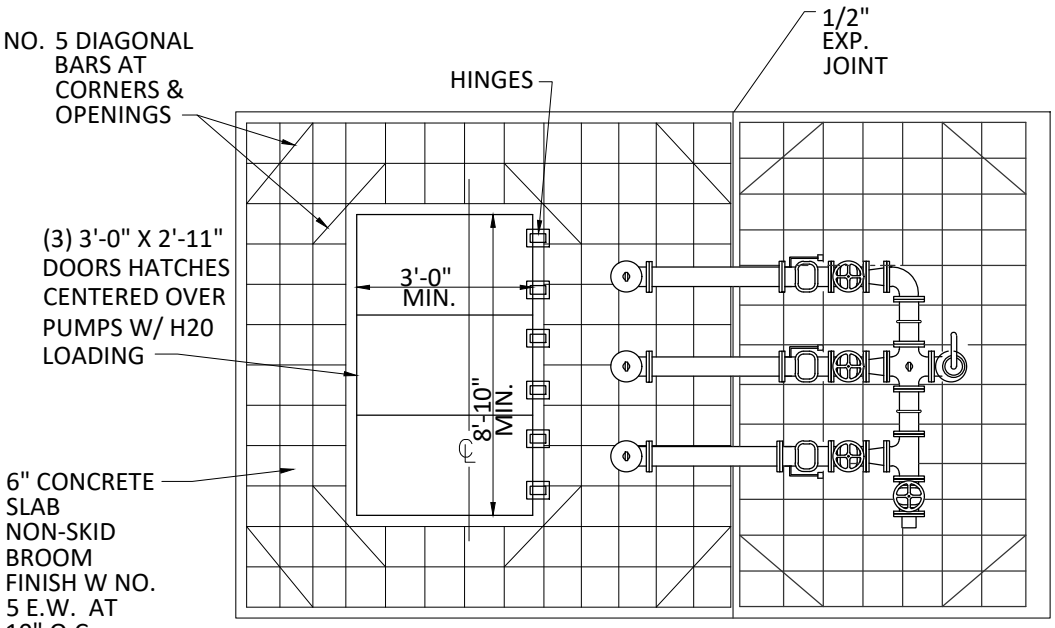
PASCO COUNTY UTILITIES

DETAIL P6C



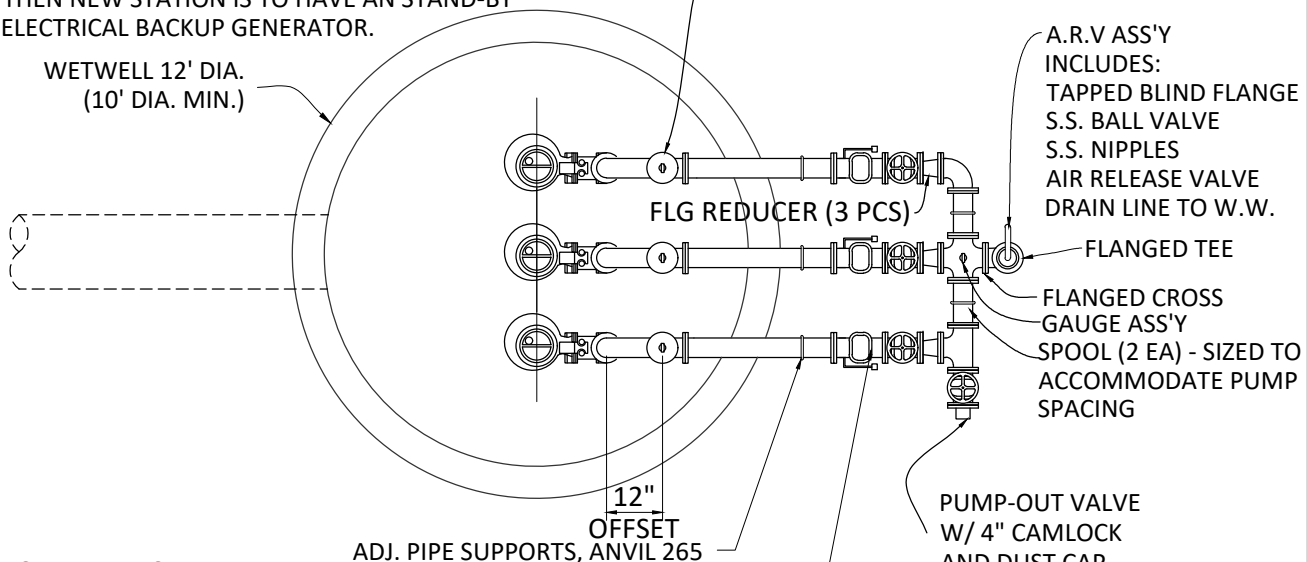
NOTE: LIGHT AND POLE "RAB 15FOOT P/N/11-1502 AND RAB 52 WATT LED P/N ALEDFC52

CREATED FEB 2021 REVISED MAY 2021	PUMP STATION (TRI–PLEX) SITE PLAN & ACCESS	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL P7



SLAB PLAN VIEW
LIFT STATION & PIPING

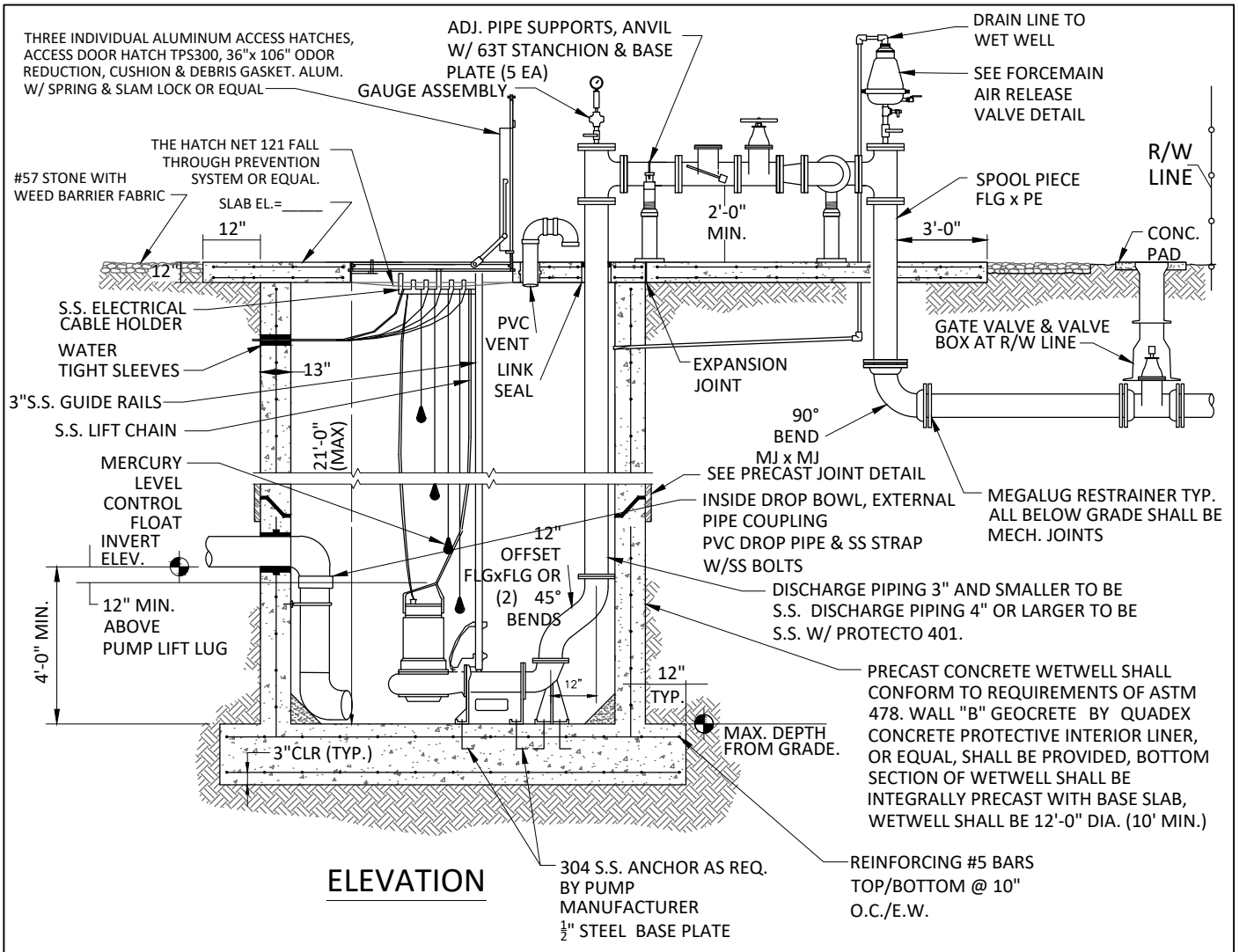
NOTE:
WHEN NEW PUMP STATIONS ADDED TO PCU SYSTEM, MANIFOLD, MH OR ADDED WET WELLS, THEN NEW STATION IS TO HAVE AN STAND-BY ELECTRICAL BACKUP GENERATOR.



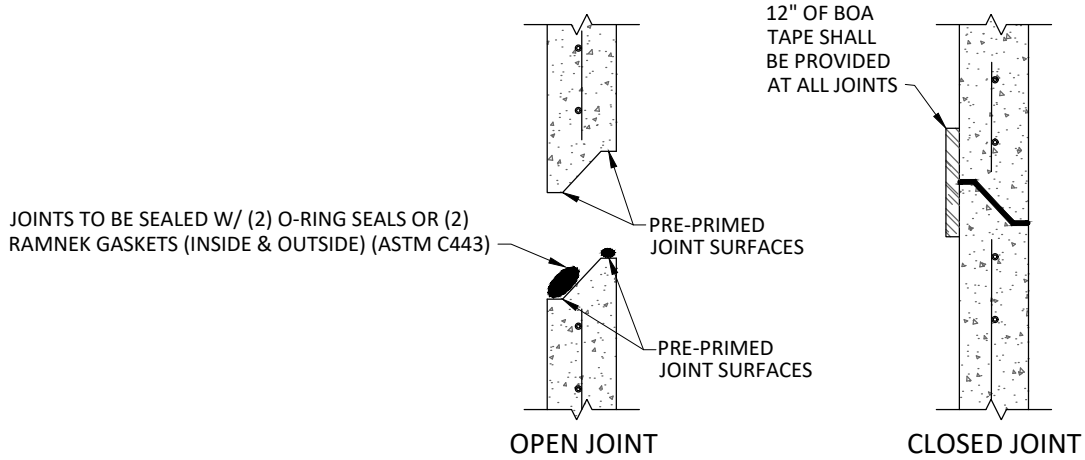
NOTE: PUMP OUT ASSEMBLY CAN BE PLACED ON EITHER SIDE TO BEST ACCOMMODATE PROPOSED LAYOUT

PLAN VIEW
LIFT STATION & PIPING

CREATED FEB 2021 REVISED MAY 2021	PUMP STATION (TRIPLEX) SLAB & PIPING PLAN	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL P8



ELEVATION



PRECAST JOINT DETAIL

CREATED FEB 2021 REVISED MAY 2021	TRIPLEX PUMP STATION ELEVATION & PIPING PROFILE	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL P9

NOTES:

1. ALL PIPING WITHIN THE WETWELL (LARGER THAN 3") AND ALL ABOVE GROUND PIPING SHALL BE MANUFACTURED FLANGED PIPE. FIELD FABRICATED FLANGES (UNI-FLANGE OR MEGAFLANGE) WILL NOT BE PERMITTED UNLESS SPECIFIED HEREIN.

2. ALL DUCTILE IRON PIPE AND FITTINGS SHALL BE PROVIDED WITH CERAMIC EPOXY INTERIOR LINING (PROTECTO 401). IN ADDITION, ALL PIPE & FITTINGS WITHIN THE WETWELL SHALL BE S.S.
3. ALL UNDERGROUND FITTINGS SHALL BE RESTRAINED MECHANICAL JOINT AND SHALL BE PROVIDED WITH PROTECTO 401 INTERIOR LINING.

4. IF LIFT CABLES ARE USED, LIFTING RINGS MUST BE PROVIDED EVERY 4 FT.

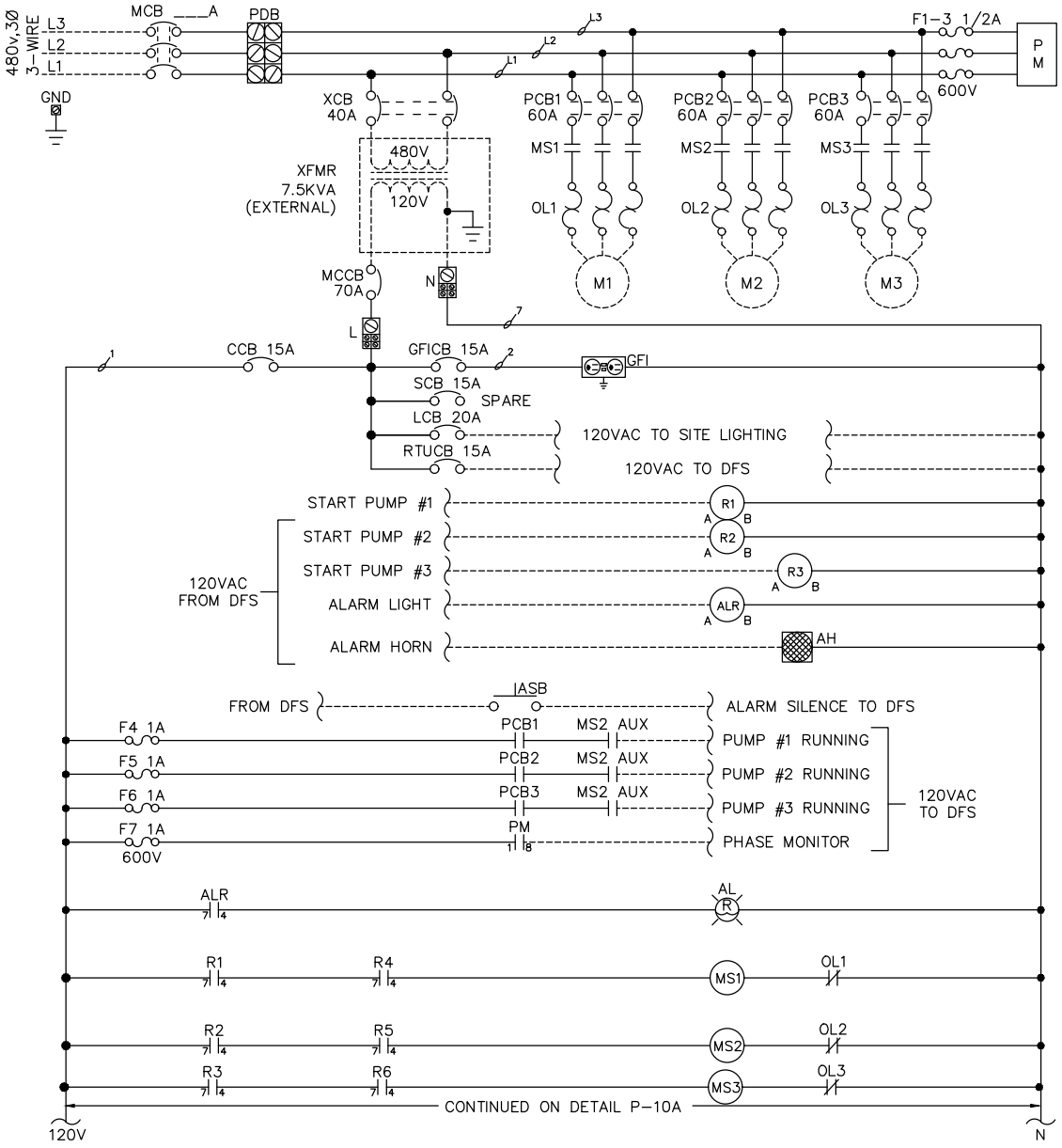
5. INDIVIDUAL WALL PENETRATION SLEEVES SHALL BE PROVIDED FOR EACH PUMP CABLE.

6. ALL HARDWARE (INCLUDING FLANGE BOLTS & NUTS) SHALL BE STAINLESS STEEL.

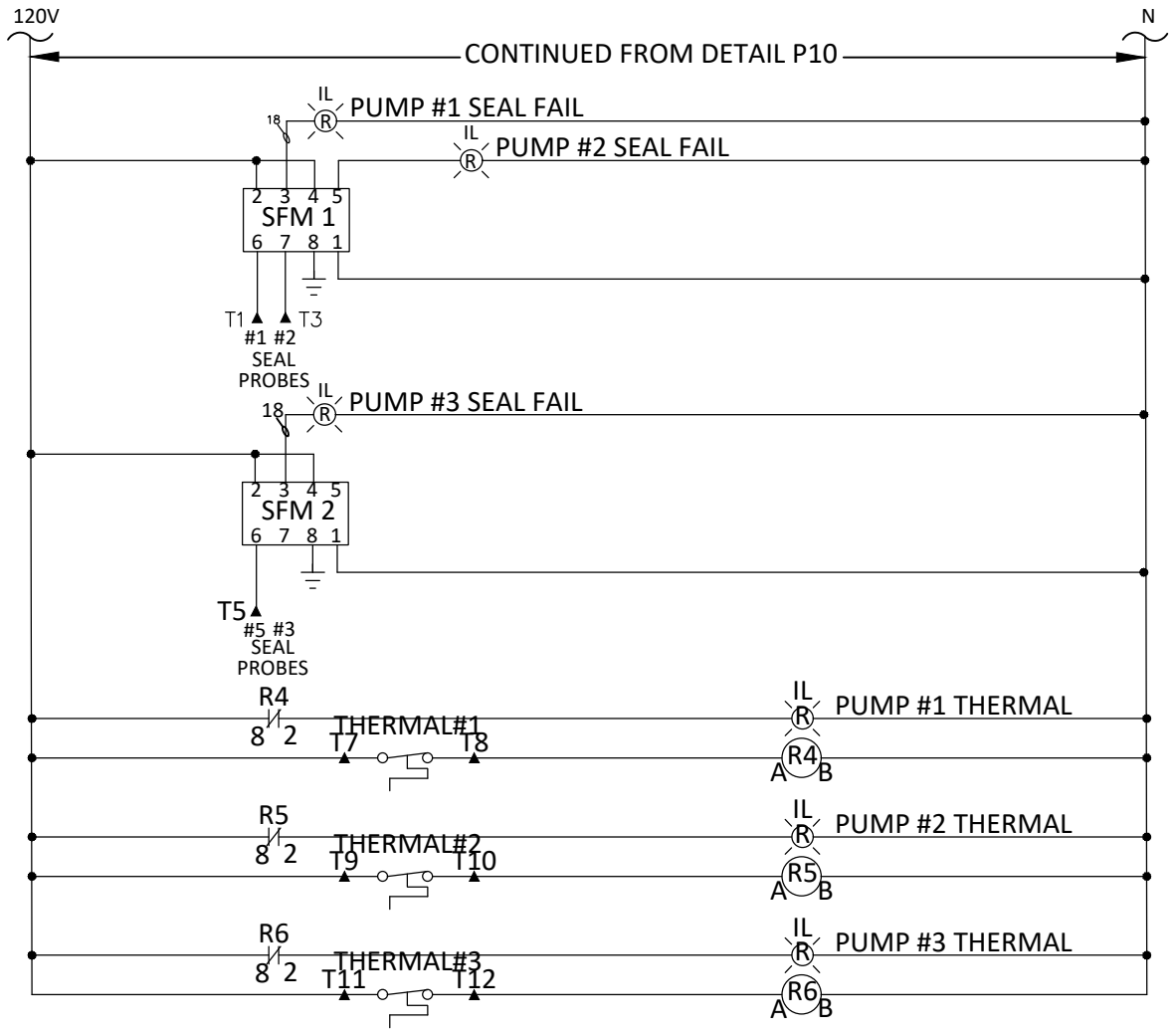
7. ALL ABOVE GROUND PIPING TO BE PAINTED SAFETY GREEN.

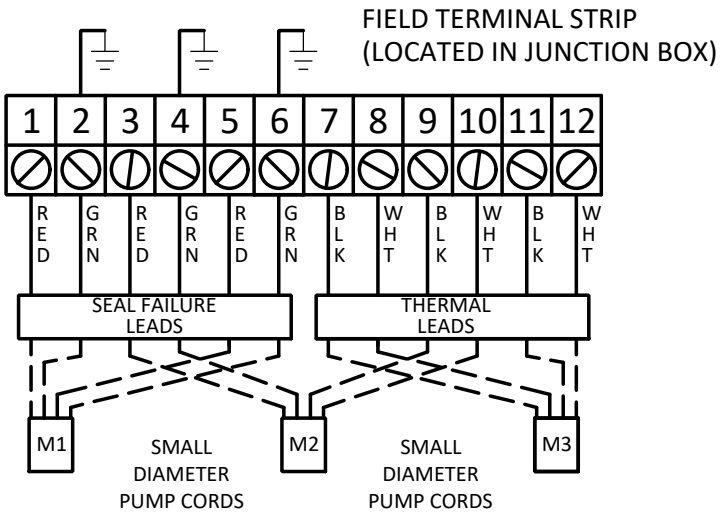
8. SLAB ELEVATION TO BE 12 IN. ABOVE C/L OF ROADWAY OR 12 IN. ABOVE 100 YEAR FLOOD PLAIN - WHICHEVER IS HIGHER.

CREATED FEB 2021 REVISED MAY 2021	TRIPLEX PUMP STATION ELEVATION & PIPING NOTES	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL P9A



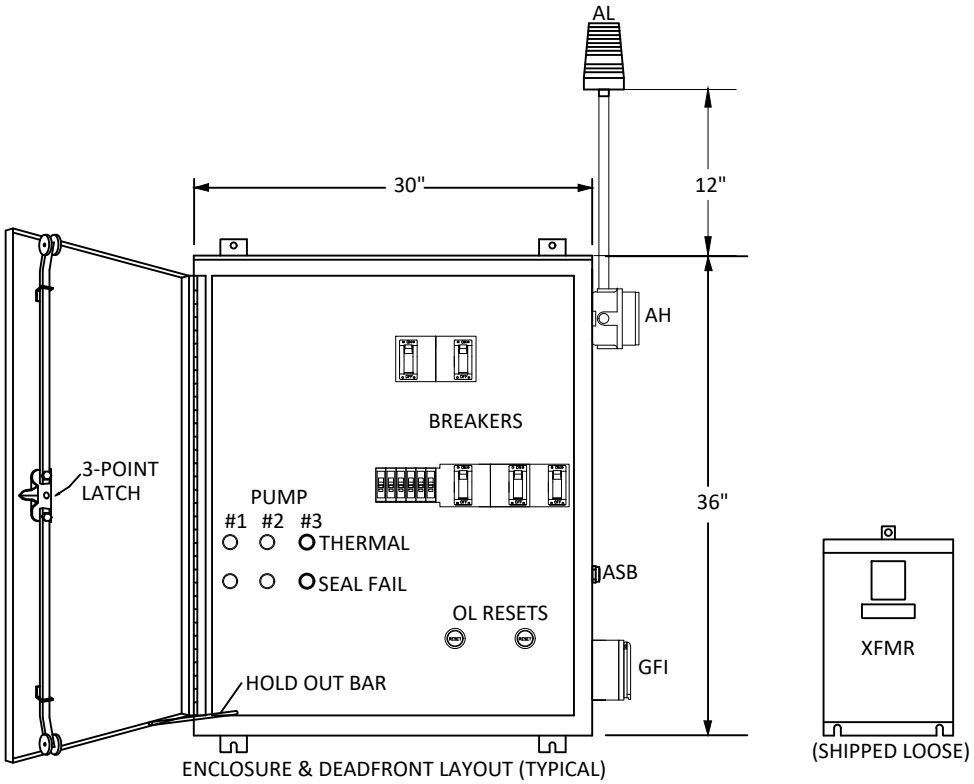
CREATED FEB 2021 REVISED	MASTER PUMP STATION TRIPLEX WIRING DIAGRAM (1 OF 3)	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL P10



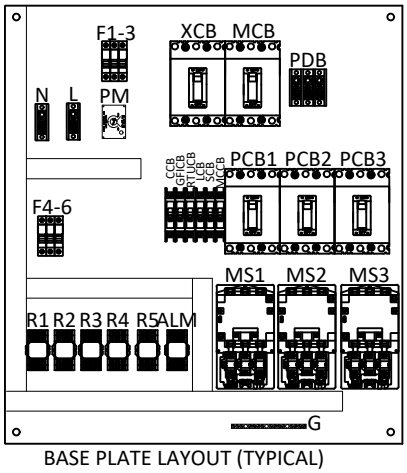


CREATED FEB 2021 REVISED MAY 2021	STANDARD PUMP STATION TRIPLEX WIRING DIAGRAM (2 OF 3)	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL P10A

BILL OF MATERIALS			
QTY.	ABBR.	DESCRIPTION	MANUFACTURER, PART#
1	ENC	ENCLOSURE, NEMA 4X ALUMINUM	SCHAEFER'S, SPN4AL-363012
1	MCB	MAIN CIRCUIT BREAKER	SQ.D, HGL36 (SIZE AS REQ'D)
3	PCB1,2,3	PUMP CIRCUIT BREAKER	SQ.D, HGL36 (S.A.R.) + S29450
1	XCB	TRANSFORMER CIRCUIT BREAKER	SQ.D, HGL26040
1	MCCB	MAIN CONTROL CIRCUIT BREAKER	SQ.D, QOU170
1	CCB	CONTROL CIRCUIT BREAKER	SQ.D, QOU115
1	GFICB	GFI CIRCUIT BREAKER	SQ.D, QOU115
1	SCB	SPARE CIRCUIT BREAKER	SQ.D, QOU115
1	LCB	SITE LIGHTING CIRCUIT BREAKER	SQ.D, QOU120
1	RTUCB	RTU CIRCUIT BREAKER	SQ.D, QOU115
3	MS1,2,3	MOTOR STARTER	SQ.D, 8536 (SIZE AS REQ'D)
9	OL1-3	OVERLOAD HEATER	SQ.D, B (SIZE AS REQ'D)
1	XFMR	TRANSFORMER 480V/120V 7.5KVA (EXTERNAL)	SQ.D, 7400-7S1F
3	F1-3	FUSE, TIME-DELAY, 1/2A 600V	FERRAZ, ATQR-1/2
1	PM	PHASE MONITOR	DIVERSIFIED, SUA-440-ASA
1	GFI	GFI RECEPTACLE	PASS & SEYMOUR, 1595-I
5	R1-4,ALR	CONTROL RELAY - 120VAC COIL	EATON, D5PR3A
1	AH	ALARM HORN W/ BACK BOX	FEDERAL, 350-120-30 + WB
1	AL	STROBE ALARM LIGHT	FEDERAL, LP3P-120R
1	ASB	ALARM SILENCE BUTTON	SQ.D, 9001-SKR1BH5
4	F4-2	FUSE, FAST-ACTING, 1A	FERRAZ, ATMR-1
2	SFM	SEAL FAILURE MODULE	DIVERSIFIED, SPM-120-ABA-100K
6	IL	INDICATING LIGHT	EATON, C22-L-XR-120, RED



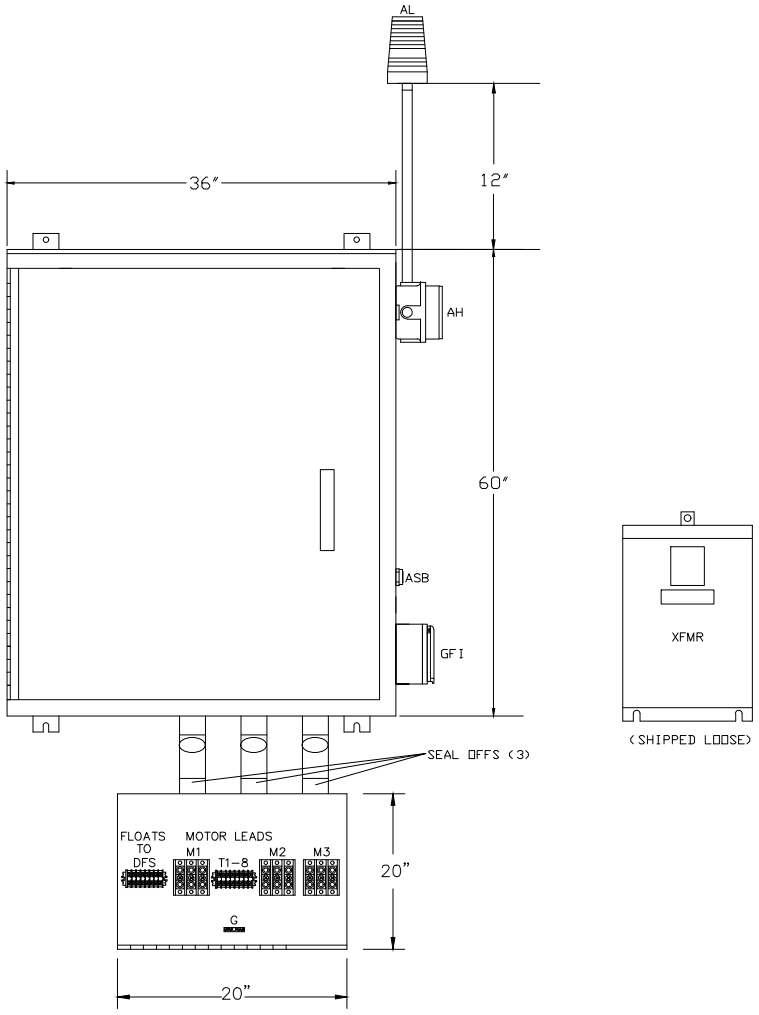
ENCLOSURE & DEADFRONT LAYOUT (TYPICAL)



BASE PLATE LAYOUT (TYPICAL)

* WHERE SOFT MOTORS STARTERS ARE REQUIRED PANEL BOX DIMENSIONS MAY VARY

CREATED FEB 2021 REVISED MAY 2021	MASTER PUMP STATION TRIPLEX CONTROL PANEL BOX COMPONENT LAYOUT	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL P11



OUTER DOOR OF J-BOX HAS BEEN REMOVED FOR CLARITY

JUNCTION BOX BILL OF MATERIALS		
	JUNCTION BOX	CARLON, CJ14126
TB	TERMINAL BLOCKS	SQ.D, 9080-GK6
M1,2,3	CONTACT BLOCK FOR MOTOR LEADS	MARATHON, 1323572
G	GROUNDING BAR	EATON, GBK5

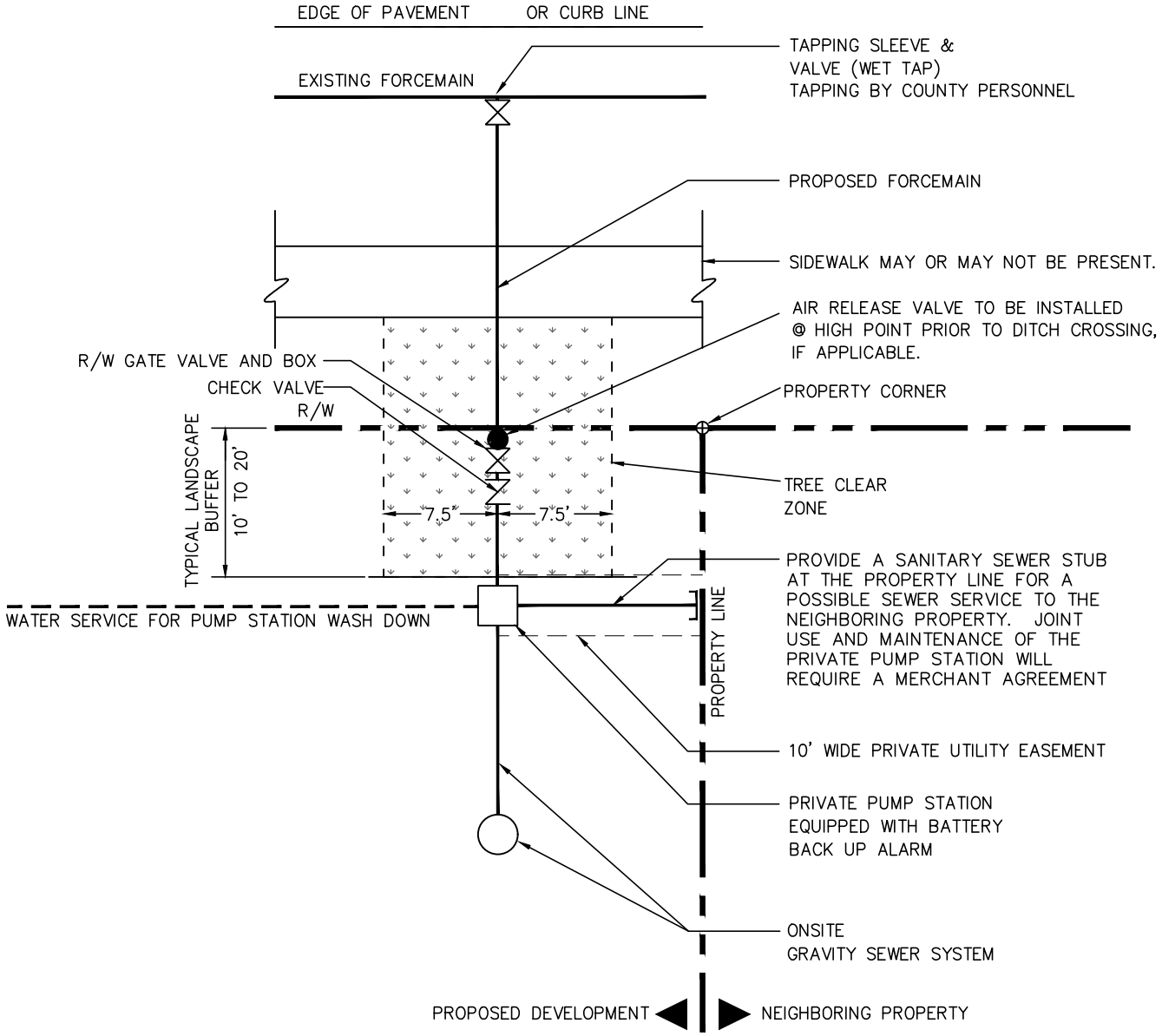
CREATED FEB 2021
REVISED

MASTER PUMP STATION
TRIPLEX WIRING DIAGRAM (2 OF 2)

PROVIDED FOR INFORMATIONAL PURPOSES ONLY.
NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL

PASCO COUNTY UTILITIES

DETAIL P11A



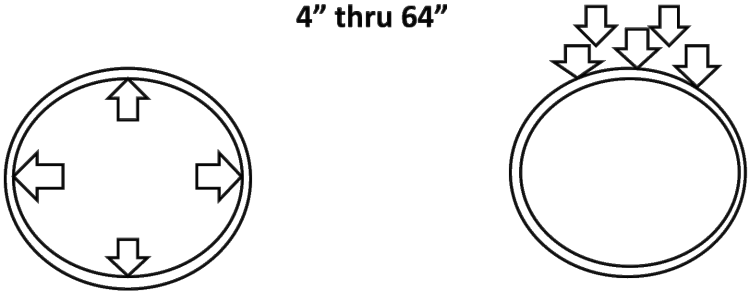
TREE CLEAR ZONE EXTENDS 7.5' TO EITHER SIDE OF FORCEMAIN

TREES MUST NOT BE PLANTED IN THE TREE CLEAR ZONE. TREE CLEAR ZONES ARE ESTABLISHED TO PROTECT FORCEMAIN LINE FROM DAMAGE CAUSED BY GROWTH OF ROOT SYSTEMS.

TREE CLEAR ZONE

CREATED 08/10/09 REVISED AUG 2015 MAY 2016 JUNE 2017	PRIVATE PUMP STATION TYPICAL LAYOUT	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL P–12

Ductile Iron Pipe
for Water or Other Liquids
ANSI/AWWA C151/A21.51
Working Pressures and Maximum Depths of Cover
For Minimum Pressure Classes of Ductile Iron Pipe
4" thru 64"



Size in.	Pressure Class	Thickness in.	Working Pressure psi	LAYING CONDITIONS Maximum Depth of Cover in Feet++				
				Type 1	Type 2	Type 3	Type 4	Type 5
4	350	0.25	350 +	53.0	61.0	69.0	85.0	100.0^
6	350	0.25	350	26.0	31.0	37.0	47.0	65.0
8	350	0.25	350	16.0	20.0	25.0	34.0	50.0
10	350	0.26	350	11.0**	15.0	19.0	28.0	45.0
12	350	0.28	350	10.0**	15.0	19.0	28.0	44.0
14	250	0.28	250	*	11.0**	15.0	23.0	36.0
16	250	0.30	250	*	11.0**	15.0	24.0	34.0
18	250	0.31	250	*	10.0**	14.0	22.0	31.0
20	250	0.33	250	*	10.0	14.0	22.0	30.0
24	200	0.33	200	*	8.0**	12.0	17.0	25.0
30	150	0.34	150	*	-	9.0	14.0	22.0
36	150	0.38	150	*	-	9.0	14.0	21.0
42	150	0.41	150	*	-	9.0	13.0	20.0
48	150	0.46	150	*	-	9.0	13.0	20.0
54	150	0.51	150	*	-	9.0	13.0	20.0
60	150	0.54	150	*	5.0**	9.0	13.0	20.0
64	150	0.56	150	*	5.0**	9.0	13.0	20.0

+These pipes are adequate for the rated working pressure plus a surge allowance of 100 psi. Ductile iron pipe for working pressures higher than 350 psi is available. Figures include 2.0 safety factor times the sum of working pressure and 100 psi surge allowance.

++ An allowance for single H-20 truck with 1.5 impact factor is included for all sizes and all depths of cover.

^Calculated maximum depth of cover exceeds 100'.

*Laying condition Type 1 is limited to 12" and smaller pipe. For 14" and larger pipe, laying condition Type 1 should not be used.

**Minimum allowable depth of cover is 3'.

CREATED FEB 2021 REVISED MAY 2021	WORKING PRESSURES AND MAXIMUM DEPTHS OF COVER TABLE	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN PCU APPROVAL
	PASCO COUNTY UTILITIES	DETAIL P-13

Ductile Iron Pipe
for Water or Other Liquids
ANSI/AWWA C151/A21.51
WORKING PRESSURES AND MAXIMUM DEPTH OF COVER
for Pressure Classes

Size in.	Pressure[+] Class psi	Nominal Thickness in.	LAYING CONDITIONS Maximum Depth of Cover in Feet[±]				
			Type 1	Type 2	Type 3	Type 4	Type 5
30	150	0.34	[++]	-	9	14	22
	200	0.38	[++]	8*	12	16	24
	250	0.42	[++]	11	15	19	27
	300	0.45	[++]	12	16	21	29
	350	0.49	[++]	15	19	25	33
36	150	0.38	[++]	-	9	14	21
	200	0.42	[++]	8*	12	15	23
	250	0.47	[++]	10	14	18	25
	300	0.51	[++]	12	16	20	28
	350	0.56	[++]	15	19	24	32
42	150	0.41	[++]	-	9	13	20
	200	0.47	[++]	8	12	15	22
	250	0.52	[++]	10	14	17	25
	300	0.57	[++]	12	16	20	27
	350	0.63	[++]	15	19	23	32
48	150	0.46	[++]	-	9	13	20
	200	0.52	[++]	8	11	15	22
	250	0.58	[++]	10	13	17	24
	300	0.64	[++]	12	15	19	27
	350	0.70	[++]	15	18	22	30
54	150	0.51	[++]	-	9	13	20
	200	0.58	[++]	8	11	14	22
	250	0.65	[++]	10	13	16	24
	300	0.72	[++]	13	15	19	27
	350	0.79	[++]	15	18	22	30
60	150	0.54	[++]	5**	9	13	20
	200	0.61	[++]	8	11	14	22
	250	0.68	[++]	10	13	16	24
	300	0.76	[++]	13	15	19	26
	350	0.83	[++]	15	18	22	30
64	150	0.56	[++]	2**	9	13	20
	200	0.64	[++]	8	11	14	21
	250	0.72	[++]	10	13	16	24
	300	0.80	[++]	12	15	19	26
	350	0.87	[++]	15	17	21	29

*Calculated maximum depth of cover exceeds 100'.

[+]These pipes are adequate for the rated working pressure indicated for each nominal size plus a surge allowance of 100 psi. Calculations are based on a 2.0 safety factor times the sum of working pressure and 100 psi surge allowance.

Ductile iron pipe for working pressures higher than 350 psi is available.

[±]An allowance for a single H-20 truck with 1.5 impact factor is included for all sizes and all depths of cover.

[++]Laying condition Type 1 is limited to 12" and smaller pipe. For 14" and larger pipe, laying condition Type 1 should not be used.

**Minimum allowable depth of cover is 3'.

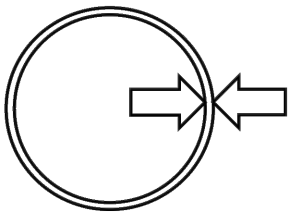
CREATED FEB 2021
REVISED MAY 2021

WORKING PRESSURES AND MAXIMUM DEPTHS OF COVER TABLE

PASCO COUNTY UTILITIES

DETAIL P-14

Ductile Iron Pipe
ANSI/AWWA C150/A21.50
And
ANSI/AWWA C151/A21.51
Standard Pressure Classes – Wall Thickness and Nominal Wall Thickness



Size in.	Outside Diameter in.	Pressure Class				
		150	200	250	300	350
		Nominal Thickness (inches)				
4	4.80	-	-	-	-	0.25
6	6.90	-	-	-	-	0.25
8	9.05	-	-	-	-	0.25
10	11.10	-	-	-	-	0.26
12	13.20	-	-	-	-	0.28
14	15.30	-	-	0.28	0.30	0.31
16	17.40	-	-	0.30	0.32	0.34
18	19.50	-	-	0.31	0.34	0.36
20	21.60	-	-	0.33	0.36	0.38
24	25.80	-	0.33	0.37	0.40	0.43
30	32.00	0.34	0.38	0.42	0.45	0.49
36	38.30	0.38	0.42	0.47	0.51	0.56
42	44.50	0.41	0.47	0.52	0.57	0.63
48	50.80	0.46	0.52	0.58	0.64	0.70
54	57.56	0.51	0.58	0.65	0.72	0.79
60	61.61	0.54	0.61	0.68	0.76	0.83
64	65.67	0.56	0.64	0.72	0.80	0.87

Pressure classes are defined as the rated water working pressure of the pipe in psi. The thickness shown are adequate for the rated water working pressure plus a surge allowance of 100 psi. Calculations result in net thicknesses and are based on a minimum yield strength in tension of 42,000 psi and 2.0 safety factor times the sum of working pressure and 100 psi surge allowance.

Thickness can be calculated for rated water working pressure and surges other than the above by use of equation 1 in ANSI/AWWA C150/A21.50.