

SECTION 2

PREPARATION OF MASTER PLANS, CONSTRUCTION PLANS, AND RECORD DRAWINGS

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2.1 MASTER PLAN

2.1.1 A “Master Plan” for water, wastewater, and/or reclaimed water is required for all residential or commercial projects to be constructed in multiple phases, or for single – phase residential projects with more than one pump station. The “Master Plans” must be approved prior to the approval of construction plans. For large subdivisions the “Master Plan” may require approval before the point of connection can be issued during the processing of the utility service application. The construction plans must be consistent with the approved “Master Plan”. For any changes to the development, the Developer must submit a revised and updated “Master Plan”. The requirement for submittal of a revised “Master Plan” may be waived by the Planning and Growth Management Department (PGMD) Project Review Team, in conjunction with Water Resource Services (WRS) Infrastructure Planning Team, if the County considers the changes to be minor or not significant.

2.1.2 The “Master Plan” will consist of a layout of the major water, wastewater, and/or reclaimed water lines superimposed on a topographic map. The layout plan sheet(s) shall be at a minimum scale of 1" = 200' and show existing and proposed improvements in sufficient detail to show intent of design. In the event that the number of plan sheets exceeds two (2) sheets at the 1"=200' scale, the Master Plan shall be submitted at a scale of 1"=500'. The “Master Plan” shall be signed and sealed by a Professional Engineer licensed in the State of Florida. The requirements for each specific utility plan include:

2.1.2.1 General

2.1.2.1.1 The topographic map shall be of one-foot contours.

2.1.2.1.2 Developments immediately adjacent to undeveloped tracts shall include a conceptual plan for extension of potable water, wastewater, and/or reclaimed water service to said tracts.

2.1.2.1.3 “Master Plans” shall have a vicinity map showing the location of the project and the scale used.

SECTION 2

PREPARATION OF MASTER PLANS, CONSTRUCTION PLANS, AND RECORD DRAWINGS

- 2.1.2.1.4 All plan elevations shall comply with the Datum Requirements as listed in the Survey and Mapping Manual located on Hillsborough County Real Estate web site.
- 2.1.2.2 Wastewater
 - 2.1.2.2.1 Invert and top elevations for manholes.
 - 2.1.2.2.2 Pipe diameters (both force mains and gravity lines).
 - 2.1.2.2.3 Total wastewater flow (both average daily flow and peak) to each pump station. A summary of each unit or tract stating: Type of use (single family residential, master-metered residential, commercial, etc.), Unit Flow Factors, and Peaking Factors.
 - 2.1.2.2.4 Pump Station locations with top, invert, and bottom elevations
 - 2.1.2.2.5 Clear delineation of existing versus future units or tracts.
- 2.1.2.3 Potable Water
 - 2.1.2.3.1 Calculations for maximum potable water demand based on full or projected ultimate development or use gross acreage and land use. Maximum water demand will be calculated as peak hour flow plus fire flow per WRS Technical Specification 02080.1.
 - 2.1.2.3.2 Consult with the WRS Infrastructure Planning Team to obtain a “system response curve” (pressure versus flow) representing the County's water distribution network hydraulic response to the requested water demand.
 - 2.1.2.3.3 Use the network response curve to design a water distribution network. Then, submit the “Master Plan” with a pipe network analysis (e.g., EPANET, KYPIPE, etc.) for flow and pressure distribution for approval. The “Master Plan” shall include connection points and pipe sizes. All available information on hydrant locations and lot platting should be included.

SECTION 2

PREPARATION OF MASTER PLANS, CONSTRUCTION PLANS, AND RECORD DRAWINGS

2.1.2.4 Reclaimed Water

2.1.2.4.1 Calculations for reclaimed water demand. Minimum design standards are outlined in Technical Specification 02083.1, Part 5, "Design Standard for Reclaimed Water Distribution Systems in Residential Subdivisions."

2.1.2.4.2 Consult with the WRS Infrastructure Planning Team to obtain a "system response curve" representing the County's distribution network response to the requested water demand.

2.1.2.4.3 Use the network response curve to design a reclaimed water distribution network. Then, submit the final design with a pipe network hydraulic analysis for flow and pressure distribution for approval. The final design shall include connection points, pipe sizes, meter location(s), and lot platting.

2.2 CONSTRUCTION PLAN FORMAT

2.2.1 GENERAL

2.2.1.1 Plans shall be prepared on 24" x 36" sheets, unless otherwise pre-approved by the County. The cover sheet shall include a vicinity map.

2.2.1.2 An index of all drawings shall be included on the cover sheet or first sheet following. Include an overall utility plan on one sheet and if there are more than three (3) Plan and Profile sheets, include a key map to identify the Plan and Profile sheet numbers.

2.2.1.3 A title block shall be located in the lower right hand corner of each sheet including the cover sheet identifying the Engineer of Record (EOR), firm, telephone number and page content.

2.2.1.4 All pages of blueprint / black line construction plans submitted for review and approval must be signed, sealed, and dated by the Florida Registered Professional Engineer responsible for the project.

2.2.1.5 All submittals must be accompanied by a letter of transmittal to include the PGMD assigned Service Request Number, the project

SECTION 2

PREPARATION OF MASTER PLANS, CONSTRUCTION PLANS, AND RECORD DRAWINGS

Folio Number(s), along with the name, address and telephone number of the project engineer.

2.2.1.6 If a pressure system is to be constructed, a copy of the manufacturer's pump performance curve overlaid on the system response curve must be included in the submittal.

2.2.1.7 All plan elevations shall comply with the Datum Requirements as listed in the Survey and Mapping Manual located on Hillsborough County Real Estate web site. (Marcel Diaz)

2.2.2 DESIGN CRITERIA

The design criteria and specifications presented in Sections 3, 4, and 5 of this document and the WRS Technical Specifications shall be used in preparation of design plans and specifications.

2.2.3 DRAWINGS

2.2.3.1 Construction plans with gravity facilities shall show both plan and profile views of the gravity system. Plans with only on-site water, reclaimed water, and wastewater pressure facilities will not require profile views, unless the proposed construction will be within areas of existing infrastructure, but will require a plan view. The horizontal scale may be 1 inch = 20 feet down to, but no less than, 1 inch = 50 feet. The vertical scale shall be 1 inch = 5 feet.

2.2.3.2 When proposed construction will be within areas of existing infrastructure, e.g., road right-of-way, plan and profile views shall be shown. The horizontal scale shall be 1 inch = 20 feet and the vertical scale shall be 1 inch = 5 feet. All underground utilities, storm drains or other structures which may cross or be located close to the proposed pipelines and structures shall be shown on the drawings in both plan and profile views. Show cross section details of all conflicting crossings and location and elevation of all air release valves.

2.2.4 UTILITY EASEMENTS

2.2.4.1 Potable and reclaimed water transmission/distribution mains and wastewater collection systems must be constructed within County road rights-of-way. Under special circumstances, utility lines within easements may be approved, subject to the following conditions.

SECTION 2

PREPARATION OF MASTER PLANS, CONSTRUCTION PLANS, AND RECORD DRAWINGS

2.2.4.1.1 Easement over Lot Lines:

2.2.4.1.1.1 Gravity Wastewater Lines:

- a. Easement width of 20 feet
- b. Line installed in the center of the easement
- c. Pipe material shall be C-900
- d. No Lateral connections allowed

2.2.4.1.1.2 Pressure Lines (Potable/Reclaimed Mains, Force Mains);

- a. Easement width of 20 feet
- b. Line installed in the center of the easement
- c. Line installed within a steel sleeve
- d. Sleeve to extend minimum of 15 feet beyond front plane of adjacent houses and 20 feet minimum beyond the rear plane of adjacent houses
- e. Top of sleeve to be at 3 feet – 3.5 feet below grade
- f. Install isolation valves in the right of way and near the rear of the lots

2.2.4.1.2 Easement in Open Area

2.2.4.1.2.1 Gravity Wastewater Lines:

- a. Easement width of 25 feet for lines up to 15 feet deep
- b. Easement width of 30 feet for lines greater than 15 feet deep
- c. Line installed in the center of the easement
- d. Pipe material shall be C-900
- e. No lateral connections allowed

2.2.4.1.2.2 Pressure Lines (Potable/Reclaimed Mains, Force Mains);

- a. Easement width of 20 feet
- b. Line installed in the center of the easement

SECTION 2

PREPARATION OF MASTER PLANS, CONSTRUCTION PLANS, AND RECORD DRAWINGS

- 2.2.4.2 All perpetual utility easement agreements or easement dedications by Plat shall include the following condition: **“No structure shall be placed or constructed, permanently or temporarily, on, in, or over the easement.”**
- 2.2.4.3 Water, wastewater, and reclaim water easements outside the ROW shall be dedicated for “Hillsborough County” use, and not specified for “public” use. No private entities shall be allowed to use easements dedicated to the County.

2.3 STANDARD ITEMS FOR CONSTRUCTION PLAN REVIEW

2.3.1 ALL CONSTRUCTION PLANS

- 2.3.1.1 Plans on 24" x 36" paper .
- 2.3.1.2 Proper scale is used and noted on each view.
- 2.3.1.3 Plans must reflect the approved point of connection (P.O.C.) as specified in the "Service Application Conditional Approval Letter."
- 2.3.1.4 North arrow, abbreviations, notes, etc.
- 2.3.1.5 Signed, sealed and dated by the Engineer of Record registered in the State of Florida (all sheets).
- 2.3.1.6 Width and center line of each right-of-way indicated.
- 2.3.1.7 Width of pavement and distance to property line shown for all streets.
- 2.3.1.8 Street names or identifiers indicated (correct location on plan).
- 2.3.1.9 Subdivision name, lot, and block numbers.
- 2.3.1.10 All existing County-regulated utilities proximate to the design shall be shown on the plan view in their reported location with dimensioning.
- 2.3.1.11 Maintain a minimum of 18 inches vertical clearance for all wastewater gravity and force mains and reclaimed water mains crossing under water lines. When this can not be maintained, see pertinent separation criteria in Appendix D of the WRS Technical Specifications.

SECTION 2

PREPARATION OF MASTER PLANS, CONSTRUCTION PLANS, AND RECORD DRAWINGS

- 2.3.1.12 Size, type, material, and length of pipes shown for all water, reclaimed water, and wastewater lines both on-site and off-site.
- 2.3.1.13 Whenever the water, reclaimed water, or wastewater line crosses existing pavement, specify the crossing method, i.e., jack and bore or open-cut.
- 2.3.1.14 Specify the invert of all intersecting utilities on the plan or profile views.
- 2.3.1.15 Minimum line clearance from property line is 5 feet.
- 2.3.1.16 Minimum cover is 36 inches over utilities pipelines.
- 2.3.1.17 Permanent structures shall not be constructed in easements or right-of ways containing water, reclaimed water or wastewater utilities.
- 2.3.1.18 An aesthetics plan to address above ground water meter assemblies and any other above ground facilities shall be submitted explaining how visual impact is to be minimized.

2.3.2 PLANS WITH WATER MAINS

- 2.3.2.1 Minimum water line clearance from property line is 5 feet.
- 2.3.2.2 Joint restraint length specified at all water main bends, valves, fittings, fire hydrants, and tapping sleeves. When plan and profile sheets are required per 2.2.3.1, the joint restraint information shall be included on the plan and profile drawings. The joint restraint detail shall conform to County specifications.
- 2.3.2.3 Valves with roadway boxes shall be provided for all branch connections, loop ends, fire hydrant stubs or other locations, as required, to facilitate operation of the distribution system. Valves shall be placed so that the maximum allowable length of water main required to shutdown for repair work shall not be more than 500 feet in commercial, industrial or multi-family residential districts, or 1,000 feet in other areas. If construction is to be phased, a valve followed by one full length of pipe must be installed at the end of each line that is to be continued. Valves shall meet the requirements of WRS Technical Specification 02080.1.

SECTION 2

PREPARATION OF MASTER PLANS, CONSTRUCTION PLANS, AND RECORD DRAWINGS

- 2.3.2.4 Air release valves shall be specified where the water main profile is such that air pockets or entrapment could occur resulting in flow blockage.
- 2.3.2.5 Fire hydrant spacing in accordance with WRS Technical Specification 02080.1.
- 2.3.2.6 The location of PVC sleeves for use in connection with far side water service installations.
- 2.3.2.7 Water distribution mains within residential subdivisions shall be PVC, or Ductile Iron Pipe (DIP), and shall comply with the requirements of WRS Technical specification, 02080.1 All other water mains shall be DIP. Note size and type of material.
- 2.3.2.8 A note indicating that PVC water mains shall have suitable magnetic locator tape buried over the pipe and tracer wire affixed to the pipe.

2.3.3 PLANS WITH WASTEWATER GRAVITY MAINS

- 2.3.3.1 For gravity mains, the size, type of pipe, slope, and distance between manholes shall be stated on the profile view.
- 2.3.3.2 Invert elevations and directions shall be specified for each pipe entering or exiting a manhole. Rim elevation must also be specified. Identify the lowest point (rim elevation) in the gravity system.
- 2.3.3.3 All manhole stubs and connections shall be shown on both the plan and profile view. All stubs shall include plugs.
- 2.3.3.4 Manhole and manhole connection details shall be shown.
- 2.3.3.5 Drop manhole and detail is required for drops 2.0 feet or more.
- 2.3.3.6 Gravity lines shall be 8-inch PVC minimum within right-of-way, 6-inch minimum for double service laterals, and 4-inch minimum for single service laterals.
- 2.3.3.7 Manholes outside paved areas shall include water-tight manhole cover seals.

SECTION 2

PREPARATION OF MASTER PLANS, CONSTRUCTION PLANS, AND RECORD DRAWINGS

2.3.4 PLANS WITH WASTEWATER FORCE MAINS

- 2.3.4.1 Force mains should be at least 5 feet from the property line.
- 2.3.4.2 Joint restraint length specified at all force main bends, valves, fittings, and tapping sleeves. When plan and profile sheets are required per 2.2.3.1, the joint restraint information shall be included on the plan and profile drawings. The joint restraint detail shall conform to County specifications.
- 2.3.4.3 Valves with roadway boxes shall be provided for all branch connections. In-line valves shall be provided at intervals not to exceed 1,000 feet.
- 2.3.4.4 Air release valves shall be specified where the force main profile is such that air pockets or entrapment could occur resulting in flow blockage.
- 2.3.4.5 A note indicating that all PVC force mains shall have a suitable magnetic locator tape buried over the force main and tracer wire affixed to the pipe..
- 2.3.4.6 PVC pipe used in force mains shall comply with the requirements of WRS Technical Specification, 02081.2
- 2.3.4.7 Provide detail of any force main connection to a manhole.

2.3.5 PLANS WITH RECLAIMED WATER MAINS

- 2.3.5.1 Minimum reclaimed water line clearance from property line is 5 feet.
- 2.3.5.2 Joint restraint length specified at all reclaimed water main bends, valves, fittings, and tapping sleeves. When plan and profile sheets are required per 2.2.3.1 the joint restraint information shall be included on the plan and profile drawings. The joint restraint detail shall conform to County specifications.

SECTION 2

PREPARATION OF MASTER PLANS, CONSTRUCTION PLANS, AND RECORD DRAWINGS

- 2.3.5.3 Valves with roadway boxes shall be provided for all branch connections or other locations as required to facilitate operation of the distribution system. Valves shall be placed so that the maximum allowable length of water main required to shutdown for repair work shall not be more than 1,000 feet in commercial, industrial, or multi-family residential districts; 2,000 feet on distribution systems in residential districts, and 2,000 feet on transmission systems. If construction is to be phased, a valve followed by one full length of pipe shall be installed at the end of each line that is to be extended. Valves shall meet the requirements of WRS Technical Specification 02083.1.
- 2.3.5.4 Air release valves shall be specified where the water main profile is such that air pockets or entrapment could occur resulting in flow blockage.
- 2.3.5.5 The location of PVC sleeves for use in connection with far side water service installations.
- 2.3.5.6 Reclaimed water distribution mains within residential subdivisions shall be PVC, or Ductile Iron Pipe (DIP). All other water mains shall be DIP. Note size and type of material.
- 2.3.5.7 A note indicating that PVC reclaimed water mains shall have a suitable magnetic locator tape buried over the pipe and tracer wire affixed to the pipe.

2.3.6 JACK AND BORE CROSSINGS

- 2.3.6.1 Jacked crossings shall show the casing pipe on both the plan and profile view. County Standard jacking detail must be included. Jack & Bore details can be found in, 02080.2 for potable water mains; 02081.6 for wastewater mains; and 02083.2 for reclaimed water mains. Refer to Specification 02070 for installation requirements.
- 2.3.6.2 A cross sectional detail of the jacking shall be included.
- 2.3.6.3 Casing pipe diameter must be specified on the detail and profile views.
- 2.3.6.4 Class and thickness of casing pipe shall be specified.

SECTION 2

PREPARATION OF MASTER PLANS, CONSTRUCTION PLANS, AND RECORD DRAWINGS

- 2.3.7 WASTEWATER PUMP STATIONS (privately owned)
 - 2.3.7.1 Location of pump station on private property.
 - 2.3.7.2 Design capacity (average daily/peak flows) and system response/curve calculations.
 - 2.3.7.3 Pump identification, including all nameplate data. Pump curve for selected pump with design point noted.
 - 2.3.7.4 Wet well operating elevations, invert, and slab elevations.
 - 2.3.7.5 Identification of fittings and valves on private property.
- 2.3.8 WASTEWATER PUMP STATIONS (to be County owned and maintained)
 - 2.3.8.1 Size of site to be dedicated to County. The service driveway shall be a minimum of 28 feet from edge of road pavement to front of pump station fence/gate, unless otherwise approved.
 - 2.3.8.2 Setback requirements for a Master Pump Station (serves 3,000 ERCs or more) are 20 feet to residential lot line and 50 feet to surrounding residential structures or building envelopes. Setback requirements for a Neighborhood Pump Station (serves less than 3,000 ERCs.) are 20 feet to the rear or side lot line and 30 feet to surrounding residential structures or building envelopes.
 - 2.3.8.3 All utilities required for maintenance and operation of the pump station.
 - 2.3.8.4 Valve and piping identification.
 - 2.3.8.5 Backflow prevention device.
 - 2.3.8.6 By-pass capabilities.
 - 2.3.8.7 Pump identification, including all nameplate data.
 - 2.3.8.8 Design capacity (average daily/peak flows) and system response/curve calculations.
 - 2.3.8.9 Wet well design criteria and pump control level settings.

SECTION 2

PREPARATION OF MASTER PLANS, CONSTRUCTION PLANS, AND RECORD DRAWINGS

2.3.8.10 Pump curve for selected pump with design point noted.

2.3.8.11 Information in Sections 2.3.8.7 - 2.3.8.10, above, shall be included on a pump station calculations detail sheet.

2.3.8.12 Electrical Load Calculation and Coordination Study included on electrical sheet or noted that same to be provided on electrical sheet with shop drawing submission.

2.3.9 WASTEWATER PUMP STATIONS HYDRAULIC REQUIREMENTS

Prior to actual design of any pumping station, the Developer's Engineer must contact the Site Plan and Subdivision Review Section of the Planning and Growth Management Department and Infrastructure Planning Team of the Water Resource Services. Proper coordination between the Developer's Engineer and these Sections will assure the proposed pumping station will meet the hydraulic requirements of the County wastewater system.

2.3.10 PLAN SUBMISSION CHECK LIST

Appendix 1 is a check list which the Engineer may use, if desired, as a final check on construction plans prior to plan submission to the County.

2.4 RECORD DRAWING SUBMITTALS

2.4.1 Following completion of construction and testing, the Developer's Engineer of Record (licensed in the State of Florida) shall submit, to the PGMD Site Plan and Subdivision Review Section one (1) set of "Record" drawings on CD in dwf format, one (1) unencrypted AutoCAD 2004 or later dwg file of project geometry tied to an established County benchmark and stripped of all design notes and other proprietary information, and four (4) sets of 24" x 36" blue or black line prints. If BOCC acceptance is not required, the number of blue / black line print sets can be reduced to two (2). All blue / black line prints shall be signed, dated in ink, and sealed by the Engineer of Record.

2.4.1.1 All drawing revisions shall be consistent in style, color, line weight, font, symbol, and layer with the original construction documents. No additional colors, fonts, line weights, or block symbols shall be accepted.

SECTION 2

PREPARATION OF MASTER PLANS, CONSTRUCTION PLANS, AND RECORD DRAWINGS

2.4.1.2 All file revisions must be performed on a computer using AutoCAD 2004 or later. No conversions from Microstation or other CAD based programs will be accepted.

2.4.2 Record drawings must show changes to and/or deviations from approved construction plans. They must clearly indicate the "as-built" condition. Changed information must be crossed out while remaining legible with the new information printed beside the original. Significant changes such as pipeline routing or alignment should be highlighted on the drawings using a "cloud." The completed record drawings shall have the look and appearance of the original. The Record Drawings shall include the following information:

2.4.2.1 All Water/Wastewater/Reclaimed Water Record Drawings

2.4.2.1.1 Offsets from edge of pavement and R-O-W to pipe lines shall be shown at not greater than 100 feet intervals.

2.4.2.1.2 Location of casing pipe, concrete encasement, and sheeting by station and elevation. Include size, length, material type and wall thickness of casing.

2.4.2.1.3 Record all changes to finished grade.

2.4.2.1.4 Record any changes in alignment or elevation of other utilities due to construction. Record all found utilities not shown on approved construction plans.

2.4.2.1.5 Provide installed pipe diameter, material type, and AWWA/ASTM/ANSI classification.

2.4.2.1.6 If abandonment of existing facilities is approved by the County, provide size, type, depth, location, and limits of any abandoned pipe. Also include the method of abandonment (i.e., mortar filled, etc.).

2.4.2.1.7 In rare circumstances, certain improvements within existing rights-of-way or easements may require locations using a minimum of three (3) ties to permanent points.

2.4.2.1.8 Cross-sectional details shall be provided where utilities cross.

SECTION 2

PREPARATION OF MASTER PLANS, CONSTRUCTION PLANS, AND RECORD DRAWINGS

- 2.4.2.1.9 Record drawings shall contain a clear statement if the project name has changed.
- 2.4.2.2 Water, Wastewater, and Reclaimed Water Pressure Pipe Drawings
 - 2.4.2.2.1 Location and type of all fittings, bends, reducers, sleeves, plugs, caps, tees, crosses, taps, restrained joints, valves, blow-offs, hydrants, high and low points, etc..
 - 2.4.2.2.2 Provide installed top of pipe elevations at a minimum of 200' intervals for all off-site mains and at all high points for air release valves.
 - 2.4.2.2.3 Station all connections when they are not on property lines.
- 2.4.2.3 Gravity Line Drawings
 - 2.4.2.3.1 On the plan view, show location of wastewater manholes by the wastewater gravity or road centerline station numbers. Note on plans which centerline is used.
 - 2.4.2.3.2 Annotate the distance between manholes, finished rim elevations if roadway elevations are revised, entrance and exit pipe invert elevations, invert directions at each manhole, and pipe slopes on plan or profile sheets.
 - 2.4.2.3.3 Provide stationing of all lateral connections and the depth of cover at the property line if it is less than or greater than the standard depth (3' - 4').
 - 2.4.2.3.4 Provide size, length, invert elevation and grade of stub-outs for future connections.
- 2.4.3 OTHER CERTIFICATION:

When certification of "Record" Drawings is performed by an engineer other than the Design Engineer, the following requirements shall apply:

 - 2.4.3.1 The certification shall be completed by a Registered Professional Engineer (PE) licensed in the State of Florida.

SECTION 2

PREPARATION OF MASTER PLANS, CONSTRUCTION PLANS, AND RECORD DRAWINGS

- 2.4.3.2 Any deviations from the original design which were made shall be coordinated with the Design Engineer to insure that the integrity of the original design is not compromised.
- 2.4.3.3 The deviations shall be highlighted on the drawing, using a “cloud”, to indicate any items revised by the Certifying PE. Revisions shown on record drawings shall be in CAD or drafted to the same quality as the original drawings, not hand drawn in the field.
 - 2.4.3.3.1 All revisions to computer generated drawings shall be made in AutoCAD 2004 or later using the same symbols, style, colors, line weights and fonts as used in the original drawings. All completed record drawings shall have the look and appearance of the original drawings.
 - 2.4.3.3.2 All revisions to hand drafted drawings shall be performed to the same standard and quality levels as the originals. No field sketches or free hand graphic modifications will be allowed.
- 2.4.3.4 A statement by the Certifying PE, responsible for making the revisions, shall be placed on each sheet, which states that he made the revisions designated by the “cloud” and is responsible for this revision.
 - 2.4.3.4.1 Each sheet shall contain the Certifying Engineer's engineering company logo with their name, address and telephone number.
 - 2.4.3.4.2 Each sheet shall contain a statement that the Certifying PE, or someone under his direct supervision, observed the construction, prepared the record drawing, and found that the construction was performed in substantial compliance with the intent of the design drawings. Statements by the Certifying PE disclaiming responsibility for accuracy of Record Drawings are **NOT** allowed.
 - 2.4.3.4.3 The Certifying PE shall sign in ink, date, and seal each blue print. In addition, one electronic dwf file of the “Record” drawings shall also be submitted.

SECTION 2

PREPARATION OF MASTER PLANS, CONSTRUCTION PLANS, AND RECORD DRAWINGS

2.4.4 CONSTRUCTION FEATURE INFORMATION

Information on the as-built features (potable water, wastewater and reclaim water) shall be submitted per Appendix 3. The information shall be submitted on a CD at the time of Record Drawing submittal. Each feature on the spreadsheet shall be given a unique ID that shall correspond with its designation on the Record Drawings.

- END OF SECTION 2 -