



Tetra Tech, Inc.

WORK ORDER INITIATION FORM for the CITY OF CLEARWATER

Date: June 4, 2015

Project Number: _____

City Project Number: 15-0010-UT

Plan Set Number: _____

1. PROJECT TITLE:

Groundwater Replenishment Phase 3: Water Purification Plant – Design, Permitting, Bidding Assistance, and Public Outreach and Education.

2. SCOPE OF SERVICES:

The City of Clearwater (City) is embarking on the design, permitting, bidding, and public outreach and education phases of the Groundwater Replenishment Water Purification Plant and associated aquifer recharge system. Phase 3 of the Groundwater Replenishment Project is a culmination of activities that began in 2009 with the production of the Preliminary Feasibility Study followed by a full Feasibility Study in 2011. Recent field activities included the 12 month operation of a pilot water purification treatment system from June 2013 to June 2014 at the City's Northeast Water Reclamation Facility (NEWRF). The pilot system treated reclaimed water to a finished water quality that met or surpassed drinking water standards.

Tetra Tech will provide preliminary and final designs, permitting, bidding, and public outreach services for the development of the City's Groundwater Replenishment Water Purification Plant and related facilities. The facilities associated with this project include the following:

- Water Purification Plant (WPP)
- Pipelines from the WPP to aquifer recharge wells and concentrate disposal well
- Aboveground equipment for the aquifer recharge wells
- Aboveground equipment for the concentrate deep injection well

The WPP will be located on City property and adjacent to the City's NEWRF. The WPP will include the following primary treatment processes: membrane filtration with ultrafiltration (UF), reverse osmosis (RO), advanced oxidation process (AOP) using hydrogen peroxide (H₂O₂) and ultraviolet (UV) light, dissolved oxygen (DO) removal with membrane contactors, and purified water stabilization. The WPP's target annual average design capacity is 2.4 million gallons per day (MGD), produced from approximately 3.0 MGD of influent reclaimed water and the advanced membrane water treatment processes operating at a recovery rate of 80 percent or higher. Demineralization concentrate of approximately 600,000 gallons per day (GPD) generated by the RO process will be disposed of via a deep injection well proposed to be located on site.

Details regarding the proposed processes are provided below.

1. Water Purification Treatment – the water purification process is a three barrier process consisting of UF, RO, and AOP:
 - a. Membrane Filtration with Ultrafiltration (UF) – The first step of the WPP treatment process is filtration of the reclaimed water utilizing UF. The UF process will target an approximate 94 percent recovery as demonstrated in the pilot testing phase.
 - b. Reverse Osmosis (RO) – The second step of the WPP treatment process is treatment of the filtered water utilizing RO. The RO process will target an approximate 80-85 percent recovery as demonstrated in the pilot testing phase.
 - c. Advanced Oxidation Process (AOP) – The third step of the WPP treatment process is advanced oxidation of the water to treat the low molecular weight compounds in the water. Hydrogen peroxide is dosed upstream of the UV light reactor so that hydroxyl radicals can be generated which will break apart the low molecular weight compounds.

2. Post-Treatment Water Conditioning:
 - a. The purified water will be conditioned for compatibility with the native groundwater. Water conditioning will consist of:
 - i. Membrane Contactor (MC) system for dissolved oxygen (DO) removal.
 - ii. Carbon dioxide addition for water stabilization.
 - iii. Calcium hydroxide (lime slurry) addition for stabilization.
 - iv. Sodium bisulfide addition for quenching of chloramine and hydrogen peroxide residual.

A conceptual site plan for the WPP was developed in the 2011 Feasibility Study and is attached. This plan shows the WPP located on City property to the north of the NEWRF. Utilizing this conceptual site plan and adding areas for administrative offices, meeting rooms, restrooms, and the plant's control room and electrical room results in a process building of approximately 15,000 square feet (sf). The UF and RO equipment will be housed in an enclosed, ventilated process area as part of the process building.

The AOP and MC equipment will be housed outside and under cover, in an approximate 2,000 sf area. The WPP site will include a dedicated access road extending north from the existing North-South NEWRF access road, and paved areas for access to the site facilities and parking.

Four (4) aquifer recharge wells, one (1) concentrate deep injection well, and monitoring wells are proposed for this project. Three (3) of the recharge wells will be located on City property, on or near the NEWRF site, and one (1) of the recharge wells will be located on City property at the City's Chi Chi Rodriguez Golf Course (see attachment). The concentrate deep injection well will be located on City property to the north of the NEWRF. Equipment at the aquifer recharge wells and concentrate deep injection well will be located on concrete pads. Approximately 7,000 linear feet (LF) of 6-inch, 8-inch, and 12-inch diameter piping from the WPP to the aquifer recharge wells and approximately 1,000 LF of 8-inch diameter piping from the WPP to the concentrate deep injection well are proposed for this project.

The following tasks will be completed as part of the preliminary and final designs and permitting, bidding, and public outreach of the aforementioned facilities:

- Preliminary Engineering Services related to facility planning and preparation of a Preliminary Design Report (30% design document) for use in third party review and confirmation of project costs by others.
- Develop the contract documents (bidding and contract documents, engineering drawings and technical specifications) for the procurement and construction of the WPP, pipelines, and aboveground equipment for the recharge wells and concentrate disposal well.
- Prepare and submit permit applications for the construction of these facilities.
- Provide bidding assistance.
- Provide public outreach and education services.

In order to provide logical, orderly completion of this assignment, the project is presented in phases. Tasks to be completed in each phase are described herein.

1.0 PRELIMINARY DESIGN

Preliminary Design (30%)

The purpose of the preliminary design phase is to work with the City, the Southwest Florida Water Management District (SWFWMD), the City's hydrogeological consultant, and the City's public outreach consultant to develop the basis of design for the WPP and associated facilities, complete topographic surveys and geotechnical investigations, conduct site planning, and update the opinion of cost for the facilities. A Preliminary Design Report including 30% design phase plans and an index of technical specifications will be prepared under this task. Subtasks to be completed in this phase are as follows:

- A. Facilitate a project kick-off meeting with Tetra Tech's staff, the City, the SWFWMD, the City's hydrogeological consultant, and the City's public outreach consultant. Prepare and distribute meeting minutes to all attendees.
- B. Treatment Facility Site Planning: Conduct planning meetings and engineering evaluations for the site planning of the proposed WPP facilities. This scope of services is based upon location of the WPP on City property to the north of the City's existing Northeast Water Reclamation Facility (NEWRF).
 - 1. Preliminary Civil Evaluations: Conduct preliminary civil site development evaluations including review of existing access roads, stormwater systems, utility infrastructure, site conditions, permits, and other features that may be constraints to the civil site development for the proposed facilities.
 - 2. Site Planning Workshop: Hold a site planning workshop with the City and project team to discuss site constraints and the potential location and orientation of the proposed facilities.
 - 3. Stormwater Permit Evaluation: Evaluate the existing stormwater permit conditions and requirements and prepare preliminary estimates of impervious area to determine impacts of the proposed development.
 - 4. Code Review: Review code requirements for the proposed facilities including IBC, NFPA, and local codes and identify the local authorities having jurisdiction for the project.
 - 5. Electrical Power Coordination: Review existing electrical power utility feeds at the proposed site for sufficiency to the proposed facilities and determine potential routes for additional utility power easements that may be necessary.
 - 6. Process Utility Tie-In Coordination: Review locations of process tie-in locations with the existing NEWRF and determine impacts and space requirements of interconnecting piping in relation to the existing facilities, including potential utility conflicts to be resolved. Establish a preliminary list of utility locates and soft dig locations to be investigated.
 - 7. Conceptual Site Plan: Develop a conceptual site plan showing proposed treatment facilities, buildings, access roads and gates, perimeter fences, stormwater infrastructure, incoming utility power and communications and other facilities contemplated by the City and the project team. The conceptual site plan will also consider potential options for locations of the concentrate deep injection well location and the aquifer recharge injection wells as identified by the City's hydrogeological consultant. The conceptual site plans will be based on input from the City and the project team with respect to security, operations, and accessibility and visibility for public tours.
 - 8. Site Plan Technical Memo: Prepare a draft technical memo summarizing the findings of the treatment facility site planning task for review and comment by the City and the project team. The finalized tech memo will be included in the preliminary design report.

Using the conceptual site selected by the City and the project team, develop site plan for facilities required by this project, yard piping plan, and preliminary mechanical plans showing the proposed facilities.

- C. Wellfield and Pipeline Planning
 - a. Coordination with Hydrogeological Consultant.
 - b. Coordination of Well Access and Required Setbacks.
 - c. Evaluation of Well locations.
 - d. Evaluation of Pipeline Alignment Options: Determine the routing of the recharge water pipeline to the four (4) aquifer recharge wells, routing of the concentrate discharge pipeline to the concentrate disposal well, and pipelines routing on the NEWRF site.
 - e. Development of Conceptual Well Site Plans: Provide the conceptual design of the aboveground appurtenances at the recharge wells and the concentrate injection well.
 - f. Facilitation of Conceptual Design Review Meeting.
 - g. Development of Well Sites and Pipelines Technical Memo.

- D. Building Programming: Based on previous evaluations performed in the feasibility study, the anticipated building size is expected to be approximately 12,000 S.F. however the addition of operation spaces to the facility may increase the overall building footprint by another 3,000-4,000 S.F.
 - a. Building Programming Meetings: Organize two (2) building programming meetings to identify operational and functional requirements for the proposed WPP main process building.
 - b. Determine building requirements necessary to achieve LEED BD+C (building design + construction rating system) certification (e.g. certified, silver, gold, or platinum levels). The City has indicated a desired LEED status level of silver for the WPP.
 - c. Complete programming of the WPP, including the development of conceptual operations and the process building.

- E. Surveying and Ecological Investigations
 - a. Surveying: Perform topographic surveys of the WPP site (approximately 2 acres) and the WPP entrance road, and route surveys of the recharge water pipeline (approximately 7,000 LF), the concentrate discharge pipeline (approximately 1,000 LF), the reclaimed water pipeline from the NEWRF to the WPP (approximately 2,000 LF), and a pipeline to the NEWRF headworks (approximately 1,500 LF). The survey work will be completed in accordance with "Minimum Technical Standards" as defined in Florida Statutes. Horizontal and vertical control will be established based on Pinellas County datum NAD83.
 - b. Conduct a preliminary ecological constraints review of the WPP site and pipeline routes to determine the presence of state and/or federally listed (protected) species and their associated habitats.
 - c. Tree Survey: Perform a tree survey for areas affected by the development of the proposed WPP facilities and pipelines.

F. Subsurface Geotechnical Investigation: Perform a soils investigation for the necessary soils data and other pertinent information required for final design of structural and stormwater management elements. Soil boring logs and classifications, existing groundwater levels and estimated seasonal high levels, pipe trench and backfill requirements, and structures foundation requirements will be submitted in report format. A program of twelve (12) Standards Penetration Test (SPT) borings will be conducted at the WPP site. Six (6) SPT borings, each advanced to approximately 30 feet below existing grade are proposed in the process building area, one (1) SPT boring advanced to approximately 50 feet below existing grade in the purified water storage tank area, and five (5) SPT borings advanced to approximately 20 feet below existing grade within the areas of the remaining structures are proposed. The borings will be conducted in accordance with ASTM D-1586. The field investigation for the pipelines includes a program of 22 SPT borings along the proposed pipeline alignments. It is planned that 20 shallow SPT borings (to approximately 10 feet) will be performed along the pipeline routes and two (2) borings to approximately 30 feet will be performed at the pipeline crossing of McMullen-Booth Road.

G. Preliminary Design Report

- a. Incorporate the tested processes and findings from the water purification treatment system 12 month pilot study, and the results from the City's hydrogeological consultant's work into the preliminary design of the proposed treatment facilities.
- b. Review 12 months of reclaimed water quality data.
- c. Prepare a preliminary opinion of cost for the construction of the groundwater replenishment system including the WPP, recharge water pipeline, concentrate disposal pipeline, recharge wells, and concentrate disposal well.
- d. Prepare a Preliminary Design Report (PDR) that presents the basis of design for the recommended facilities and the size and configuration of the facilities. The report will be prepared in accordance with the requirements established in Chapter 62-555 Florida Administrative Code (F.A.C.). The PDR will include the 30% Design Plans and an Index of Technical Specifications, and include the following elements:
 - i. Subsurface Geotechnical Investigation Report;
 - ii. Preliminary site layout showing property boundary, general arrangement of facilities on the site and proposed plant access point from existing road;
 - iii. Preliminary process flow schematic;
 - iv. Preliminary process and instrumentation diagrams (P&IDs) for each treatment process step and each chemical feed system;
 - v. Plant power distribution diagram, including standby power sources and transfer switching;

- vi. Preliminary motor list with voltages estimates of power loads;
 - vii. Preliminary process mass balances;
 - viii. Process description including plant loadings, design criteria and anticipated recharge water quality;
 - ix. Basic design data for each treatment unit in the plant, including basic dimensions, areas, volumes, and hydraulic loadings;
 - x. Process control strategy;
 - xi. General arrangement plan of major buildings and treatment facilities;
 - xii. Preliminary architectural elevations and proposed building materials for major buildings;
 - xiii. Building and tankage design criteria including foundation type(s) and allowable soil bearing pressures, wind loadings, floor and roof dead and live loads, allowable stresses for structural steel, concrete and reinforcing steel;
 - xiv. Index of technical specifications with outline type listing by specification section the manufacturer/supplier(s) of equipment and materials used as reference in specification;
 - xv. Listing of proposed pre-purchase of equipment or materials;
 - xvi. Identify all related projects and points of interface and dependency.
- e. Attend a review meeting with the City, the SWFWMD, and the City's hydrogeological consultant to discuss the PDR, modify the report as required, and develop concurrence regarding the proposed facilities prior to final design.

Deliverables – Eight (8) copies and one (1) electronic pdf file copy will be provided of the following documents:

- *Draft Site Plan Technical Memo (Final to be included in PDR);*
- *Draft Well Site and Pipeline Technical Memo (Final to be included in PDR);*
- *Draft and Final Facility Planning Technical Memorandum;*
- *Draft and Final Subsurface Geotechnical Investigation Report;*
- *Draft and Final Preliminary Design Report including 30% Design Plans and Index of Technical Specifications.*

Third Party Review of Preliminary Design

Upon completion of the Preliminary Design Report by Tetra Tech, a third party will review the Preliminary (30%) Design documents. Implementation of comments and/or recommendations that result from the third party review process will be discussed with the City once any necessary actions have been determined by the SWFWMD. Should the results of the third party review process require a change to the project or have similar impact that will entail redesign efforts, Tetra Tech will provide a proposal for additional services as an addendum to this Work Order.

2.0 FINAL DESIGN

Final Design

Upon City/SWFWMD acceptance of the Preliminary Design Report and acceptance that the third party's 30% design comments/recommendations have been sufficiently addressed, Tetra Tech will initiate final design of the Project. The final design will result in preparation of the bidding and contract documents, engineering drawings and technical specifications, which will be submitted to the City for review at 60-, 90- and 100-percent completion levels. The 60-percent submittal shall include engineering drawings in plan view and select sections and draft technical specifications. The 90-percent submittal shall include updated engineering drawings (all disciplines) plan views, sections, and details; bidding, contractual, and updated technical specifications; and opinion of probable construction costs. The 100-percent submittal shall include updated engineering drawings; updated bidding, contract and technical specifications and updated opinion of probable construction costs incorporating the City's comments. The project drawings will be prepared utilizing Autodesk Civil 3D and Revit 2013 software to allow for the production of two dimensional drawings from a three dimensional model and bidding/specifications using MS WORD.

To ensure proper design of the facilities, Tetra Tech will obtain approval from the City for any substantial changes in the preliminary design prior to incorporation in the final design. Tasks to be completed during this phase are summarized below:

1. Subsurface Utility Investigation: Perform subsurface utility investigations with ground penetrating radar (GPR) and ten (10) soft digs to determine locations of existing facilities at the pipeline crossing of McMullen-Booth Road, on the NEWRF property, on the Chi Chi Rodriguez golf course property, within roadway ROW, and on the property proposed for the WPP.
2. LEED Certification Process: Design the WPP to meet the targeted LEED certification level established during preliminary design and submit the LEED application for design credits.
3. Prepare construction drawings necessary to clearly depict the improvements identified during preliminary design. The construction drawings shall be compiled using the City's Deliverables Standards, as referenced in Attachment "A". A preliminary list of drawings is presented below:

General

Cover Sheet

Index of Drawings (3 sheets)

Location Map and General Notes
Legend and Abbreviations
Process Flow Schematic

Civil

Existing Site Conditions, General Notes and Site Erosion
Proposed Overall Site and Key Map
Site Demolition Plan
Construction Traffic Plan
Temporary Construction Entrance
Entrance Road Geometry
Site Geometry Plan - North
Site Geometry Plan - South
Entrance Road Paving, Grading and Drainage (2 sheets)
Site Paving, Grading and Drainage - North
Site Paving, Grading and Drainage - South
Civil Sections (3 sheets)
Civil Details (5 sheets)

Recharge Wells

Recharge Water Pipeline - Plan & Profile (5 sheets at 1" = 40' scale)
Recharge Well - Well #1 Site Plan
Recharge Well - Well #2 Site Plan
Recharge Well - Well #3 Site Plan
Recharge Well - Well #4 Site Plan
Recharge Well - Civil Details (3 sheets)

Concentrate Injection Well

Injection Well Pipeline – Plan & Profile (1 sheet at 1" = 40' scale)
Injection Well Site Plan & Details

Landscaping and Irrigation

Landscaping and Irrigation General Notes and Schedules
Existing Tree Plan
Landscaping Plan - North
Landscaping Plan - South
Irrigation Plan - North
Irrigation Plan - South
Landscaping Details (4 sheets)

Structural

Process Building - General Notes and Schedules
Post Treatment - Chemical Buildings Notes and Schedules
Post Treatment - Electrical Building Notes and Schedules
Post Treatment Structures General Notes and Schedules
Process Building - Foundation Plan (2 sheets)

Process Building - Roof Framing Plan (2 sheets)
Process Building - Trench Grating Plan
Process Building – Sections (3 sheets)
Process Building – Details (3 sheets)
Post Treatment - Carbon Dioxide Bulk Storage Area Foundation Plan
Post Treatment Carbon Dioxide Bulk Storage Area - Details
Post Treatment Building - Foundation Plan and Schedules
Post Treatment Building - Roof Framing Plan
Post Treatment Building – Details (2 sheets)
Post Treatment Building - Miscellaneous Details (2 Sheets)
Post Treatment Equipment Slab - Plan
Post Treatment Equipment Slab - Stairs and Access Walkway
Post Treatment Equipment Slab - Sections
Post Treatment - Miscellaneous Sections (2 sheets)
Post Treatment - Miscellaneous Details (2 sheets)

Architectural

Legend and Abbreviations
Process Building - Floor Plan (2 sheets)
Process Building - Roof Plan
Process Building - Ceiling Plan
Process Building – Elevations (2 sheets)
Process Building – Sections (2 sheets)
Process Building - Laboratory Sections
Process Building - Miscellaneous Wall Sections
Process Building – Details (2 sheets)
Process Building - Signage Details
Process Building - Railing Details
Process Building - Roofing Details
Process Building - Door Schedules
Process Building - Window / Louver Schedules
Process Building - Finish Schedules (3 sheets)
Post Treatment Building - Floor Plan
Post Treatment Building - Roof Plan
Post Treatment Building - Elevations
Post Treatment Building - Sections
Post Treatment Building - Schedules
Post Treatment Building – Details

Plumbing

Plumbing Legend
Sanitary System Risers
Domestic Water Risers
Process Building - Operations Area Plumbing Plan
Process Building - UF Area Plumbing Plan
Process Building - RO Area Plumbing Plan

Process Building - Riser Diagrams (2 sheets)
Process Building – Details (2 sheets)
AOP and MC Area - Plumbing Plan
AOP and MC Area - Riser Diagrams
Post Treatment Building - Plumbing Plan
Post Treatment Building - Riser Diagrams

Fire Protection

General Notes and Schedules
Process Building Plan
Post Treatment Building Plan
Schedules (2 sheets)
Details (2 sheets)

Process

General Notes and Schedules
Legend and Symbols
Process Flow Diagram - Supply Water Pump System and Conveyance
Process Flow Diagram - UF Treatment - Pretreatment Systems
Process Flow Diagram - UF Treatment - Overall System & Feed Pumps
Process Flow Diagram - UF Treatment - Typical UF Train
Process Flow Diagram - UF Treatment - Backwash System
Process Flow Diagram - UF Treatment - CIP System
Process Flow Diagram - RO Treatment - EQ Tanks
Process Flow Diagram - RO Treatment - Pretreatment Systems
Process Flow Diagram - RO Treatment - Overall System & Feed Pumps
Process Flow Diagram - RO Treatment - Typical RO Trains
Process Flow Diagram - RO Treatment - CIP System
Process Flow Diagram - AOP Treatment - Overall System
Process Flow Diagram - AOP Treatment - Typical AOP Train
Process Flow Diagram - MC Treatment - EQ Tanks
Process Flow Diagram - MC Treatment - Overall System & Feed Pumps
Process Flow Diagram - MC Treatment - Typical MC Train
Process Flow Diagram - MC Treatment - Vacuum Pump System
Process Flow Diagram - Post Treatment - Overall System
Process Flow Diagram - Post Treatment - Contact Tanks
Process Flow Diagram - Recharge Conveyance - Overall System
Process Flow Diagram - Recharge Wells - Typical Wellhead
Process Flow Diagram - Concentrate Conveyance - Overall System
Process Flow Diagram - Concentrate Disposal Well & Monitoring Wells
Process Flow Diagram - Backwash / Flush Water Recovery
Process Flow Diagram - UF Pretreatment - Sodium Hypochlorite System
Process Flow Diagram - UF Pretreatment - Ammonium Sulfate System
Process Flow Diagram - UF CIP System - Citric Acid System
Process Flow Diagram - UF CIP System - Sodium Hypochlorite System
Process Flow Diagram - UF CIP System - Sodium Hydroxide System

Process Flow Diagram - UF CIP System - Sodium Bisulfite System
Process Flow Diagram - RO Pretreatment - Antiscalant System
Process Flow Diagram - RO Pretreatment - Sulfuric Acid System
Process Flow Diagram - AOP Treatment - Hydrogen Peroxide System
Process Flow Diagram - MC Treatment - Sodium Bisulfite System
Process Flow Diagram - Post Treatment - Carbon Dioxide System
Process Flow Diagram - Post Treatment - Calcium Hydroxide System
Process Flow Diagram - Post Treatment - Sodium Hydroxide System
Process Flow Diagram - Post Treatment - Sodium Bisulfide System
Existing Site and Yard Piping Plan
Proposed Major Yard Piping Plan - North
Proposed Major Yard Piping Plan - South
Proposed Minor Yard Piping Plan - North
Proposed Minor Yard Piping Plan - South
Plant Lift Station - Plan and Sections
Yard Piping – Sections (3 sheets)
Yard Piping – Details (3 sheets)
Process Building - Overall Plan
Process Building - Operations Area Plan
Process Building - UF Pretreatment Area Plan
Process Building - UF Pretreatment Chemical Systems Plan
Process Building - UF Process Area Plan
Process Building - Typical UF Train Plan
Process Building - UF CIP System Plan
Process Building - UF CIP Chemical Systems Plan
Process Building - UF Backwash System Plan
Process Building - EQ Tanks and CIP System Area Plan (2 sheets)
Process Building - RO Pretreatment Area Plan
Process Building - RO Pretreatment Chemical Systems Plan
Process Building - RO Process Area Plan
Process Building - Typical RO Train Plan
Process Building - RO CIP System Plan
Process Building - UF Bulk Chemical Storage Plan
Process Building - RO Bulk Chemical Storage Plan
Process Building - Typical UF Train Isometric
Process Building - UF CIP System Isometric
Process Building - UF Backwash System Isometric
Process Building - Typical RO Train Isometric
Process Building - RO CIP System Isometric
Process Building - UF Chemical Sections
Process Building - UF System Sections (2 sheets)
Process Building - UF CIP Sections
Process Building - UF Backwash Sections
Process Building - EQ Tanks Sections
Process Building - RO Chemical Sections
Process Building - RO System Sections (2 sheets)

Process Building - RO CIP Sections
Process Building – Details (3 sheets)
AOP and MC Area - Overall Plan
AOP and MC Area - AOP System Plan
AOP and MC Area - Typical AOP Train Plan
AOP and MC Area - EQ Tanks Plan
AOP and MC Area - MC Booster Pump System
AOP and MC Area - MC System Plan
AOP and MC Area - Typical MC Train Plan
AOP and MC Area - Typical AOP Train Isometrics
AOP and MC Area - EQ Tanks Isometrics
AOP and MC Area - Typical MC Train Isometrics
AOP and MC Area - Typical AOP Train Sections
AOP and MC Area - AOP System Sections
AOP and MC Area - EQ Tanks Sections
AOP and MC Area - MC Booster Pump System Sections
AOP and MC Area - Typical MC Train Sections
AOP and MC Area - MC System Sections
AOP and MC Area – Details (2 sheets)
Post Treatment Chemicals - Overall Plan
Post Treatment Chemicals - Static Mixer Area Plan
Post Treatment Chemicals - Carbon Dioxide System Plan
Post Treatment Chemicals - Calcium Hydroxide System Plan
Post Treatment Chemicals - Sodium Hydroxide System Plan
Post Treatment Chemicals - Sodium Bisulfide System Plan
Post Treatment Chemicals - Contact Tank Plan
Post Treatment Chemicals – Sections (5 sheets)
Post Treatment Chemicals - Contact Tank Sections
Post Treatment Chemicals – Details (3 sheets)
Recharge Well - Typical Plan
Recharge Well - Sections
Recharge Well - Details
Injection Well - Typical Plan
Injection Well - Sections
Injection Well - Details
Process Mechanical - General Details (6 sheets)

Mechanical – HVAC

HVAC Symbols and Abbreviations
Process Building - Indoor Overall Plan
Process Building - Outdoor Plan
Process Building - Operations Area Plan
Process Building - UF Process Area Plan
Process Building - RO Process Area Plan
Process Building – Sections (2 sheets)
Process Building – Details (2 sheets)

Process Building - Schedules
Post Treatment Building - Indoor Plan
Post Treatment Building - Outdoor Plan
Post Treatment Building - Sections
Post Treatment Building - Details
Post Treatment Building – Schedules

Electrical

Electrical Symbols and Abbreviations
Overall Electrical Site Plan
Electrical Site Plan 1
Electrical Site Plan 2
Process Building Overall Electrical and Control Plan with Key
Process Building - Operations Area Electrical Plan
Process Building - Operations Area Control Plan
Process Building - Operations Area Lighting Plan
Process Building - UF Chemicals Electrical and Control Plan
Process Building - UF Area Electrical Plan
Process Building - UF Area Control Plan
Process Building - UF CIP System Electrical and Control Plan
Process Building - UF Backwash System Electrical and Control Plan
Process Building - RO Area Electrical Plan
Process Building - RO Area Control Plan
Process Building - RO CIP System Electrical and Control Plan
Process Building - RO Chemicals Electrical and Control Plan
Process Building - MCC Electrical Plan
Process Building - MCC Control Plan
Process Building - SCADA and Security Electrical and Control Plan
Process Building - Restrooms Electrical, Control and Lighting Plan
Process Building - UF and RO Area Lighting Plan
Process Building - Exterior Lighting Plan
Process Building - Roof Electrical and Lightning Plan
AOP and MC Area – Electrical Plan
AOP and MC Area – Control Plan
AOP and MC Area – Lighting Plan
Post Treatment Building - Electrical and Control Plan
Post Treatment Building - Roof Lightning Protection Plan
Modifications to NEWRF Facilities - Electrical and Control Plan
Modifications to NEWRF Facilities - Electrical and Control Plan
Recharge Well - Electrical, Control and Lighting Plan
Injection Well - Electrical, Control and Lighting Plan
Switchgear for Process Building - One Line Diagram
Switchgear for Process Building - One Line Diagram
MCC for Process Treatment Building - One Line Diagram
Electrical Room Equipment Elevations
MCC Post Treatment Electrical - One Line Diagram

Control Diagrams (4 sheets)
Panel board Schedule 1
Panel board Schedule 2
Panel board Schedule 3
Lighting Schedule 1
Lighting Schedule 2
Interconnection Diagram - UF Chemicals
Interconnection Diagram - UF System
Interconnection Diagram - UF Typical Train
Interconnection Diagram - UF CIP System
Interconnection Diagram - UF Backwash System
Interconnection Diagram - EQ Tanks
Interconnection Diagram - RO Chemicals
Interconnection Diagram - RO Pretreatment Process
Interconnection Diagram - RO System
Interconnection Diagram - RO Typical Train
Interconnection Diagram - CIP System
Interconnection Diagram - AOP System
Interconnection Diagram - AOP Typical Train
Interconnection Diagram - EQ Tanks
Interconnection Diagram - MC Feed Pumps
Interconnection Diagram - MC System
Interconnection Diagram - MC Typical Train
Interconnection Diagram - Hydrogen Peroxide System
Interconnection Diagram - Carbon Dioxide System
Interconnection Diagram - Calcium Hydroxide System
Interconnection Diagram - Sodium Hydroxide System
Interconnection Diagram - Process Building MCC/ Switchgear
Interconnection Diagram - Post Treatment MCC
Interconnection Diagram - Recharge Well
Interconnection Diagram - Concentrate Injection Well
Interconnection Diagram - Conveyance Systems
Ductbank Sections (3 Sheets)
Electrical Details (5 sheets)

Instrumentation

General Notes and Schedules
Legend and Symbols
P&ID - Supply Water Pump System and Conveyance
P&ID - UF Treatment - Pretreatment Systems
P&ID - UF Treatment - Overall System & Feed Pumps
P&ID - UF Treatment - Typical UF Train
P&ID - UF Treatment - Backwash System
P&ID - UF Treatment - CIP System
P&ID - RO Treatment - EQ Tanks
P&ID - RO Treatment - Pretreatment Systems

P&ID - RO Treatment - Overall System & Feed Pumps
 P&ID - RO Treatment - Typical RO Trains
 P&ID - RO Treatment - CIP System
 P&ID - AOP Treatment - Overall System
 P&ID - AOP Treatment - Typical AOP Train
 P&ID - MC Treatment - EQ Tanks
 P&ID - MC Treatment - Overall System & Feed Pumps
 P&ID - MC Treatment - Typical MC Train
 P&ID - MC Treatment - Vacuum Pump System
 P&ID - Post Treatment - Overall System
 P&ID - Post Treatment - Contact Tanks
 P&ID - Recharge Wells - Conveyance System
 P&ID - Recharge Wells - Typical Wellhead
 P&ID - Concentrate Disposal - Conveyance System
 P&ID - Concentrate Disposal - Wellhead and Monitoring Wells
 P&ID - Residuals - Backwash & Flush Water Return
 P&ID - UF Pretreatment - Sodium Hypochlorite System
 P&ID - UF Pretreatment - Ammonium Sulfate System
 P&ID - UF CIP System - Citric Acid System
 P&ID - UF CIP System - Sodium Hypochlorite System
 P&ID - UF CIP System - Sodium Hydroxide System
 P&ID - UF CIP System - Sodium Bisulfite System
 P&ID - RO Pretreatment - Antiscalant System
 P&ID - RO Pretreatment - Sulfuric Acid System
 P&ID - AOP Treatment - Hydrogen Peroxide System
 P&ID - MC Treatment - Sodium Bisulfite System
 P&ID - Post Treatment - Carbon Dioxide System
 P&ID - Post Treatment - Calcium Hydroxide System
 P&ID - Post Treatment - Sodium Hydroxide System
 P&ID - Post Treatment - Sodium Bisulfide System
 SCADA System Architecture (3 sheets)
 Panel Details (4 sheets)
 Instrument Details (4 sheets)

4. Prepare a comprehensive project manual that contains the City's bidding and contract documents (Division 0 and 1) and technical specifications (Divisions 2 through 16) for competitive bidding. The project manual and its contents will be formatted in accordance with the Construction Specification Institute (CSI) and prepared using MS WORD.
5. Prepare and submit an opinion of probable construction costs with the 90- and 100-percent submittals based on vendor quotations and previous bid tabulations.
6. Prepare for and attend up to 15 project coordination meetings with the City, the SWFWMD, and the City's hydrogeologic consultant during final design. Prepare and distribute meeting minutes to all attendees.

7. A review meeting will be held with the City following each submission. Tetra Tech will prepare comment tracking sheets at each completion level, document meeting minutes, and distribute such minutes to all attendees over the project duration.

Deliverables – Eight (8) copies and one (1) PDF electronic copy will be provided for each submittal described below:

- *60-, 90-, and 100-percent submittals of the bidding and contract documents, engineering drawings and technical specifications.*
- *Project coordination meetings minutes.*
- *60-, 90-, and 100-percent submittal review meeting minutes and comment/response tracking spreadsheet.*
- *Opinion of probable construction costs at the 90- and 100-percent completion levels.*

3.0 PERMITTING

Tetra Tech will prepare and submit permit applications and supporting documentation to the Florida Department of Environmental Protection (FDEP), Southwest Florida Water Management District (SWFWMD), the City's Planning Department, and Pinellas County to obtain permits for construction and operation the proposed facilities. Tetra Tech will also respond to requests for additional information (RAIs) from permitting agencies to clarify the original applications. All permit application fees will be paid by the City. Permits related to this project and associated work are as follows:

1. Site Permitting (SWFWMD or FDEP) – Prepare for and attend one (1) pre-application meeting for the Environmental Resource Permit (ERP) for the WPP. Prepare and submit an application for a permit modification to the Environmental Resource Permit (ERP) for the WPP and respond to RAIs. It is anticipated that construction within wetlands and mitigation are not necessary. Site permitting also includes the permitting of the access drive to the WPP.
2. FDEP Permitting of WPP –The WPP and associated recharge water pipelines will be permitted in accordance with the requirements established in Chapter 62-555 F.A.C. Tetra Tech will prepare for and attend up to four (4) pre-application meetings with the FDEP for the WPP and recharge water pipelines permitting. Tetra Tech will prepare and submit the FDEP applications associated with the WPP and recharge water pipelines. Tetra Tech will provide material to support the City's hydrogeologic consultant's preparation and submittal of the underground injection control (UIC) concentrate injection well permit.
3. Pinellas County ROW Use – Prepare for and attend one (1) pre-application meeting for the Pinellas County Right of Way (ROW) Use permitting of the recharge water pipeline

crossing of McMullen-Booth Road. Prepare and submit the ROW Use Application to the County.

4. City of Clearwater ROW Use – Prepare for and attend one (1) pre-application meeting for the City of Clearwater ROW Use permitting for the recharge water pipelines in City ROW. Prepare and submit the ROW Use Application to the City.
5. City of Clearwater Building Permit Application – Prepare for and attend one (1) meeting with the City’s Building Department to review the project and assist in obtaining pre-approval for Contractor pickup.

The City’s hydrogeological consultant will be responsible for the permitting related to the aquifer recharge wells and concentrate disposal well. Tetra Tech will support that permitting effort by attending up to four (4) permitting meetings and by providing documentation related to the aboveground equipment at the aquifer recharge wells and concentrate disposal well.

Deliverables – Eight copies (8) and one (1) electronic pdf file copy to be provided of the following documents:

- *Draft and Final Permit Applications*
- *Meeting minutes of pre-application and coordination meetings*

4.0 BIDDING ASSISTANCE

Upon authorization to proceed with the bidding phase of the project, Tetra Tech will complete the following tasks:

1. Assist the City with developing the project’s Prequalification requirements for potential bidders and evaluating potential bidders’ responses to the qualification requirements to develop the list of prequalified bidders.
2. Provide one (1) signed and sealed copy of the Contract Documents (engineering drawings and specifications) in PDF format for distribution to potential bidders by the City’s Purchasing Department.
3. Attend the pre-bid meeting with the City.
4. Respond to questions as required to interpret, clarify or expand the bidding documents. The City Purchasing Department will prepare and distribute all addenda.
5. Review and evaluate the apparent low bidder’s qualifications for undertaking the work and make recommendations of contract award.

6. Prepare and provide one (1) conformed set of the Contract Documents (engineering drawings in AutoCAD and PDF format and specifications in MS Word and PDF format) to the City.

5.0 PUBLIC OUTREACH AND EDUCATION

The City will continue to perform public outreach and communications activities in accordance with the strategies identified in the “Public Outreach Summary Report (February 2014)”. Tetra Tech will assist the City with public outreach activities. Additionally, a Technical Advisory Committee (TAC) will be convened to provide oversight of the project. The scope of services associated with public outreach and the TAC during the design and permitting phases of this project are as follows:

Public Outreach

- Conduct two (2) public perception surveys of the City’s citizens to measure the effectiveness of education and outreach efforts that have occurred. The survey results will be included in the Public Outreach Summary Report.
- Measure the effectiveness of the established website, tracking the number of unique webpage views monthly to measure the number of stakeholders using the site.
- Plan a media day with local media to discuss the project.
- Prepare an annual update to the February 2014 Groundwater Replenishment Project, Public Outreach Summary Report, including results from the above listed activities to be provided each year through the first year of water treatment plant operation. For this design and permitting phase, one (1) annual report update will be produced in 2016.
- Conduct quarterly public outreach status meetings and provide quarterly reports including the minutes from the quarterly public outreach status meetings and an updated work task schedule and timeline. Six (6) quarterly status meetings (via teleconference) and six (6) quarterly reports are anticipated during design and permitting based on this schedule:
 - 2015 – 2 meetings and reports
 - 2016 – 4 meetings and reports

The quarterly reports will contain a written review of outreach accomplishments, number of participants reached, number of site visits and pageviews to the project

website, survey results, material samples, photos and any other relevant information related to the project. The reports are due the last day of each quarter, December 31; March 31; June 30, and September 30, via email to the Southwest Florida Water Management District. The quarterly reports shall be included in the updated Public Outreach Summary Report and shall include a summation of all interim reports, final project overall outreach/impact numbers, program evaluation and evaluation results with recommendations for improvement.

- Attend (via teleconference) the project's monthly status meetings.
- Prepare a stakeholder database/ mailing list of property/business owners, elected/appointed officials, media, and other interested parties.
- Prepare Community Awareness Plan (CAP) that outlines the outreach activities to be implemented during the project.
- Prepare for and conduct up to five (5) informational meetings with community or City representatives.
- Prepare for, conduct, and summarize three (3) public meetings with stakeholders and Council members.
- Conduct ½-day workshop with the City and the SWFWMD to discuss potential public education elements to be included in the water purification treatment facility to promote the findings of the project along with other industry best practice messaging for water resources and conservation. Estimated costs associated with potential public education elements will be developed. The workshop discussion and the follow up costing evaluation will be summarized in a technical memorandum.
- Participate in two (2) Technical Advisory Committee (TAC) meetings during the design, permitting and bidding phase of this project.

Technical Advisory Committee (TAC)

- Form the Technical Advisory Committee (TAC), which will review the project's drawings and specifications at 30% and 90% design and provide objective technical oversight during design and permitting. The TAC will be comprised of the following members:
 - Technical expert in designing and permitting reclaimed water purification systems to potable water standards

- Technical expert in designing and permitting Florida groundwater injection systems into USDW (underground source of drinking water) aquifers
- Expert in public outreach design and administration
- At least one citizen representative

Deliverables – Eight (8) copies and one (1) PDF electronic copy will be provided for each submittal described below:

- *Draft and Final Annual Public Outreach Summary Report*
- *Draft and Final TAC Summary Document*

3. PROJECT GOALS:

The following work products will be delivered to the City and the SWFWMD as part of this project:

- *Draft and Final Facility Planning Technical Memorandum*
- *Draft and Final Preliminary Design Report*
- *60%, 90%, and 100% Design Plans and Specifications*
- *Draft and Final Permit Applications*

Eight (8) hard copies and electronic pdf file copies of these documents will be provided as follows:

- Five (5) hard copies and one (1) pdf copy to the City
- Three (3) hard copies and one (1) pdf copy to the SWFWMD

The project drawings will be produced utilizing Revit 2013 to allow for the production of three dimensional (3D) drawings. At the completion of the project, the record drawings will be submitted in AutoCAD Release 2011 format.

4. BUDGET:

This price includes all labor and expenses anticipated to be incurred by Tetra Tech, Inc. for the completion of these tasks in accordance with Professional Services Method “A” – Cost Times Multiplier Basis for Task 5.2 only and Method “B” – Lump Sum – Percentage of Completion by Task, **for a fee not to exceed two million, seven hundred ninety seven thousand, nine hundred dollars (\$2,797,900.00).**

The City will be responsible for paying permit application fees.

5. SCHEDULE:

The project is to be completed 15 months from issuance of notice-to-proceed. The project deliverables are to be phased as follows:

Preliminary Design (30% Design)

180 calendar days

60% construction documents and permit applications	270 calendar days
90% construction documents	360 calendar days
Final (100%) construction documents	450 calendar days

6. STAFF ASSIGNMENT (Consultant):

Many team members will be involved in this project. Tetra Tech’s primary staff assignments for this project are as follows:

- Project Manager - Emilie Moore
- Engineer of Record - Jarrett Kinslow
- Quality Assurance/ Quality Control (QA/QC) – James Christopher, Jill Hudkins, Gary ReVoir, Jon Fox
- Technical Advisors – Steve Tedesco, Mark Wilf
- Project Engineers – Dave MacNevin, Jennifer Roque, James Warner, John Toomey

The City’s primary staff assignments for this project are as follows:

- Project Manager – Robert Fahey
- Deputy Project Manager – Lan-Anh Nguyen
- Project Team – David Porter, Kathy McGrath, Fred Hemerick, Glenn Daniel

7. CORRESPONDENCE/REPORTING PROCEDURES:

Engineer’s/Architect’s project correspondence shall be directed to Emilie Moore, PE. City project correspondence shall be directed to Lan-Anh Nguyen, PE with copies to others as appropriate.

8. INVOICING/FUNDING PROCEDURES:

Invoices for work performed shall be submitted monthly to the City of Clearwater, Engineering Department, Attn.: Veronica Josef, Senior Staff Assistant, PO Box 4748, Clearwater, Florida 33758-4748. Contingency services will be billed as incurred only after written authorization is provided by the City to proceed with those services.

City Invoicing Code: **0315-96773-561300-533**

9. INVOICING PROCEDURES

At a minimum, in addition to the invoice amount(s) the following information shall be provided on all invoices submitted on the Work Order:

- A. Purchase Order Number and Contract Amount.
- B. The time period (begin and end date) covered by the invoice.
- C. A short narrative summary of activities completed in the time period.
- D. Contract billing method – Lump Sum or Cost Times Multiplier.
- E. If Lump Sum, the percent completion, amount due, previous amount earned and total earned to date for all tasks (direct costs, if any, shall be included in lump sum amount).

- F. If Cost Times Multiplier, hours, hourly rates, names of individuals being billed, amount due, previous amount earned, total earned to date for each task and other direct costs (receipts will be required for any single item with a cost of \$50 or greater or cumulative monthly expenses greater than \$100).
- G. If the Work Order is funded by multiple funding codes, an itemization of tasks and invoice amounts by funding code.

10. SPECIAL CONSIDERATIONS:

The consultant named above is required to comply with Section 119.0701, Florida Statutes (2013) where applicable.

The City is responsible for paying all application fees for permits, registrations, and certifications, including:

- LEED registration and certification fees
- Permit application fees for FDEP, SWFWMD, Pinellas County, and City permits

The City is responsible for the expenses associated with advertising, production and delivery of materials associated with the public outreach campaign.

PREPARED BY:

APPROVED BY:

Mark Rynning, PE
Executive Vice President
Tetra Tech, Inc.

Michael D. Quillen, PE
City Engineer
City of Clearwater

Date

Date

WORK ORDER INITIATION FORM

CITY OF CLEARWATER DELIVERABLES STANDARDS

FORMAT:

The design plans shall be compiled utilizing one of the following standards:

City of Clearwater CAD standards or Consultant's CAD standards (please provide all supporting documents when utilizing Consultant's Standards).

DATUM:

Horizontal and Vertical datum shall be referenced to North American Vertical Datum of 1988 (vertical) and North American Datum of 1983/90 (horizontal). The unit of measurement shall be the United States Foot. Any deviation from this datum will not be accepted unless reviewed by City of Clearwater Engineering/Geographic Technology Division.

DELIVERABLES:

A minimum of two (2) signed and sealed Plans and Contract Documents (specifications book) labeled "ISSUED FOR BID" shall be provided at the onset of the bid phase, as well as electronic copies. Electronic plan copies in PDF and CAD and electronic contract documents in PDF and MS Word.

The design plans shall be produced on bond material, 24" x 36" at a scale of 1" = 20' unless approved otherwise. The consultant shall also deliver all digital files in CAD drawing format and PDF format together with all project data in AutoCAD Civil 3D file format. All references, such as other drawings attached, images and graphic files, custom fonts and shapes shall be included in hard copy and electronic copy.

Prior to the City Council award date, a minimum of two (2) copies of signed and sealed plans and contract documents (specifications book) labeled "CONFORMED" shall be provided. All revisions made during the bid phase shall be included in the plan sets and noted in the revision block or as a footnote. Copies of each Addendum shall be included at the front of the contract and all revisions made during the bid phase shall be incorporated into the Contract Documents.

Electronic copies of "CONFORMED" plans (PDF and CAD) and contract documents (PDF and MS Word) shall be provided prior to the City Council award date.

NOTES:

- If approved deviation from using Clearwater CAD standards, the consultant shall include all necessary information to aid in manipulating and printing/plotting the drawings. Please address any questions regarding file format to Mr. Tom Mahony, Geographic Technology Manager, at (727) 562-4762 or email address: tom.mahony@myclearwater.com.

Groundwater Replenishment Water Purification Plant Design, Permitting, Bidding, and Public Outreach/Education

Tetra Tech, Inc.

WORK ORDER INITIATION FORM PROJECT BUDGET

Task	Description		Consultant Services	Total
1.0	Preliminary Design			
1.1	Project Management & Progress Meetings		\$32,200	
1.2	Treatment Facility Site Planning		\$67,100	
1.3	Wellfield & Pipeline Planning		\$21,500	
1.4	Survey & Ecological Evaluations		\$73,100	
1.5	Subsurface Geotechnical Engineering		\$25,400	
1.6	Building Programming		\$62,200	
1.7	Preliminary (30%) Design Documents		\$471,400	
Total Lump Sum Preliminary Design				\$752,900
2.0	Final Design			
2.1	Project Management & Progress Meetings		\$89,900	
2.2	Subsurface Utility Engineering		\$30,500	
2.3	QA/QC, Design Coordination, Cost Estimating		\$163,200	
2.4	Design for LEED Certification		\$52,600	
2.4	60% Design		\$812,700	
2.5	90% Design		\$406,300	
2.6	100% Design		\$135,500	
Total Lump Sum Final Design				\$1,690,700
3.0	Permitting			
3.1	Meetings, Permits Preparation & Submittal		\$109,500	
Total Lump Sum Permitting				\$109,500
4.0	Bidding Assistance			
4.1	Bidding Assistance		\$28,100	
Total Lump Sum Bidding Assistance				\$28,100
5.0	Public Outreach and Education			
5.1	Public Outreach	Lump Sum	\$146,700	
5.2	Technical Advisory Committee (TAC) Allowance	T&M, NTE	\$40,000	
5.3	Services Contingency		\$30,000	
Total Public Outreach and Education				\$216,700
Subtotal, Labor and Subcontractors				\$2,797,900
Grand Total				\$2,797,900