TASK ORDER NO. 2

NORMAN UTILITIES AUTHORITY
OWNER

AND

CAROLLO ENGINEERS, INC.

This Task Order is issued by the OWNER and accepted by ENGINEER pursuant to the mutual promises, covenants and conditions contained in the Agreement between the above named parties dated the 22nd day of May, 2012, in connection with:

Phase II Water Treatment Plant Improvements
(Project)

PURPOSE

The purpose of this Task Order is to:

Amend Task Order No. 1 to authorize the follow:

- Removal of the remaining portions of the flood study (Subtasks 220.6 through 220.9) based upon the conclusion that expansion of the existing lagoons within current property is not feasible given estimates of the location of the 100-year flood and the current Strategic Water Supply Plan Recommendations to reduce annual average withdrawals of 10.5 mgd from Lake Thunderbird to current permit levels.
- Preparation of a technical memorandum to evaluate two long-term solids disposal options and provide recommendations for solids handling and disposal at the Norman WTP.
- Design Services to prepare additional plans and specifications to supplement Task Order No. 1 plans and specifications to include (along with the elements in Task Order No. 1) the following features in a single construction contract :
    - Expand the new chemical building to include additional system chemicals to suppliment ozone disinfection, enhance biological filtration, and rehabilitate/replace existing chemicals storage and feed systems.
    - Design a settled water lift station to overcome hydraulic limitations for incorporation of an intermediate ozone system for taste and odor removal.
    - Design a pure oxygen ozone system for oxidation purposes.
    - Design an Ozone contactor to achieve advanced oxidation of settled water to achieve taste and odor removal and oxidize contaminants of emerging concern. Ozone will not be designed to meet ODEQ requirements for primary disinfection requirements.
    - Retrofit existing filtration systems with air/water backwash, non-chlorinated backwash water, and additional media to promote
    - Design a UV disinfection system to achieve primary drinking water disinfection standards and satisfy ODEQ requirements for the elimination of chloramines disinfection.

- Additional services required to prepare cost opinions and provide bidding services for these additional/modified design elements.
- Allowances for the following:
  - Division of design into two distinct biddable projects to allow for cost loading of design elements.
  - Design and bidding services for inclusion of a solids handling pump station and force main to transfer solids from the Water Treatment Plant to the Norman WWTP through the existing gravity sewer system.
- Authorize Construction Administration Services for a 23 month construction duration which involve the following subtasks:
  - Task 300 - Project Management
  - Task 305 - Conformed Drawings and Specifications
  - Task 310 - Progress Meetings and Workshops
  - Task 315 - Prepare Responses to Request for Information (RFI's)
  - Task 320 - Review Shop Drawings and other Submittals
  - Task 325 - Evaluate Contractor Change Order Requests
  - Task 330 - Prepare Change Order Request and Change Orders
  - Task 335 - Review Monthly Payment Requests
  - Task 340 - ODEQ Coordination and Other Services During Construction
  - Task 345 - Final Walkthrough and Final Completion

- Authorize full-time on-site Construction Observation Services for a 23 month construction duration
- Authorize Post Construction Services for the following subtasks:
  - Task 500 – Interactive Operation and Maintenance Manuals
  - Task 510 - Record Drawings
  - Task 520 - Operation and Startup Assistance

ENGINEER'S SERVICES

See Exhibit A to Task Order No. 2 for additional details regarding authorized modifications for Task Order No. 1 under this contract.

TIME OF PERFORMANCE

See Exhibit A to Task Order No. 2 for additional details regarding authorized modifications for Task Order No. 1 time of performance under this contract. The dates presented in Exhibit A are based upon the performance of the design under one contract without the allotted elements. Should these be incorporated, the times of performance will change.

PAYMENT

See Exhibit B to Task Order No. 2 for a summary of the additional payment authorized under this Task Order No. 2.

See Exhibit B to Task Order No. 1 for the summary of the payment authorized under Task Order No. 2.

EFFECTIVE DATE

This Task Order No. 2 is effective as of the _____ day of _____, 2015

IN WITNESS WHEREOF, duly authorized representatives of the OWNER and of the ENGINEER have executed this Task Order No. 2 evidencing its issuance by OWNER and acceptance by ENGINEER.

CAROLLO ENGINEERS, INC.

By: _____
Vice President

By: _____
Senior Vice President

OWNER

Accepted this _____ day of _____, 2015.

By: _____
Officer

ATTEST:

_____
Secretary

Approved by the City Attorney's Office on February 2, 2015.

_____
Assistant City Attorney

Exhibit A to Task Order No. 2
Scope of Services
Phase II Water Treatment Plant Improvements
Design, Bidding and Construction
Contract K-1112-124

Task 200 – Project Management: No change to task descriptions; however, additional effort required for Task Order No. 2 items.

Task 210 – Agency Coordination: No change.

Task 215 – Design Project Meetings and Workshops: No change to task descriptions; however additional effort required for Task Order No. 2 items.

Task 220 – Flood Study:

a. Subtask 220.1 – Data Collection and Review: **No change.**
b. Subtask 220.2 – Runoff Flow Computation: **No change.**
c. Subtask 220.3 – HEC-RAS Model Development: **No change.**
d. Subtask 220.4 – Field Survey: **No change.**
e. Subtask 220.5 – Hydraulic Analysis of Present Conditions: **No change.**
f. Subtask 220.6 – Hydraulic Analysis of Ultimate Conditions: **DELETE and replace with the following**.

"Subtask 220.6 – WTP Solids Handling Evaluation: The purpose of the WTP Solids Handling Evaluation is to evaluate long term solids disposal options. Staff has observed that when they stay within their current allocation from Lake Thunderbird, existing lagoon system works well (capacity of existing lagoons if WTP exceeds approximately 8.4 mgd). Alternatives that will be evaluated are:

1. Alternative No. 1: Continue current operation of solids handling, including operation of lagoons and land application.
2. Alternative No. 2: Pumping solids to the Norman Water Reclamation Facility (WRF) for processing."

g. Subtask 220.7 – Improvement Project Development: **DELETE and replace with the following**.

"g. Subtask 220.7 – WTP Solids Handling Project Development: Engineer shall determine improvement projects and provide cost opinions for long-term (20 year) disposal of WTP solids.

h. Subtask 220.8 – Flood Study Memorandum: **DELETE and replace with the following**.

"h. Subtask 220.8 – WTP Solids Handling Memorandum: Engineer shall prepare memorandum summarizing the alternative development, analysis, and recommend improvements."

i. Subtask 220.9 – Agency Coordination: **No change**.TM on the Solids Evaluation. ($20,0000).

h. Subtask 220.8 – WTP Solids Handling Memorandum: Engineer shall prepare memorandum summarizing the alternative development, analysis, and recommend improvements."

Task 225 – Ozone/Biofiltration Pilot Plant Study: No change.

Task 230 – Field/Site Surveying: No change to task description; cost for survey activities are included in revised project budget.
Task 235 – Geotechnical Investigations at WTP: No change to task descriptions, however additional effort required for Task Order No. 2 items. To obtain data to evaluate subsurface conditions for the proposed buildings and structures, at total of 20 borings will be performed.

Task 240 – Preparation of Drawings (plans for Project Construction:

a. Subtask 240.1 – New Disinfection Building Housing Hypochlorite Generation and Liquid Ammonium Sulfate Systems: Add the following text at end of current subtask description.
"New Disinfection Building also will house bisulfite, hydrogen peroxide, phosphoric acid, carbon dioxide, and fluoride. Building layout will be generally as shown in the preliminary plan provided in Attachment D. See Subtask 240.1 task description table (which includes both Task Order 1 and 2 items) for additional information."

b. Subtask 240.2 – Ozone System for Taste and Odor Reduction and Ultraviolet (UV) System for Disinfection: Remove the existing task description and replace with the following text. See Subtask 240.2 task description table for additional information.
"Based on the results of the ozone pilot study and the conceptual design evaluation, it is recommended that intermediate ozone and biofiltration be employed for taste and odor reduction followed by UV for disinfection.

The new ozone contactor will be used to reduce geosmin and MIB concentrations through Advanced Oxidation Processes (AOP) at high pH downstream of the softening process. It is assumed that a single contactor will be designed to treat the entire plant capacity. The contactor will consist of a series of over-under flow baffle walls with fine bubbled diffusers in the first and second chambers. The ozone contactors, LOX storage, and ozone generation equipment will be installed in separate buildings. Although the new process may fit within the existing hydraulic profile, it is assumed that a low-lift pump station will be required to pump between the softening basins.

The UV facility will be constructed downstream of the filters to meet primary disinfection requirements."

c. Subtask 240.3 – Aging Infrastructure and Treatment Capacity Improvements: Minor change to task description to include work related to modifications to Filters 1 through 8. See Subtask 240.3 task description in the following table (which includes both Task Order 1 and 2 items) for detailed description of task items. Add the following text to the end of the subtask description:

1. Subtask 240.3B – Solids disposal improvements necessary to pump WTP solids to the Norman WRF. This subtask assumes design of a lift station and

forcemain to connect to a nearby existing sanitary sewer lift station. Design will be based on results of Subtask 220.6 WTP Solids Handling Evaluation . Other solids handling improvements not related to the disposal of solids are included in Subtask 240.3.

d. Subtask 240.4 – Remodel Maintenance Shop and Create New Storage Area: Remove the existing task description and Attachment B and replace with the following text. See Subtask 240.4 task description table (which includes both Task Order 1 and 2 items) for additional information.

"The existing maintenance shop space will be remodeled to allow parking of equipment and storage. One roll up door will be added with remainder of interior features to be demolished. A new maintenance shop will be constructed and will incorporate office space, conference space, and restroom facilities. A preliminary plan is provided in Attachment E."

Remove Attachment C Estimated Drawing List (excluding Ozone). The preliminary drawing list has been updated to reflect the additional Task Order 2 items and is included as Attachment F.

Task 245 – Design and Preparation of Project Specifications: No change to task descriptions, however additional effort required for Task Order No. 2 items.

Task 250 – Prepare Estimates of Probable Construction Costs: No change to task descriptions, however additional effort required for Task Order No. 2 items.

Task 255 – Contractor Prequalification: No change to task descriptions, however additional effort required for Task Order No. 2 items.

Task 260 – Project Advertisement and Bidding: Task 260 and subtasks 260,1 though 260.4 as included in Task Order No. 1 assume that a single construction project which includes all design items described above. Subtask 260.5 provides an allowance for bidding the improvements in two bid packages.

"e. Subtask 260.5 – If the City decides to issue improvement projects described above as two construction projects, this allowance will be used to cover Engineer's increased costs associated with issuing two sets of construction documents. Engineer will perform services described in Subtasks 260.1 through 260.4 for each improvement project. If the City decides to issue single construction project, the allowance provided in Subtask 260.5 will not be used.

It is assumed that items that will be bid in the first bid package will indude:
1. High Service Pump Station
2. Chemical Feed System for Alum and Ferric Sulfate

All remaining items comprising the work described in this Task Order will be bid in a separate bid package."

Attachment A – Anticipated Pilot Study Equipment: **No change.**

Attachment B – Preliminary Maintenance Barn Layout: **Delete.**
Attachment C – Estimated Drawing List (excluding Ozone): **Delete.**
Attachment D – New Disinfection Building Layout
Attachment E – New Maintenance Building Layout
Attachment F – Preliminary Drawing List (single construction project)

Time of Completion (all items)
The schedule assumes that a single set of bid documents will be issued. If improvements are issued as two bid packages, additional time will be required.

Task	Approximate Duration (weeks)	Weeks after NTP (Task Order 2)
Notice to Proceed		
Geotechnical Investigations (from Task Order 1)	4	8
Preliminary Design of Improvements	18	22
Review and Acceptance	2	24
Interim Design Submittal	12	36
Review and Acceptance	2	38
Final Design Submittal	12	50
Review and Acceptance	2	52
Bid Phase Services	6	58

Subtask 240.1 – New Disinfection Building ~~Housing Bulk Hypochlorite and Ammonia Sulfate System~~ (Task Order 1 and 2)		
Project Element	**Description**	**Features**
Chemical Feed Systems – New Disinfection ~~System~~ Building		
Bulk/On-site Generation Sodium Hypochlorite System	• Onsite hypochlorite generation system designed to feed up to ~~4.0~~ 8.00 ppm at 20 mgd • 30 days minimum storage of brine based upon anticipated average day and average dose. • Solution storage tanks to be equipped with supplement bulk delivery unloading station and a minimum of 1.5 days storage for generation equipment failure event. • Installation of piping and appurtenances for primary and secondary feed points (assumed 6 total).	• Brine storage capacity of 20 tons • Two 750 ppd generators • softener and water heater/chiller for brine solution feed • One air cooled rectifier • Two interior sodium hypochlorite solution storage tank with capacity of 18,000 gallons each • Three (1 spare) peristaltic hose feeder pumps and two brine feed pumps • Two hydrogen dilution blowers and one hypo dilution panel
Liquid Ammonia Sulfate System	• System designed to feed up to ~~1.0~~ 1.78 ppm at 20 mgd • Storage based upon anticipated average day and average dose • Installation of piping and appurtenances for primary and secondary feed points (assumed 4 total)	• New FRP interior 10,000 gallon ammonia storage tank • Three metering pump skids • Ammonia feeders and associated dilution water softeners to be housed in onsite generation building
Sodium Bisulfite Solution	• Dose is based on needing to quench up to 5 mg/L chloramines (as monochloramine) at a stoichiometric ratio of 1.47. • System designed to feed up to 7.35 ppm at 20 mgd • Installation of piping and appurtenances for primary feed points (assumed 2 total)	• New FRP interior 3,000 gallon sodium bisulfite storage tank • Two metering pumps

Hydrogen Peroxide	• System designed to feed up to 0.10 ppm at 20 mgd • Storage based upon anticipated average day and average dose • Installation of piping and appurtenances for primary feed points (assumed 2 total)	• Storage area provided for 1 tote + 1 spare • Two metering pumps
Phosphoric Acid	• System designed to feed up to 0.03 ppm (as P) at 20 mgd • Storage based upon anticipated average day and average dose • Installation of piping and appurtenances for primary feed points (assumed 2 total)	• Storage area provided for 1 tote + 1 spare • Two metering pumps
Fluoride	• System designed to feed 0.8 mg/L at 20 mgd • Storage based upon anticipated average day and average dose • Installaion of piping and appurtenances for primary feed points (assumed 2 total)	• Storage area provided • Redundant feeder

Chemical Systems – Primary Process Chemicals		
Chemical Building	• Building to house the following: o Brine feed pumps o Sodium hypochlorite generators and associated equipment o Sodium hypochlorite feeder pumps o Ammonia feed pumps o Hypochlorite storage tanks and containment area o Ammonium sulfate storage tanks and containment area o Exterior slab for brine storage o Bisulfite feed pumps and storage o Hydrogen Peroxide feed pumps and storage (Alternate) o Phosphoric Acid feed pumps and storage o Fluoride feed pumps and storage	• Sloped roof with steel bar joists and built-up membrane • 8-inch CMU with 4-inch brick fascia to match existing brick • Double insulation glass windows to match Chemical Building • Electrical to be fed from Electrical Building
Electrical System Improvements		
Disinfection and Ammonia	• New 480V distribution equipment (MCCs and switchboard) o MCC-DISIN-A, MCC-DISIN-B	• Install in Disinfection Building • New MCCs to operate facilities associated with both the ammonia feed system and the onsite sodium hypo generation system as well as other new chemical systems • Master plan for future generation equipment. • MCCs to be fed from SWGR-1 in the Electrical Building • Include provisions for City supplied security system
Lighting Design	• Lighting design for Disinfection Building interior/exterior	• Lighting and receptacles.
Grounding	• Grounding of Disinfection Building	• New grounding grid will be installed

Instrumentation and Control System		
Server and Network	• No improvements	• No improvements
SCADA System Software	• SCADA system software	• Complete integration of all new systems into the existing SCADA system • Incorporate select loads into Automatic transfer control system program for backup from existing generator
Plant Network Communication System	• New fiber optic loop to be tied into existing system fiber optic loop	• Fiber optic cables likely between Electrical Building and Filter Building
Plant Network PLC System	• Install PLC for monitoring and control of new systems in Disinfection Building	• Building PLC(s) (PCM-DISIN) shall be located in the Disinfection Building • PLC(s) to monitor and control sodium hypochlorite, ammonia sulfate, polymer, sodium bisulfite, hydrogen peroxide, phosphoric acid and fluoride system systems
Instrumentation and Controls	• New Instrumentation for Disinfection Building • Flow pacing and feeding controls of chemical systems listed.	P&IDs for the following systems: • Onsite Hypochlorite • Ammonia sulfate • Bisulfite • LAS • Hydrogen Peroxide • Phosphoric Acid • Polymer feed • Fluoride
HVAC/Fire Protection System Improvements		
Disinfection Building Heating	• Separate heating for SH and Ammonia Rooms • Heating as required for plant operations and maintenance	• Low speed ventilation for 6 air changes/hour • Indirect fired tube heaters for corridor
Disinfection Building Cooling	• Cooling for SH and electrical rooms only	• Area with Generators and rectifier to be cooled by ambient air from HVAC system during summer months
Disinfection Building Ventilation	• Ammonia room and SH room to have separate ventilation	• Ventilation system will be designed as required by code and per discussion with City staff

Fire Protection	• Fire protection system	• Install pre-action deluge or other system conforming to City Fire Marshall Standards
Security System	• Coordinate with the City's designated security system installation contractor	• Coordination includes only conduit installation locations.
Utility System Improvements		
Utility Water	• Design supply water system for hypochlorite/ammonia sulfate dilution piping	• Design connection to new main pressure zone pumps to bring new 8-inch pipe to Disinfection Building • Provide prepackaged booster pump station for generation system water
Utility Air	• Route pneumatic piping to Disinfection Building for operation of pneumatic equipment	• Similar to existing system
Drainage	• Disinfection Building drainage system	• Building drains to sludge lagoons

Subtask 240.2A – Ozone System for Taste and Odor Reduction (Task Order 2) – OZONE CONTACTOR, GENERATION AND LOX, AND INTERMEDIATE PUMP STATION		
Project Element	**Description**	**Features**
Ozone System/Pump Station		
Ozone System	• New ozone contactor used to meet primary disinfection requirements and to reduce geosmin and MIB concentrations • Ozone contactors, LOX storage and ozone generation equipment installed in separate buildings	• Liquid Oxygen fed system with ambient air vaporizers. • Ozone generation equipment and all appurtenances such as open loop cooling, and ozone destruction • Safety monitoring equipment as required by code
Ozone Contactor	• System designed for 20 mgd hydraulic flow	• 1 contactor trains each with 20 mgd capacity • Over-under flow baffle walls with fine bubbled diffusers in the first and second chambers with 95% average transfer efficiency

Ozone Generation	• System designed for 20 mgd hydraulic flow • Minimum Hydraulic flow: 4 mgd	• Total ozone dosage of 3.5 mg/L • 2 generators each with 675 ppd capacity • Inlet flow control valve sized to realize 15:1 turndown for low flow periods
LOX Storage	• System designed for 20 mgd hydraulic flow • Minimum Hydraulic Flow 4 mgd	• 1 LOX tank with emergency connection for portable LOX tank • 11,000 gal, providing 15 days of storage (3.5 mg/L, 20 mgd and 10% gas concentration) • 3 ambient vaporizers, each at 6,750 ppd O_2 (at 10% gas concentration)
Intermediate Pump Station	• System designed for 20 mgd hydraulic flow • Minimum Hydraulic Flow 4 mgd	• 4 Low-Lift Pumps Propeller with bypass around ozone system.
Ozone Electrical System		
Ozone 480V	• New 480V distribution equipment (MCCs and switchboards)	• Install in Ozone Generation Building • New MCCs to operate facilities associated with ozone systems and pump station • Master plan for future generation equipment • MCCs to be fed from switchgear in the Electrical Building
Lighting Design	• Lighting design for exterior and interior portion of Ozone systems	• New exterior lighting for roof of ozone contactor and LOX storage • New exterior/interior lighting for ozone generation building
Grounding	• Grounding of Ozone systems	• New grounding grid will be installed

Instrumentation and Control System		
Server and Network	• No improvements	• No improvements
SCADA System Software	• SCADA system software	• Complete integration of all new systems into the existing SCADA system • Incorporate select loads into Automatic transfer control system program for backup from existing generator
Plant Network Communication System	• New fiber optic loop to be tied into existing system fiber optic loop	• Fiber optic cables connecting to existing network
Plant Network PLC System	• Install PLC for control of Ozone systems	• PLCs shall be located in the Ozone Generation Building Control Room • Building PLC (PCM-OZONE) will monitor and control Low Lift Pumps and communicate with Ozone VCP PLC(s). Ozone VCP(s) will be provided with PLC(s) for control and monitoring of Ozone processes.
Instrumentation and Controls	• New Instrumentation for Ozone systems • Instrumentation and monitoring of pump station	P&IDs for the following systems: • LOX storage and feed • Gaseous oxygen (GOX) feed and monitoring • Ozone Generators • Cooling Water System • Ozone gas feed and monitoring • Destruct system
Instrumentation and Controls	• New Instrumentation for Ozone systems	• Typical instrumentation for lox storage, gas feed, ozone generation and ozone feed system as required for operation and monitoring • As recommended by ozone system supplier.
Ozone System HVAC/Fire Protection System Improvements		
Ozone Generation Building Heating	• Provide heating system appropriate for building	• Low speed ventilation for 6 air changes/hour • Indirect fired tube heaters for corridor

Ozone Generation Building Cooling	• Provide cooling as required for the ozone building	• Generators and rectifier to be cooled by HVAC during summer months
Ozone Generation Building Ventilation	• Provide appropriate ventilation required by local code	• 8-10 air changes per hour in summer • 6 air changes per hour in winter • For mechanical room, provide 6 air changes/hour for normal conditions; 12 air changes/hour for ozone/oxygen alarm
Fire Protection	• Fire protection system	• Install pre-action deluge or other system conforming to City Fire Marshall Standards
Security System	• Coordinate with the City's designated security system installation contractor	• Coordination includes only conduit installation locations.
Ozone System Utility System Improvements		
Utility Water	• Design supply water system for open loop cooling water system • It is assumed that recarbonated or finished water is used for the cooling water	• Design connection to new main pressure zone pumps to bring new 8-inch pipe to ozone contactor • Pumping system and piping for cooling water
Utility Air	• Route pneumatic piping to ozone system for operation of pneumatic equipment	• Design and layout of piping system
Drainage	• Ozone contactor and ozone generation building drainage system	• Building drains to sludge lagoons

Subtask 240.2B – Ultraviolet (UV) System for Primary Disinfection (Task Order 2) - UV DISINFECTION FACILITY		
Project Element	**Description**	**Features**
UV Facility		
UV Equipment	• Fully redundant UV disinfection system • 20 mgd hydraulic flow • Minimum Flow: 4 mgd	• Two 48-in reactors • Target dose of 17 mJ/cm2 based on a UVT of 85%
Electrical System Improvements		

UV System 480V	• New 480V distribution equipment	• New 480V distribution equipment to be fed from switchgear in the Electrical Building
Lighting Design	• Lighting design for exterior and interior portion of UV Facility	• New lighting and receptacles
Grounding	◦ Grounding of UV systems	◦ New grounding grid will be installed
Instrumentation and Control System		
Server and Network	• No improvements	◦ No improvements
SCADA System Software	• SCADA system software	◦ Complete integration of all new systems into the existing SCADA system • Incorporate select loads into Automatic transfer control system program for backup from existing generator
Plant Network Communication System	◦ New fiber optic loop to be tied into existing system fiber optic loop	◦ Fiber optic cables to be connected to existing network, location TBD.
Plant Network PLC System	• Install PLC for control of UV systems	◦ Building PLC (PCM-UV) shall be located in the UV Facility • PLC to monitor and control UV system
Instrumentation Upgrade	◦ New Instrumentation for UV systems	• Dose monitoring • UVT measurements • Flow pacing of UV dose
UV Facility HVAC/Fire Protection System Improvements		
UV Facility Heating/Cooling/Ventilation	• New HVAC system for UV Facility	◦ As required by code and plant/City Staff
Fire Protection	• New Fire protection system for UV Building	◦ As required by code and City
Security System	◦ Coordinate with the City's designated security system installation contractor	• Coordination includes only conduit installation locations.
Ozone System Utility System Improvements		
Utility Water	• Design supply water system for building ◦	• Design connection to new high pressure zone pumps
Drainage	• UV Facility drainage system	• Building drains to sludge lagoons

Subtask 240.3 – Aging Infrastructure and treatment Capacity Improvements (Task Order 1 and 2)		
Project Element	**Description**	**Features**
Raw Water System Improvements		
~~To be negotiated following ozone pilot study results~~ Raw Water System	• No improvements.	• No improvements
Solids Contact Clarification		
Solids Contact Clarifier 3	• Yard piping modifications to facilitate direct discharge to lagoon upon clarifier startup • ~~Redundant lime feed~~ • Provide way to startup clarifier offline (drain to lagoons directly or provide drain pump for corresponding filters)	• Discharge to common 12-inch line to lagoons (connect to existing SCC 4 drain line. Add butterfly diversion valves). • ~~Redundant lime feed loop and pinch valve assembly~~
Solids Contact Clarifier 4	• ~~Yard piping modifications to facilitate direct discharge to lagoon upon clarifier startup~~ • ~~Redundant lime feed~~ • Provide way to startup clarifier offline (drain to lagoons directly or provide drain pump for corresponding filters)	• Discharge to common 12-inch line to lagoons (connect to existing SCC 4 drain line. Add butterfly diversion valves). • ~~Redundant lime feed loop and pinch valve assembly (SCC 3 and 4 only)~~
Recarbonation Basins – Improvements		
Recarbonation Basin 1	• No improvements	• No improvements
Recarbonation Basin 2	• No improvements	• No improvements
Dual Media Filtration – Improvements		

Filters 1-8 ~~Piping~~ Modifications	• ~~To be negotiated following ozone pilot study and city testing of piping integrity~~ • Conduct piping integrity testing • Other modifications to be negotiated following integrity testing • Install air scour • Install new media retention baffles • Install new hydrogen peroxide and phosphoric acid dosing points • Install new filter drain pump • Replace filter media with GAC • Improve access to building (rollup door with windows)	• Coordination and implementation of new filter controls for these processes in conjunction with PLC installation and upgrade. See Filter PLC System improvements herein
Filter backwash supply modifications	• ~~To be negotiated following ozone pilot study~~ • Deactivate the existing backwash pump • Install new can backwash pumps downstream of filters so dechlorinated backwash water is used for cleaning filters	•

Filter Backwash Wastewater Collection	• Drain piping improvements to alleviate basement flooding • ~~Install one new earthen lagoon for filter backwash collection~~ • ~~New yard piping, manhole structures and piping modifications to existing to isolate backwash collection piping from sludge piping.~~ • ~~Modify drain piping in the filter gallery as needed to accommodate new filter backwash collection system~~ • ~~Security fence relocation~~ •	• ~~Dedicated backwash water collection lagoon~~ • ~~Lagoon/backwash collection yard piping modifications to include the construction of a diversion structure with automated valves/gates for backwash collection diversion and optional flushing. SCADA monitoring and control of diversion structure to be included.~~ • ~~Assumes stream improvements, if necessary to permit construction of lagoon, will be done by others.~~
Filter Backwash Wastewater Pump Station	• ~~Install new backwash water return pump station constructed within lagoon to return water to the head of the plant utilizing the existing 6-inch sludge decant force main.~~ • ~~New yard piping to convey decant to existing 6-inch sludge decant forcemain.~~ •	• ~~New backwash water return pump station to be prepackaged with electrically actuated plug valves and flow meter. SCADA monitoring and control of pump station to be included.~~ • ~~Station equipped with quick disconnects.~~
Finished Water Storage and Pumping		
Reservoir 1	• Replace drain valves • Replace and raise hatch (to prevent rainwater from entering) and replace ladder	•
Reservoir 2	• Replace drain valves	•
High pressure zone pump station	• Install two new 3 mgd pumps with new motors • Assumes that pumps will be sized by others • Conduct surge analysis (assuming that new 1 MG water tower is installed as scheduled in 2015 and without tank)	• Structural improvements, if any, to wet well to accommodate new pumps • Raise hatch • New header vault • Constant speed starters to be provided in the Electrical Building.

Finished water transmission main	~~• No improvements~~ • New connection to plant water line and filter backwash • New connection to WTP loop system to feed the carbon dioxide units	~~• No improvements~~
Solids Handling Improvements		
New lagoon storage	~~• Install one new earthen lagoon for sludge storage~~ ~~• New yard piping, manhole structures, and modifications to existing sludge piping for gravity flow of sludge from treatment facilities to new sludge storage lagoon~~ ~~• New yard piping and modifications to existing decant piping for gravity flow of decant water from new sludge storage lagoon to decant pump station~~ ~~• Security fence relocation~~ •	~~• Lagoon yard piping modifications to include the valving to manually isolate new sludge lagoon~~ • ~~Lagoon to be equipped with inlet and decant structures~~
New lagoon decant pump station	• OWNER to procure and install new decant pump station. Utilize existing 6-inch forcemain. • Install flow meter on 6-inch forcemain.	• Provide automated shutoff valves and fiber optic control to lagoon pump station. • SCADA monitoring and control of pump station • Station equipped with quick disconnects
Existing sludge lagoons	• Outlet gate valve replacement on each existing lagoon	• Design as alternate
Sanitary sewer	• New SS grinder and lift station for plan sanitary system and brine reject from ion exchange units • New gravity yard piping as needed • Tie into City sanitary sewer collection system	• Lift station will be designed to pump either to new sanitary sewer • Existing septic tank and leach field will be removed • SCADA monitoring of lift station.
Chemical Feed Systems – Disinfection System		

Chlorine Feed System	• Decommission of existing chlorine storage and feed system	• Decommission of existing chlorine system
Ammonia Feed System	• Decommission of existing ammonia storage and feed system	• Decommission of existing ammonia system
Chemical Systems – Primary Process Chemicals		
Pebble Quicklime storage and feed system	• Relocate existing aging tank, slurry loop pump, and emergency loop pump to chlorine room in Chemical Building • Installation of redundant lime aging tank in chlorine room • ~~Installation of redundant loop and metering valves to SCC 3 and 4~~ • Provide system redundancy	• Modifications to lime slurry piping to accommodate new aging tank locations • Replace portions of PVC pipe with copper to better absorb the water hammer • Install second emergency pump to feed SCC 1 and 2 • Modification of system to provide full redundancy of operation of all common equipment by all slakers. • Include general fail alarm as a hardwired contact from each Lime VCP to PLC-CHEM to provide better alarming to operators of potential problems. • Evaluate use of tube pumps versus loop system
~~Liquid Aluminum Sulfate Storage and Feed System~~	• ~~Replacement of storage tanks~~ • ~~Replacement of fill and pump suction piping for feed system~~ • ~~Replacement of metering pumps and associated appurtenances~~ • ~~New storage level measurement devices~~ • ~~Construction of chemical storage containment wall and sump pump~~ • ~~Emergency eyewash installation~~ • If bid as two construction projects, include replacement of alum pumps in kind.	• ~~New tanks and fill, vent, drain, and withdrawal piping with associated valving~~ • ~~New metering pumps for increased reliability~~

Carbon dioxide feed system improvements	~~• No improvements~~ • Replace valves • Add booster pump to improve feed	~~• No improvements~~
Ferric sulfate feed system improvements	• Replace feed pumps	• To match existing chemical layouts
Chemical Building	• New coatings • New door • Improve access (roll up door with windows)	
Chemical Feed Systems – Secondary Systems		
~~Temporary PAC storage and feed system~~	~~• Install support structure for hoist~~	~~•~~
Sodium Fluorosilicate System	~~• No improvements~~ • Decommission the existing fluoride feed system • Install new storage area, feeders, etc. in new Disinfection Building as listed in Table 240.1	~~• No improvements~~
Electrical System Improvements		
Backup or redundant primary power system	• Demolition of existing generator and NEMA 6 panel in Chemical Building	• Refeed affected circuits from panels in Chemical Building Electrical Room.
Main Service Electrical Improvements	• No improvements	• No improvements
High pressure zone 480V MCC improvements	• ~~Four~~ Two new soft starts • Decommission of existing exterior electrical gear and primary feed	• Re-feed pumps from electrical gear located in Electrical Building • OG&E coordination for decommission of primary feed to existing service
Chemical Building 480V MCC improvements	• No improvements	• No improvements
Filter Building lighting improvements	~~• To be negotiated following ozone pilot study~~ • No improvements	• ~~To be determined~~ • No improvements
Chemical Building lighting improvements	• No improvements	• No improvements

Site Lighting improvements	• ~~To be negotiated following ozone pilot study~~ • Demo all existing site lighting with associated lighting controls. • Provide new site lighting and new buried conduits/wire around the plant to replace the existing site lights.	• ~~To be determined~~ • Include centralized photocell and contactors, controllable from the Electrical Building. • Includes site lights around the main plant areas, but does not include lighting around the Lagoon Areas. • Pole-mounted LED lighting with hinges.
Instrumentation and Control System		
Well field system telemetry	• No improvements	• No improvements
Server and network	• No improvements	• No improvements
SCADA system software	• Complete integration of all new systems into existing SCADA system • Provide programming that allows chemical feed uses when water storage towers are full	• Upgrade SCADA system as necessary to handle new demands • Provide full monitoring and control of all new system
Filter PLC System	• ~~To be negotiated following ozone pilot study~~ • Install new PLCs for moinitoring and control of filters	• Each existing filter cabinet will be provided with a new CompactLogix PLC and an Operator Interface Terminal (OIT) • Each filter cabinet's existing pilot lights and individual controller functionalities will be replaced with control and status indications from each individual OIT. • PLCs to be provided with UPS. • Includes automatic filter controls and backwash calls, but no automatic backwashing controls. • Filter 1-4 enclosures will be replaced completely, Filter 5-8 will be provided with new metal plates.
Plant network communication system – SCC	• ~~To be negotiated following ozone pilot study~~ • No improvements	• No improvements

Plant network PLC system	• Install new PLCs for monitoring and control of all new equipment	• PLCs to be provided with UPS
Instrumentation upgrade	• New instrumentation where recommended	• Provide clearwell level monitors, one for each clearwell.
HVAC System Improvements		
Filter building	• ~~To be negotiated following ozone pilot study~~ • Replace existing heating with natural gas. Alternative heating sources to be considered in addition to traditional heaters	• Install new gas main into building and heaters
Main service pump station	• ~~To be negotiated following ozone pilot study~~ • No improvements	• No improvements
General Site Work		
Chemical trench	• Installation of new covers on old chemical trench (insulation 1" closed cell – add another layer of insulation and replace • Installation of new chemical trench for pneumatic piping and chemical solution feeds for ammonia and chlorine • ~~Additional chemical trench improvements to be negotiated following ozone pilot study~~ • Installation of new chemical trench for pneumatic piping and chemical solution feeds for polymer, sodium bisulfite, hydrogen peroxide, phosphoric acid, and sodium fluorosilicate • Heat chemical trench from Chemical Building or using radiant heaters	•

Sample line	• Install sample line from high pressure zone pumps (downstream of Well No.5) line to lab • Evaluate turbidity samplers from clarifiers; replace if needed to allow continuous sampling and provide alarms when turbidity is outside setpoint	• Include turbidity and chlorine monitoring
Utility System Improvements		
Utility Water	• ~~To be negotiated following ozone pilot study~~ • Connect to filter backwash supply • Connect to water loop	• To be determined
Utility Air	• ~~To be negotiated following ozone pilot study~~ • Install air compressor and new air lines to Filter Building	• Compressor and lines sized for appropriate flows.

Subtask 240.3B – Solids Disposal Improvements (Task Order 2)		
Project Element	**Description**	**Features**
Solids Disposal Improvements		
Solids Disposal Pump Station	• New pump station designed to pump WTP solids to an existing sanitary sewer lift station for solids disposal at the WRF • Force main connecting new pump station to nearby SSLS	• Location and features to be determined following Subtask 220.6

Subtask 240.4 – Maintenance Shop Remodel and New ~~Storage~~ Maintenance Building (Task Order 1 and 2)		
Project Element	**Description**	**Features**
Architectural		
Remodeling of existing maintenance shop	• Demo/relocate rigid maintenance equipment/facilities • ~~Remodel for additional office space~~ • Add one new roll up door	• ~~See Attachment B~~
New Maintenance Building	• New Maintenance Building approximately 80 ft x 40 ft	• See Attachment E
Electrical System		
New power feed to existing maintenance shop	• New 480V service from Electrical Building	• ~~Backup generation~~ • New 480V panelboard and transformer (exterior). Transformer to feed existing system panel (240/120) • ~~New 480V welder outlets (2)~~
~~New lighting to existing maintenance shop~~	• ~~New building interior lighting~~	• ~~New fixtures, ballasts, and lights for all area~~
New power feed to new Maintenance Building	• New 480V service from Electrical Building	• Backup generation (via existing generator). • New 480V panelboard and transformer/lighting panel • New 480V welder outlets (2)
New Maintenance Building 480V	• New 480V distribution equipment	• MCCs to be fed from switchgear in the Electrical Building
Lighting Design	• Lighting design for exterior and interior	• To match existing
Grounding	• Grounding	• New grounding grid will be installed
Instrumentation and Control System		
	• Not included	• Not included
HVAC/Fire Protection System Improvements		
Building heating and cooling in existing maintenance shop	• No improvements. • ~~Office space (heating/cooling)~~ • ~~Maintenance area~~	• ~~MAU (electric) for heating/cooling in offices and conference room~~ • ~~Heating (electric or natural gas tube) for maintenance area. 8-10 ACH for summer and welding ventilation~~ • No improvements.

Security system in existing maintenance shop	• Coordinate with the City's designated security system installation contractor	• Coordination includes only routing of site conduits to the existing location. All exposed conduits and wire in the building is by Owner's designated security system installation contractor.
Building heating and cooling in new Maintenance Building	• Office space, break/conference room, restrooms (heating/cooling) • Maintenance areas (heating/ventilation)	• Per owner designation and per local codes
Security system in New Maintenance Building	• Coordinate with the City's designated security system installation contractor	• Coordination includes only conduit installation locations.
Utility System Improvements		
Potable water in existing maintenance shop	• New plumbing and drain system for building	• Per code
Drainage in existing maintenance shop	• Building drainage system	• To new grinder station
Potable water in new maintenance building	• New plumbing and drain system for building	• Per code
Drainage in new maintenance building	• Building drainage system	• To new grinder station

CONSTRUCTION ADMINISTRATION: The following tasks describe the engineer's construction administration services. It is based upon an anticipated duration of construction of 23-months and a certain quantity of paperwork generated, samples collected and analyzed, and number of meetings conducted as a result of construction activities. In addition, in the event that notice to proceed for Construction is later than January 1, 2017, additional fee may be required and should be, at a minimum, adjusted based upon the ENR construction cost index ratio:

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Task 300 - Project Management. Engineer shall complete project management tasks to include 1) budget and schedule monitoring; 2) workshop planning and development; 3) overall internal project coordination; 4) overall project coordination between City and Engineer, Contractor and Engineer, and between Engineer and Engineer's Sub consultants.

Task 305 - Conformed Drawings and Specifications

ENGINEER shall prepare conformed drawings and specifications (updated design drawings to include the revisions contained in addenda). ENGINEER shall provide one (1) set of conformed full-sized reproducible drawings and two (2) sets of conformed half-sized drawings, and three (3) sets of conformed specifications to the City. ENGINEER shall provide two (2) sets of conformed full-sized reproducible drawings and three (3) sets of conformed half-sized drawings, and five (5) sets of conformed specifications to the CONTRACTOR.

Task 310 - Progress Meetings and Workshops. Engineer shall plan and facilitate monthly progress meetings with City staff and representatives from the Contractor to discuss the progress of the work and resolve issues. ENGINEER shall attend the following meetings during construction:

310.1 Pre-Construction Meeting

ENGINEER shall attend a preconstruction meeting to facilitate understanding of the contract requirements by all parties involved. The meeting will be conducted by the ENGINEER. Meeting notes will be prepared by the ENGINEER. One (1) on-site meeting is assumed for this task.

310.2 Attend Construction Progress Meetings

ENGINEER shall attend on-site monthly construction progress meetings. The budgeted amount for this task is based on attending one (1) meeting per month.

ENGINEER shall prepare meeting notes and provide updated submittal logs, RFI logs, and change order logs to OWNER.

310.3 Attend Bi-Monthly Progress Meetings Via Telephone: ENGINEER shall attend all remaining Bi-Monthly progress meetings via telephone or videoconference. Discussion topics, action items, and decisions made at these meetings will be recorded and updated submittal logs, RFI logs, change order logs, and meeting minutes will be provided to meeting participants and the City's Project Manager.

310.4 ENGINEER shall attend special on-site meetings (not conducted on the same day as the regularly scheduled meetings) at the request of the OWNER to discuss and assist in resolving construction issues. The intent of these meetings is to expedite the submittal review process and resolve contract change orders and requests for information. Five additional (5) meetings have been assumed for this task.

Task 315 - Prepare Responses to Requests for Information (RFI's) and Issue Contract Document Clarifications (CDC's).

315.1 ENGINEER shall prepare written responses to the CONTRACTOR's written questions and concerns that arise during construction through the Request for Information (RFI) process. ENGINEER shall provide clarification or direction to the contractor through written responses to these requests for information.

315.2 Contract Document Clarifications (CDC's) shall be initiated by the ENGINEER when questions and concerns arise that cannot be resolved through a close and thorough examination of the Contract Document, or for which an interpretation may result in a material change in the design or operational intent of the facility. CDC's shall include sketches and drawing/specification revisions.

315.3 ENGINEER shall maintain logs of RFIs and CDC's tracking the topic, date submitted, date responded and resultant actions of responses. The logs will be updated weekly and provided as a point of discussion in construction progress meetings.

Task 320 - Review Shop Drawings and Other Submittals.

320.1 Initial Submittal Review: Engineer shall review the shop drawings, material samples, O&M manuals, laboratory tests, mill tests results, and related information and provide responses within twenty-eight (28) calendar days to the contractor regarding the suitability of the proposed equipment and materials to be incorporated into the project. Items reviewed, actions taken (including allowed substitutions), and recommendations made will be maintained in a log that, along with the accepted shop drawings and related information will be turned over to the City following project construction.

320.2 Resubmittal Review: The Contract Documents permit the Contractor to submit up to one resubmittal to attain approval from the ENGINEER for a particular submission. The cost of submittal review beginning with the second resubmittal shall be borne by the CONTRACTOR. Reimbursement by OWNER will be made by deducting such costs from subsequent payments to CONTRACTOR.

320.3 Special Submittal Review Meetings: As part of the efforts to expedite the approval of certain submittals, the Contract Documents include a one-day review meeting at the Norman WTP following the ENGINEER's review period. The purpose of this meeting will be to review the SUPPLIER's Submittal and discuss ENGINEER's Comments. It is assumed that on-site review meetings will be conducted for the following submittals:

- Ozone Generators
- Chemical Feed Equipment – Onsite Generation
- Ozone Feed System
- 480V MCC.

Task 325 - Evaluate Contractor's request for Change Orders and Claims. Engineer shall review Potential Change Order (PCO's) submissions by the contractor and make recommendations to the City regarding the acceptance or rejection of the proposed change. This includes requests for additional time, and additional money. Engineer's services related to resolution of claims (over and above reviewing the claim and making recommendation to City) are beyond the scope of services.

Task 330 - Prepare Change Order Requests and Change Orders. Engineer shall prepare change order requests to the contractor for proposed changes in the contract for construction. Change orders, including modified and/or additional drawings, specifications, and other exhibits shall be prepared to define the scope and extent of the change and solicit a price from the contractor to perform the work.

Task 335 - Review Monthly Progress Payment Requests: Engineer shall review monthly progress payment requests from the contractor and make recommendations to the City for payment. This review shall include assessment of materials and/or equipment stored on-site or off-site in an approved and bonded warehouse and for which the contractor is requesting payment for stored materials.

Task 340 ODEQ Coordination and Other Services During Construction. Other services to be provided by the Engineer in support of the construction work includes the following:

340.1. Conduct factory witness tests as appropriate for equipment or systems likely to include large pumps and motors and instrumentation and control system upgrades. It is assumed that two (2) (offsite) factory witness tests will be required.

340.2. Maintain database of construction progress photographs (and videos as may become pertinent) for record purposes and for use in training and development of the Computerized O&M Manual).

340.3. Perform substantial completion walk-thru of the constructed improvements. Develop a punch list of incomplete work items for project construction and provide same to Contractor with a copy to City. Make recommendations to City regarding Substantial Completion of construction and issue certificate of Substantial Completion.

340.4 Coordination with ODEQ: SRF staff to comply with State DWSRF requirements for reporting and evaluation of construction documents.

Task 345 - Final Walkthrough and Recommend Final Acceptance. Following completion of construction, Engineer shall perform a final inspection of the work completed by the Contractor and make recommendations as appropriate for partial or final acceptance of the work. Following Contractor's completion of punch list items on Certificate of Final Completion, Engineer will conduct final walkthrough to verify correction of punch list items and process final payment application.

INSPECTION SERVICES: The following tasks describe the engineer's services associated with the inspection of the Work. It is based upon full time inspection for an anticipated duration of construction of 22-months plus 30 days for final completion activities, and a certain number of visits and days to conduct special inspections. Due to no fault of Engineer, should the duration of construction activities, final completion activities, or site visits/duration of special inspection be extended beyond those listed herein, additional inspection services for this period shall be considered outside the scope of this contract. In addition, in the event that notice to proceed for Construction is later than January 1, 2017, additional fee may be required and should be, at a minimum, adjusted based upon the ENR construction cost index ratio:

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Except to the extent specifically identified elsewhere in the Contract, Engineer shall not during site visits or as a result of such observations of work in progress, supervise, direct, or have control over the work being performed. Nor shall Engineer have authority over or responsibility for the means, methods, techniques, sequences or procedures of construction selected by the contractor or safety precautions and programs incident to the work or for any failure of the contractor to comply with laws, rules, regulations, ordinances, codes or orders applicable to the furnishing and/or performance of work.

Task 400 - Inspection Services.

400.1 Resident Inspection: Engineer shall provide Resident Project Representation (RPR) to observe the work in progress by the Contractor, subcontractor, vendors, and suppliers. This includes one (1) senior Resident Project Representative (RPR). Daily logs will be kept of the construction activities, decisions rendered, concerns, resolution of problems, etc. It is assumed that RPR full time services (8 hours/day, 5 days/week) will be provided for the total construction period of 22 months plus the total duration of final completion (30 days).

400.2 Electrical Inspection: Attachment A provides the anticipated construction schedule for the project. Much of the activity for the electrical installation will be concentrated over a period of three (3) months during the construction period. To provide the expertise necessary during this period, an electrical inspector will assist the RPR in review and inspection of the electrical and instrumentation and control installation. It is assumed that the electrical inspection will occur in two (2) trips of one (1) week each.

400.3 Special Inspection: Requirements for Special Inspection are found in *Chapter 17* of the *2006 International Building Code.* Special inspection is defined as the inspection of work, which requires expertise in order to ensure compliance with approved construction documents and referenced standards. To comply with these requirements, a structural inspector will assist the RPR in review and inspection of the foundations for all new buildings and Structures.

It is assumed that the special inspection will occur in four (4) trips of two (2) consecutive days.

400.4 The resident project representative (RPR) shall be responsible for weekly review of the as built set with the Contractor as well as weekly maintenance and review of Contractor's RFI's, change order's, claims and other administrative activities. RPR shall be responsible for ordering compliance testing, summarizing results of compliance testing in log form and informing Contractor and City of results on a daily basis.

POST CONSTRUCTION SERVICES:

Task 500 - Prepare Interactive O&M Manual

ENGINEER shall prepare an Operation and Maintenance (O&M) Manual for the Phase II improvements. The O&M Manual will be separated into three divisions, an introductory overview, individual unit process description, and appendices. Unit processes shall include: pretreatment, Ozone, Low Lift Pumping , Biofiltration , UV, Chemical Feed Systems, Electrical, Instrumentation and Control (SCADA), Emergency Generation, and Utility Water Systems. Each unit process chapter shall include a general operations description, process control, startup and shutdown, normal operating procedures, emergency operating procedures, alarm conditions and troubleshooting, design criteria, component equipment listing, safety, maintenance, and figures.

Four (4) copies of the O&M manual shall be provided in draft form for OWNER review and startup assistance. After incorporation of OWNER comments, four (4) copies of the manual shall be provided in hard copy format with electronic copies of text and figures for future revisions. In addition, in the event that notice to proceed for Construction is later than January 1, 2017, additional fee may be required and should be, at a minimum, adjusted based upon the ENR construction cost index ratio:

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O&M manuals for equipment will be provided separately by CONTRACTOR.
Engineer shall complete a computerized operations and maintenance (O&M) manual that integrates the work completed as part of this project into an interactive database. Specific subtasks to be completed include the following:

500.1 Develop Interactive Graphic Representations of Plant Areas: Engineer will develop 3-D renderings of the Norman WTP with sufficient detail to create interactive clickable references for the new areas:
500.2 Engineer will create a digital resource library (DRL) with a file structure containing the following elements for each clickable area/subarea as defined in task 500.1

500.3. Conversion & Indexing of Plant O&M Manual: The content of the resulting plant O&M manual, including text, figures, tables, drawings, and photographs, will be converted from its source application file formats to formats compliant to open standards including XHTML, PDF, and JPG. The converted content will be indexed to include information on each item's Title, Subject, Description, Author, Keywords, and Date of Publication.

500.4. Delivery of Interactive Computerized O&M Manual Platform: The electronic O&M manual will be installed on to a Windows Vista Server provided by the City. This platform is designed to provide the plant with an easy-to-use tool for hosting, browsing, searching, and cross-referencing reference materials regarding the plant. The platform will include easy-to-use, non-technical, browser-based features for quickly modifying existing content and uploading and cross-referencing new content without the need for consultant intervention or support.

Task 510 - Prepare As-Built Drawings. The CONTRACTOR will maintain a current set of marked-up Contract Documents detailing field changes and clarifications. During Construction, ENGINEER's RPR shall inspect CONTRACTOR's markups of As built drawings on a weekly basis to assess compliance with the requirements of the contract documents. Following Contract closeout, ENGINEER shall prepare one set of full-sized and one set of half-sized reproducible set of record drawings reflecting field changes and clarifications noted by the CONTRACTOR and ENGINEER. ENGINEER shall not be responsible for field measuring as-built conditions and will rely solely on the information provided by the CONTRACTOR as the basis for preparing record drawings.

Engineer shall complete edits to the project drawings to reflect changes made during construction such that the final set of drawings reflect, to the extent practical, actual constructed conditions. Final as-built drawings shall be provided to the City upon completion of this task along with reproducible CD's of the updated drawings. ENGINEER shall provide one (1) full- size copy of the drawings on Vellum, two (2) full-sized copies and two (2) 1/2 size hard copies of the drawings, and four hard (4) copies of the as-built construction set.

Task 520 - Conduct Operator Training and Start-up Assistance:

Initial operator training services shall include preparing a draft work plan for the overall training and use of the computerized operation and maintenance (O&M) manual. The work plan will be a brief document (ten to twenty pages plus schedule) describing anticipated Engineer and City responsibilities.

520.1 Training: Following substantial completion of the Work, Engineer shall conduct two 2-day training sessions at the Plant that will focus on the following:

Session 1:

1. Basis of design of process systems throughout the plant
2. Ozone System
3. Low Lift Pumping
4. Biofiltration
5. Chemical Feed Systems
6. UV Disinfection
7. Overall treatment optimization
8. Troubleshooting tips

Session 2:

1. Electrical System and Emergency Generation System
2. Instrumentation and Control System SCADA
3. Background information and use of the computerized O&M manual (including importing new or revised data, viewing and annotating record drawings, etc)
4. Updating the manual
5. Integration of manual information with the Plant Instrumentation and Control System

520.2 Startup: Engineer shall work with Plant staff during the final startup and the acceptance test prior to closeout of the construction contract. It is assumed the interim startup tasks will necessitate 160 hours during final (plant-wide) startup and debugging.