AMENDMENT NO. 1 TO
PROFESSIONAL SERVICES AGREEMENT
FOR THE FRANKLIN WASTEWATER RECLAMATION FACILITY
MODIFICATIONS AND EXPANSIOIN PROJECT
COF Contract No 2013-0001

THIS Amendment is made and entered into on this the ____ day of _____, 2013, by and between the **City of Franklin, Tennessee** ("City") and **CDM Smith** ("Consultant").

WITNESSETH:

WHEREAS, the City and Consultant entered into a Professional Services Agreement entitled City of Franklin, Tennessee Professional Services Agreement, Wastewater Reclamation Facility Modifications and Expansion Project (COF Contract No 2013-0001) ("Agreement"), dated the 3rd day of March 2013 at a fee not to exceed $2,967,150.00; and

WHEREAS, during the preliminary engineering (design) of the Project the Consultant and City staff has determined that there is a need for a revision in the Scope of Services for the Agreement to add Task 307, Task 405, Task 406, Task 407, Task 408, Task 409, Task 410, Task 411, Task 601 and Task 602 as found in Exhibit A, Amendment 1 Proposal (attached and made a part hereto); and

WHEREAS, the four Tasks as listed have multiple sub-parts which are described in Exhibit A; and

WHEREAS, the Consultant has presented to City staff a summary of costs that breaks down the anticipated work effort for each Task total Task Value (Table 1) as found in Exhibit A; and , has been reviewed by City staff and appears to be appropriate for the work required for completion of the Tasks; and

WHEREAS, City staff feels the Task Values as present in Table 1 of Exhibit A are appropriate for the anticipated work required for the Scope of Services revisions for the Agreement.

NOW, THEREFORE, in consideration of these premises and the mutual promises contained herein, it is agreed by and between the parties as follows:

1. The foregoing recitals are incorporated by reference as if fully stated herein.

2. Consultant's Responsibilities and Duties. The Consultant shall perform the design services as proposed in the Scope as found in **Exhibit A**. Exhibit A shall be considered as an integral part hereof.

3. City's Responsibilities and Duties. The City shall pay the Consultant in an amount not to exceed **Two Million Two Hundred Ninety-Three Thousand and No/100 Dollars ($2,293,000.00)** for the additional Services as described in Exhibit A for Task

307, Task 405, Task 406, Task 407, Task 408, Task 409, Task 410, Task 411, Task 601 and Task 602.

4. Force Majeure. Neither party will be liable to the other for any delay or failure to perform any of the services or obligations set forth in this Agreement due to causes beyond its reasonable control, and performance times will be considered extended for a period of time equivalent to the time lost because of such delay plus a reasonable period of time to allow the parties to recommence performance of their respective obligations hereunder. Should a circumstance of Force Majeure last more than ninety (90) days, either party may by written notice to the other terminate this Agreement. The term "force majeure" as used herein shall mean the following, as further described below: acts of God; strikes, lockouts or other industrial disturbances; acts of public enemies; orders or *restraints of any kind of the government of the United States or of the State or* any of their departments, agencies or officials, or any civil or military authority; insurrections, riots, landslides, earthquakes, fires, storms, tornadoes, droughts, floods, explosions, breakage or accident to machinery, transmission pipes or canals; or any other cause or event not reasonably within the control of either party. The parties agree to use The Old Farmer's Almanac, Nashville International Airport (http://www.almanac.com/weatherhistory/oneday.php?month=2&day=21&year=2007&number=723270&wban=13897) to determine whether weather conditions constitute a force majeure. If, on a particular date, thunder, tornadoes and fog are recorded, or if total precipitation exceeds one half inch, then it shall constitute a force majeure.

5. Equal Employment Opportunity. In connection with this Amendment and the project, CLIENT and CONSULTANT shall not discriminate against any employee or applicant for employment because of race, color, sex, national origin, disability or marital status. CLIENT and CONSULTANT will take affirmative action to ensure that CONSULTANT is employed and that employees are treated during employment without regard to their race, age, religion, color, gender, national origin, disability or marital status. Such action shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination, rates of pay or other forms of compensation; and selection for training, including apprenticeship. CONSULTANT shall insert the foregoing provision in all contacts relating to this Amendment or project.

6. Title VI – Civil Rights Act of 1964. CLIENT and CONSULTANT shall comply with all the requirements imposed by Title VI of the Civil Rights Act of 1964 (42 U.S.C. 2000d), 49 C.F.R., Part 21, and related statutes and regulations. CONSULTANT shall insert the foregoing provision in all contacts relating to this Amendment or project.

7. Conflicts of Interest. No amount shall be paid directly or indirectly to an employee or official of the State of Tennessee as wages, compensation, or gifts in exchange for acting as an officer, agent, employee, subcontractor, or consultant to the Agency in connection with any work contemplated or performed relative to this AGREEMENT. CONSULTANT shall insert the foregoing provision in all contacts relating to this Amendment or project.

8. Notices. Any notice provided pursuant to the Amendment, if specified to be in writing, will be in writing and will be deemed given: (a) if by hand delivery, then upon receipt thereof; (b) if mailed, then three (3) days after deposit in the mail where sender is located, postage prepaid, certified mail return receipt requested; (c) if by next day delivery service, then upon such delivery; or (d) if by facsimile transmission or electronic mail, then upon confirmation of receipt. All notices will be addressed to the parties at the addresses set forth below (or set forth in such other document which the Amendment may accompany, or such other address as either party may in the future specify in writing to the other):

In the case of the CLIENT:	In the case of CONSULTANT:
City of Franklin Attn: David Parker 109 Third Ave. South P.O. Box 305 Franklin, TN 37065 (615) 550-6660 davidp@franklintn.gov	CDM Smith Attn: Zack Daniel Six Corporate Centre 830 Crescent Centre Drive Suite 400 Franklin, TN 37067 DanielZA@cdmsmith.com

9. Waiver. Neither party's failure or delay to exercise any of its rights or powers under the Amendment will constitute or be deemed a waiver or forfeiture of those rights or powers. For a waiver of a right or power to be effective, it must be in writing signed by the waiving party. An effective waiver of a right or power shall not be construed as either (a) a future or continuing waiver of that same right or power, or (b) the waiver of any other right or power.

10. Severability. If any term or provision of the Amendment is held to be illegal or unenforceable, the validity or enforceability of the remainder of the Amendment will not be affected.

11. Precedence. In the event of conflict between this Amendment and the provisions of the previous Agreements, or any other contract, agreement or other document to which the Amendment may accompany or incorporate by reference, the provisions of this Agreement will, to the extent of such conflict (or to the extent the Agreement is silent), take precedence unless such document expressly states that it is amending this Amendment.

12. Entire Agreement. The Amendment between the parties supersedes any prior or contemporaneous communications, representations or agreements between the parties, whether oral or written, regarding the subject matter of the entire Amendment. The terms and conditions of this Amendment may not be changed except by an amendment expressly referencing this Amendment by section number and signed by an authorized representative of each party.

13. Additions/Modifications. If seeking any addition or modification to the Amendment, the parties agree to reference the specific paragraph number sought to be

changed on any future document or purchase order issued in furtherance of the Amendment, however, an omission of the reference to same shall not affect its applicability. In no event shall either party be bound by any terms contained in any purchase order, acknowledgement, or other writings unless: (a) such purchase order, acknowledgement, or other writings specifically refer to the Amendment or to the specific clause they are intended to modify; (b) clearly indicate the intention of both parties to override and modify the Amendment; and (c) such purchase order, acknowledgement, or other writings are signed, with specific material clauses separately initialed, by authorized representatives of both parties.

14. Breach. Upon deliberate breach of the Amendment by either party, the non-breaching party shall be entitled to terminate the Amendment without notice, with all of the remedies it would have in the event of termination, and may also have such other remedies as it may be entitled to in law or in equity.

15. Survival. This Amendment shall survive the completion of or any termination of the original contract, revised contract, or agreement or other document to which it may accompany or incorporate by reference.

16. All other provisions on the Agreement dated March 4, 2013, are unchanged and remain in full force and effect.

IN WITNESS WHEREOF, the parties have executed this Amendment.

The CITY OF FRANKLIN, TENNESSEE

By:_____
Dr. Ken Moore
Mayor

CDM Smith

By: _____
Print Name: _____
Title: _____

Attest:

_____
Eric S. Stuckey
City Administrator

Approved as to form:

_____
Shauna R. Billingsley
City Attorney

Exhibit A
Amendment No 1
COF Contract No 2013-0001

Amendment 1 Proposal

Franklin Wastewater Reclamation Facility Expansion and Upgrades

This document is the first proposed amendment to the March 4, 2013 contract between the City of Franklin, Tennessee (City) and CDM Smith for the Franklin Wastewater Reclamation Facility (WRF) Expansion and Upgrades project. Evaluations and investigations performed by CDM Smith during the preliminary design of the facility modifications have revealed that specific elements of the original scope of work will not have to be performed; and that there are additional scope items required or recommended for the City of Franklin to adequately address existing issues or expansion needs at the WRF. The proposed modifications to the scope and the rationale for those modifications are described in the scope sections below. The sections discussing the impacts and adjustments requested to the project design and bidding schedule and the associated scope of work budget follow the scope section.

Scope

The proposed amendment to the scope of work consists of the following tasks:

- Task 307 – Additional Evaluations and Investigations
  - Odor Control Investigation and Site Sampling
  - UV System Pre-Selection Process
  - Expansion of the Biosolids Management Evaluation and Pre-Selection Work
  - Evaluation of the Plant's Site-Wide Electrical System
  - Site Survey and Geotechnical Investigation of the required Expanded Biosolids Area
  - Evaluation of the Plant Sanitary Sewer Drainage System
- Task 405 – Eliminate Proposed Headworks Modifications and Add Design of a New Headworks Facility.
- Task 406 - Expansion of Biosolids Management System Design Scope (Thermal Hydrolysis, Solar Drying, Combined Heat and Power (CHP)/Cogeneration System, FOG Receiving and Processing Station)
- Task 407 – Addition of Design of Plant Site-Wide Electrical Distribution System Reliability Improvements
- Task 408 – Other Additions and Deletions to Design Scope
  - Add Design of Oxidation Ditch Diffused Aeration System Modifications and Blower Addition
  - Add Design of Modifications to Eliminate Water Entry into the Clarifier Electrical Room
  - Eliminate Design of Expansion of the Existing Denitrification Filter System, Add Design Modifications Within the Filter Pipe Gallery, and Add Design of Demolition and Piping Modifications at the ABW Filters

- Eliminate Design of Modifications to the Existing UV System and Add Design of New UV System
- Add Design of Modifications to Plant Water and Reclaimed Water Pump Station Systems
- Add Evaluation and Design of Plant-wide Flow Metering Systems
- Add Collection System RTU and Radio System Related Design Expansion

- Task 409 – Add Coordination of Competitive Pre-Selection of Certain Biosolids Equipment
- Task 410 – Add Preparation and Coordination of an Early Construction Package
- Task 411 – Add Assistance with Bidding of the Early Construction Package
- Task 601 – Add Modifications to Radio System and Addition of Redundancy
- Task 602 – Add Expansion of SCADA Design Scope

The purpose and scope for each of these tasks is provided below. Note that the design components of the tasks described below will include all associated deliverables as defined in the original scope of work for the 30%, 60% and 90% stages of design and associated services through bidding of the project.

Task 307 Additional Evaluations and Investigations

Further detailed discussions of the modified scope of work items identified above follows below:

Task 307A – Odor Control Investigation and Site Sampling

The decision to construct a new headworks, rather than modifying the existing headworks, led to the need for collection of information related to generation of hydrogen sulfide gas in the influent wastewater. This task included a visit to the site to examine the headworks and installation of hydrogen sulfide gas detection and logging equipment in two locations in the existing headworks. The monitoring data was used to establish the relative level of odor causing gases; and in turn, help select the method of odor control for the new headworks and equalization basin facilities.

Task 307B, UV System Pre-Selection Process

Each UV disinfection system from the multiple manufacturers are specific in their layouts, sizing and construction; and therefore, are different and make it difficult to produce design drawings for the channels and ancillary facilities without picking a manufacturer and designing around the specific system. To accommodate this process selection, CDM Smith assisted the City through the development of a package and pre-selection process for the UV manufacturer.

This task includes addition of a competitive pre-selection process to identify the most advantageous option for the City. The scope includes development of specifications, soliciting submittals from up to five vendors that include capital cost, operation and maintenance cost, and non-cost information, preparing addenda in response to vendor questions, evaluating submittals (including capital cost and life-cycle cost analysis) and non-economic comparisons, preparation of an evaluation memorandum presenting the comparison and recommendations, coordination with the City staff to select the vendor, and preparation of an letter of intent for the vendors signature upon approval by the Board of Mayor and Alderman (BOMA).

Task 307C, Expansion of the Biosolids Management Evaluation Work

The original contract and scope of work included evaluation of three specific biosolids management alternatives, development of a technical memorandum, and presentation of the results to the BOMA. After the initial evaluation of the three alternatives, the City staff decided that expansion of the evaluation to include additional biosolids management alternatives, specifically the addition of thermal hydrolysis and modification of solar drying applications, was in the City's best interest. As part of this preliminary process, CDM Smith worked extensively with a vendor representing equipment for multiple parts of the processes under consideration to best establish a process scope and budget for the work. This additional planning resulted in the need for CDM Smith to evaluate multiple rounds of proposals prepared by the vendor. The preceding changes have also resulted in the need for additional coordination and three additional presentations to BOMA. The exact scope for this item was difficult to define as we were working through the process with City staff and BOMA, as it is necessary for the consulting services to adapt as the plan developed. This additional evaluation, analysis and Board presentations accounted for an additional $43,000 of out of scope work.

Task 307D - Evaluation of the Plant Site Electrical System

At the beginning of the project, CDM Smith performed a preliminary review of the overall electrical system for the Franklin WRF. This review revealed that the electrical system does not meet state (TDEC) and federal redundancy requirements for electrical systems and that the City was paying for service through numerous meters rather than a single centralized plant meter, resulting in significant unnecessary fees and costs. Maintaining these numerous meters has resulted in higher monthly electrical costs, and CDM Smith has met with the City staff and presented these findings. The City requested that CDM Smith perform an overall evaluation of the electrical system and design a system to meet the long-term redundancy and supply requirements. The scope for this task will include the following subtasks followed by preparation of a preliminary design report section describing the evaluation and the results of the evaluation:

- Verify that the two feeds to the plant site are actually from two different independent sources.
- Work with Middle Tennessee Electric Membership Corporation (MTEMC) to obtain rate structure including surcharges, discounts, etc. for each service.
- Work with MTEMC to obtain the layout of each of the metered services; as well as historic billing information to determine peak and normal demands at each metered service.
- Establish conceptual planning level estimates of existing and projected demands
- Evaluate the potential cost savings versus the cost of consolidating to a single meter.
- Develop a recommendation for modification of the overall electrical system considering the existing and projected conditions. Prepare a technical memorandum that presents our findings and recommendations for City review and consideration.
- Accompany the City to a meeting with MTEMC to discuss options for future electrical service to the Franklin WRF.

After the meeting with MTEMC, CDM Smith will revisit the recommendations and findings in the technical memorandum and provide a modified memorandum to the City.

Task 307 E – Site Survey and Geotechnical Investigation of Expanded Biosolids Area

The expansion of the biosolids process scope results in expansion of the biosolids area of the site; therefore, additional surveying and geotechnical work will be necessary. The survey will include collection of topographic information, as well as existing structures, other above surface features, and subsurface utility information. Subsurface utilities in the additional area to be surveyed, per this task, are very limited and we assume that it can be surveyed without additional potholing.

Once the preliminary design of the biosolids systems are completed, CDM Smith will conduct additional geotechnical investigations at the locations of the new proposed structures and other appropriate locations. The following assumptions were made to estimate the cost of this work:

- Completion of 15, 25-foot deep borings and 10, 15-foot borings,
- Split spoon sampling,
- Completion of 12 Shelby Tubes will be collected,
- Boreholes will be grouted upon completion of testing
- Laboratory testing will include at a minimum: 8 Atterberg limits, 5 grain size analysis, 10 percent fines tests, 16 moisture content, 3 consolidation tests, and three UCS Rock tests.
- Field work estimated to take up to ten days.

A final geotechnical report will be prepared and will include presentation of the data, evaluation and interpretation of the data, and foundation recommendations for all structures.

Task 307F- Evaluation of the Plant Sanitary Sewer Drainage System

Waste streams from the various treatment processes discharge to a plant site drain system that flows to the Process Wastewater Pump Station, which in turn overflows to the influent pump station (i.e., there are no longer operating pumps in the pump station). In addition, one of the force mains from the collection system connects into a manhole in the plant site drain system. When peak flows occur in this force main, wastewater backs up into the filter mud well. Once the new biosolids treatment system begins discharging to the on-site sanitary sewer system this existing issue will get worse. This problem is intertwined with the problem of measuring the true plant influent flow rate, because it currently isn't possible to measure plant waste stream/side stream flow without also including the flow from the force main identified above. Therefore, changes are proposed to solve the on-site sanitary sewer system hydraulic problems but may aid, hinder or have no effect in solving the flow measurement issues. To solve these problems, CDM Smith proposes to perform the following analysis:

- Evaluate the potential to intercept the collection system force main flows in an off-site gravity collection system that goes directly to the influent pump station. If this can be achieved, capacity can be freed up in the on-site sanitary sewer system and the flow metering problem can be simplified.
- Model the main line of the on-site sanitary sewer system to evaluate the ability of the sewer system to accept the additional hydraulic loading from the proposed biosolids processes. The

modeling will consider a scenario where the force main remains connected to the plant site drain system and a scenario where the force main is rerouted to a drain going directly to the influent pump station.

- It is also possible that the hydraulic issues being observed by the operators are due to undersized pumps in the Process Wastewater Pump Station. Thus, the Process Wastewater Pump Station will be evaluated against estimated plant process waste stream flows and raw wastewater force main flows to determine if the pumps are the limiting component of this hydraulic system.
- The hydraulic grade line in the influent pump station wet well is quite low, so the potential to flow directly to the influent pump station may exist. This option will be evaluated as a possibility as well.

Series 400 Tasks - Additions and Deletions to the Design Scope

As analysis was performed during the preliminary design the need for several design scope additions and deletions were identified. For example, the sanitary sewer collection system modeling, which was used to establish peak influent flows showed that retrofitting of the existing headworks would not be feasible considering the magnitude of the estimated flows. This task includes performance of design work, or elimination of design work, associated with the necessary additions and deletions. Each of the additions and deletions are identified in the subtasks below. Attachment A to this amendment provides tables showing the anticipated revised list of drawings compared to the anticipated list of drawings from the original scope of work. The lists are color coded to identify drawings that will be removed or added. Drawings to be removed from the original list of drawings are highlighted in red and drawings that must be added to the original list of drawings are highlighted in green. Electrical drawings that must be added to bring the electrical system backbone into compliance with regulatory redundancy requirements are highlighted in blue. The drawing list tables are arranged by discipline and the first table provides a summary of the quantity of added sheets and deleted sheets.

Task 405 - Eliminate Proposed Headworks Modifications and Add Design of a New Headworks Facility

The original scope of work included the assumption that the existing headworks facility could hydraulically process, the influent flow; and scoped the replacement of the aging equipment at the facility. To assure the sizing of the facility was appropriate, the contract scope of work included developing a collection system model to more appropriately estimate the peak flows into the WRF. This approach was necessary because there was no existing system model and the current plant metering is not capable of measuring flows above a certain peak rate, and the plant is not capable of processing peak flows (i.e. water is backed up into the sewage collection system to protect the plant). Results from the collection system model indicate that the peak flow corresponding to the average design flow of 16 mgd is estimated at 52 mgd. Based on the flow analysis, a new headworks facility was determined to be needed based on the peak flow exceeding the capacity of the existing headworks facility with the proposed modifications. Therefore, the City and CDM Smith reached the decision that a new headworks facility must be constructed to properly treat projected flows.

The proposed headworks facility will include the following primary features:

- Flow metering of each of the two influent force mains,
- Three 20-mgd screens, including a bypass channel,
- Three 20-mgd forced vortex grit removal units,
- Isolation slide gates to allow use of any combination of screens with any combination of grit removal units,
- Screening trough and water system to convey screenings to the washer compactors,
- Screening washer compactors,
- Grit classifiers and associated telescoping valve control,
- All electrical and instrumentation/controls for the new facility,
- All associated plumbing and HVAC systems for the new facility,
- Pumps to convey excess flows to the equalization basin.

Task 406 - Expansion of the Biosolids Management System Design Scope

The original scope of work included design of sludge thickening, anaerobic digestion, and dewatering facilities, as well as a separate biosolids odor control system. During the evaluation of biosolids treatment and disposal alternatives, it was determined that the preferred treatment process includes, not only anaerobic digestion, but also enhancements to the digestion process (thermal hydrolysis), a means of beneficially reusing the biogas produced by the digesters, and the solar drying process for the treated solids. In addition, the biosolids facilities are also going to include a fats, oils and grease (FOG) receiving station to co-digest the plant biosolids and the FOG waste streams. The following revisions to the sheet list reflect the complete solids treatment processes and supporting facilities associated with the selected Alternative 4A.

- It is envisioned that the new solids handling facilities will be located on the west side of the property; although two structures located on the existing site (the existing dewatering building and an adjacent tank) will be modified and reused. Due to the westward expansion a number of site, yard piping, erosion and sedimentation control, grading and drainage, and landscaping drawings were added to the scope of the facilities.
- The fats, oils, and grease (FOG) receiving station, an outdoor facility that will be located adjacent to the new digester facilities, was added to the scope of work. Addition of the FOG facilities from local restaurants and other food service establishments is expected to increase the biogas production in the digesters and lead to additional production of electricity and heat from the cogeneration facility.
- The addition of thermal hydrolysis and associated pre- and post-dewatering to the biosolids system will require the addition of one building. CDM Smith evaluated the potential reuse of the existing solids building and determined that it would be cost effective to convert that building into the post dewatering facility. For the purposes of this scope of work, we have assumed that this amendment requires the addition of one building for the biosolids process,

the sludge screening and pre dewatering building. The original contract included design of a digester building, which will remain in the scope.

- The proposed pre-dewatering process replaces the thickening process; and therefore, the proposed sheets for the sludge thickening process were deleted from the list.
- The biosolids facility will include a combined heat and power (CHP) system which was added as part of the scope of work for this amendment. This system uses the digester biogas to produce useful heat and electricity for the treatment process and leads to the overall sustainability of the project.
- A limited solar drying system installation (two dryers) and supporting equipment, including dewatered and dried biosolids storage bins, will be added as part of this amendment. The solar dryers further reduce the quantity of solids to be disposed and will be designed and bid as an alternate as part of the biosolids system.

Task 407 – Addition of Design of Plant Site-Wide Electrical Distribution System Reliability Improvements

The evaluation in task 309 showed that the current main power sources and the structure of the site electrical distribution system leave the treatment system at risk from several potential single points of failure scenarios. Currently, the site has 11 different service meters which result in the City purchasing power at higher rates than is necessary; not to mention, the additional cost and surcharges associated with each meter. This task includes the design of plant-wide modifications to rectify the existing electric distribution issues. Additional single line power diagrams, MCC drawings, and elementary control diagrams are necessary for the design of improvements to bring the electrical system backbone into compliance with regulatory system reliability requirements. Additional electrical drawings required for this scope item are highlighted in blue in the electrical drawing list in Attachment A.

The proposed scope does not include improvements to the local systems that are not associated with plant components being modified for the proposed plant improvements. These include:

- BNR Basins Blowers (However, we will provide partial redundancy by keeping the new blowers on opposite side of the existing MSB-EB that currently feeds to BNR basins),
- Clarifiers and RAS/WAS pumps and associated facilities,
- The denitrification filter complex,
- The administration and laboratory building.

Task 408 – Other Additions and Deletions to the Design Scope

Task 408A – Addition of Design of Oxidation Ditch Diffused Aeration System Modifications and Blower Addition

Process modeling of the BNR basins for the proposed modifications, including the addition of side streams from the thermal hydrolysis system for solids management, indicates the need for additional aeration capacity in the oxidation ditches. Currently, two of the three ditches have supplemental air provided through diffused aeration and the third relies upon the surface aerators for all available

aeration. Based on the process modeling, completed during preliminary design, the system needs additional supplemental air for all three basins. This task includes design of the necessary diffused air system modifications. We anticipate the following modifications:

- Addition of two new supplemental blowers,
- Addition of blower electrical and control equipment at the proposed new electrical building,
- Installation of diffusers in oxidation ditch 3,
- Addition of air piping to oxidation ditch 3,
- Expansion of the diffuser system in oxidation ditches 1 and 2,
- Expansion and addition of air piping to the existing oxidation ditches 1 and 2 and installation of larger piping as necessary for proper oxygen transfer.

The electrical and control equipment for the two existing blowers and the BNR system equipment is housed in a prefabricated building near the blowers. The building is air conditioned, but is not adequately cooled by the HVAC system, which has already been supplemented by a wall unit. In addition, there is not adequate room in the building for the additional blower electrical and control equipment to be housed. CDM Smith will evaluate the status and will make a recommendation on whether the existing equipment should be moved to the new electrical building or if modifications should be made to the HVAC system for the existing prefabricated building. If HVAC system modifications are necessary, CDM Smith recommends that those modifications be performed by a turnkey contractor rather than included in this design.

Task 408B – Additional Design of Modifications to Eliminate Water Entry into the Clarifier Electrical Room

Rainwater and wash-down water currently leak into the existing building situated between clarifiers 5, 6, 7, and 8, which creates a safety concern due to the fact the building houses electrical equipment, as well as the RAS and WAS pumps. CDM Smith performed an initial inspection of the building to determine the cause of the leaks; however, the pump station will be further evaluated during design for causes of the leakage and all leakage areas will be identified. Repairs will be designed for the joint between the roof slab and clarifier walls and the hose station pipe penetrations to prevent water from entering the pump station. The repairs are expected to require the addition of one design drawing.

Task 408C – Eliminate Design of Expansion of the Existing Denitrification Filter System, Add Design Modifications within the Filter Pipe Gallery and Add Design of Demolition and Piping Modifications at the ABW Filters

CDM Smith performed a hydraulic evaluation of the existing filter system and coordinated with the filter manufacturer to estimate the capacity of the existing deep bed filter system. The plant operations staff performed hydraulic stress testing on the filters to support the CDM Smith evaluation. The evaluation indicates a peak flow capacity of approximately 33 mgd with one filter out of service and one of the remaining filters in the backwash mode at any given time; however, the evaluation also showed that with three filters in operation and one fourth of the flow routed directly to the filter clear well, effluent

limits will be met. Based on these results, and the fact that taking a filter out of service is a very rare occurrence, the City staff, based on recommendation of CDM Smith, decided to forgo construction of a sixth filter.

Although a sixth deep bed filter will not be constructed, the City has decided to keep one of the three existing old ABW filters on-line should routing of a portion of the water around the deep bed filters be necessary. This task includes the design of the demolition of the two westernmost ABW filters, modifications to the piping between the clarifiers and the filters piping system to accommodate routing of water to the ABW filters in the event that one of the deep bed filters must be out of service, and modifications necessary to allow the easternmost ABW filter to operate.

While addition of a sixth filter will not be necessary, significant modifications to the piping in the filter piping gallery will still be necessary to rectify hydraulic constraints between the clarifiers and the filters. In addition, design of piping and valving to allow routing of a portion of the flow directly to the filter clear well will be necessary, as indicted above. Based on the scope of work adjustments, a portion of the existing proposed drawings will be eliminated, but addition of other drawings, as defined in the sheet list, will be necessary.

Task 408D – Eliminate Design of Modifications to the Existing UV System and Add Design of a New UV System

The contract scope of work included modifications to the existing UV disinfection system. During preliminary design, it became clear to the design team and City staff that significant maintenance of plant operations (MOPO) issues would be encountered with utilization of the existing channels for the new UV system. In addition, competitive procurement of equipment would be extremely difficult, as most systems could not be accommodated into the existing layout and channels and would require extensive modifications. Due to the unknowns and difficulty with working with the existing structure, it was determined that it was the most cost-effective solution to pre-select the UV manufacturer and design a new structure around the selected equipment to ensure the most effective design could be accomplished and implemented.

Task 408E – Add Design of Modification to the Plant Water and Reuse Pump Station Systems

The plant water pumping system currently consists of three 200 gpm pumps, which provide a firm capacity of around 400 gpm. We estimate that the new equalization basin will require a flow rate of up to 1000 gpm for required washdown, and that in addition to the equalization basin, the new headworks and odor control system will require an additional 500 gpm. It is too early to estimate the plant water needs for the solids processing systems, but they are estimated to be fairly significant as well. Therefore, the peak plant water demands may be greater than 1,500 gpm and the existing plant water pumping system won't be adequate to provide the desired capacity.

In addition to the plant water system, the Franklin WRF has a reuse pump station that supplies treated effluent to off-site locations that utilize the reclaimed water. The existing pump station includes two small vertical turbine pumps and two large vertical turbine pumps and is designed to allow addition of one more vertical turbine pump. Our understanding is that the pumps are variable speed and have a

design pressure of 85 psi, which is adequate for the plant water uses. The proposed scope of work will include:

Hydraulic Analysis

CDM Smith will conduct a hydraulic analysis of the existing reclaimed water system and verify that it can be modified to provide water to the plant water system. The analysis will determine what modifications would be necessary to use the system for plant water needs. CDM Smith will construct a hydraulic model for the reclaimed water high service pump station that will simulate system design pressure, flow, and operation, as well as the addition of the on-site usage. Various modifications will be modeled to the reclaimed water high service pump station to determine what changes will be necessary to supplement the plant water system. These modifications may include changes to system operations and controls, replacement of reclaimed high service pumps, or an additional high service pump.

CDM Smith will then evaluate the constructability of the required modifications to the reclaimed high service pump station. This evaluation will include a determination of what changes will be necessary to the existing electrical system based on any proposed pump or control changes. CDM Smith will summarize the results of the hydraulic analysis and constructability evaluation in a draft technical memorandum (TM). The draft TM will be submitted to the City staff for review. After the City has submitted comments on the draft TM, CDM Smith will incorporate the City's comments and submit a final TM.

Final Design

CDM Smith will provide final design services for the modification to the existing reclaimed water high service pump station and associated plant water system. The modifications will include process mechanical, electrical, structural, and instrumentation and control modifications. CDM Smith will present 60% and 90% design documents for these proposed modifications with the rest of the WRF submittals.

Task 408F – Add Evaluation and Design of Plant-Wide Flow Metering Systems

During the operational assessment of the WRF, including multiple discussions with City staff, we learned that the Tennessee Department of Environment and Conservation (TDEC) has expressed concerns with the facility flow metering capabilities and has identified potential weaknesses. Although the design of certain flow metering systems was included in the original contract scope, additional flow metering will be necessary to address regulatory and monitoring concerns. Addressing these flow metering weaknesses has the added benefit of providing more accurate flow signals to allow better control of chemical feed systems, the UV system, and other facility systems. Better control may result in cost savings on chemicals and power.

We have assumed that the flow metering systems identified in the bullets below will be needed for this project. In all cases where the flow meters are below grade we have assumed that the meters will be in manholes or small vaults that are accessed by ladders (rather than stairs).

- Influent flow metering: Influent flow metering is currently accomplished by measuring the hydraulic head over weirs in the existing headworks. We propose to modify the system and install magnetic flow meters on each of the two influent pump discharge force mains. We recommend that these be installed on the riser pipes feeding the new headworks influent channel. No additional drawings will be required as these will be shown on the drawings for the new headworks.
- Side stream flow metering: All plant liquid waste streams and side streams are ultimately returned to the influent pump station. However, some streams flow through the Process Wastewater Pump Station on their way to influent pump station, and some bypass the Process Wastewater Pump Station plant drain pump station and flow directly to the influent pump station. Since influent flow measurement will occur on the discharge force mains from the influent pump station, measurement of the waste streams and side streams identified above is necessary to calculate the true influent flow to the plant. We have assumed that two waste stream/side stream flow meters will be necessary and that each of these will be in a vault. We have assumed that isolation valves for the meters will be direct bury.
- Collection system raw wastewater force main flow monitoring: The waste stream/side stream flow measurement is complicated by the current connection of a collection system force main to one of the on-site sanitary sewer manholes. That means that a portion of the flow measured by the flow meters identified in the previous bullet is truly raw wastewater flow. To allow calculation of the true plant influent flow, the flow in this force main must also be measured. Thus, addition of another meter is necessary and has been assumed for this proposal. This results in an undesirable, but apparently necessary complexity in the plant site flow monitoring, so CDM Smith will evaluate other ways to achieve the goals without addition of this flow meter to attempt to eliminate the need for this meter. This is discussed previously in Task 307F.
- Flow equalization influent flow meters: There will be two equalization tank influent pipe lines for the equalization of plant flows; one will be a gravity feed line and the other will be a pumped force main. The gravity line will be used when the tank water level is low enough to convey water to the basins and the flows are lower than can be achieved with the available equalization influent pump turn down; however, when flows increase or the tanks have existing water, the pumps will convey the water via the associated force main. This metering will include design of isolation valves and magnetic flow meters for control of flow to the proposed equalization basin.
- Flow equalization effluent flow meter and control valve: The effluent flow metering will allow for monitoring and control of the flow out of the equalization basin and back to the influent pump station. This metering will include design of an isolation valve, a control valve, a magnetic flow meter and a vault to house the flow meter and control valve. We assume that the isolation valve will be direct buried and that the control valve and meter will be in vaults. The control valve will use the meter to allow wastewater to flow at a selected rate from the equalization basin back to the influent pump station.
- Plant effluent flow meter: Plant effluent flow measurement is currently accomplished by measuring the hydraulic head over a set of weirs in the basin downstream of the UV system. The

locations of the water level sensors are not effective; although there aren't really any better locations for the sensors in the basin; and therefore, the flow measurement accuracy is very poor. In addition, measurement occurs prior to extraction of water for the reuse system.

This metering will include design of a new magnetic flow meter, isolation valve, and vault. The meter will tentatively be located in the pipe from the post aeration basin to the step aerator.

Task 408G – Add Collection System RTU and Radio System Related Design Expansion

The scope of the design for the RTU and Radio System expansion is described in Task 602

Task 408H – Add Site Visit by Construction Specialist

We propose addition of a site visit by our construction specialist to obtain better knowledge of the work and its effect on current operations and maintenance of plant operations (MOPO). The site visit would be performed by the construction specialist and the project manager. Since this project includes a large amount of modifications to existing structures, the value of the construction specialist review will increase if he has seen the structures to be modified prior to the review. The project manager's familiarity with the proposed modifications will help the construction specialist to visualize and understand the intricacies of the proposed modifications and improvements.

Task 409 – Assistance with Competitive Pre-Selection of Certain Biosolids Equipment

Thermal hydrolysis equipment from different manufacturers are specific in their layouts, sizing and construction; and therefore, are specific enough that it is difficult to produce design drawings for the systems without picking a manufacturer and designing around the specific system. To accommodate this selection, the City would like to retain CDM Smith's assistance with a competitive pre-selection process. Competitive pre-selection of the thermal hydrolysis and other associated equipment will allow the City to better manage the capital and long-term costs of the thermal hydrolysis system.

The equipment to be pre-selected will include the thermal hydrolysis process equipment and the associated boiler units, feed hoppers, cooling units, dilution units, and the feed pumps to the digesters. The ancillary equipment identified above was selected after discussions with the manufacturers. The goal was to identify equipment that potentially has an impact on the ability of the manufacturers to meet process guarantee requirements for the system.

1. Preparation of a pre-selection bid package. The package will include detailed performance based technical specifications, which will also include specific materials and equipment requirements. The package will also include a bid sheet, measurement and payment details, a form or forms to gather information needed for long-term cost and non-cost evaluations, Division 1 specifications and a letter agreement that commits the selected equipment manufacturer to providing equipment and services to the successful contractor at the bid cost under the conditions defined in the specifications. The first draft of this document will be reviewed by CDM Smith technical experts and revised before submittal to the City. CDM Smith will then transmit the document to the City for review. A conference call will be held to review the document with the City and then a final document will be prepared.

2. Bidding. CDM Smith will then solicit proposals from the two potential equipment manufacturers (Kruger and Cambi). CDM Smith will provide day-to-day bidding period coordination and will produce up to two bid addendums.
3. Performance of an alternatives analysis. Using the information provided by the manufacturers, CDM Smith will perform an alternatives analysis similar in scope to the analysis performed for the UV system pre-selection. The analysis will include capital cost comparison, operation and maintenance cost comparison, life-cycle cost comparison, and non-cost comparison. We anticipate that we will have to make one request for additional information to the manufacturers. A report similar to that produced for the UV system pre-selection will be prepared. An internal draft of the report will be reviewed by CDM Smith technical experts and then revised and transmitted to the City for review. After the City has completed its review, CDM Smith will hold a review conference call with the City and subsequently finalize the report.
4. Upon approval by the City, CDM Smith will assist with obtaining a signed commitment letter from the successful manufacturer.

Task 410 – Add Preparation and Assistance with Bidding of an Early Construction Package

The City desires to bid and construct a portion of the construction package early. This task includes preparation of a bid package for potential early construction work. CDM Smith evaluated potential options for the break-out of early construction and discussed the potential options with the City. Based on that discussion, it was decided that the improvements to the SCADA system, which are mostly off-site, would be the appropriate work to bid and construct early. Since the SCADA system improvements are largely off-site (i.e., not on the treatment plant site) and have little overlap with each other, the chances of the work of this contract impacting the work of the main contractor would be relatively small. The SCADA work should also have relatively little overlap in time with the main contract, which would also minimize the chance that the two contractors will be working at the same time in the same place and potentially interfere with each other.

We estimate that this early construction bid package will contain 42 drawings and that 13 of these drawings will appear again in the future primary project package. Each of these drawings will require additional work to customize it for the early construction bid package. In some cases, design and drawing modifications will have to be made to show the transition from early construction to primary project improvements. Also, the associated drawings and specifications will have to be produced several times throughout the process, over and beyond what would have been required with only one bid set. Once the primary project bid package is compiled, a portion of these drawings will have to be modified again to reflect the early work completed. Our estimate results in a cost of about 13 percent of what would have been incurred by producing the drawing set from scratch.

The proposed design scope for early construction will include the following components:

- All off-site SCADA and radio system improvements identified in this amendment request and the original contract,

- A small amount of the high level on-site SCADA system improvements identified in this amendment request and the original contract. The exact scope will be established in cooperation with the City.

We have assumed that the following sequence of events will occur for the early procurement package:

1. Ninety percent documents will be produced,
2. A technical review of the documents will be performed by CDM Smith technical experts,
3. The documents will be revised and transmitted to the City for review,
4. A review meeting will be held with the City,
5. Final documents will be produced.

After production of the final documents, CDM Smith will assist the City with bidding of the early construction package. Our services will include:

- Attendance of a pre-bid meeting by the project manager and technical lead,
- Administration of document sales,
- Day-to-day coordination with the City and bidders,
- Preparation of up to two addenda,
- Attendance at the bid opening by the project manager, and
- Review of bids and preparation of a recommendation letter.

We have assumed that documents will either be produced and distributed in electronic form or CDM Smith will charge for the documents to offset printing and labor costs associated with creation of hard copies for potential bidders.

Task 601 - Modifications to Radio System and Addition of Redundancy

After agreement on the standardization of the SCADA system components was established, the City identified issues with the existing radio system, including system design issues that result in loss of communication to multiple stations when failure at one station occurs. CDM Smith arranged a conference call on October 4, 2013 to discuss these issues with City and SSR staff. The conceptual solutions to these issues were developed during this call. This task includes performance of additional work necessary to design modifications necessary to address these issues and incorporate them into the SCADA system design under the original scope. Specifically, this task will include:

- Modifying system architecture drawings to incorporate new redundancy that includes both radio and cellular modem links and other necessary software and hardware (router, firewall, etc.)
- Research to determine what equipment is necessary to provide redundancy communication switchover and monitoring and what manufacturers/models are acceptable. Determination of

what programming steps would need to be taken to provide desired functionality in order to update specifications properly for bidding of the project.

- Updating of specifications with new equipment and new control strategies related to the redundancy and switchover. This will include requirements to the Contractor detailing the manufacturing and testing of one demo RTU to show proper functionality before building all other RTUs.

Task 602 - Expansion of SCADA Design Scope

After making site visits to look at RTUs and other SCADA system components at some of the existing collection system sites; we believe that in some cases, it may be necessary to do more than simply remove the RTU and install a new RTU in the same place. In addition, we learned from talking to Harvey Smithson that there are five sites that are currently not connected to the SCADA system that the City desires to connect to the system. This task involves adding the design of the improvements that will be necessary to address the issues and goals expressed above.

Many of the RTUs are larger than the old RTUs in some cases (i.e., the new ones may not fit in the same location) and/or some of the RTUs may have to be relocated to meet current NFPA and other code requirements. In either of these specific cases, electrical design drawings will be required, where they wouldn't be for a straight swap out of equipment.

There are a total of 40 existing sites. In two cases the RTU panels are in vaults, seven are in buildings, four are in huts, one is in a canned pump station, and twenty-six are located in outside panels. We currently don't know how many of the sites will require electrical design upgrades, but based on the statistics above, and for the purpose of this proposal, we have assumed that ten sites will require electrical design and that 11 electrical drawings will be required for these ten sites. Prior to design, an electrical engineer will visit each of the 40 sites to evaluate whether a straight swap out can occur or if the new RTU will have to be relocated due to space constraints or code/NFPA issues. During these site visits, photos and measurements will be taken to support design efforts.

The existing sites that are currently not connected to the SCADA system will require more extensive investigation and design efforts. The proposed scope will include the following components:

1. Software Radio Survey – This involves electronically plotting the sites, the radio transmitter, and any repeater stations in a topographic software and determining approximate antenna heights for optimal signal strength. These heights would then be cross referenced against city/county codes and ordinances.
2. Field Radio Survey – This task involves a sub-contractor performing an actual radio survey at the sites to determine tower/pole placement and necessary height for optimal radio signal strength.
3. Conference Call with City – A meeting will be held to gain an understanding of the City's goals with respect to monitoring and control at each site new SCADA site and to discuss concepts on the layout of the improvements.

4. Site Visits – Each of the new sites will be visited by an electrical engineer and an instrumentation and control engineer. The goal of the visits will be to review the existing equipment, determine if the instrumentation is usable with the new RTU, do a general review of the site, identify potential locations for the RTU and antenna, and take photos to support design.
5. Topographic Survey – A survey will be performed at each site to provide a base for site layout drawing.
6. Geotechnical Investigation – The antenna for each site will have to be mounted on a mast or a tower, depending on the required height for the antenna. If a tower is required, a geotechnical investigation will have to be performed. For the purpose of this proposal we have assumed that geotechnical investigations will have to be performed at three of the sites and two borings will have to be performed at each of these three sites.
7. Design of Improvements – We have assumed that the design will include development of five civil drawings, two structural drawings, five electrical drawings and five instrumentation and control drawings. The following additional assumptions were made for the design:
    - We assume that the RTUs will be mounted on the masts or towers.
    - Where towers will be used we propose to place the responsibility for the tower and slab/foundation design on the tower manufacturer.
    - Where masts will be used the slab/foundation design will be performed by CDM Smith.

The design related portions of the scope identified above are reflected in the cost for Task 405, while the non-design related costs are reflected in the cost for this task.

TIME OF COMPLETION/SCHEDULE

The ENGINEER will initiate work on the revised scope of work immediately upon approval by the City of Franklin BOMA. The ENGINEER will deliver the comprehensive final design documents ready for bidding within 300 calendar days (approximately 43 weeks) from the Notice to Proceed. ENGINEER's services under the Design Phase will be considered complete at the earlier of (1) the date when the submittals have been accepted by OWNER or (2) thirty days after the date when such submittals are delivered to OWNER for final acceptance, plus in each case such additional time as may be considered reasonable for obtaining approval of governmental authorities having jurisdiction to approve the portions of the PROJECT designed or specified by the ENGINEER. The permitting duration is not within the control of the ENGINEER.

Bidding services will commence upon advertisement of the project by OWNER and will run until the OWNER's recommendation of award. The time of completion of the bidding phase is dependent upon the OWNER's procurement process and schedule and not within the control of the ENGINEER.

COMPENSATION AND PAYMENT

Invoicing shall continue to be completed monthly on a billing rate basis based on the work completed within the dates of the invoice per the approved Task and Labor Categories and the corresponding billing rate for the individual(s) completing the work. A project status report will accompany each progress billing to update the OWNER of the work and project progress. The not-to-exceed upper limit fee for the proposed additional work is $ 2,293,000. This will bring the revised total project upper limit to $ 5,260,150. A breakdown of additional project values by tasks is presented in Table 1 below, and the billing rates for the project shall remain the same as the original contract values. All project related expenses shall be billed at CDM Smith's cost with no mark-up as per the existing contract.

Table 1: Task Value

Task No.	Description	Task Value
307	Evaluations and Investigations	$ 191,000
405	Additional Headworks Design	$202,000
406	Additional Biosolids Design	$1,201,000
407	Electrical Backbone System Design	$96,000
408	Other Additional Design	$359,000
409	Biosolids Equipment Pre-Selection Services	$75,000
410	Early Construction Design and Bidding	$91,000
601	Modifications to Radio System and Addition of Redundancy	$ 12,000
602	Expansion of SCADA Scope	$ 66,000
TOTAL AMENDMENT AUTHORIZATION		**$ 2,293,000**

HISTORIC
FRANKLIN
TENNESSEE

ITEM #15
WRKS
05/13/14

MEMORANDUM

May 8, 2014

TO: Board of Mayor and Aldermen

FROM: Eric Stuckey, City Administrator
David Parker, City Engineer/CIP Executive
Mark Hilty, Water Management Director

SUBJECT: Amendment No. 1 to Professional Services Agreement for the Franklin Wastewater Reclamation Facility Modifications and Expansion Project, COF Contract No 2013-0001

Purpose

The purpose of this memorandum is to present information to the Board of Mayor and Aldermen (BOMA) to consider Amendment No. 1 to the Professional Services Agreement, COF Contract No 2013-0001, for the Franklin Wastewater Reclamation Facility (WRF) Modifications and Expansion Project.

Background

The City of Franklin and CDM Smith entered into a Professional Services Agreement entitled City of Franklin, Tennessee Professional Services Agreement, Wastewater Reclamation Facility Modifications and Expansion Project, dated March 3, 2013 at a fee not to exceed $2,967,150.

During the preliminary design work to date, numerous evaluations and investigations have been performed. These analyses have identified various elements in the original scope that will not have to be performed and have identified additional scope items that are required or recommended for the City to adequately address existing issues or expansion needs of the WRF. The proposed modifications to the scope are summarized below with the rationale presented in Exhibit A.

- Task 307 – Additional Evaluations and Investigations
  - Odor Control Investigation and Site Sampling
  - UV System Pre-Selection Process
  - Expansion of the Biosolids Management Evaluation and Pre-Selection Work
  - Evaluation of the Plant's Site-Wide Electrical System
  - Site Survey and Geotechnical Investigation of the required Expanded Biosolids Area
  - Evaluation of the Plant Sanitary Sewer Drainage System
- Task 405 – Eliminate Proposed Headworks Modifications and Add Design of a New Headworks Facility.
- Task 406 - Expansion of Biosolids Management System Design Scope (Thermal Hydrolysis, Solar Drying, Combined Heat and Power (CHP)/Cogeneration System, FOG Receiving and Processing Station)
- Task 407 – Addition of Design of Plant Site-Wide Electrical Distribution System Reliability Improvements
- Task 408 – Other Additions and Deletions to Design Scope

- Add Design of Oxidation Ditch Diffused Aeration System Modifications and Blower Addition
- Add Design of Modifications to Eliminate Water Entry into the Clarifier Electrical Room
- Eliminate Design of Expansion of the Existing Denitrification Filter System, Add Design Modifications Within the Filter Pipe Gallery, and Add Design of Demolition and Piping Modifications at the ABW Filters
- Eliminate Design of Modifications to the Existing UV System and Add Design of New UV System
- Add Design of Modifications to Plant Water and Reclaimed Water Pump Station Systems
- Add Evaluation and Design of Plant-wide Flow Metering Systems
- Add Collection System RTU and Radio System Related Design Expansion

- Task 409 – Add Coordination of Competitive Pre-Selection of Certain Biosolids Equipment
- Task 410 – Add Preparation and Coordination of an Early Construction Package
- Task 411 – Add Assistance with Bidding of the Early Construction Package
- Task 601 – Add Modifications to Radio System and Addition of Redundancy
- Task 602 – Add Expansion of SCADA Design Scope

Financial Impact

Staff has reviewed the proposed costs for the anticipated work, presented in Table 1 of Exhibit A (totaling $ 2,293,000), and believe the values are appropriate for the work required for completion of the tasks. The total fee for design services, including Amendment No. 1 is $5,260,150, or approximately 5.3% of the anticipated construction cost.

Recommendation

Staff recommends approval of Amendment No. 1 to Professional Services Agreement for the Franklin Wastewater Reclamation Facility Modifications and Expansion Project, COF Contract No 2013-0001 Resolution 2014-40.