CITY OF FRANKLIN, TENNESSEE
PROFESSIONAL SERVICES AGREEMENT
COF Contract No. 2018-0023

THIS PROFESSIONAL SERVICES AGREEMENT ("Agreement") is by and between the City of Franklin, Tennessee, hereinafter referenced as City, and **CDM SMITH** hereinafter referenced as Consultant, who mutually agree as follows:

DECLARATIONS. City desires to retain Consultant to provide engineering, related technical, and other services in connection with City's project hereinafter referenced as Project. The Project is described as follows:

RECLAIMED WATER SYSTEM MODEL
AND MASTERPLAN UPDATE

1. SCOPE OF SERVICES. Consultant shall provide engineering related technical services for the Project in accordance with the Scope of Services (Services) as found in Attachment A which shall be considered as an integral part hereof.

2. Consultant shall submit as a part of Attachment A an individual Fee Schedule and a Completion Schedule for the Project based on the detailed Scope of Services.

3. In event of a conflict between this Agreement and the attached document(s), this Agreement shall supersede conflicting terms and conditions.

4. Consultant shall be paid on a monthly basis for work performed based on the Fee Schedule as contained in Attachment A in the Amount of **ONE HUNDRED NINETY-FIVE THOUSAND FIVE HUNDRED AND NO/100 DOLLARS ($195,500.00).**

The Board of Mayor and Aldermen Approved this Agreement on the _____ Day of _____ 201__.

TERMS AND CONDITIONS FOR PROFESSIONAL SERVICES

ARTICLE 1. SERVICES. Consultant will:

1.1 Act for City in a professional manner, using that degree of care and skill ordinarily exercised by and consistent with standards of competent consultants using the standards in the industry:

1.2 Consider all reports to be confidential and distribute copies of the same only to those persons specifically designated by the City.

1.3 Perform all services under the general direction of a senior professional employee, licensed and/or registered in the State of Tennessee, when appropriate.

1.4 Designate, in writing, the sole Project representative to coordinate with City the Services to be provided, including all contact information.

1.5 Unless provided for in the Project Scope of Services (Attachment A), Consultant shall perform all Services with his own forces (employees). Should sub-consultants be proposed to be used in the Project, a listing of said sub-consultants with Services to be performed shall be provided. After approval of this Agreement, no substitute for sub-consultants shall be allowed unless approved by City.

1.6 Retain pertinent records relating to the services performed for a period of seven (7) years following the completion of the work; during this period the records shall be available for review by City at all reasonable times.

ARTICLE 2. CITY'S RESPONSIBILITIES. City, or its authorized representative, will:

2.1 Provide Consultant with all information regarding the Project, which is available to, or reasonably obtainable by, the City.

2.2 Furnish right-of-entry onto the Project site for Consultant's necessary field studies and surveys. Consultant will endeavor to restore the site to its original condition and shall remain solely liable for all damages, costs and expenses, including reasonable attorneys' fees, for failure to make such restoration.

2.3 Designate, in writing, the sole Project representative to coordinate with and direct the Consultant, including all contact information.

2.4 Guarantee to Consultant that it has the legal capacity to enter into this contract and that sufficient monies are available to fund Consultant's compensation.

ARTICLE 3. GENERAL CONDITIONS.

3.1 Consultant, by the performance of services covered hereunder, does not in any way assume, abridge or abrogate any of those duties, responsibilities or authorities customarily vested in other professionals or agencies participating in the Project.

3.2 Consultant shall be responsible for the acts or omissions of any party involved in concurrent or subsequent phases of the Project acting upon written instruction issued by the Consultant.

3.3 Neither City nor Consultant may assign or transfer its duties or interest in this Agreement without written consent of the other party.

3.4 ALLOCATION OF RISK AND LIABILITY; GENERAL. Considering the potential liabilities that may exist during the performance of the services of this Agreement, the relative benefits and risks of the Project, and the Consultant's fee for the services rendered, and in consideration of the promises contained in this Agreement, the City and the Consultant agree to allocate and limit such liabilities in accordance with this Article.

3.5 INDEMNIFICATION. Consultant agrees to indemnify and hold City harmless from and against legal liability for all judgments, losses, damages, and expenses to the extent such judgments, losses, damages, or expenses are caused by Consultant's negligent act, error or omission in the performance of the services of this Agreement. In the event judgments,

losses, damages, or expenses are caused by the joint or concurrent negligence of Consultant and City, they shall be borne by each party in proportion to its own negligence.

3.5.1 SURVIVAL. The terms and conditions of this paragraph shall survive completion of this services agreement.

3.6 LIMITATIONS OF RESPONSIBILITY. Consultant shall not be responsible for (a) construction means, methods, techniques, sequences, procedures, or safety precautions and programs in connection with the Project unless specifically undertaken in Attachment A, Scope of Services ; (b) the failure of any contractor, subcontractor, Consultant, or other Project participant, not under contract to Consultant, to fulfill contractual responsibilities to City or to comply with federal, state, or local laws, regulations, and codes; or (c) procuring permits, certificates, and licenses required for any construction unless such procurement responsibilities are specifically assigned to Consultant in Attachment A, Scope of Services.

ARTICLE 4. TERMINATION BY THE CITY. The City may terminate this Agreement in accordance with the following terms and conditions:

4.1 Termination for Convenience. The City may, when in the interests of the City, terminate performance under this Agreement with the Consultant, in whole or in part, for the convenience of the City. The City shall give written notice of such termination to the Consultant specifying when termination becomes effective. The Consultant shall incur no further obligations in connection with the work so terminated, other than warranties and guarantees for completed work and installed equipment, and the Consultant shall stop work when such termination becomes effective. The Consultant shall also terminate outstanding orders and subcontracts for the affected work. The Consultant shall settle the liabilities and claims arising out of the termination of subcontracts and orders. The City may direct the Consultant to assign the Consultant's right, title and interest under termination orders or subcontracts to the City or its designee. The Consultant shall transfer title and deliver to the City such completed or partially completed work and materials, equipment, parts, fixtures, information and Contract rights as the Consultant has in its possession or control. When terminated for convenience, the Consultant shall be compensated as follows:

(1) The Consultant shall submit a termination claim to the City specifying the amounts due because of the termination for convenience together with costs, pricing or other data required by the City. If the Consultant fails to file a termination claim within one (1) year from the effective date of termination, the City shall pay the Consultant the amount the City deems the Consultant is due.

(2) The City and the Consultant may agree to the compensation, if any, due to the Consultant hereunder.

(3) Absent agreement to the amount due to the Consultant, the City shall pay the Consultant the following amounts:

(a) Contract costs for labor, materials, equipment and other services accepted under this Agreement;

(b) Reasonable costs incurred in preparing to perform and in performing the terminated portion of the work, and in terminating the Consultant's performance, plus a fair and reasonable allowance for direct job site overhead and earned profit thereon (such profit shall not include anticipated profit or consequential damages); provided however, that if it reasonably appears that the Consultant would have not profited or would have sustained a loss if

the entire Agreement would have been completed, no profit shall be allowed or included and the amount of compensation shall be reduced to reflect the anticipated rate of loss, if any;

The total sum to be paid the Consultant under this Section shall not exceed the total Agreement Price, as properly adjusted, reduced by the amount of payments otherwise made, and shall in no event include duplication of payment.

4.2 Termination for Cause. If the Consultant does not perform the work, or any part thereof, in a timely manner, supply adequate labor, supervisory personnel or proper equipment or materials, or if it fails to timely discharge its obligations for labor, equipment and materials, or proceeds to disobey applicable law, or otherwise commits a violation of a material provision of this Agreement, then the City, in addition to any other rights it may have against the Consultant or others, may terminate the performance of the Consultant, in whole or in part at the City's sole option, and assume possession of the Project Plans and materials and may complete the work.

In such case, the Consultant shall not be paid further until the work is complete. After Completion has been achieved, if any portion of the Contract Price, as it may be modified hereunder, remains after the cost to the City of completing the work, including all costs and expenses of every nature incurred, has been deducted by the City, such remainder shall belong to the Consultant. Otherwise, the Consultant shall pay and make whole the City for such cost. This obligation for payment shall survive the termination of the Agreement.

In the event the employment of the Consultant is terminated by the City for cause pursuant to this Section and it is subsequently determined by a Court of competent jurisdiction that such termination was without cause, such termination shall thereupon be deemed a Termination for Convenience under this Section and the provisions of Section 4.1 shall apply.

4.3 Termination for Non-Appropriation. The City may also terminate this Agreement, in whole or in part, for non-appropriation of sufficient funds to complete or partially complete the Project, regardless of the source of such funds, and such termination shall be on the terms of Section 4.1.

4.4 The City's rights under this Section shall be in addition to those contained elsewhere herein or provided by law.

ARTICLE 5. SCOPE OF SERVICES. Consultant shall provide the Services as described in Attachment A, Scope of Services.

5.1 By mutual agreement, this Agreement and scope can be amended by the parties. The scope and fee for any additional tasks or services under such amendment shall be mutually negotiated and agreed to in writing prior to beginning such additional tasks or services.

5.2 ENVIRONMENTAL RESPONSIBILITY.

Where drilling/sampling services are involved, the samples obtained from the Project site are the property of the City. Should any of these samples be recognized by the Consultant to be contaminated, the City shall remove them from the Consultant's custody and transport them to a disposal site, all in accordance with applicable government statutes, ordinances, and regulations. For all other samples, the Consultant shall retain them for a sixty (60)-day period following the submission of the drilling/sampling report unless the City directs otherwise; thereafter, the Consultant shall discard the samples in accordance with all federal, state and local laws.

ARTICLE 6. SCHEDULE.

6.1 TIME OF THE ESSENCE. The parties agree that time is of the essence with respect to the parties' performance of all provisions of the Agreement.

6.2 Before executing this Agreement, the Consultant shall have prepared and submitted for approval to the City a Completion Schedule for the Project with milestones for the various stages (tasks) of the Services as outlined in the Scope of Services. The Consultant shall submit and obtain the City's approval for any proposed changes to the logic, durations, sequences, or timing of tasks as approved in the Completion Schedule.

6.3 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: 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.

6.4 Should City request changes in the scope, extent, or character of the Project, the fee and the time of performance of Consultant's Services as indicated in Attachment A shall be adjusted equitably.

ARTICLE 7. USE OF DOCUMENTS, DATA.

7.1 All Documents, including, but not limited to, reports, drawings, specifications, and computer software prepared by Consultant pursuant to this Agreement are instruments of service in respect to the Project. Consultant shall retain an ownership and property interest therein (including the right of reuse at the discretion of the Consultant) whether or not the Project is completed.

7.1.1 USE OF DATA SYSTEMS: Ownership, property interests and proprietary rights in data systems used by Consultant do not extend to the data created by or supplied to Consultant by the City; all rights to that data (including derivative or hidden data such as metadata) shall vest solely in City at the moment of creation.

7.1.2 DISCLOSURE OF DOCUMENTS/DATA. City may be required to disclose documents or data under state or federal law. City shall notify Consultant if a request for data or documents has been made and shall give Consultant a reasonable opportunity under the circumstances to respond to the request by redacting proprietary or other confidential information. Consultant waives any right to confidentiality of any document, e-mail or file it fails to clearly mark on each page as confidential or proprietary. In exchange, Consultant agrees to indemnify, defend, and hold harmless City for any claims by third parties relating thereto or arising out of (i) the City's failure to disclose such documents or information required to be disclosed by law, or (ii) the City's release of documents as a result of City's reliance upon Consultant representation that materials supplied by Consultant (in full or redacted form) do not contain trade secrets or proprietary information, provided that the City impleads Consultant and Consultant assumes control over that claim.

7.2 By execution of this Agreement, Consultant and his sub-consultant(s) grant the City a royalty-free, perpetual, irrevocable, and assignable license to use any and all intellectual property interest Consultant or his sub-consultant(s) possess to any drawings, details, specifications, documents, and other information created before each of their first involvement with the Project and subsequently incorporated into the Project's documents. City-furnished data that may be relied upon by Consultant is limited to the printed copies that are delivered to the Consultant pursuant to Article 2 of this Agreement. Any copyrighted electronic files furnished by City shall be used by Consultant only for the Project as described herein. City's posting or publication of such documents created by Consultant for City shall constitute fair use and shall not constitute an infringement of Consultant's copyright, if any.

7.3 Documents that may be relied upon by City are limited to the printed copies (also known as hard copies) that are signed or sealed by the Consultant. Files in electronic media format of text, data, graphics, or of other types that are furnished by Consultant to City are only for convenience of City, unless the delivery of the Project in electronic media format has been dictated in Attachment A, Scope of Services. Any conclusion or information obtained or derived from electronic files provided for convenience will be at the user's sole risk.

7.4 Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within sixty (60) days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the party delivering the electronic files. Unless stated otherwise herein, Consultant shall not be responsible to maintain documents stored in electronic media format after acceptance by City.

7.5 When transferring documents in electronic media format, Consultant makes no representations as to long term compatibility, usability, or readability, of documents resulting from the use of software application packages, operating systems, or computer hardware differing from that as required of, and used by, Consultant at the beginning of this Project.

7.6 City may make and retain copies of Documents for information and reference in connection with use on the Project by the City, or his authorized representative. Such Documents are not intended or represented to be suitable for reuse by City or others on extensions of the Project or on any other project. Any such reuse or modifications without written verification or adaptation by Consultant, as appropriate for the specific purpose intended, will be at City's sole risk and without liability or legal exposure to the Consultant or to Consultant's sub-consultants.

7.7 If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

7.8 Any verification or adaptation of the Documents for extensions of the Project or for any other project will entitle Consultant to further compensation at rates to be agreed upon by City and Consultant.

ARTICLE 8. INSURANCE.

8.1 During the performance of the Services under this Agreement, Consultant shall maintain the following minimum insurance:

a) General Liability Insurance with a combined single limit of $1,000,000 per occurrence and $2,000,000 annual aggregate.

b) Automobile Liability Insurance with a combined single limit of $1,000,000 for each person and $1,000,000 for each accident.

c) Workers' Compensation Insurance Coverage A in accordance with statutory requirements and Coverage B, Employer's Liability Insurance, with a limit of $500,000 for each occurrence.

d) Professional Liability Insurance with a limit of $1,000,000 annual aggregate.

8.2 Consultant shall add the City an additional insured on all policies unless otherwise prohibited.

8.3 Consultant shall, upon execution of this Agreement, furnish City certificates of insurance, which shall include a provision that such insurance shall not be canceled without at least thirty (30) days' written notice to City.

8.4 No insurance, of whatever kind or type is to be considered as in any way limiting other parties' responsibility for damages resulting from their activities in the execution of the Project. City agrees to include, or cause to be included, in the Project's construction contract, such requirements for insurance coverage and performance bonds by the Project's construction contractor as City deems adequate to indemnify City, Consultant, and other concerned parties against claims for damages and to insure compliance of work performance and materials with Project requirements.

ARTICLE 9. PAYMENT.

9.1 City will pay Consultant for services and expenses in accordance with the Fee Schedule proposal submitted for the Project as part of the Scope of Services. Consultant's invoices will be presented at the completion of the work or monthly and will be payable upon receipt. Payment is due upon presentation of invoice and is past due thirty (30) days from invoice date. City shall give prompt written notice of any disputed amount and shall pay the remaining amount.

9.2 Consultant shall be paid in full for all services under this Agreement, including City authorized overruns of the Project budget or unforeseen need for Consultant's services exceeding the original Scope of Services.

9.3 TRAVEL; EXPENSES

City shall reimburse reasonable expenses, including travel and meals, when specified in the Scope of Services, but only in accordance with the City's Travel and Expense Policy and Procedures Manual. The maximum amount will be applied as of the date of travel and as listed in the per diem reimbursement rates on the "CONUS" website developed by the United States General Services Administration, located at www.gsa.gov [click on 'per diem rates' under the 'etools' category].

ARTICLE 10. MISCELLANEOUS PROVISIONS

10.1 EQUAL EMPLOYMENT OPPORTUNITY. In connection with this Agreement and the Project, City and Consultant shall not discriminate against any employee or applicant for employment because of race, color, sex, national origin, disability or marital status. City and Consultant will take affirmative action to ensure that the contractor used for the Project does not discriminate against any employee and 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.

10.1.1 Consultant shall insert the foregoing provision in all contracts relating to this Project.

10.2 TITLE VI – CIVIL RIGHTS ACT OF 1964. City 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.

10.2.1 Consultant shall insert the foregoing provision in all contracts relating to this Project.

10.3 NO THIRD PARTY RIGHTS CREATED. City and Consultant each binds itself and its successors, executors, administrators, permitted assigns, legal representatives and, in the case of a partnership, its partners, to the other party to this Agreement and to their successors, executors, administrators, permitted assigns, legal representatives and partners of such other party in respect to all provisions of this Agreement. The Services provided for in this Agreement are for the sole use and benefit of City and Consultant. Nothing in this Agreement shall be construed to give any rights or benefits to anyone other than City and Consultant.

10.4 WARRANTIES/LIMITATION OF LIABILITY/WAIVER. City reserves all rights afforded to local governments under law for all general and implied warranties. City does not waive any rights it may have to all remedies provided by law and therefore any attempt by Consultant to limit its liability shall be void and unenforceable.

ARTICLE 11. EXTENT OF AGREEMENT:

11.1 APPLICABLE LAW/CHOICE OF FORUM AND VENUE. This Agreement is made under and will be construed in accordance with the laws of the State of Tennessee without giving effect to that state's choice of law rules. The parties' choice of forum and venue shall be exclusively in the courts of Williamson County, Tennessee. Any provision of this Agreement held to violate a law or regulation shall be deemed void, and all remaining provisions shall continue in force.

11.2 ENTIRE AGREEMENT. This Agreement, including these terms and conditions, represent the entire Agreement between City and Consultant for this Project and supersedes all prior negotiations, representations or agreements, written or oral. This Agreement may be amended only by written instrument signed by City and Consultant.

ARTICLE 12. DISPUTE RESOLUTION, BREACH.

12.1 If a dispute should arise relating to the performance of or payment for the Services under this Agreement, the aggrieved party shall notify the other party of the dispute within a reasonable time after such dispute arises. During the pendency of any dispute, the parties shall continue diligently to fulfill their respective obligations hereunder. No arbitration or mediation shall be required as a condition precedent to filing any legal claim arising out of or relating to this Agreement. No arbitration or mediation shall be binding.

12.2 BREACH. Upon deliberate breach of the Agreement by either party, the non-breaching party shall be entitled to terminate the Agreement with 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.

ARTICLE 13. SURVIVAL.

The provisions contained in this Professional Services Agreement shall survive the completion of or any termination of the Agreement, contract or other document to which it may accompany or incorporate by reference or which subsequently may be modified, unless expressly excepted from this Article upon consent of both parties.

BY: _____
Consultant's Signature
TITLE: _____
Date: _____

BY: _____
Dr. Ken Moore
Mayor
Date: _____

Approved as to Form:

_____
Tiffani M. Pope, Staff Attorney
COF Contract No. 2018-0023

Attachment to Exhibit A

Reclaimed Water System Hydraulic Model Development and Masterplan Update

Scope of Services

Background and Objectives

In the summer of 2017, the City of Franklin (COF) Reclaimed Water System experienced flow and pressure drops and delivery issues in multiple service areas, particularly along the southern service areas in and around the Berry's Farm subdivision. The City's Water Management Department solicited CDM Smith to develop a Reclaimed Water System model to evaluate the overall system; and specifically, evaluate the issues being experienced in the southern service areas in order to propose short-term alternatives that could address the operations (such as valve operations, system interconnections and potential storage options) over the remainder of the summer.

As a result of the discussions related to the reclaimed system service and a follow-up to the initial analysis, the City desired to update the existing reclaimed water system masterplan and progress the model to develop short-term and long-term recommendations for both operations and capital investment for the entire system. The updates would consider a broad-range of options to address future reclaimed water system demands city-wide; as well as, options for reclaimed water utilization to comply with increasingly stringent nutrient reduction requirements for the existing and future wastewater effluent discharge.

The following sections summarize the proposed tasks to provide the City with short-term solutions for system pressure issues and long-range planning for future reclaimed water demands.

Project Scope of Work

Task 1 – Model Development

Task 1.1 City Staff Coordination and System Information Gathering

CDM Smith will obtain the following information and determine the adequacy of the information to assist in the development of the reclaimed water system analytical model. The information assembled shall include, but is not limited to, the following:

- City's GIS geodatabase of the existing reclaimed water system infrastructure,
- Historical and current customer demands (billing data),
- Reclaimed pump station pump curves and control settings,
- SCADA Data, including average and peak day demands (as available), and
- As-built drawings (pipe size, material, etc.)

To date, CDM Smith and the City have coordinated on the available data for the system; as well as collected additional field data to assist in the initial development and calibration of the model. The information collected and utilized to date include the following items. Additional data collection to be completed is described in additional tasks herein.

- GIS database of existing reclaimed water network
- Pumps curves for reclaimed water pump station
- Actual usage (meter data) versus contract usage for customers
- System data collected on existing system pressures and flows at various locations within the system (see below)

System Data:

Location	Data Type	Dates
Franklin WRF at Reclaimed Pumps	Pressure	5/23/2017 - 5/26/2017 6/2/2017 - 6/6/2017 6/12/2017 - 6/13/2017 6/28/2017 - 7/3/2017 11/9/2017 – 11/10/2017
Franklin WRF at Reclaimed Pumps	Flow	6/2/2017 - 6/6/2017 6/28/2017 - 7/3/2017 11/9/207 – 11/10/2017
Redwing Farms	Pressure	5/23/2017 – 5/26/2017 6/6/2017 – 6/13/2017 11/9/207 – 11/10/2017
Berry Farms Air Release	Pressure	6/6/2017 – 6/13/2017
Berry Farms Hydrant	Pressure	5/23/2017 – 5/26/2017 6/6/2017 – 6/13/2017 6/28/2017 – 7/3/2017 11/9/207 – 11/10/2017
Berry Farms Reclaim Meter	Pressure	6/28/2017 – 7/3/2017
Berry Farms Domestic Hydrant	Pressure	6/28/2017 – 7/3/2017
Downs Blvd.	Pressure	6/28/2017 – 7/3/2017
Legends Golf Club	Pressure	11/9/207 – 11/10/2017
Westhaven LS	Pressure	11/9/207 – 11/10/2017

Task 1.2 Develop Reclaimed System Hydraulic Model

After performing a review of the available data, CDM Smith will develop a WaterGEMS hydraulic model of the City's existing Reclaimed Water System. The City's GIS database will be used to construct the base model and incorporate all existing system infrastructure. Customer demands from City records will

be distributed to the appropriate nodes within the model and system wide diurnal demand curves will be developed.

Task 1.3 Inspect Effluent Pump Station for Reclamation

To ensure a thorough understanding of the condition and current operations of the system pump station, CDM Smith staff will visit and inspect the effluent pump station (water reclamation pump station) at the Water Reclamation Facility (WRF) to catalog the nameplate, information for each operable pump and verify the normal operating point(s) for the pump systems by recording flow and pressures for the station. If power meters are available, CDM Smith will calculate wire-to-water efficiencies and identify any inefficiencies of the pump(s).

Task 1.4 Pump Curves and Pump Controls Incorporated into the Model

CDM Smith will incorporate all the pump curves into the model, adding curves as needed and setting up controls to start and stop pumps during extended period simulations. If available, the City will provide test curves for any pumps that have been tested within the past 10 years, certified performance curves, or manufacturer's design curves for each pump. The City will provide on/off settings for automatically controlled pumps, and CDM Smith will interview operators to obtain information for simulating manually controlled pumps. CDM Smith will assimilate this information and the results of the water reclaimed pump station inspection(s) to ensure each pump station is accurately represented in the model. We will identify pumps that operated during spot-checks at points that do not fall on the provided curves in the model and recommend formal pump tests where discrepancies cannot be resolved. If SCADA data is available, we will also compare to field measurements for an additional accuracy check and utilize the SCADA data for the calibration efforts.

Task 1.5 System Field Testing

CDM Smith will conduct a multitude of field tests to best calibrate the system model to the conditions observed in the field. The testing will include a mix of system analysis including monitoring at individual customer meters, flow and pressure measurements within the system, hydrant testing (limited due to minimal hydrants and blow-offs on the system) and c-factor testing.

Initially, CDM Smith will coordinate the installation of recorders at approximately 10 of the City's largest customers to watch real-time usage within the system. A Meter Master 100EL, or similar type monitor, will be installed on the existing reclaimed water meters for an extended, continuous period, estimated from May 2018 to August 2018 to capture the extents of the high demand period. Monitors will record water usage in small increments (one to five-minute periods) for the entire period to ensure that the usage patterns are captures. The exact number of monitors will be adjusted as necessary to obtain the information required for successful calibration. Due to the unknown cost of the monitor rentals and data collection, an allowance for the equipment and/or subcontractor to perform the work has been included for $20,000. The actual contract value of the monitoring program will be provided to the COF for approval prior to commencing the work.

In addition to the monitoring at the meters, CDM Smith will work with the COF to field measure flows and pressures within selected pipes similar to the data collected and shared above from the summer of 2017. These tests will typically be completed during high demand days during summer months to accentuate head losses along trunk mains during periods of minimal flushing. We will utilize system pressure loggers and associated flow data from the system to convert measured pressures to feet of water and add gauge elevations in order to plot hydraulic grade lines (HGLs) against distance. These plots will demonstrate the accumulation of head losses and illustrate bottlenecks or other potential hydraulic restrictions within the pipe network. The hydraulic gradient tests also provide accurate bench mark information for model calibration. We anticipate utilizing up to 8 pressure loggers within the reclaimed system assuming the locations can be accessed and available for the connection of the loggers. These field activities will be coordinated with the City of Franklin to identify the most appropriate, and available, locations.

In addition to the field tests identified above, CDM Smith may also utilize c-factor testing and hydrant testing as appropriate to collect additional calibration data. The c-factor testing is not anticipated to be as valuable as the testing above due to the relative newness of the piping network. CDM Smith will work with the City staff to identify up to five areas within the system with the oldest infrastructure to verify pipe c-factor. The purpose of these tests is to provide a characterization of the C-factor for the various grouping of pipes throughout the reclaimed water system. The chosen locations, including the primary piping leaving the WRF pump station, will assist with determining the conveyance capacity of the piping network; as well as assisting with any piping affected by tuberculation or deposits. The preliminary C-factors in the model will be adjusted based on the test results. We assume that the COF Water Management Department will provide staff to accompany CDM Smith during the tests and perform operation of hydrants/valves as required.

Finally, CDM Smith will perform hydrant testing within the system where possible. The lack of hydrants and blow-off locations within the system will limit the opportunities for the two-hydrant testing, but testing will be coordinated with the City staff. The field pressure data for static and flowing conditions will be collected utilizing the two hydrant testing protocols. Data for two flow tests and a static pressure reading near the highest system elevation will be collected. Flow tests will be conducted using a procedure similar to hydrant flow tests on the potable water system, with reclaimed water blowoff valves opened to induce a large demand on the system instead of opening a flow hydrant. Although the blowoff flow rate may not be able to be measured directly due to the configuration, we will be able to estimate the blowoff flow rate using SCADA data from the high service pumps at the WRFs. The system demands, operating conditions, and blowoff flow rates observed during the field tests will be simulated in the hydraulic model, and the modeled and field pressures will be compared and calibrated against at each location. Due to the lack of current knowledge in regards to the potential locations where testing could be completed, this proposal includes up to 10 flow (hydrant/blowoff) tests and will be adjusted based on actual coordination on potential locations with the City staff.

Task 1.6 Calibrate Model using Field Tests

The accuracy of a computer model is highly dependent on its degree of calibration. To determine if a computer model is calibrated, actual field conditions are simulated using the model. System operating

parameters (e.g. system pressures, flow, etc.) generated by the model are compared with the parameters measured in the field activities outlined above in task 1.5.

CDM Smith will calibrate the developed model by running steady-state simulations to mirror the existing operations observed during the field tests discussed above. The calibration will compare the predicted flows and pressures with measurements from the hydrant flow tests and hydraulic gradient tests. The model will be adjusted until its predictions agree reasonably, as agreed upon by CDM Smith and the COF, with the observed measurements. Major discrepancies will be investigated and resolved prior to finalizing the calibration.

Task 1.7 Prepare a Model Calibration Report

CDM Smith will prepare a briefing report that describes the sources of information used for background model data and documents the final calibration results. The report will include charts and tables comparing model predictions with flow and pressure measurements, including SCADA data sets (as available).

Task 1.8 Train City Staff

CDM Smith will conduct three 8-hour days of training for all appropriate City staff at the Water Management offices focusing on:

- Basic overview of model components, including general background and operations of WaterGEMS Software
- Updating the model using GIS data or drawings of new developments/subdivisions
- Creating scenarios to model multiple operations situations

In addition to the time for the actual training, this task includes all the time and effort to prepare the documents, presentation and materials for the training.

Task 2 – City-Wide Reclaimed Water System Analysis

Task 2.1 Kickoff and Additional Meetings to Develop System Goals and Demand Scenarios/Alternatives Approach

CDM Smith will facilitate a kickoff meeting and up to four follow-up meetings to determine the COF Water Reclamation System usage goals; for example, whom and where the City wants to serve (residential vs commercial) as major customers and how the City wants to expand and operate the system into the short-term and long-term future. The meetings will be utilized to develop demand and alternative scenarios based on the meeting discussions that will be utilized in the model and are intended to meet the following criteria:

- The adequacy of the system under its current demands, including identifying systems weakness. This will be a scenario consisting of two sub-sets: one with actual current metered use showing

deficiencies, if any, and a second showing contractual committed usages showing deficiencies, if any**.**

- The adequacy of the system where capacity has been granted, but is not currently in service. This will be a scenario that will consist of the two subsets. (actual use = existing metered use + granted contractual with peaking factor)
- The adequacy of the system to incorporate the City's future needs based on projected growth. This scenario will consist of the ability to add projected growth nodes and areas with appropriate peaking factors to the scenarios above.

Task 2.2 Hydraulic Model Update with Developed Scenarios/Alternatives

CDM Smith will utilize the hydraulic model developed in Task 1 to model the scenarios discussed above and any additional needs developed as part of Task 2.1 discussions. These scenarios will be incorporated into the model to allow for future usage of the scenarios by the COF.

Task 2.3 Develop Peaking Factors

Peaking factors will be assigned to represent daily and seasonal variation in water usage based on current usage patterns observed in the reclaimed system, specific usage information obtained from customer billing database, reclaimed profiles from customer types in other similar communities, and typical peaking factors from accepted manuals of practice. In addition, we will utilize the field testing and monitoring of individual meters in Task 1 to verify these peaking factors.

Task 2.4 Evaluation of Hydraulic Model Runs of Developed Scenarios/Alternatives and Developed Peaking Factors

CDM Smith will perform hydraulic model simulations to assess the capacity and ability of the existing water reclamation system's pumping, conveyance and storage to serve the developed scenarios. Water quality and operating conditions will be evaluated for seasonal conditions (winter average day, summer average day, summer maximum day). CDM Smith will review the City's Standard Operating Procedures with respect to best practices from other utilities resources and provide recommendations, as necessary, to improve system operations.

Task 2.5 Development of Water Reclamation System to Serve Water Reclamation Demand

After the water reclamation system scenarios/alternatives are established in the model, projections will be updated and potential system Improvement projects will be developed as part of both a short-term and long-term capital improvements program. CDM Smith will perform hydraulic modeling analysis to determine the infrastructure required to meet the projected demand scenarios established in 2.1. CDM Smith will utilize hydraulic model results to evaluate the least-cost combination of pumping, storage, and transmission improvements to meet the projected demands. In determining improvement recommendations, the following will be considered:

- Reclaimed water storage needs (at both the existing and future WRFs, as well as the reclaimed distribution system)
- Establishing pressure zones to correspond with the potable water system

- Operating protocols
- Water quality
- Balancing the mix of customer uses to reduce peak demand on the system
- Flexibility and redundancy to improve operation and maintenance
- System interconnections and looping
- Maintaining continual flow of water
- Need for system re-chlorination stations at pump/storage locations to maintain water quality
- End of pipe blow-off locations
- Remote flow control valves to manage system and customer delivery
- Additional treatment capacity
- Additional treatment needs

As part of the capital program development, up to three meetings will be held with the COF staff to develop and evaluate potential projects to meet the long-term needs of the system.

Task 2.6 Technical Memorandum of Model Results Tabulating System Improvements

Once conceptual facility improvements associated with each of the scenarios/alternatives are developed, CDM Smith will prepare a technical memorandum describing the analysis protocol, the model results and a list of potential conceptual infrastructure improvement projects. CDM Smith will conduct a meeting that will explain the protocol that developed the conceptual facility improvements. An update meeting will be held to give insight on the identified projects to the COF so decisions on the orderly improvement of the system can be achieved. Cost estimates will be prepared for the primary alternatives developed in conjunction with the COF. The cost evaluation will include both estimated capital costs and operation and maintenance costs for both the treatment facilities and the storage and distribution facilities. To compare among potential alternatives to supply customers, a unit cost per gallon of reclaimed water demand will be calculated.

Task 3 – Master Plan Update Report

Task 3.1 Master Plan Report Development

CDM Smith will prepare a draft report that summarizes the conceptual reclaimed water alternatives and identifies the highest potential primary alternatives based on the analysis conducted under Tasks 2.1 through 2.6. Within the report, CDM Smith will identify preliminary phasing of the recommended reclaimed water system alternatives with respect to current planned projects in the system, future development, and planned WRF expansions and future constructions. The plan will also include regulatory considerations, particularly as it relates to future discharges and potential WRF permitting limitations and capital project improvement costs. Upon review, CDM Smith will update the draft report based on all feedback from the COF and publish a final Reclaimed System Master Plan Report.

Compensation

CDM Smith proposes to complete the work under Tasks 1 through 3 above for a not-to-exceed budget of $195,500.00. The details of this cost estimate are shown on the table below and included in the task

breakdown. CDM Smith will bill the project on a monthly basis based on the attached task breakdown and billing rate table. For each monthly invoice, CDM Smith will submit a monthly progress report and update on project status and deliverables.

	Project Tasks	Hours	Totals
1	Task 1 – Model Development	600	$99,000
2	Task 2 - City-Wide Reclaimed Water System Analysis	535	$75,000
3	Task 3 - Master Plan Update Report	160	$21,500
	Total Tasks 1 - 3	1,295	$195,500

Labor Category	Billing Rate ($/hour)
Senior Technical Advisor	$ 225
Officer	$ 210
Project Manager	$ 195
Technical Specialist	$ 175
Senior Engineer	$ 155
Engineer II	$ 135
Engineer	$ 115
Senior Field Technician	$ 105
Junior Engineer	$ 100
GIS/Field Technician	$ 90
Clerical/Contract Administrator	$ 75

Client: City of Franklin, TN
Project: Reclaimed Water Emergency Services and Master Plan Update
Detail: Scope of Work Fee Estimate
Date: 12/18/17

		Senior Technical Advisor	Officer	Project Manager	Technical Specialist	Senior Engineer	Engineer II	Engineer	Senior Field Technician	Junior Engineer	GIS/Field Technician	Clerical/Contract Administrator					
Task Descriptions		$225	$210	$195	$175	$155	$135	$115	$105	$100	$90	$75		Labor	ODCs	OPs	Task Level
		Hrs	Hrs	Hrs	Hrs	Hrs	Hrs	Hrs		Hrs	Hrs	Hrs	Total Hr	Totals	Totals	Totals	Totals
Task 1 - Model Development																	
1.1	City Staff Coordination and System Information Gathering	2	2	4	4		32	20				2	66	$9,120	$250		$ 9,370
1.2	Develop Reclaimed System Hydraulic Model		2	2			52	16				2	74	$9,820			$ 9,820
1.3	Inspect Effluent Pump Station for Reclamation		2	2		4	4			8	4		24	$3,130	$150		$ 3,280
1.4	Pump Curves and Pump Controls Incorporated into the Model		2	2			12	8					24	$3,350			$ 3,350
1.5	System Field Tests	2	2	6	6		40	24	24		60	4	168	$19,470	$1,000	$20,000	$ 40,470
1.6	Calibrate Model using Field Tests		2	4			40	24					70	$9,360			$ 9,360
1.7	Prepare a Model Calibration Report	4	2	4			40	16		16		8	90	$11,540	$100		$ 11,640
1.8	Train City Staff	4	2	2	8		32	24			8	4	84	$11,210	$500		$ 11,710
	Task Totals	**12**	**16**	**26**	**18**	**4**	**252**	**132**	**24**	**24**	**72**	**20**	**600**	**$77,000**	**$2,000**	**$20,000**	**$ 99,000**
Task 2 - City-Wide Reclaimed Water System Analysis																	
2.1	Kickoff and Additional Meetings to Develop System Goals and Demand Scenarios/Alternatives Approach	6	5	7	8		16	12				3	57	$8,930	$200		$ 9,130
2.2	Hydraulic Model Update with Developed Scenarios/Alternatives			2	4		40	24		8			78	$10,050			$ 10,050
2.3	Develop Peaking Factors	2	2	2	2		16	4		4	4		36	$4,990			$ 4,990
2.4	Evaluation of Hydraulic Model Runs of Developed Scenarios/Alternatives and Developed Peaking Factors	8	4	8	16		50	40		16	4		146	$20,310			$ 20,310
2.5	Development of Water Reclamation System to Serve Water Reclamation Demand	8	4	4	10		56	16		4			102	$14,970			$ 14,970
2.6	Technical Memorandum of Model Results Tabulating System Improvements	2	2	4	12		40	40		16			116	$15,350	$200		$ 15,550
	Task Totals	**26**	**17**	**27**	**52**		**218**	**136**		**48**	**8**	**3**	**535**	**$74,600**	**$400**		**$ 75,000**
Task 3 - Master Plan Update Report																	
3.1	Master Plan Report Development	4	2	8	10		80	40			8	8	160	$21,350	$150		$ 21,500
	Task Totals	**4**	**2**	**8**	**10**		**80**	**40**			**8**	**8**	**160**	**$21,350**	**$150**		**$ 21,500**
	TOTAL	**42**	**35**	**61**	**80**	**4**	**550**	**308**		**72**	**88**	**31**	**1,295**	**$172,950**	**$2,550**	**$20,000**	**$195,500**

Proposed Schedule for Reclaimed Water System Hydraulic Model Development and Masterplan Update

Task	Description	Start Date	End Date	Notes
1.1	City Staff Coordination and Reclaimed System Information Gathering	Upon NTP	Aug-18	
1.2	Develop and Update Reclaimed System Hydraulic Model	Upon NTP	Aug-18	Simulatneously completed with Task 1.5 and 1.6
1.3	Inspect Reclaimed System Pump Station and Perform Field Hydraulic Testing	Mar-18	Apr-18	
1.4	Pump Curves and Pump Controls Incorporated into the Model	Mar-18	Apr-18	
1.5	Reclaimed System Field Testing (Flow, Pressure, etc.)	Mar-18	Jul-18	
1.6	Calibrate Model using Field Tests and Customer Data	Jun-18	Aug-18	
1.7	Prepare a Model Calibration Report	Jun-18	Aug-18	Concurrent with model calibration effort
1.8	Training Sessions for City Staff on Model	Feb-19	Mar-19	After completion of Master Plan Report
2.1	Kickoff and Additional Meetings to Develop System Goals and Demand Scenarios/Alternatives Approach	Mar-18	Oct-18	
2.2	Hydraulic Model Update with Developed Scenarios/Alternatives	Aug-18	Sep-18	
2.3	Develop Peaking Factors	Mar-18	Aug-18	
2.4	Evaluation of Hydraulic Model Runs of Developed Scenarios/ Alternatives and Developed Peaking Factors	Sep-18	Oct-18	
2.5	Development of Water Reclamation System to Serve Water Reclamation Demand	May-18	Oct-18	
2.6	Technical Memorandum of Model Results & Recommended System Improvements	Oct-18	Nov-18	
3.1	Master Plan Report Development	Nov-18	Feb-19	