

AGREEMENT
FOR
ENGINEERING SERVICES

This AGREEMENT, between the Norman Utilities Authority (OWNER) and ALAN PLUMMER ASSOCIATES, INC., (ENGINEER);

WITNESSETH

WHEREAS, OWNER intends to increase their existing water supply and requires an update of the existing hydraulic model, an evaluation of the existing hydraulic system performance, and recommendations for system improvement needs as described in RFP-1516-6. This PROJECT will be identified as the Update Distribution System Modeling Project and shall be as described in Attachment B.

WHEREAS, OWNER engineering services in connection with the PROJECT (the SERVICES); and,

WHEREAS, ENGINEER is prepared to provide said SERVICES; and.

NOW THEREFORE, in consideration of the promises contained in this AGREEMENT, OWNER and ENGINEER agree as follows:

ARTICLE 1 - EFFECTIVE DATE

The effective date of this AGREEMENT shall be _____.

ARTICLE 2 - COMPLETION DATE

ENGINEER shall complete the SERVICES in accordance with Attachment A, Project Schedule.

ARTICLE 3 - GOVERNING LAW

The laws of the state of Oklahoma shall govern this AGREEMENT.

ARTICLE 4 - SERVICES TO BE PERFORMED BY ENGINEER

ENGINEER shall perform the SERVICES described in Attachment B, Scope of Services.

ARTICLE 5 - COMPENSATION

OWNER shall pay ENGINEER in accordance with Attachment C, Compensation.

ARTICLE 6 - OWNER'S RESPONSIBILITIES

- 6.1. OWNER-Furnished Data: Upon request, OWNER will provide to ENGINEER all data in OWNER's possession relating to ENGINEER's SERVICES on the PROJECT. Such data may include electronic data available from the OWNER's Geographic Information System (GIS) and data generated by OWNER's water distribution system model. ENGINEER will reasonably rely upon the accuracy, timeliness, and completeness of the information provided by OWNER. OWNER's data is provided for temporary use or copying by ENGINEER.
- 6.2. Access to Facilities and Property: OWNER will make its facilities accessible to ENGINEER as required for ENGINEER's performance of its SERVICES
- 6.3. Timely Review: OWNER will examine ENGINEER's studies, reports, sketches, drawings, specifications, proposals, and other documents; and transmit OWNER comments or other decisions to ENGINEER in a timely manner.
- 6.4. Meetings: OWNER will participate in monthly progress meetings or other meetings with ENGINEER or contractor(s) defined in Scope of Services.

- 6.5. Advertisements, Permits, and Access: Unless otherwise agreed to in the Scope of Services, OWNER will obtain, arrange, and pay for all advertisements for bids; permits and licenses required by local, state, or federal authorities; and land, easements, rights-of-way, and access necessary for ENGINEER's SERVICES or PROJECT construction.
- 6.6. Hazardous Substances: If hazardous substances in any form are encountered or suspected, ENGINEER will stop its own work in the affected portions of the PROJECT to permit testing and evaluation. ENGINEER will, if requested by OWNER, conduct tests to determine the extent of the problem and will perform the necessary studies and recommend necessary remedial measures at an additional fee with contract terms to be negotiated.

ARTICLE 7 - STANDARD OF CARE

ENGINEER shall exercise the same degree of care skill and diligence in the performance of the SERVICES as is ordinarily possessed and exercised by a professional engineer under similar circumstances. ENGINEER shall correct the SERVICES that fail to satisfy this standard of care. No warranty, express or implied is included in this AGREEMENT or in any drawing, specifications, report or opinion produced pursuant to this AGREEMENT.

ARTICLE 8 - LIABILITY AND INDEMNIFICATION

- 8.1 General. Having considered the potential liabilities that may exist during the performance of the SERVICES, the benefits of the PROJECT, the ENGINEER's fee for the SERVICES and in consideration of the promises contained in this AGREEMENT, OWNER and ENGINEER agree to allocate and limit such liabilities in accordance with this Article.
- 8.2 Indemnification and Liability. The CONSULTANT agrees to defend, indemnify, and hold harmless the OWNER, its officers, servants, and employees, from and against legal liability for all claims, losses, damage, cost, and expense (including reasonable attorneys' fees and accountants' fees) caused by a negligent act, error, or omission of the CONSULTANT in the performance of services under this Agreement. OWNER agrees to defend, indemnify, and hold harmless the CONSULTANT, its officers, servants, and employees, from and against legal liability for all claims, losses, damage, cost, and expense (including reasonable attorneys' fees and accountants' fees) caused by a negligent act, error, or omission of the OWNER in the performance of services under this Agreement, provided such indemnification shall be applicable only to the extent sovereign immunity has been waived pursuant to Oklahoma law. The CONSULTANT and the OWNER each agree to promptly service notice on the other party of any claims arising hereunder, and shall cooperate in the defense of such claims. The acceptance by OWNER or its representatives of any certification of insurance providing for coverage other than as required in this Agreement to be furnished by the CONSULTANT shall in no event be deemed a waiver of any of the provisions of this indemnity provision. None of the foregoing provisions shall deprive the OWNER of any action, right, or remedy otherwise available to OWNER at common law.
- 8.3 Employee Claims. ENGINEER shall indemnify OWNER against legal liability for damages arising out of claims by ENGINEER's employees. OWNER shall indemnify ENGINEER against legal liability for damages arising out of claims by OWNER's employees.
- 8.4 Consequential Damages. To the fullest extent permitted by law, ENGINEER shall not be liable to OWNER for any special, indirect or consequential damages resulting in any way from the performance of the SERVICES.
- 8.5 Survival. Upon completion of all SERVICES obligations and duties provided for in this AGREEMENT or if this AGREEMENT is terminated for any reason the terms and conditions of this Article shall survive.

ARTICLE 9 - INSURANCE

During the performance of the SERVICES under this AGREEMENT ENGINEER shall maintain the following insurance:

- 9.1 Worker's compensation insurance for ENGINEER's employees as required by Oklahoma Workers Compensation Statutes.
- 9.2 Comprehensive general liability insurance with a minimum of \$125,000 per accident for bodily injury or death and \$25,000 per occurrence for property damage.
- 9.3 Comprehensive automobile liability insurance with a minimum of \$125,000 per accident for bodily injury or death and \$25,000 for property damage.
- 9.4 Professional Liability (errors and omissions) insurance with a minimum policy value of \$1,000,000.

ENGINEER shall furnish OWNER certificates of insurance that shall include a provision that such insurance shall not be canceled without at least thirty days written notice to OWNER. All PROJECT contractors shall be required to include OWNER and ENGINEER as additional insured on their General Liability Insurance policies.

ENGINEER and OWNER each shall require its insurance carriers to waive all rights of subrogation against the other and its directors, officers, partners, commissioners, officials, agents and employees for damages covered by property insurance during and after the SERVICES. A similar provision shall be incorporated into all contractual arrangements entered into by OWNER and shall protect OWNER and ENGINEER to the same extent.

ARTICLE 10 - LIMITATIONS OF RESPONSIBILITY

ENGINEER shall not be responsible for: (1) construction means, methods, techniques, sequences, procedures or safety precautions and programs in connection with the PROJECT; (2) the failure of any contractor, subcontractor, vendor or other PROJECT participant, not under contract to ENGINEER, to fulfill contractual responsibilities to the OWNER or to comply with federal, state or local laws, regulations, and codes; or (3) procuring permits, certificates and licenses required for any construction unless such responsibilities are specifically assigned to ENGINEER in Attachment B, Scope of Services.

ARTICLE 11 - OPINIONS OF COST AND SCHEDULE

Since ENGINEER has no control over the cost of labor, materials or equipment furnished by others or over the resources provided by others to meet PROJECT schedules, ENGINEER's opinion of probable costs and of PROJECT schedules shall be made on the basis of experience and qualifications as a professional engineer. ENGINEER does not guarantee that proposals, bids, or actual PROJECT costs will not vary from ENGINEER's cost estimates.

ARTICLE 12 - REUSE OF DOCUMENTS

Upon OWNER's request ENGINEER shall furnish OWNER with deliverables and/or other data on electronic media. All documents, including but not limited to, drawings, specifications and computer software prepared by ENGINEER pursuant to this AGREEMENT are instruments of Service in respect to the PROJECT. Said documents are not intended or represented to be suitable for reuse by OWNER or others on extensions of the PROJECT or on any other PROJECT.

ARTICLE 13 - TERMINATION

This AGREEMENT may be terminated by either party upon written notice in the event of substantial failure by the other party to perform in accordance with the terms of this AGREEMENT. The non-performing party shall have fifteen (15) calendar days from the date of the termination notice to cure or to submit a plan for cure acceptable to the other party.

OWNER may terminate or suspend performance of this AGREEMENT for OWNER's convenience upon written notice to ENGINEER. ENGINEER shall terminate or suspend performance of the SERVICES on a schedule

acceptable to OWNER. If termination or suspension is for OWNER's convenience, OWNER shall pay ENGINEER for all the SERVICES performed to date, amount not to exceed the normal fee amount due for the SERVICES rendered and termination or suspension expenses. Upon restart, an equitable adjustment shall be made to ENGINEER's compensation.

ARTICLE 14 - DELAY IN PERFORMANCE

Neither OWNER nor ENGINEER shall be considered in default of this AGREEMENT for delays in performance caused by circumstances beyond the reasonable control of the non-performing party. For purposes of this AGREEMENT, such circumstances include, but are not limited to abnormal weather conditions; floods; earthquakes; fire; epidemics; war; riot and other civil disturbances; strikes, work slowdowns and other labor disturbances; sabotage; judicial restraint; and inability to procure permits, licenses, or authorizations from any local, state, or federal agency for any of the supplies, materials, accesses, or SERVICES required to be provided by either OWNER or ENGINEER under this AGREEMENT.

Should such circumstances occur the non-performing party shall, within a reasonable period after being prevented from performing, give written notice to the other party describing the circumstances preventing continued performance and the efforts being made to resume performance of this AGREEMENT.

ARTICLE 15 - COMMUNICATIONS

Any communication required by this AGREEMENT shall be made in writing to the address specified below:

ENGINEER: Alan Swartz, P.E.
Alan Plummer Associates, Inc.
414 NW 4th Street, Suite 150
Oklahoma City, OK 73102
405-440-2725
aswartz@apaienv.com

OWNER: Michelle Matthews
Norman Utilities Authority
201-C West Gray
P.O. Box 370
Norman OK 73070
405-366-5377
michelle.matthews@normanok.gov

Nothing contained in this Article shall be construed to restrict the transmission of routine communications between representatives of ENGINEER and OWNER.

ARTICLE 16 - WAIVER

A waiver by either OWNER or ENGINEER of any breach of this AGREEMENT shall be in writing. Such a waiver shall not affect the waiving party's rights with respect to any other or further breach.

ARTICLE 17 - SEVERABILITY

The invalidity, illegality, or unenforceability of any provision of this AGREEMENT or the occurrence of any event rendering any portion or provision of this AGREEMENT void shall in no way affect the validity or enforceability of any other portion or provision of this AGREEMENT. Any void provision shall be deemed severed from this AGREEMENT, and the balance of this AGREEMENT shall be construed and enforced as if this AGREEMENT did not contain the particular portion or provision held to be void. The parties further agree to amend this AGREEMENT to replace any stricken provision with a valid Provision that comes as close as possible to the intent of the stricken provision. The provisions of this Article shall not prevent this entire AGREEMENT from being void should a provision, which is of the essence of this AGREEMENT, be determined void.

ARTICLE 18 - INTEGRATION

This AGREEMENT represents the entire and integrated AGREEMENT between OWNER and ENGINEER. It supersedes all prior and contemporaneous communications, representations, and agreements, whether oral or written, relating to the subject matter of this AGREEMENT. This AGREEMENT, including its attachments and schedules, may only be changed by a written amendment executed by both parties. The following attachments and schedules are hereby made a part of this AGREEMENT:

Attachment A - Schedule
Attachment B - Scope of Services
Attachment C - Compensation

ARTICLE 19 - SUCCESSORS AND ASSIGNS

OWNER and ENGINEER each binds itself and its directors, officers, partners, successors, executors, administrators, assigns, and legal representatives to the other party to this AGREEMENT and to the directors, officers, partners, successors, executors, administrators, assigns, and legal representatives of such other party in respect to all provisions of this AGREEMENT.

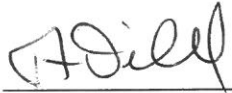
IN WITNESS WHEREOF, OWNER and ENGINEER have executed this AGREEMENT.

DATED this _____ day of _____, 20____.

Alan Plummer Associates, Inc. - ENGINEER

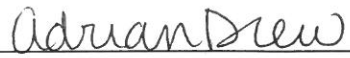
ATTEST

By:



Title:

ASSOCIATE



PM Administrator

Norman Utilities Authority- OWNER

APPROVED as to form and legality this 3 day of February, 2016



City Attorney

APPROVED by the Trustees of the Norman Utilities Authority this _____ day of _____, 20____.

ATTEST

By:

Title:

ATTACHMENT A

SCHEDULE

The PROJECT shall be completed in accordance with the following schedule.

- Task 1 – Related to Attachment B, Task B-1: OWNER shall complete GIS updates and data delivery to ENGINEER within 90 calendar days from Notice to Proceed (estimated to be May 1, 2016)
- Task 2 – Related to Attachment B, Task A-2: Progress Meeting 1
- Task 3 – Related to Attachment B, Task B-3 (c): OWNER to complete distribution system pressure measurements within 180 calendar days from Notice to Proceed (estimated to be August 1, 2016)
- Task 4 – Related to Attachment B, Tasks B-2 and B-3: ENGINEER to complete model building and calibration within 240 calendar days from Notice to Proceed (estimated to be October 1, 2016)
- Task 5 – Related to Attachment B, Task A-2: Progress Meeting 2
- Task 6 – Related to Attachment B, Tasks B-4 and B-5: ENGINEER to complete Model Analysis within 300 calendar days from Notice to Proceed (estimated to be December 1, 2016)
- Task 7 – Related to Attachment B, Task A-2: Progress Meeting 3
- Task 8 – Related to Attachment B, Tasks B-6 and B-7: Draft Report shall be delivered to OWNER within 390 calendar days from Notice to Proceed (estimated to be March 1, 2017)
- Task 9 – Related to Attachment B, Task A-2: Progress Meeting 4
- Task 10 – Related to Attachment B, Task B-7: Final Report shall be delivered to OWNER within 30 calendar days following receipt of OWNER comments on the Draft Report.

ATTACHMENT B
CITY OF NORMAN
UPDATE DISTRIBUTION SYSTEM MODELING

January, 2016

1.0 BACKGROUND

The Groundwater Well Field Development Project will provide the Norman Utilities Authority (OWNER) with additional water supply. To effectively incorporate that new supply, and to evaluate system performance and improvement needs, an update to the existing distribution system model is necessary. In General, the Update Distribution System Modeling Project (PROJECT) will consist of building a new model from the City's GIS utilizing Innovyze Infoworks WS software, calibrating that model, and using the model to conduct system performance evaluations and identify system improvements needed to optimize distribution system pressures and minimize water age where economically feasible. The model will be used to select alternate well locations as part of the system performance evaluations.

Major activities include:

- Data collection from the OWNER and other sources necessary for model building and calibration.
- Prepare population projections based upon the 2025 Land Use Plan (as amended) and the 2060 Strategic Water Supply Plan.
- Build a full pipe model from the City's GIS.
- Calibrate the model using peak flow data, collected by the OWNER utilizing pressure recorders as provided by ENGINEER.
- Conduct a system performance evaluation.
- Identify system improvements.
- Recommend and develop a Capital Improvements Plan (CIP) for the identified improvements.
- Provide training to OWNER's personnel on the hydraulic model.
- Preparation and presentation of a Model Update Report documenting the work conducted and recommendations made.

Alan Plummer Associates, Inc. (ENGINEER) will provide services related to the study activities described above. These services are further detailed as General Services below.

2.0 GENERAL SERVICES

Basic Services provided by the ENGINEER will generally be covered under three main activities: Activity A – Project Coordination, Activity B –Water Distribution System Hydraulic Modeling and Activity C – Engineering Allowances. Specific tasks for each activity are identified in the following sections.

ACTIVITY A - PROJECT COORDINATION

Task A-1 – Project Management

Provide project management for Activities A, B, and C. Project management will include, but not be limited to developing and implementing a project management plan; tracking and managing internal schedules of work; monitoring and addressing issues related to the scope of work, budget and deliverables; preparing and processing monthly billings; providing labor resources necessary to fulfill scoped work; scheduling and participating in quality control reviews; and providing updates to the OWNER on a regular basis.

- a. ENGINEER will coordinate efforts on project tasks identified below.
- b. ENGINEER shall prepare a common monthly invoice and bill for for all activities as defined in Attachment C.

Task A-2 – Design Coordination Kickoff and Progress Meetings

- a. ENGINEER will prepare for and participate in a Project kick-off meeting for the study. At the kick-off meeting ENGINEER will confirm with the OWNER the scope of work, deliverables, schedule and administrative protocols.
 1. ENGINEER will present a data needs request to the OWNER at the kickoff meeting for data to be supplied by the OWNER for use in building and/or calibrating the model.
 2. ENGINEER will prepare a meeting memorandum documenting the decisions from the meeting.
- b. Coordination Meetings - ENGINEER will coordinate, prepare for, and conduct coordination meetings to review progress with the OWNER. Meetings will take place at the OWNER's office in Norman; at appropriate milestones during the project's timeline as identified in ATTACHMENT A. ENGINEER will prepare an agenda for the meetings, moderate the meetings and prepare/distribute meeting notes. Up to four (4) coordination meetings will be held; the budgeted meetings are in addition to the kickoff meeting.

Task A-3 – Model Deliverable Training Workshop

- a. ENGINEER will provide training to designated OWNER personnel about the model files delivered as part of the PROJECT. A 1-day workshop will be scheduled at which the ENGINEER will provide the OWNER with hands-on training in the use of the water distribution system model. The workshop will be held at the office of the OWNER. As follow-up, the ENGINEER will provide up to 8 hours of technical support via phone or email to the OWNER to answer any questions associated with running the model and interpretation of results.

ACTIVITY B – WATER DISTRIBUTION SYSTEM HYDRAULIC MODELING

Task B-1 – Data Collection

- a. The following information, at a minimum; will be provided to the ENGINEER by the OWNER:
 1. Copies of previous reports related to evaluation of pumping and distribution facilities.
 2. Information related to any specific fire flow requirements within the City.
 3. Electronic GIS files containing water system pipes (including pipe data such as location/coordinates, diameter, and length, etc.), valves, fire hydrants, etc.
 4. Any available information related to pipe material and age within the system.

5. Electronic GIS or geo-coded files containing all customer metered water usage for 2010-2015. Electronic files should include location (X-Y location, if available; or address otherwise) of each meter, and monthly metered usage at each location.
 6. Electronic GIS files containing city street centerline information and city limits.
 7. Operational protocols for the system, which may include pump on/off settings, pressure reducing valve settings, etc.
 8. Plans for piping at all pump stations, and pump manufacturer's pump curves for all pumps.
 9. Relevant information on available water supply from existing and proposed groundwater wells.
 10. Measured flows (daily average) and discharge pressures for the pumps at the pump stations for 2010-2015, in electronic format (spreadsheet).
 11. Tank level data (hourly) in all storage tanks for 2010-2015. Note – exact date ranges to be determined after review of data received related to Item 10.
 12. Any records of low-pressure complaints. Map indicating areas of known problems with low or high pressures.
 13. Water quality data for water system for last 5 years, including chlorine residual, TTHMs, HAAs, temperature, pH, alkalinity and other available data, including treated water at the WTP and any available data collected within the distribution system.
 14. Best available digital elevation data for the OWNER. It is anticipated that OWNER will have 2015 digital elevation models (DEMs) and associated contour files ready by May 1, 2016 – this would be the ENGINEER'S preferred source of elevation data.
 15. Information concerning any projected growth and development within the OWNER's service area. This could include previous projections, land use zoning, and known plans for projects.
 16. Detailed information for all storage tanks, including clearwells,, to include inlet and outlet diameter, storage-depth relationship, diameter of bowl, minimum and maximum water levels, presence of interior screening, baffling or other mixing techniques.
 17. Emergency connections to any outside water sources (location, sizes, minimum and maximum flow rates, delivery pressure)
 18. Location of any special service zones, pressure reducing valves, flow control valves, service to major buildings or geographic areas within the city.
- b. Data Summary and Documentation – ENGINEER will document data sources received and utilized in a spreadsheet based table, that will also be included as an appendix to the PROJECT Report.

Task B-2 – Develop Hydraulic Model

ENGINEER anticipates building a new hydraulic model directly from the OWNER's GIS and will populate the model with piping infrastructure information. It is also anticipated that the model will be a full pipe model, consisting of all or most of the distribution system piping, regardless of diameter. The model will be developed using Innovyze's InfoWorks software. OWNER is aware that certain data gaps, line updates, and connectivity information need to be updated in the GIS in order to successfully and efficiently build this portion of the hydraulic model. OWNER is responsible for making these necessary updates to the GIS, by May 1, 2016 or 90 days after Notice to Proceed. However, if OWNER needs additional staff support in accomplishing this according to the PROJECT schedule, ENGINEER will provide additional staff support to OWNER on a as needed basis, as defined in Activity C – ENGINEERING ALLOWANCES.

- a. Initial Review of Existing Information – ENGINEER will review the information provided by the OWNER and develop recommendations to obtain additional data necessary for model setup, if needed.

- b. Develop New Water System Model – All known existing pipes will be incorporated into the model from the GIS, as supplied by the OWNER. Information provided by the OWNER also will be used to incorporate pump stations, storage facilities, and control valves into the model.
- c. Following development of the new model, ENGINEER will meet with the OWNER as part of a Progress Meeting as provided for under Task A-2 to resolve any remaining questions regarding connectivity, size, or other physical system issues. OWNER will review model physical information and configuration and confirm that the model represents actual physical conditions based on available staff knowledge.
- d. Develop Demand Distribution – Metering records provided by the OWNER will be used to determine demand distributions to each model node under maximum month conditions. Records of hourly pumped flow will then be used to define maximum day and peak hour flow conditions, identify diurnal flow patterns, and determine additional system demands not captured by the metering records.
- e. Population and Demand Projections – Projections for future demands will be developed based on the Norman 2025 Land Use Plan (as amended) and the 2060 Strategic Water Supply Plan.

Task B-3 – Hydraulic Model Calibration

- a. Pump Testing – All high service and booster pumps *greater than 5 years old* will be field tested by the OWNER in order to develop new pump curves which are representative of current operating conditions. NOTE: OWNER is currently planning to replace two of the constant speed pumps at the High Service Pump Station that feed the high pressure plane, under the upcoming WTP Improvements project. Additionally, the high service pumps that serve the main pressure plane are scheduled to be evaluated for possible repair or replacement as part of the same project. Measurements of suction and discharge pressures over a range of measured flows will be required to develop pump curves. In addition, electrical measurements will be carried out and used to measure pump efficiencies. OWNER will provide all equipment and personnel required to perform the pump testing. ENGINEER will develop the pump testing protocol and procedures and provide one person to coordinate and assist with the pump testing on-site for three 8-hour days. Additional time required to assist with on-site pump testing will be provided as a special service. Pump condition and operation and maintenance history will be documented to the extent possible through visual inspection and discussions with OWNER. NOTE: all or portions of the pump testing described here may be performed for the OWNER by another consulting firm under separate contract. If so, and the schedule of the other project allows for the delivery of testing data within the constraints of this PROJECT schedule, OWNER will deliver that data to the ENGINEER for use on this PROJECT. However, if OWNER needs additional staff support in accomplishing this according to the PROJECT schedule, ENGINEER will provide additional staff support to OWNER on a as needed basis, as defined in Activity C – ENGINEERING ALLOWANCES in order to perform the pump testing required, up to the amount included in Activity C.
- b. Pump System Analysis - Data collected in Task B-3a. will be used to define and plot pump head and efficiency curves for each pump tested. Measured pump curves will be compared to original manufacturer's pump curves. Major discrepancies will be noted, and if appropriate, recommendations for maintenance or upgrades will be identified. For each pump station where data are available, single and combined pump curves will be plotted and compared to system operations data obtained from the OWNER.
- c. System Flow/Pressure Testing – Field collected data from fire hydrant flow and pressure testing taken during high demand periods (typically summer months) is necessary for calibrating the model. OWNER's personnel will conduct these tests during the Summer of 2016; in order to supplement previous tests the ENGINEER understands have already been conducted by the OWNER (approximately 120 to 140 previous tests already accomplished). OWNER to provide the test data (previously conducted and from summer 2016) in a format as specified by the ENGINEER (electronic, spreadsheet), for ready use. ENGINEER will

provide protocol for OWNER'S use in flow testing. OWNER will provide ENGINEER with hourly operations data (flows, tank levels, valve settings, etc.) during each period when calibration testing occurs.

- d. Incorporate Operational Rules into Model - ENGINEER will incorporate system operational rules into the model, including pump trigger rules, minimum and maximum tank levels, etc., as communicated to the ENGINEER by the OWNER as part of Progress Meeting as provided by Task A-2.
- e. Calibrate Steady State Model - Model output (flows and system pressures) will be compared to field-measured system data, as provided by Task B-3a and c. Model physical parameters will be adjusted to calibrate to the field pressure and flow measurements.
- f. Perform Extended Period Simulation (EPS) Model Calibration. Modeled flows, pressures and tank levels will be compared to measured data at hourly intervals for a 48-72 hour period under maximum day flow conditions. Adjustment of model physical parameters and/or refinements to the demand distribution will be used to calibrate for EPS conditions.

Task B-4 – System Performance Evaluation – Existing System

The objective of this task is to evaluate existing water quality data and perform a screening-level water age evaluation for the existing distribution system using the EPS-calibrated model to identify areas of the distribution system that may be susceptible to formation of disinfection byproducts (DBPs) and/or reduced chlorine residual levels.

- a. Evaluate System Water Age - Use the EPS-calibrated distribution system model to compute water age within the distribution system under maximum day and minimum day flow conditions based on existing demands. Provide a color-coded map indicating ranges of water age throughout the system for existing demand conditions. Use system water age information to identify regions of the distribution system that may be most susceptible to DBP formation and/or reduced chlorine residual levels. Recommendations for improvements to issues found will be made.

Task B-5 – System Improvements

- a. Define Improvement Criteria - In conjunction with the OWNER, develop criteria for evaluation of improvements. These criteria may include measures such as maximum allowable velocities, maximum allowable head loss, minimum and maximum pressures, fire flow criteria and fiscal constraints. This task will be accomplished as part of a Progress Meeting as provided for under Task A-2.
- b. Develop Demand Scenarios - Using information obtained from previous tasks, develop demand scenarios for average day, maximum day, peak hour, and minimum hour steady state conditions. Develop demand scenario for a maximum day and minimum day EPS condition.
- c. Perform Model Runs - Steady state model runs will be made for existing demands and future conditions targeted by the Norman 2025 Land Use Plan (as amended) under maximum day, peak hour and minimum hour demand conditions. In addition, EPS model runs will be made under maximum day demand conditions in order to evaluate system performance under tank filling and draining conditions.
- d. Evaluate Improvements and Provide Improvement Rationale - The distribution model will be used to evaluate recommended improvements for the future system. Improvements will be identified through consultation with OWNER's staff and through analysis of the model results, as part of a Progress Meeting

as provided for under Task A-2. It is anticipated that one potential improvement to be evaluated will be a new pressure plane associated with the new elevated storage tank, which is scheduled to come on-line in 2016. A description and rationale for each proposed improvement will be provided in tabular form. System maps will be provided that show all distribution piping and facilities and recommended improvements.

Task B-6 – CIP Development

- a. Provide Planning Level Opinions of Probable Construction Cost (OPCCs) for Improvements - Planning level OPCCs for each improvement will be provided.
- b. Assemble Project Information – Evaluate the capital improvement needs for the system and develop a project inventory of all capital improvements proposed for the 2016-2025 planning period. To develop the project inventory, utilize information from the PROJECT and other current studies as well as information obtained from a meeting with OWNER's personnel. Assign project identification numbers and project names to each identified project and document the general scope of work for each.
- c. Develop Prioritization – Based upon model results and input from the OWNER, a preliminary prioritization schedule will be developed for the potential capital projects and reviewed with the OWNER.
- d. Finalize 10-Year CIP – Based upon review comments and input from the OWNER, finalize the 10-Year CIP. Other improvements recommended by the PROJECT that are determined to be not necessary until after the initial 10-Year CIP will be categorized separately, but documented in the report.

Task B-7 – Final Report Preparation

- a. Report Preparation – ENGINEER will prepare draft and final reports describing the water distribution system evaluation and screening level water quality evaluation, providing cost projections for improvements and recommending an implementation schedule. Recommendations for piping changes, storage capacity, pumping capacity and water quality improvements will be based on recognized industry standards and State and Federal regulations.
- b. Five printed copies and one electronic copy of the draft report will be provided to the OWNER for review. Review comments will be obtained as part of a Progress Meeting as provided for under Task A-2. Upon completion, ten printed copies and one electronic copy of the final report will be provided to the OWNER.
- c. Final project deliverables shall include all Innovyze InfoWorks WS digital model files as well as any spatial data created as a result of the modeling efforts. Maps shall be produced with the latest version of ArcGIS (currently 10.2). All geographic layers used to produce any maps or figures in the final report will be transmitted to the OWNER in either ArcGIS shapefile or geodatabase feature class format along with any associated data tables.

ACTIVITY C – ENGINEERING ALLOWANCES

- a. OWNER is aware that certain data gaps, line updates, and connectivity information need to be updated in the GIS in order to successfully and efficiently build this portion of the hydraulic model. OWNER is responsible for making these necessary updates to the GIS, by May 1, 2016 or 90 days after Notice to Proceed. However, if OWNER needs additional staff support in accomplishing this according to the PROJECT schedule, ENGINEER will provide additional staff support to OWNER on a as needed basis. Amounts shown in Attachment C are estimated costs. The OWNER will be billed for the actual amount. The amount shown will not be exceeded without written OWNER approval.

- b. OWNER may elect to purchase pressure gauge recorders for use on this project, and then retain ownership of those recorders for use in future O&M activities. This item cover the purchase cost of two pressure gauge recorders of make and model as recommended by the ENGINEER for this task.
- c. OWNER may elect to utilize ENGINEER to conduct pump tests as required by Task B-3 a. This item covers the additional budget required by the ENGINEER to accomplish that task.
- d. OWNER may elect to have ENGINEER analyze existing water quality data provided by the OWNER (e.g. chlorine residual, TTHMs, HAAs, temperature, alkalinity, pH, etc.), that will be evaluated and summarized. Evaluation will include analysis of spatial and temporal patterns associated with seasonal changes in incoming water quality and demands.

ADDITIONAL SERVICES

Additional Services are those services not included in General Services that may be required for the Project but cannot be defined sufficiently at this time to establish a Scope of Work. These include, but are not necessarily limited to the following:

- a. Other services not included in Basic or Special Services that are approved by the OWNER.
- b. Additional meetings beyond the number of meetings listed in the basic services.
- c. Additional training beyond that defined in the basic services.
- d. Assistance with on-site data collection or field services, not defined in the basic services.
- e. Conversion of any hard-copy data, specified in the basic services to be provided in electronic format by the OWNER, to electronic format.
- f. Additional modeling and analysis to include conditions that are not listed in the basic services.
- g. Preliminary or detailed design of recommended improvements listed in the Final Report.
- h. Modification of modeling or planning criteria or significant changes following model calibration or system evaluations or improvements are conducted.
- i. Labor and Analytical costs associated with water quality sampling, not included in Basic or Special Services.
- j. GIS processing of geophysical and/or geotechnical data beyond the assumptions provided in Basic or Special Services.
- k. Providing additional copies of reports, plans, specifications, and contract documents beyond those specifically described in Basic and Special Services.
- l. Public relation activities and consulting services.
- m. Services known to be required for completion of the PROJECT that the OWNER agrees are to be furnished by the ENGINEER or by a sub-consultant that cannot be defined sufficiently at this time to establish the maximum compensation.

ATTACHMENT C

COMPENSATION

The OWNER will compensate ENGINEER on a lump sum basis for the SERVICES rendered shown below. The lump sum fee is broken down below by task as defined in the Scope of Services:

Activity	Task Description	Lump Sum Amount
A-1	Project Management, QC & Reimbursable Expenses	\$44,000
A-2	Design Coordination Kickoff and Progress Meetings	\$27,000
A-3	Model Deliverable Training Workshop	\$4,000
B-1	Data Collection	\$7,000
B-2	Develop Hydraulic Model	\$21,000
B-3	Hydraulic Model Calibration	\$33,000
B-4	System Performance Evaluation – Existing System	\$6,000
B-5	System Improvements	\$22,000
B-6	CIP Development	\$11,000
B-7	Final Technical Memorandum Preparation	\$23,000
Total		\$198,000

The OWNER will compensate ENGINEER on a time and material basis for the SERVICES rendered shown below. The time and material fee is broken down below by task as defined in the Scope of Services:

Activity	Task Description	Time & Materials Amount
C-a	Engineering Allowances (GIS Data Gap support)	\$9,000
C-b	Engineering Allowances (Pressure Gauges)	\$3,000
C-c	Engineering Allowances (Pump Testing)	\$5,000
C-d	Engineering Allowances (Evaluate WQ Data)	\$7,000
Total		\$24,000

The ENGINEER may submit interim statements, not to exceed one per month, for partial payment for SERVICES rendered. The statements to OWNER will be by task for the percentage of work actually completed. The OWNER shall make interim payments within 30 calendar days in response to ENGINEER's interim statements.

No budgetary allowance has been established for Additional Services. Additional services must be authorized by amendment of the agreement. Time and materials billing for ENGINEER'S labor will be at the hourly rates provided below. ENGINEER's direct expenses, including subcontractor expenses, will include a multiplier of 1.10.