

AGREEMENT

THIS AGREEMENT, made and entered into this _____ day of _____, 2022, by and between the City of Reno and the City of Sparks, hereinafter referred to as the “CLIENT”, and Brown and Caldwell, hereinafter referred to as “ENGINEER”:

WITNESSETH:

WHEREAS, CLIENT desires to obtain Consulting Services for TMWRF Fluidized Bed Reactor and Nitrification Pump Station Evaluation and Pre-Design Project, hereinafter referred to as “Project”;

WHEREAS, public convenience and necessity require the services of a consulting engineer to provide the services required;

WHEREAS, the CLIENT has found ENGINEER qualified and experienced in the performance of said services;

WHEREAS, the CLIENT is desirous of engaging the services of ENGINEER to perform said services; and

NOW, THEREFORE, said CLIENT and said ENGINEER, for the considerations hereinafter set forth, mutually agree as follows:

ARTICLE I - SERVICES

CLIENT agrees to retain and does hereby retain ENGINEER to perform the professional engineering services hereinafter more particularly described, with such services to commence on the date of the execution of this Agreement and to continue until the completion of the work provided for herein.

ENGINEER hereby agrees to perform the professional services as set forth herein and to furnish or procure the use of incidental services, equipment, and facilities necessary for the completion of said engineering services.

ENGINEER has the status of an independent contractor as defined in NRS 333.700 and shall not be entitled to any of the rights, privileges, benefits, and emoluments of either an officer or employee of CLIENT. ENGINEER shall undertake performance of services as independent contractor and shall be wholly responsible for the methods of performance and for their performance.

ENGINEER is subject to NRS 338.010 – 338.090 (prevailing wage) for all covered work.

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ARTICLE II - SCOPE OF SERVICES

The Scope of Services is set forth in Exhibit A as attached hereto and incorporated herein by this reference forth tasks.

ARTICLE III - COMPENSATION

Payment for the engineering services hereinabove set forth shall be made by the CLIENT to the ENGINEER and shall be considered as full compensation for all personnel, materials, supplies, and equipment used in carrying out the work.

A. Compensation to the ENGINEER shall be on the basis of time and expense per Exhibit A and the fee and rate schedule as set forth in Exhibit B.

B. Payments shall be made by the CLIENT based on itemized invoices from the ENGINEER which lists costs and expenses. Such payments shall be for the invoice amount.

C. CLIENT shall pay ENGINEER within 30 days of receipt by CLIENT of ENGINEER's invoice. If CLIENT disputes only portions of an invoice, CLIENT agrees to pay for undisputed items on that invoice within the time provided herein. Payment by CLIENT of invoices or request for payment shall not constitute acceptance by CLIENT of work performed under the Agreement by the ENGINEER.

D. The budget for total charges for services authorized by this Agreement is the not-to-exceed sum of \$1,205,437.00, and shall not be exceeded without authorization of the CLIENT. The City of Reno's share is the sum of \$827,291.41 and the City of Sparks' share is the sum of \$378,145.59. The budget may be increased by amendment hereto if necessitated by a change in the scope of services which increases the cost of providing the services. ENGINEER is not authorized to provide any additional services beyond the scope of work without having authorized funding pursuant to a written amendment hereto signed by the authorized representative of the governing body.

ARTICLE IV - SCHEDULE OF WORK

ENGINEER will commence the services as described immediately following the Notice to Proceed provided to the ENGINEER by the CLIENT and will proceed with such services in a diligent manner per Exhibit C. ENGINEER will not be responsible for delays caused by factors beyond ENGINEER's control and will not be responsible for delays caused by factors which could not reasonably have been foreseen at the time the Agreement was approved. Exhibit D is the Preliminary Drawing List.

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ARTICLE V - ASSIGNMENT OF AGREEMENT

The ENGINEER SHALL not assign this Contract or any portion of the work without prior written approval of the CLIENT which may be withheld for any reason whatsoever.

ARTICLE VI- OWNER'S RESPONSIBILITY

CLIENT shall provide any information in its possession that is requested by ENGINEER and is necessary to complete the Project. CLIENT shall assist ENGINEER in obtaining access to public and private lands to allow the ENGINEER to perform the work under this Agreement. CLIENT shall examine all studies, reports, sketches, estimates, specifications, drawings, proposals, and other documents presented by the ENGINEER and shall render decisions pertaining thereto within a reasonable time so as not to delay the work of the ENGINEER.

ARTICLE VII - NONDISCLOSURE OF PROPRIETARY INFORMATION

ENGINEER shall consider all information provided by CLIENT to be proprietary unless such information is available from public sources. ENGINEER shall not publish or disclose proprietary information for any purpose other than the performance of the Services without the prior written authorization of CLIENT or in response to legal process or as required by the regulations of public entities.

ARTICLE VIII - NOTICE

Any notice, demand, or request required by or made pursuant to this Agreement shall be deemed properly made if personally delivered in writing or deposited in the United States mail, postage prepaid, to the address specified below:

To ENGINEER:

Ronald L. Ablin, P.E.
Vice President
Brown and Caldwell
1325 Airmotive Way, Suite 215
Reno, NV 89502

To CLIENT:

Trina Magoon, P.E.
Director of Utility Services
City of Reno
1 East First Street
Reno, NV 89501
P.O. Box 1900
Reno, NV 89505

John Martini, P.E.
Assistant City Manager
City of Sparks
431 Prater Way
Sparks, NV 89431
PO Box 857
Sparks, NV 89432

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

ARTICLE IX - UNCONTROLLED FORCES

Neither CLIENT nor ENGINEER shall be considered to be in default of this Agreement, if delays in or failure of performance shall be due to uncontrollable forces the effect of which, by the exercise of reasonable diligence, the non-performing party could not avoid and is not reasonably foreseeable at the time of entering into this Agreement. The term “uncontrollable forces” shall mean any event which results in the prevention or delay of performance by a party of its obligations under this Agreement and which is beyond the control of the non-performing party. It includes, but is not limited to, fire, flood, earthquakes, storms, lightning, epidemic, war, riot, civil disturbance, sabotage, inability to procure permits, licenses, or authorizations from any state, local, or federal agency or personal for any of the supplies, material, accesses, or services required to be provided by either CLIENT or ENGINEER under this Agreement, strikes, work slowdowns or other labor disturbances, and judicial restraint. ENGINEER shall be paid for services performed prior to the delay.

Neither party shall, however, be excused from performance if nonperformance is due to uncontrollable forces, which are removable. The provisions of this Article shall not be interpreted or construed to require ENGINEER or CLIENT to prevent, settle, or otherwise avoid a strike, work slowdown, or other labor action. The non-performing party shall upon being prevented or delayed from performance by an uncontrollable force immediately give written notice to the other party describing the circumstances and uncontrollable forces preventing continued performance of the obligation of this Agreement.

ARTICLE X- GOVERNING LAW

This Agreement shall be governed by and construed pursuant to the laws of the State of Nevada. In the event suit is commenced hereunder, the suit shall be brought in the appropriate court in Washoe County, State of Nevada. In the event of an arbitration or mediation, such arbitration or mediation shall be held in Reno, Nevada.

ARTICLE XI - SUCCESSORS AND ASSIGNS

CLIENT and ENGINEER each binds itself and their successors, and assigns to the other party to this Agreement and to the successors, and assigns of such other party, in respect to all covenants, agreements and obligations or this Agreement.

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ARTICLE XII - ASSIGNMENT

Neither CLIENT nor ENGINEER shall assign, sublet, or transfer any rights under interest in (including, but without limitation, monies that may become due or monies that are due) this Agreement without the written consent of the other, except to the extent that the effect of this limitation may be restricted by law. Unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under this Agreement. Nothing contained in this paragraph shall prevent ENGINEER from employing such independent consultants, associates, and subconsultants as she may deem appropriate to assist her in the performance of the Services hereunder.

ARTICLE XIII - INDEMNIFICATION

To the fullest extent permitted by law, ENGINEER shall defend, indemnify and hold harmless CLIENT and its officers, employees and agents (collectively "Indemnitees") from any liabilities, damages, losses, claims, actions or proceedings, including, without limitation, reasonable attorneys' fees, that are caused by the negligence, errors, omissions, recklessness or intentional misconduct of the ENGINEER or employees or agents of the ENGINEER in the performance of this Agreement.

ENGINEER assumes no liability for the negligence or willful misconduct of any indemnitee or other consultants of indemnitee.

ENGINEER'S indemnification obligations for claims involving Professional Liability (claims involving acts, error, or omissions in the rendering of professional services and Economic Loss Only (claims involving economic loss which are not connected with bodily injury or physical damage to property) shall be limited to the proportionate extent of ENGINEER'S negligence or other breach of duty.

If CLIENT's personnel (engineers or other professionals) are involved in defending such legal action, ENGINEER shall also reimburse CLIENT for the time spent by such personnel at the rate charged for such services by private professionals. These provisions shall survive termination of this agreement and shall be binding upon ENGINEER, her legal representatives, heirs, successors and permitted assigns.

If ENGINEER does not so defend the CLIENT and the ENGINEER is adjudicated to be liable, reasonable attorney's fees and costs shall be paid to CLIENT in an amount proportionate to the liability of ENGINEER.

ARTICLE XIV - INTELLECTUAL PROPERTY INDEMNITY

To the fullest extent permitted by law, ENGINEER shall defend, protect, hold harmless, and indemnify CLIENT and the CLIENT'S related Parties from and against any and all liability,

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loss, claims, demands, suits, costs, fees and expenses (including actual fees and expenses of attorneys, expert witnesses, and other consultants), by whomsoever brought or alleged, for infringement of patent rights, copyrights, or other intellectual property rights, except with respect to designs, processes or products of a particular manufacturer expressly required by CLIENT in writing. If ENGINEER has reason to believe the use of a required design, process or product is an infringement of a patent, ENGINEER shall be responsible for such loss unless such information is promptly given to CLIENT. This Indemnity Covenant shall survive the termination of this Agreement.

ARTICLE XV – PAYMENT OF TAXES

Any and all Federal, State and local taxes, charges, fees, or contributions required by law to be paid with respect to ENGINEER'S performance of this Agreement (including, without limitation, unemployment insurance, social security, and income taxes).

ARTICLE XVI - INSURANCE

GENERAL REQUIREMENTS

The CLIENT requires that ENGINEER purchase Industrial Insurance, General Liability, and ENGINEER's Errors and Omissions Liability Insurance as described below against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the work hereunder by the ENGINEER, its agents, representatives, employees or subconsultants. The cost of such insurance shall be borne by ENGINEER unless otherwise agreed.

INDUSTRIAL INSURANCE (WORKERS' COMPENSATION & EMPLOYER'S LIABILITY)

It is understood and agreed that there shall be no Industrial Insurance coverage provided for ENGINEER or any Subconsultant by the CLIENT and in view of NRS 616B.627 and 617.210 requiring that ENGINEER complies with the provisions of Chapters 616A to 616D, inclusive and 617 of NRS, ENGINEER shall, before commencing work under the provision of this Agreement, furnish to the CLIENT a certificate of insurance from the Worker' Compensation Insurer certifying that the ENGINEER and each Subconsultant have complied with the provisions of the Nevada Industrial Insurance Act, by providing coverage for each and every employee, subconsultants, and independent contractors. Should the ENGINEER be self-insured for Industrial Insurance, the CONSULTANT shall so notify the CLIENT and approve written approval of such self-insurance prior to the signing of a Contract. The CLIENT reserves the right to accept or reject a self-insured CONSULTANT and to approve the amount(s) of any self-insured retentions. The ENGINEER agrees that the CLIENT is entitled to obtain additional documentation, financial or otherwise, for review prior to entering into a Contract with the ENGINEER.

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Upon completion of the project, the contractor shall provide the CLIENT with a Final Certificate for itself and each Subconsultant which is prepared by the State of Nevada Industrial Insurance System. If the ENGINEER or Subconsultants are unlicensed and are a sole proprietor, coverage for the sole proprietor must be purchased and evidence of coverage must appear on the Certificate of Insurance and Final Certificate.

It is further understood and agreed by and between the CLIENT and ENGINEER that ENGINEER shall procure, pay for, and maintain the above mentioned industrial insurance coverage at the ENGINEER's sole cost and expense.

MINIMUM SCOPE OF LIABILITY INSURANCE

Coverage shall be at least as broad as: *

Commercial General Liability at least as broad as Insurance Services Office Commercial General Liability Coverage "occurrence" form CG OO O1 04 13 or an equivalent form. The Comprehensive General Liability Coverage shall include, but is not limited to, liability coverage arising from premises, operations, independent contractors, products and completed operations, personal and advertising, injury, blanket contractual liability and broad form property damage.

Automobile Coverage at least as broad as Insurance Services Office Business Auto Coverage form CA OO 01 10 13 or an equivalent form covering Automobile Liability Symbol 1 "Any Auto". In lieu of a separate Business Auto Liability Policy, the City may agree to accept Auto Liability covered in the General Liability Policy, if non owned and hired auto liability are included. The ENGINEER shall maintain limits of no less than \$1,000,000 or the amount customarily carried by the contractor, whichever is greater, combined single limit per accident for bodily injury and property damage. No aggregate limit may apply.

The Additional Insured Endorsements for General Liability shall be at least as broad as the unmodified ISO CG 20 10 04 13 and ISO CG 20 37 04 13 endorsements, or equivalent. The certificate shall confirm Excess Liability is following form.

*Coverages may be excluded only with prior approval of the CLIENTS' Risk Managers.

Professional Errors and Omissions Liability applying to all activities performed under this Agreement in a form acceptable to CLIENT. ENGINEER will maintain professional liability insurance during the term of this Agreement and for a period of six (6) years from the date of substantial completion of the project unless waived by the CLIENT. In the event the ENGINEER goes out of business during the term of this Agreement or the six (6) year period described above, ENGINEER shall purchase Extended Reporting coverage for claims arising out of ENGINEER's negligence acts, errors and omissions committed during the term of the Professional Liability Policy.

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MINIMUM LIMITS OF INSURANCE

ENGINEER shall maintain limits no less than:

1. General Liability: \$2 million minimum combined single limit per occurrence for bodily injury, personal injury and property damage and \$4 million annual aggregate.
2. ENGINEER's Errors and Omissions Liability: \$2 million per claim and \$4 million as an annual aggregate during the term of this Agreement and for six years after the completion of the project, with each subsequent renewal having a retroactive date which predates the date of this Agreement. The ENGINEER may purchase project insurance or obtain a rider on her normal policy in an amount sufficient to bring ENGINEER's coverage up to minimum requirements, said additional coverage to be obtained at no cost to the CLIENT. Should the CLIENTS' Risk Managers require project insurance, project insurance shall be purchased and premium costs shall be borne by the CLIENT. CLIENT retains option to purchase project insurance through the ENGINEER's insurer or through its own source.

DEDUCTIBLES OR SELF-INSURED RETENTIONS

Any deductibles or self-insured retentions must be declared to and approved by the CLIENT Risk Management Divisions. The CLIENT reserves the right to request additional documentation, financial or otherwise prior to giving its approval of the deductibles or self-insured retention. Any changes to the deductible or self-insured retention made during the term of this Agreement or during the term of any policy, must be approved by the CLIENTS' Risk Managers.

OTHER INSURANCE PROVISIONS

General Liability Coverages

The CLIENT, its officers, officials, employees and volunteers are to be covered as additional insureds as respects: liability arising out of activities performed by or on behalf of the ENGINEER including the insured's general supervision of the ENGINEER; products and completed operations of the ENGINEER; or premises owned, occupied or used by the ENGINEER. The coverage shall contain no special limitations on the scope of protection afforded to the CLIENT, its officers, officials, employees or volunteers.

The ENGINEER's insurance coverage shall be primary insurance as respects the CLIENT, its officers, officials, employees and volunteers. Any insurance or self-insurance maintained by the CLIENT, its officers, officials, employees or volunteers shall be excess of the ENGINEER's insurance and shall not contribute with it in any way.

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Any failure to comply with reporting provisions of the policies shall not affect coverage provided to the CLIENT, its officers, officials, employees or volunteers.

The ENGINEER's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

Endorsements for General Liability, Auto, and Excess/Umbrella Liability listing all additional insureds are required. The endorsement for Excess/Umbrella Liability can be accomplished by the ENGINEER'S production of a letter from the insurance company stating that Excess/Umbrella Liability will "follow form."

The ENGINEER'S insurance coverage shall be endorsed to state that coverage shall not be suspended, voided, canceled or non-renewed by either party, reduced in coverage or in limits except after at least thirty (30) days prior written notice for reasons other than non-payment of premium and at least ten (10) days for non-payment of premium mail has been given to the CLIENT.

ACCEPTABILITY OF INSURERS

Insurance is to be placed with an A.M. Best and Company rating level of A - Class VII or better, or otherwise approved by the CLIENT in its sole discretion. CLIENT reserves the right to require that ENGINEER'S insurer be a licensed and admitted insurer in the State of Nevada, or on the Insurance Commissioner's approved but not admitted lists.

VERIFICATION OF COVERAGE

ENGINEER shall furnish the CLIENT with certificates of insurance, including but not limited to the Certificate of Compliance in NRS 616B.627 and with original endorsements affecting coverage required by this article. The certificates and endorsements for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf and must be countersigned by a duly appointed and licensed agent in this state. The certificates are to be on forms approved by the CLIENT. All certificate and endorsements are to be received and approved by the CLIENT before work commences. The CLIENT reserves the right to require complete, certified copies of all required insurance policies, at any time. ENGINEER can request that confidential information be redacted.

SUBCONSULTANTS

ENGINEERS shall require all subconsultants to be insured on their own or under its policies and shall furnish separate certificates and endorsement for each subconsultant. Coverages for subconsultants shall be subjected to all of the requirements stated herein.

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Miscellaneous Conditions

If the ENGINEER or any Subconsultant fails to maintain any of the insurance coverages required, the CLIENT may terminate this Agreement for cause.

ENGINEER shall be responsible for and remedy all damage or loss to any property, including property of CLIENT, caused in whole or in part by the ENGINEER, any subconsultant, or any employee, directed or supervised by ENGINEER, except damage of loss attributable to faulty drawings or specifications.

Nothing herein contained shall be construed as limiting in any way to the extent to which the ENGINEER may be held responsible for payment for damages to persons or property resulting from her operations or the operations of any subconsultant under her.

If ENGINEER's failure to maintain the required insurance coverage results in a breach of this Agreement, CLIENT may purchase the required coverage, and without further notice to ENGINEER, deduct from sums due to ENGINEER any premium cost advanced by CLIENT for such insurance.

ARTICLE XVII - LITIGATION

This Agreement does not require the ENGINEER to prepare for or appear in litigation on behalf of The CLIENT, or as agent of the CLIENT, other than specified herein, except in consideration of additional reasonable compensation.

ARTICLE XVIII - TERMINATION OF WORK

Either party to this Agreement may terminate the Agreement for cause upon giving the other party thirty (30) days prior written notice. Cause may include, failure to perform through no fault of the party initiating the termination. In addition, CLIENT may terminate the Agreement for any one of the following causes: performance by ENGINEER which CLIENT deems unsatisfactory in CLIENT's sole judgment; and CLIENT's lack of funds to complete the work. Cause for ENGINEER may include, failure of CLIENT to make timely payment to ENGINEER without good cause, following a demand for payment.

In addition, CLIENT may terminate any or all of the work covered by this Agreement by notifying ENGINEER in writing. In the event such termination occurs at the conclusion of services pursuant to an executed task order, then ENGINEER shall be entitled to receive compensation for all work satisfactorily completed and performed through the conclusion of that task order. No other changes or costs incurred for services or materials other than pursuant to an executed task order shall be reimbursed by CLIENT pursuant to this Agreement. In the event such termination occurs during the performance of services pursuant to an authorized task order, then ENGINEER and CLIENT shall need to determine what, if any additional services should be

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performed by ENGINEER in order to close out the work in progress and provide any such unfinished materials to CLIENT. ENGINEER and CLIENT shall agree upon the additional amount of work to be performed following the termination notice and the amount payable by CLIENT for such work. In the event that the parties cannot otherwise agree on the amount to be paid pursuant to this provision, then the matter may be referred to the Dispute Resolution Procedure in ARTICLE XXIII.

In the event the Agreement is terminated by CLIENT for cause, including performance deemed unsatisfactory by CLIENT, or ENGINEER failure to perform, or other cause created by ENGINEER, CLIENT may withhold and offset against any payments otherwise due and/or seek recovery from ENGINEER for amounts already paid, including without limitation: amounts paid for unsatisfactory work or work not done in accordance with this Agreement; value of CLIENT's time spent in correcting the work or problem; any increase in cost resulting from the problem or work; and any other costs which result from such termination. Subject to the terms herein, ENGINEER will be paid for services performed prior to termination.

ENGINEER expressly agrees that this Agreement shall be terminated immediately if for any reason local, federal and/or State Legislature funding ability to satisfy this Agreement is withdrawn, limited, or impaired.

ARTICLE XIX - PROFESSIONAL SERVICES

ENGINEER shall be responsible for the professional quality and technical accuracy of all services furnished by ENGINEER and their subconsultants under this Agreement. Without limiting the effect of any other provision of this Agreement and in addition to any other provision contained herein, ENGINEER shall, without additional compensation, correct or revise any errors or omissions in their services.

ENGINEER and their subconsultants retained pursuant to this Agreement are considered by CLIENT to be skilled in their profession to a degree necessary to perform the services and duties contained in this Agreement, and CLIENT hereby relies upon those skills and the knowledge of ENGINEER and their subconsultants. ENGINEER and their subconsultants shall perform such professional services and duties as contained in this Agreement in conformance to and consistent with the standards generally recognized as being employed by professionals of their caliber in the State of Nevada. ENGINEER makes no warranty, either expressed or implied, as to their findings, recommendations, specifications or professional advice other than as provided herein.

Neither CLIENTS' review, approval, or acceptance of nor payment for any of the professional services or work required under this Agreement shall be construed to operate as a waiver of any of CLIENTS' rights under of this Agreement. The rights and remedies of CLIENT provided for under this Agreement are in addition to any other rights and remedies provided by law.

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Project information including but not limited to reports, written correspondence, and verbal reports will be prepared for the use of the CLIENT. The observations, findings, conclusions and recommendation made represent the opinions of the ENGINEER. Reports, records, and information prepared by others will be used in the preparation of the report. The ENGINEER has relied on the same to be accurate and does not make any assurances, representations, or warranties pertaining to the records or work of others, except for its subconsultants, nor does the ENGINEER make any certifications or assurances except as explicitly provided in writing. No responsibility is assumed by the ENGINEER for use of reports for purposes of facility design by others.

ARTICLE XX – PROPERTY: COPYRIGHTS

The ENGINEER shall furnish to the CLIENT all field notes, reports, data, and electronic or magnetic media, and original tracings of all drawings and plans, maps, photographs, and other materials (including, if requested by the Director, design computations, design sketches and review drawings) prepared pursuant to this Contract (hereinafter collectively referred to as “Documents”). The originals of such Documents shall be and remain the property of the CLIENT.

All of such Documents shall be deemed to be “works made for hire” prepared for the CLIENT. The ownership of all copyrights and all rights embodied in the copyrights in or to such Documents shall rest in the CLIENT when any such is subject to copyright. The ENGINEER agrees that it, nor any of its employees, shall have any right to copyright any of such Documents. The ENGINEER further agrees that neither it nor any of its employees shall exercise any of the rights embodied in the copyrights in or to such Documents, unless authorized to do so by the Reno City Council. The ENGINEER shall place a conspicuous notation upon each Document which indicates that the copyright thereto is owned by the CLIENT.

Should it be finally determined, by a court or to her tribunal of competent jurisdiction, that any of such Documents is not a “works make for hire,” it is agreed that the provisions of this section shall be termed an assignment, sale, and transfer of the copyright in or to such Documents to the CLIENT for the longest term allowed by law. Notwithstanding the foregoing, the ENGINEER may retain copies of such Documents and such copies shall remain the property of the ENGINEER. The ENGINEER shall have the right to use such copies as it may desire, but the ENGINEER may not sell, license, or otherwise market such Documents.

Documents, including drawings and specification prepared by ENGINEER pursuant to this Contract, are not intended or represented to be suitable for reuse by CLIENT or others on extensions of the services provided for the Project or any other project. Any use of completed Documents for other projects and/or any use of uncompleted Documents without specific written authorization from ENGINEER will be at the CLIENT’s sole risk without liability or legal exposure to ENGINEER.

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ARTICLE XXI - RIGHTS OF ENGINEERS AND EMPLOYEES

No personnel employed by ENGINEER shall acquire any rights or status in the CLIENT services and ENGINEER shall be responsible in full for payment of its employees, including insurance, deductions, and all the like.

ARTICLE XXII - SERVICES BY CLIENT

It is understood and agreed that the CLIENT shall, to the extent reasonable and practicable, assist and cooperate with the ENGINEER in the performance of ENGINEER's services hereunder. Such assistance and cooperation shall include, but not necessarily be limited to, environmental approval, right of access to work sites; providing material available from the CLIENT's files such as maps, As-Built drawings, records, and operation and maintenance information; serving all notices, holding all hearings, and fulfilling legal requirements in connection therewith; and rendering assistance in determining the location of existing facilities and improvements which may be affected by the project.

ARTICLE XXIII - DISPUTE RESOLUTION PROCEDURE

1. If disputes arise under this Agreement, the parties agree to attempt to resolve such disputes through direct negotiations or if such negotiations are not successful, by non-binding mediation conducted in accordance with the rules and procedures to be agreed upon by the parties.
2. The prevailing party in an action to enforce the Agreement shall be entitled to recover its reasonable attorney's fees and costs. It is specifically agreed that a reasonable attorney's fee shall be \$125 per hour.

ARTICLE XXIV - NO UNFAIR EMPLOYMENT PRACTICES

1. In connection with the performance of work under this Agreement, Engineer agrees not to discriminate against any employee or applicant for employment because of race, creed, color, religion, national origin, age, sex, sexual orientation, gender identity, gender expression, veteran status, or any other protected class status applicable under federal, state or local law, rule or regulation. Such Agreement 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.
2. ENGINEER further agrees to insert this provision in all subcontracts hereunder, except subcontracts for standard commercial supplies or raw materials.
3. As used in this Article, sexual orientation means having or being perceived as having an orientation for heterosexuality, homosexuality or bi-sexuality.

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4. As used in this Article, Race includes traits associated with race, including, without limitation, hair texture and protective hairstyles.
5. Any violation of these provisions by ENGINEER shall constitute a material breach of contract.

ARTICLE XXV - AMERICANS WITH DISABILITIES ACT

1. To the extent applicable for the Project, ENGINEER and its subconsultants shall comply with the terms, conditions, and requirements of the Americans with Disabilities Act of 1990 (P.L. 101-136), 42 U.S.C. 12101, as amended, and regulations adopted thereunder contained in 28 C.F.R. 26.101-36.999, inclusive, and any relevant program-specific regulations.

ARTICLE XXVI - GENERAL PROVISIONS

1. Integration. This Agreement, including the Exhibits and the Recitals, all of which are true and correct and are incorporated by reference as a part of this Agreement, constitutes the complete and integrated Agreement between the parties with respect to the matters recited herein, and supersedes any prior or contemporaneous written or oral agreements or understandings with respect thereto.
2. Severability. The legality of any provision or portion of this Agreement shall not affect the validity of the remainder.
3. Amendment. This Agreement shall not be modified, amended, rescinded, canceled, or waived, in whole or in part, except by written amendment signed by duly authorized representatives of the parties.
4. No Third Party Benefit. This Agreement is a contract between CLIENT and ENGINEER and nothing herein is intended to create any third party benefit.
5. Governing Law and Jurisdiction. This Agreement shall be administered and interpreted under the laws of the State of Nevada. Any action at law, suit in equity or judicial proceeding for the enforcement of this Agreement or any provision thereof shall be instituted only in the district courts of the State of Nevada, County of Washoe.

ARTICLE XXVII - DUE AUTHORIZATION

Each party represents that all required authorizations have been obtained to execute this Agreement and for the compliance with each and every term hereof. Each person signing this Agreement warrants and represents to the other party that he or she has actual authority to execute this Agreement on behalf of the party for whom he or she is signing. A facsimile signature on this Agreement shall be treated for all purposes as an original signature.

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Duplicate originals. This Agreement is executed in one duplicate original for each party hereto, and is binding on a party only when all parties have signed and received a duplicate original.

IN WITNESS WHEREOF, CLIENT has caused this Agreement to be executed by the City of Reno and ENGINEER have caused this Agreement to be executed, all as of the day and year first above written.

ENGINEER

By: _____
Ronald L. Ablin, P.E., Vice President

CITY OF RENO

ATTEST:

By: _____
Hillary L. Schieve, Mayor

By: _____
Mikki Huntsman, Reno
City Clerk

CITY OF SPARKS

ATTEST:

By: _____
Ed Lawson, Mayor

By: _____
Lisa Hunderman, Sparks
City Clerk

APPROVED AS TO FORM:

APPROVED S TO FORM:

By: _____
Susan Ball Rothe
Deputy City Attorney

By: _____
Wes Duncan
Sparks City Attorney



Exhibit A. Scope of Work

City of Reno

Fluidized Bed Reactor and Nitrification Pump Station

Evaluation and Pre-Design

Truckee Meadows Water Reclamation Facility

September 21, 2022

Project Background

Truckee Meadows Water Reclamation Facility (TMWRF), jointly owned and operated by the Cities of Reno and Sparks, has requested engineering services from Brown and Caldwell (BC) to evaluate the hydraulic and process treatment capacity of TMWRF's fluidized bed bioreactors (FBRs) and upstream nitrification pump station (NPS). TMWRF has four FBR cells for the conversion of nitrite and nitrate to nitrogen gas (N_2). The FBRs are up-flow reactors where flow is applied to the bottom of the cells through nozzles designed to provide a specific mixing energy intended to keep the fixed film media in suspension. Upstream of the FBRs are TMWRF's six nitrification trickling filter (NTF) towers, with tower effluent pumped through the NPS and combined with FBR recycle flows as FBR influent. Methanol is added to the FBR influent stream to provide a carbon source for the denitrifying bacteria, which is required to convert nitrate and nitrite to N_2 . Each FBR cell is 40 feet (ft) by 20 ft with an unexpanded sand media depth of approximately 8 ft. During normal operation, the reactor influent flow expands the media to a fluidized bed height of approximately 16 ft. A portion of the effluent flow is conveyed back to the NPS for the purpose of maintaining a minimum flow rate, and therefore, a minimum up-flow velocity; this is done to keep the media fluidized. The effluent from each FBR cell leaves via a weir and combines in an effluent junction box to be conveyed to TMWRF's Post-Aeration system.

Operational challenges at the FBRs include sustaining proper forward flow and recirculation flow to maintain consistent fluidization without FBR sand media washout. Operations must also maintain the NTF flow trim via the FBR recirculation control valve to keep the target minimum wetting flows. Additional challenges include sand media washout, poor biofilm separation from sand through the media scour pumps, and a lack of understanding of the FBRs ideal sand media quantity. TMWRF operations have also communicated difficulty in confirming the FBR media bed height, finding alternative media and suppliers, measuring FBR effluent total organic carbon (TOC) and nitrate with online monitoring instrumentation, and achieving good media and biomass separation. Gravity flow modeling, as well as high water level events, show significant restrictions to required flows in the FBRs, downstream yard piping, and components of the Post Aeration system. Recent changes to TMWRF's thickened waste activated sludge (TWAS) handling from bypassing the anaerobic digesters directly to the centrifuges has resulted in less nitrogen loading to the FBRs; this coupled with an FBR eductor sand media addition system (to fully load each FBR cell with sand) has improved the FBR performance and capacity.

To address these process, hydraulic, and operational challenges, BC will complete an alternatives evaluation and pre-design of the FBR and NPS with recommended improvements. BC's project approach is as follows.

Project Approach

BC has worked closely with the City of Reno (City) and TMWRF on identifying the FBR improvements which best address the process, hydraulic, and operational challenges. BC's alternative evaluation and pre-design of the FBRs and NPS will take into consideration current (e.g. direct TWAS dewatering) and future (e.g., implementation of a new granular activated sludge process) changes. Careful consideration to ancillary and supporting upstream and downstream processes, such as the NTF screens, chemical feed systems, post aeration, media filters, chlorine contact tank (or future UV system), on-line water quality (e.g., TOC and nitrate nitrogen) monitoring instrumentation, and flow control and flow measurement will be included.

The primary focus of the evaluation of the following equipment and processes are anticipated:

- Existing FBR structure
- FBR influent, effluent and recycled piping, valving, and flow meters
- Media abrasion pumps
- FBR dewatering pumps
- Effluent weirs
- Sand injection cone
- Yard piping to Post Aeration
- Nitrification effluent pumps
- FBR instrumentation, including effluent nitrate and TOC analyzers
- Methanol pumps, injection locations, and control system.

Additionally, BC will evaluate the control strategy for the Equalization Basin and upstream and downstream processes to assess the impact and effect of these on or from the FBR system.

Phase 100. Project Management

The objectives of project management are to keep this project on schedule, stay within budget, and to deliver contracted scope of services. The project management task includes internal project team and client coordination, preparation of a project management plan (PMP), quality control (QC) Plan, fieldwork safety plan (FWSP), monthly preparation of invoices/status reports, overall project tracking, and maintaining a risk register and a decision log. Monthly invoices will include a cover letter that describes work completed, percent of budget expended to date by task, and percent complete by task. BC will conduct a project kickoff meeting and site visit with the City and TMWRF to review project goals, milestones, and gather information. BC will develop and distribute the kickoff meeting agenda and presentation materials for this meeting.

Meetings:

- Kickoff Meeting and site visit (up to four BC staff for a duration of 4 hours, held in-person)
- Monthly 1 hour internal coordination meetings (up to four BC staff for a duration of 1 hour each) for the duration of the project.

Deliverables:

- Monthly progress status reports and invoices (via email)
- Kickoff Meeting agenda and draft and final meeting minutes (one digital copy in MS Word and .pdf).

Assumptions:

- TMWRF will provide at least one staff member to guide the site visit.
- Invoices will be issued monthly on a time and material basis.
- The project duration is assumed to be 12 months.

Phase 200. Flow, Loading, and Condition Update

One purpose of this phase is to determine the specific flow and loading conditions for the FBR, both for current operation and for future buildout conditions as defined by the City and TMWRF. This will be completed by reviewing flow and loading data collected by TMWRF over the past two years. The second purpose of this phase is to allow early access to the FBR cell internals for visual non-destructive inspection. TMWRF's 2020 Facility Plan (written by BC) documented flow and loading and associated influent peaking factors. This phase will evaluate the output from individual flow meters throughout the NTF and FBR processes to better understand the FBR specific projected flow rates. In addition, several nitrate loading scenarios will be developed to take into account changes associated with direct TWAS dewatering and the potential for upstream nitrogen

removal. Updated design criteria will be developed for the expected ranges of nitrogen loading to the FBR for existing and buildout conditions when TMWRF's influent annual average (AA) flow reaches 44 million gallons per day (mgd). This will include the evaluation of hourly flow rates of the FBR influent, through each FBR cell, and effluent, and the various peak hydraulic flow conditions that are expected. Flow and loading scenarios will be used to complete a hydraulic model, which will form the basis of design for the pre-design project.

The FBR cell internals for two cells will be inspected by BC, as access allows. TMWRF will be responsible for draining and removing the sand out of each cell prior to inspection. One inspection should take place as early in the project as practical, with the second inspection following as standard TMWRF operation and maintenance allows. It is assumed that inspection of one FBR cell will take up to 4 hours and will require a confined space entry. BC will comply with all TMWRF health and safety and confined space entry requirements, and work with TMWRF's Safety Coordinator on an entry plan.

Meetings:

- FBR Flows and Loads Workshop (up to four BC staff for a duration of 2 hours on MS Teams)

Deliverables:

- Data request (in MS Word or .pdf format), to include process data and flow rate information from the past two years. Hourly flow rate data will be requested to refine the design peak hour flow rate.
- Draft FBR Flow and Loading Analysis and Design Criteria Table (one digital copy in MS Word and .pdf).
- FBR inspection notes and photographs (via email) for documentation and inclusion in Task 403.
- Meeting agenda, draft and final meeting minutes (one digital copy in MS Word and .pdf).

Assumptions:

- Schedule assumes TMWRF will provide data from data request within 10 working days after receipt of the data request.
- The Final FBR Flow and Loading Analysis and Design Criteria Table will be provided in the project's Alternatives Evaluation TM
- Two of the FBR cells will be visually inspected and require confined space entry. Inspection of one FBR cell will be completed in a four (4) hour workday.
- Final scheduling of the FBR inspection will be conducted by TMWRF.
- TMWRF will drain and remove all sand out of the cell prior to inspection.
- TMWRF will review and provide comments on BC's health and safety plan prior to inspection.

Phase 300. Hydraulic and Process Modeling and Testing

The purpose of this phase is to develop and utilize tools needed to analyze the capacity and performance of the FBRs in order to develop improvement and expansion alternatives. BC will use historical data provided by TMWRF to develop a process model to evaluate the existing FBRs, as well as to simulate modifications to the FBR process to better understand the impact changes may have on treatment performance.

Task 301. Hydraulic Modeling

Both gravity and pumped flow hydraulic models will be developed using the design flow rates established in Phase 200. A Visual Hydraulics model will be used to model the gravity flow from the discharge side of the FBRs through the Post-Aeration tank to the influent of TMWRF's tertiary filtration system. BC will additionally develop an AFT Fathom model to evaluate the pumped flow from the NPS to the FBR cells. These models will help determine what upgrades are needed to achieve the hydraulic capacity required.

An understanding of the routing of pumped flows from both the influent and effluent sides of the Nitrification Pump Station will be developed. This understanding will inform the AFT Fathom modeling efforts and allow potential modifications to existing facilities and operations to be evaluated. At a minimum, this understanding will describe flow to the existing and future FBR cells, as well as nitrification effluent recycle pump flow to the

Nitrification Towers. It is reported that nitrification effluent recycle currently operates at greater than 95% speed approximately a third of the time.

A similar understanding of the routing and constraints of the gravity flows from the FBRs will be developed. This will build upon the previous hydraulic modeling that showed gravity flow restrictions at the inlet and outlets of the Post Aeration tank. This task will consider the recirculation flows as well as flow from the FBRs to and from the Post Aeration tank. A supplementary Visual Hydraulics model segment utilizing the existing secondary effluent trough valving and piping will be developed to investigate the use of this piping to supplement the capacity of the existing restrictive gravity piping.

BC will document the assumptions and results from these hydraulic models in the project's Alternative Evaluation Technical Memorandum (TM) and discuss preliminary results in a Hydraulic Model Results workshop. The end products of this task are models that can then be used and adjusted to evaluate various alternatives in the FBR alternative evaluation tasks.

Meetings:

- Hydraulic Model Results Workshop (up to four BC staff for a duration of 1 hour on MS Teams)

Deliverables:

- Meeting agenda, draft and final meeting minutes (one digital copy in MS Word and .pdf).

Assumptions:

- BC's Visual Hydraulics model developed for TMWRF's 2020 Facility Plan (2020) will be used as a starting point for this analysis.
- As-built drawings will be used to determine key hydraulic elevations from the existing system.
- TMWRF will provide photos when available and control system information for historically high flow events at the plant.
- TMWRF will provide existing NPS pump information including pump curves and nameplate information.

Task 302. FBR Tracer Study

The purpose of this task is to conduct a tracer study to determine the adequacy of the FBR flow distribution in its current configuration, previously recommended by Paul Sutton and BC in 2016 (*FBR Bed Sampling Procedures, Sample Analyses, and Interpretation of Results*). BC will conduct the FBR tracer study using online instrumentation to measure the tracer in real time to understand how flow is routed between and distributed within the existing FBR cells. If significant flow splitting or distribution issues are identified, BC can then recommend improvements to achieve better flow dynamics which should result in better performance and more efficient use of methanol when dosing into the combined influent of the FBRs. Results from the FBR Tracer Study will be documents in the project's Alternative Evaluation TM.

Meetings:

- Tracer Study preparation meeting and site walk (up to two BC staff for a duration of 3 hours, in person)

Deliverables:

- Meeting agenda, draft and final meeting minutes (one digital copy in MS Word and .pdf).
- Draft and Final FBR Tracer Study Protocol (one digital copy in MS Word and .pdf).

Assumptions:

- TMWRF will provide comments on the Draft FBR Tracer Study Protocol plan within 10 days of receipt.
- The FBR Tracer Study will be conducted by BC in one 8-hour work day during normal working hours.
- Final scheduling of the FBR Tracer Study will be conducted by TMWRF.
- TMWRF will provide one staff member to conduct the site walk, in addition to one or more staff to help modify operation of the FBR system during the FBR Tracer Study.

- The actual tracer (i.e. dyes, microspheres/nanoparticles, radioactive, lithium chloride, etc.) will be confirmed as part of the study protocol and will be compatible with TMWRF site requirements.

Task 303. Computational Fluid Dynamics Modeling

The objective of this task is to develop a computational fluid dynamics (CFD) model to better define the flow regime and hydraulics into and out of the FBR. While the FBR tracer study will better define the residence time distribution (RTD) through each cell, document flow distribution, and pin-point potential short circuiting and distribution issues that could disrupt the media fluidization, it will not completely define the FBR influent and effluent flow regime, nor will it predict how to best connect additional FBR capacity. CFD modeling, coupled with the use of AFT Fathom and Visual Hydraulics for the influent and effluent flows, will better document the fluid dynamics in and out of the FBR and inform how to split the FBR flow for additional capacity. CFD modeling can also be calibrated with the FBR Tracer Study to improve accuracy. CFD modeling will not, however, accurately predict the hydrodynamics of the media in the FBR, given the three phases (e.g., water, sand and biosolids) in the FBR.

To complete this task, BC will collect dimensional information for the existing FBRs and utilize results from the Phase 200 Flow, Loading, and Condition Update and Task 301 Hydraulic Modeling to build and calibrate the CFD model. We will setup and develop the CFD model and check it with the AFT Fathom, Visual Hydraulics and RTD data. The model will then be used to confirm flow distribution alternative(s) for the preferred design alternative in Phase 400.

Meetings:

- CFD model setup and information meeting (up to two BC staff for a duration of 2 hours on MS Teams)

Deliverables:

- Meeting agenda, draft and final meeting minutes (one digital copy in MS Word and .pdf).
- Draft and Final FBR CFD Modeling TM (one digital copy in MS Word and .pdf).

Assumptions:

- Base model completed after Phase 200 tasks and Task 302 FBR Tracer Study.
- Provisions for dimensional information by TMWRF as required beyond record drawings.
- Flow distribution modeling completed after Task 402.
- Final Draft and Final FBR CFD Modeling TM will be completed after Task 402.

Task 304. Process Model Calibration

The purpose of this task is to conduct process modeling at the FBR design conditions to inform the preliminary design of the FBR cells. BC will perform heat and materials mass balance (HMB) calculations and use that information to help calibrate a biological process model using SUMO software, paired with spreadsheet based analyses. Several FBR stress tests will be conducted by varying flow to a single cell from 11 to 16 mgd for an agreed upon time, measuring nitrate on the effluent to develop a response curve used to aid in the process model calibration. Varying flow rates to the FBR cells will be gradual and be performed in concert with TMWRF operations to maintain a low effluent nitrate concentration which meets TMWRF permit limits. The stress tests will be planned to not impact overall daily effluent nitrogen concentrations to any significant margin. BC is aware of the 2.0 milligrams nitrogen per liter maximum day nitrate limit and the stress tests that are recommended will be planned to maintain compliance as a priority.

The process modeling task will help inform the project's design criteria by providing information to:

- Develop recommendations for design range of flow rates and nitrogen loading rates to the FBR while maintaining permit limits.
- Develop recommendations for the quantity of sand to maintain in each FBR cells.

- Develop preliminary design of new FBR cell(s), if found necessary to accommodate planned flow and loading criteria developed in Phase 200.

Biological observed yield information developed simplistically from the HMBs and with subsequent verification from the SUMO modeling software will be used to provide an initial estimate of biofilm thicknesses on the FBR media. Given the median sand media diameter, amount of sand in each reactor, and estimated surface area, an approximation will be made of the biofilm thickness. This will be used to compare with theoretical drag coefficients and specific gravity estimates to determine the terminal settling velocity of the sand at the design conditions loaded with biofilm. This information will be used to estimate the required upward velocities of the FBRs at different design conditions (i.e. different flow and loading values) and/or biomass loading thicknesses to appropriately fluidize the FBR bed such that there will be no media carryover. Additionally, this information will be used to evaluate different FBR media quantities required for the different loading scenarios given current and required fluidization flowrates, resultant media bed heights, and the FBR cell dimensions.

The end product of this task is a calibrated process model which can be used to perform alternatives analyses. The process capacity of the existing FBR system will be quantified and documented. Any insights gained from this task that can result in immediate operational and performance improvements will be made available to TMWRF for implementation, as required. This information will be used to inform the subsequent evaluation and pre-design tasks, described below.

Meetings:

- Process Model preparation meeting and site walk (up to two BC staff for a duration of 3 hours, in person)
- Process Model Results Workshop (up to four BC staff for a duration of 1 hour on MS Teams)

Deliverables:

- Meeting agenda, draft and final meeting minutes (one digital copy in MS Word and .pdf).
- Draft and Final Stress Test Study Protocol (one digital copy in MS Word and .pdf).

Assumptions:

- TMWRF will provide comments on the Draft Stress Test Study Protocol plan within 10 days of receipt.
- The Stress Test Study will be conducted by TMWRF adjusting flow rates and providing water quality data and instrument data. BC does not anticipate being on-site during the stress test.
- TMWRF will provide one staff member to conduct the site walk and 1 or more staff to help modify operation of the FBR system as needed for stress testing.

Task 305. Hydro-cyclone Pilot Testing

The purpose of this task is to pilot test hydro-cyclones for biomass separation at the FBR process. The purpose of the hydro-cyclones testing is to provide better biomass separation from the media than what is achieved using the current media abrasion pumps and large separation cones, thereby providing potential to increase the capacity by keeping a more appropriate amount of biomass in the system. The goal of pilot testing is to determine optimal control parameters and configuration of the hydro-cyclones. BC will provide support for pilot testing by performing the following tasks:

- Coordinating with hydro-cyclone vendor(s) to get a system to pilot test at TMWRF
- Evaluation of using the existing media abrasion pumps both with and without the hydro-cyclones
- Developing a Pilot Testing Plan describing the test objectives and key metrics, such as:
 - Timing and extent of tests
 - Installation and operating setpoints such as optimal abrasion pump flow rate and suction intake elevations
 - Metrics to track during the test to gauge success such as hydro-cyclone sand capture efficiency and resultant sand settling rates

- Critical success factors such as operability and controllability
- On-site support for the duration of the Pilot Test by one BC staff member
- BC will contract for and provide Contractor assistance in constructing any temporary facilities required. It is anticipated that temporary platforms and handrails will be required as well as temporary hoses and valving to facilitate the hydro-cyclone testing.

BC will document Pilot Testing results in the Alternative Evaluation TM. Test results will be used to inform the alternatives analyses and pre-design tasks.

Meetings:

- Pilot Testing Preparation Meeting and site walk (up to two BC staff for a duration of 4 hours, with a virtual connection on MS Teams other BC staff attendance outside of the site walk)

Deliverables:

- Draft and Final Hydro-cyclone Pilot Testing Plan (one digital copy in MS Word and .pdf).

Assumptions:

- TMWRF will provide comments on the Draft Pilot Testing Plan within 10 days of receipt.
- On-site support for the hydro-cyclone Pilot Test assumes a BC staff member will be present for the first full day (8-hours) of pilot test(s) and to visit the site each day for a duration of 2-hours each.
- Hydro-cyclone pilot testing is assumed to last five full working days.
- BC assumes that it will receive hydro-cyclones within 60-days of ordering from its selected hydro-cyclone vendor. BC is not responsible for delays as a result of the vendor.
- Equipment costs are included as expenses in the project budget under this task. BC will charge the City the cost included in the vendor quote. If the vendor quote is higher than the budgeted expense, the difference will be paid for by the City through the project's contingency budget.
- Hydro-cyclones will be handed over to the City for ownership at the conclusion of the project.
- TMWRF will identify one staff member to support pilot testing activity.
- TMWRF lab will conduct any sampling and analysis required to confirm viability of the pilot tests.
- Results from Pilot Testing will be provided in the Alternative Evaluation TM.

Task 306. Ultrasonic Level Detection Pilot Testing

The purpose of this task is to pilot test up to two (2) ultrasonic level detection instruments to monitor the FBR bed height. TMWRF staff have communicated difficulty in confirming the FBR media bed height with their existing equipment and that ultrasonic level detection at the FBRs worked well during a past test. BC will provide support for pilot testing of the ultrasonic level detectors by performing the following tasks:

- Coordinating with ultrasonic level detector vendor(s) to provide up to two instruments to pilot test at TMWRF
- Developing a plan to test key objectives and metrics, such as:
 - Timing and extent of tests
 - Installation location
 - Accuracy of level detection results, compared to TMWRF's existing level detection system
 - Critical success factors such as operability and controllability
- Coordinating with the vendor and TMWRF during installation, including temporary power and data logging, of the instrument(s)
- Providing on-site support for the first day of operation by one BC staff member

BC will document ultrasonic level detector pilot test results in the Alternative Evaluation TM. Test results will be used to inform the alternatives analyses and pre-design tasks.

Meetings:

- No additional meeting required; coordination for the tests is anticipated to be completed during the Hydro-cyclone pilot testing meeting.

Deliverables:

- Final Ultrasonic Level Detection Pilot Testing Plan (one digital copy in pdf).

Assumptions:

- BC will coordinate with up to two ultrasonic level detection vendors for pilot testing.
- One BC staff member will provide up to two 2-hours of on-site support during installation of the ultrasonic level detector(s) with one follow-up site visit for a duration of 2-hours.
- Ultrasonic level detection pilot testing is assumed to last 30 full working days.
- BC assumes that it will receive ultrasonic level indicator instrumentation within 60-days of ordering from selected vendors. BC is not responsible for delays as a result of a vendor.
- Equipment costs are included as expenses in the project budget under this task. BC will charge the City the cost included in the vendor quote. If the vendor quote is higher than the budgeted expense, the difference will be paid for by the City through the project's contingency budget.
- Ultrasonic level indicators will be handed over to the City for ownership at the conclusion of the project.
- TMWRF will identify one staff member to support pilot testing activity and confirm viability of results.
- TMWRF can provide dimensions and details of FBR media beds for instrumentation parameter set up.
- Ultrasonic level detection results will be provided by TMWRF to BC within 10 working days after completion of the test.
- Results will be provided in the Alternative Evaluation TM.

Phase 400. Alternatives Evaluation

The purpose of this task is to compare and document alternatives for rehabilitating the existing FBR system as well as alternatives for expanding the FBR system with new process tanks and equipment to achieve higher process and hydraulic capacity.

Task 401. Rehabilitation of the Existing FBR System

The purpose of this task is to evaluate rehabilitation and improvement options for the existing FBR process. BC will consider alternatives to rehabilitating the existing FBR process while attempting to achieve more capacity within the existing system. The hydraulic and process models developed in previous tasks will be used for this effort. Rehabilitation alternatives will consider the structural, mechanical, electrical, and instrumentation aspects of the FBR facility and methanol storage and dosing facility. BC will provide recommendations on the following:

- Modifications to piping, valving, and flow metering
- Improvements to the existing FBR structure
- Fate of the media abrasion pumps and method of implementing hydro-cyclones, if that technology is selected
- Media abrasion suction and discharge piping configuration
- Fate of the FBR dewatering pumps
- Modifications to the effluent weirs

- Modifications to the sand injection cone
- Modifications to the NPS
- Modifications to FBR instrumentation, including effluent Nitrate and TOC analyzers
- Modifications to methanol pumps, injection locations, and control system
- Quantity of sand needed to optimize treatment for each design nitrate loading rate
- Modifications to Post Aerations inlet and outlet gates to improve hydraulic capacity
- Modifications to gravity piping between FBR and Post Aeration tank
- Rehabilitation of existing MCCs located in the FBR building

BC will provide an updated process and hydraulic capacity rating for the planned, rehabilitated FBR system. BC will develop a American Association of Cost Engineering (AACE) Class V (-50 to +100 percent) probable construction cost to assist the team in decision making. In addition, BC will provide recommendations for varying levels of redundancy and discuss with TMWRF staff to carry this redundancy assumption through the alternatives analysis. For this task, lidar scans of the FBR equipment galleries and FBR deck will be completed by BC's survey subconsultant. A topographic survey of the FBR structure and adjacent roads and piping will also be conducted to address potential rehabilitation conflicts.

Meetings

- Two FBR Rehabilitation Workshops (up to four BC staff for a duration of 2 hours on MS Teams, with two BC staff attending in-person).

Deliverables:

- Meeting agenda, draft and final meeting minutes (one digital copy in MS Word and .pdf).
- Rehabilitation alternatives, including AACE Class V (+50 to -50 percent) cost estimate, will be provided in the Alternative Evaluation TM.

Assumptions:

- Budget assumes lidar scans of FBR equipment galleries and the top deck of the FBRs only. Topographic surveys will be completed outside of the FBR building on adjacent roadways to the Post Aeration tank. A detailed survey scope is outlined in Phase 600.

Task 402. Expansion of the Existing FBR System

The purpose of this task is to evaluate up to three alternatives to expand the existing FBR system with additional tankage or capacity. Expansion of the existing FBR system will be in addition to the recommended rehabilitation. A high level technical screening review of non-FBR systems comparison matrix will also be provided. Anticipated FBR expansion alternatives include:

- Expanding with one or two FBR cells to match existing, with or without a new sand storage silo depending on the recommendation provided by BC.
- Expanding with one or two FBR cells similar to existing but with a smaller volume, with or without a new sand storage silo.
- Expanding the FBRs with a packaged FBR system to operate in parallel to the existing four FBR cells.

For each expansion alternative, BC will provide recommendations on the following:

- Modifications to piping, valving, and flow metering.
- Additional modifications to the NEPS, if additional modifications are required compared to those recommended in the rehabilitation alternatives.
- Modifications to methanol dosing system to incorporate new process tanks.
- Modifications to gravity flow piping to Post Aeration tank.

BC will provide capacity ratings to each of the three alternatives along with a list of benefits and challenges associated with each alternative. BC will develop an AACE Class V probable construction cost for each alternative for the purposes of comparing alternatives and to assist the team in decision making. BC will use the same redundancy criteria developed for the rehabilitation alternatives.

Meetings

- Held con-currently with FBR Rehabilitation Workshop

Deliverables:

- Expansion alternatives, including AACE Class V probable construction cost, will be provided in the Alternative Evaluation TM.

Assumptions:

- BC will evaluate up to three alternatives to expand the existing FBR system with new process tanks to expand capacity.

Task 403. Alternatives Evaluation TM

The information and results collected from tasks in Phases 200, 300, and 400 will be coalesced and summarized in a Draft Alternatives Evaluation TM for review and comment. BC will review and address City and TMWRF comments, questions, and concerns in the Alternatives Evaluation Workshop for clarification. A Final Alternatives Evaluation TM will then be written and issued to the City. While non-FBR technologies, including moving bed biofilm reactor (i.e., MBBR) and biofilters are not being considered in this analysis, these technologies will be discussed in the Alternatives Evaluation TM at a high level to provide the City with written documentation which reinforce why FBR rehabilitation and/or expansion are ideal for this application.

Meetings

- Draft Alternatives Evaluation TM Workshop (up to four BC staff for a duration of 2 hours on MS Teams, with two BC staff attending in-person).

Deliverables:

- Meeting agenda, draft and final meeting minutes (one digital copy in MS Word and .pdf).
- Draft and Final Alternatives Evaluation TM (one digital copy in MS Word and .pdf).
- Alternative Evaluation TM Review Comment Log (one digital copy in Microsoft Excel)
- AACE Class V probable construction costs for three FBR rehabilitation alternatives and three FBR expansion alternatives

Assumptions:

- TMWRF will provide comments on the Draft Alternatives Evaluation TM within 10 days of receipt.

Phase 500. Pre-Design Services

The purpose of this task is to develop a preliminary design based on the City and TMWRF's selected design alternative from the project's previous tasks. BC will screen one design alternative and document findings in a Preliminary Design Report (PDR). In conjunction with the PDR, BC will advance the engineering design and project definition to approximately 30 percent on the selected alternative. This will include the development of preliminary design drawings, diagrams, plans, specifications, and data sheets that will inform the development of an AACE Class 4 (-30 to +50 percent) construction cost estimate for the selected alternative. BC will identify potential sources of power if new facilities are to be constructed. It is assumed that TMWRF will provide historical power metering data for nearby MCCs or switchgears to be used in load calculations. BC will review TMWRF's Electrical Master Plan study that is currently under development by others.

Meetings:

- PDR Review Workshop (up to four BC staff for a duration of 2 hours on MS Teams, with at least two BC staff attending in person).

Deliverables:

- Draft PDR (one digital copy in MS Word and .pdf).
- 30 percent design drawings and list of specifications (one digital copy in MS Word and half size .pdf) that would include the following:
 - Process flow diagram
 - Hydraulic profile
 - Preliminary Piping and Instrumentation Diagrams
 - Preliminary Plot Plans
 - Preliminary General arrangement drawings
 - Preliminary Foundation Plans
 - Preliminary Yard and Utility Piping Plans
 - Preliminary Electrical Conceptual Block Diagrams
 - Preliminary Electrical Single Line Diagrams
 - Preliminary Tie-in drawings
- Meeting agenda, draft and final meeting minutes (one digital copy in MS Word and .pdf).
- PDR Review Comment Log (one digital copy in Microsoft Excel).
- Final PDR (one digital copy in .pdf).
- AACE Class 4 cost estimate for the preferred alternative (one digital copy in .pdf).

Assumptions:

- A site survey and geotechnical investigation will be performed to aid in the pre-design work.
- BC CAD standards will be used.
- The design scope is based on the recommended project from Phase 400. Only one alternative will be carried forward through predesign.
- TMWRF will provide historical power metering data for nearby MCCs or switchgears to be used in load calculations.
- Construction opinion of probable cost estimates, financial analysis, and feasibility projections are subject to many influences including, but not limited to, price of labor and materials, unknown or latent conditions of existing equipment or structures, and time or quality of performance by third parties. Such influences may not be precisely forecasted and are beyond the control of BC; actual costs incurred may vary substantially from the estimates prepared by BC. BC does not warrant or guarantee the accuracy of construction or development cost estimates.

Phase 600. Subconsultant Support

To aid in the FBR pilot testing and pre-design tasks, BC's subconsultants will perform the following.

Task 601. Structural Design

BJG Architects and Engineers (BJG) will provide architectural and structural support through each phase of the project, including input and review of the FBR inspections, structural design of a pilot testing platform (to be constructed by others), support through the pilot testing phase, summarizing structural findings and

recommendations in the Alternatives Evaluation TM, and pre-design for both the FBR rehabilitation and expansion alternatives. BJG's pre-design effort includes the submittal of structural design criteria and 30 percent design drawings for the PDR and a review of the preliminary design construction cost estimate. BJG will additionally perform a seismic evaluation of the FBR and NPS buildings for seismic upgrades (no design of upgrades included) consistent with ASCE 41. Structural design deliverables will be submitted as a single package with BC deliverables.

Task 602. Lidar and Topographic Survey

CFA Land Surveyors (CFA) will perform a topographic survey to map the planimetric and topographic features encompassing the FBR and Post Aeration structures as well as all in between surface features. Lidar scans will be performed on the FBR equipment gallery and the top of the FBRs. Data collected will enable preparation of a 1-ft contour map at a suitable scale, and existing structures features and surface apparent utilities will be located. Sewer and storm drain manholes and inlets within the project area will be measured for invert elevations. Water and gas valves will be measured for top of nut elevations. Spot elevations on structures, at crowns in pipes, in existing channels, and at weirs will also be collected to assist and verify elevations used in the gravity hydraulic models. Manholes immediately outside of the project area will also be included for directional, size, and invert validation. The final deliverable will include planimetric and topographic features with 1-ft contours sufficient for preparation of civil design plans.

Task 603. Geotechnical Investigations

Black Eagle Consulting, Inc. (Black Eagle) will perform a geotechnical investigation with soils laboratory testing in order to develop geotechnical data for the potential expansion of the FBR system. Black Eagle's scope of work includes research of past geotechnical reports and information about the project site, field exploration, field and laboratory testing, and preparation of a geotechnical report with recommendations for construction. Exploration of the project site adjacent to the FBRs will be performed by advancing up to two borings north and south of the FBRs to adequately reveal the subsurface soil and groundwater conditions. Borings will be advanced using hollow-stem auger drilling or solid flight auger techniques, at a target depth of 15 ft below the existing ground surface.

Task 604. Pilot Testing Construction

Resource Development Group (RDG) will assist BC in preparation for pilot testing activities. Specifically, RDG will fabricate and install a proposed 21-ft long access deck across a FBR cell so that the pilot testing team may access the center of the FBR cell. RDG will additionally install the proposed pilot testing equipment, including two hydro-cyclones and up to three ultrasonic level indicators. Equipment to be installed by RDG will be provided by BC. The design of the access deck will be completed by BJG, so coordination between RDG, BJG, and BC is required. RDG's scope does not include design specifications, temporary power and lighting, overtime pay, or payment and performance bonds.

Deliverables:

- Lidar and topographic survey map with elevations (one digital copy in AutoCAD format and .pdf).
- Geotechnical investigation report (one digital copy in .pdf).
- Pilot testing access platform design by BJG (one digital copy in .pdf).

Assumptions:

- The survey will be based on horizontal survey control tied to existing monuments and the City's plant vertical datum bench marks, assumed to be in NAVD88.
- Black Eagle will obtain permits for geotechnical field explorations.
- Permitting for pilot testing is not required.

Phase 700. Contingency

A contingency fund of \$100,000 will be included to cover tasks not included in the scope of work or which deviate from the project's listed assumptions. Approval by the City PM is needed prior to the release of contingency funds.

Fee Estimate

Work will be performed on a time and expense basis for a not to exceed project budget of **\$1,205,437**. A breakdown of the project's fee estimate by phase and task is provided in Table 1. A supporting rate schedule is included as Exhibit B. The anticipated project schedule and list of drawings used to develop the fee estimate are included as Exhibit C and D, respectively.

Assumptions:

- Labor Rate is in accordance with attached rate schedule.
- No markups on expenses.
- 5 percent proposed markups on sub-consultant fee.
- Unspent budget on completed tasks can be reallocated.
- Cost is managed at the project level and not phase level.
- Labor rates will not be escalated unless project schedule is extended by at least six (6) months.

Project Schedule

A preliminary project schedule showing the start, end, and duration of each project task is included as Exhibit C. The total project duration through Bid Support Services is assumed to be 12 months.

Assumptions:

- Notice to Proceed will be issued by the City on October 24, 2022
- The City and TMWRF review period is ten working days for all deliverables.

Table 1. FBR and NPS Evaluation and Pre-Design Fee Estimate					
Phase/Task	Phase/Task Description	Labor	Expenses	Subconsultant	Total
100	Project Management	\$45,105	\$-	\$-	\$45,105
200	Flow, Loading & Condition Update	\$59,762	\$-	\$-	\$59,762
201	Data Review	\$7,908	\$-	\$-	\$7,908
202	Flow and Loading Update	\$23,592	\$-	\$-	\$23,592
203	Flow and Loads Workshop	\$5,354	\$-	\$-	\$5,354
204	FBR Inspections	\$18,064	\$-	\$-	\$18,064
205	QC Review	\$4,844	\$-	\$-	\$4,844
300	Hydraulic/Process Modeling & Testing	\$326,902	\$36,000	\$-	\$362,902
301	Hydraulic Modeling	\$31,056	\$-	\$-	\$31,056
302	FBR Tracer Study	\$56,412	\$15,000	\$-	\$71,412
303	Computational Fluid Dynamics Model	\$67,334	\$-	\$-	\$67,334
304	Process Model Calibration	\$57,628	\$-	\$-	\$57,628
305	Hydro-cyclone Pilot Testing	\$63,116	\$10,000	\$-	\$73,116
306	Ultrasonic Pilot Testing	\$30,588	\$11,000	\$-	\$41,588
307	QC Review	\$20,768	\$-	\$-	\$20,768
400	Alternatives Evaluation	\$302,598	\$-	\$-	\$302,598
401	FBR Rehab Alternative	\$114,876	\$-	\$-	\$114,876
402	FBR Expansion Alternative	\$72,840	\$-	\$-	\$72,840
403	Alternative Evaluation TM	\$72,760	\$-	\$-	\$72,760
404	Alternative Evaluation Workshop	\$6,596	\$-	\$-	\$6,596
405	Rehab/Expansion Cost Estimates	\$19,650	\$-	\$-	\$19,650
406	QC Review	\$15,876	\$-	\$-	\$15,876
500	Pre-Design Services	\$140,650	\$-	\$-	\$140,650
501	Draft Preliminary Design Report	\$81,600	\$-	\$-	\$81,600
502	Preliminary Design Workshop	\$4,752	\$-	\$-	\$4,752
503	Final Preliminary Design Report	\$27,444	\$-	\$-	\$27,444
504	Pre-Design Cost Estimate	\$19,650	\$-	\$-	\$19,650
505	QC Review	\$7,204	\$-	\$-	\$7,204
600	Subconsultant Support	\$-	\$-	\$194,420	\$194,420
601	Structural Design - BJG	\$-	\$-	\$115,420	\$115,420
602	Lidar and Topographic Survey - CFA	\$-	\$-	\$23,300	\$23,300
603	Geotechnical Investigation - B.E.	\$-	\$-	\$10,700	\$10,700
604	Pilot Testing Construction - RDG	\$-	\$-	\$45,000	\$45,000
700	Owner Contingency	\$-	\$-	\$-	\$100,000
GRAND TOTAL		\$875,017	\$36,000	\$194,420	\$1,205,437

Exhibit B: BC Standard Rate Table

Brown and Caldwell Schedule of Hourly Billing Rates

Level	Engineering	Technical/Scientific	Administrative	Hourly Rate
A			Office/Support Services I	\$55
B	Drafter Trainee	Field Service Technician I	Word Processor I Office/Support Services II	\$73
C	Assistant Drafter	Field Service Technician II	Word Processor II Office/Support Services III	\$80
D	Drafter Engineering Aide Inspection Aide	Field Service Technician III	Accountant I Word Processor III Office/Support Services IV	\$96
E	Engineer I Senior Drafter Senior Illustrator Inspector I	Geologist/Hydrogeologist I Scientist I Senior Field Service Technician	Accountant II Word Processor IV	\$116
F	Engineer II Inspector II Lead Drafter Lead Illustrator	Geologist/Hydrogeologist II Scientist II	Accountant III Area Business Operations Mgr Technical Writer Word Processing Supervisor	\$137
G	Engineer III Inspector III Senior Designer Supervising Drafter Supervising Illustrator	Geologist/Hydrogeologist III Scientist III	Accountant IV Administrative Manager	\$163
H	Senior Engineer Principal Designer Senior Construction Engineer Senior Engineer	Senior Geologist/Hydrogeologist Senior Scientist	Senior Technical Writer	\$186
I	Principal Engineer Principal Construction Engineer Supervising Designer	Principal Geologist/Hydrogeologist Principal Scientist	Corp.Contract Administrator	\$211
J	Supervising Engineer Supervising Constr. Engineer Supervising Engineer	Supervising Scientist Supervising Geologist/ Hydrogeologist	Assistant Controller	\$223
K	Managing Engineer	Managing Geologist/Hydrogeologist Managing Scientist	Area Bus Ops Mgr IV	\$243
L	Chief Engineer Executive Engineer	Chief Scientist Chief Geologist/Hydrogeologist	Corp Marketing Comm. Mgr.	\$263
M	Vice President			\$289
N	Senior Vice President			\$325
O	President/Executive Vice President			\$325
P	Chief Executive Officer			\$325

Exhibit C: Project Schedule

TMWRF FBR and NPS Evaluation and Pre-Design
Project Schedule



TMWRF FBR and NPS Evaluation and Pre-Design
Project Schedule

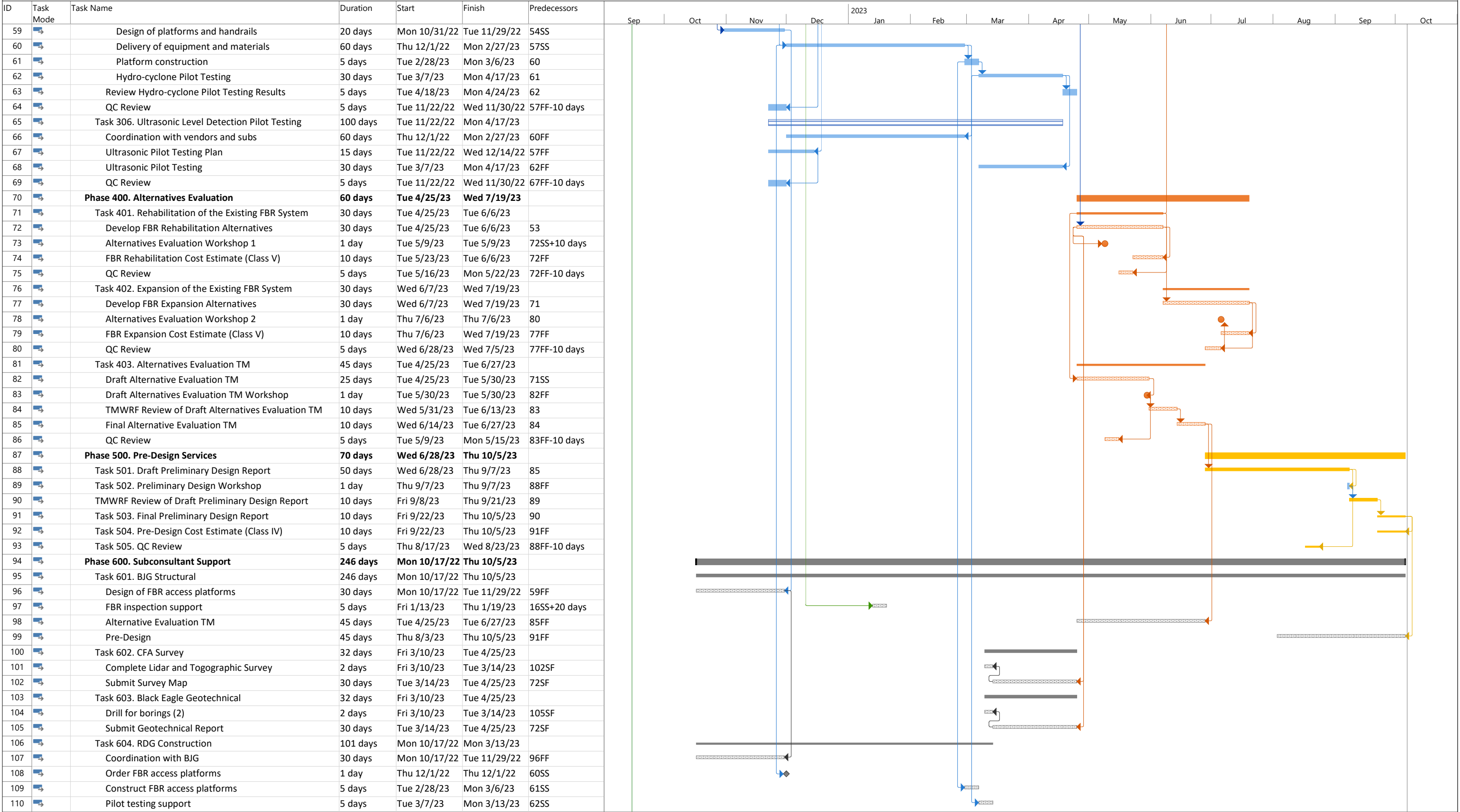


Exhibit D: Preliminary Drawing List

**TMWRF FBR and NPS Evaluation and Pre-design
Preliminary Drawing List**

Sheet Number	Drawing Number	Discipline	Sheet Title	30% Submittal
1		GENERAL	Cover Sheet, Vicinity, and Location Map	YES
2		GENERAL	Drawing Index and Design Criteria	YES
3		GENERAL	Abbreviations	YES
4		GENERAL	General Legends and Symbols	YES
5		GENERAL	Treatment Plant Site Plan	YES
6		GENERAL	Project Site Plan	YES
7		GENERAL	Hydraulic Profile (NE PS to Post Aeration Tank)	YES
8		GENERAL	Existing FBR Process Flow Diagram	YES
9		GENERAL	Final FBR Process Flow Diagram	YES
10		DEMOLITION	Demolition 1 - Lower Level	YES
11		DEMOLITION	Demolition 2 - Middle Level	YES
12		DEMOLITION	Demolition 3 - Top	YES
13		DEMOLITION	Demolition Photos 1	
14		DEMOLITION	Demolition Photos 2	
15		DEMOLITION	Demolition Photos 3	
16		CIVIL	Civil Symbols and Legend	YES
17		CIVIL	Civil Details 1	YES
18		CIVIL	Civil Details 2	
19		CIVIL	Existing Site Plan	YES
20		CIVIL	Final Site Plan	YES
21		CIVIL	Excavation Constraints and Limitations	YES
22		CIVIL	Grading and Paving Plan	YES
23		CIVIL	Temporary Yard Piping Modifications	
24		CIVIL	Yard Piping Plan 1	YES
25		CIVIL	Yard Piping Plan 2	YES
26		CIVIL	Yard Piping Details	
27		CIVIL	Yard Piping Overview Rendering	
28		STRUCTURAL	Structural General Notes	
29		STRUCTURAL	Details 1	
30		STRUCTURAL	Details 2	
31		STRUCTURAL	Cells 1 to 4 Rehabilitation Plans	YES
32		STRUCTURAL	Cells 1 to 4 Rehabilitation Details 1	
33		STRUCTURAL	Cells 1 to 4 Rehabilitation Details 1	
34		STRUCTURAL	Cells 5 and 6 Foundation Plan	YES
35		STRUCTURAL	Cells 5 and 6 Lower Level Plan	YES
36		STRUCTURAL	Cells 5 and 6 Middle Level Plan	YES
37		STRUCTURAL	Cells 5 and 6 Middle Top Plan	YES
38		STRUCTURAL	Cyclone Structure Plan	YES
39		STRUCTURAL	Cells 5 and 6 Section 1	YES
40		STRUCTURAL	Cells 5 and 6 Section 1	
41		STRUCTURAL	Cyclone Structure Section and Details	YES
42		STRUCTURAL	Cells 5 and 6 Renderings	
43		STRUCTURAL	Misc Partial Plans 1	YES
44		STRUCTURAL	Misc Partial Plans 2	

Sheet Number	Drawing Number	Discipline	Sheet Title	30% Submittal
45		MECHANICAL	Mechanical General Notes	
46		MECHANICAL	Plan Cells 1 to 4 Lower Level	YES
47		MECHANICAL	Plan Cells 1 to 4 Middle Level	YES
48		MECHANICAL	Plan Cells 1 to 4 Top	YES
49		MECHANICAL	Plan 1 Cells 5 and 6	YES
50		MECHANICAL	Plan 2 Cells 5 and 6	YES
51		MECHANICAL	Plan 3 Cells 5 and 6	YES
52		MECHANICAL	FBR Sections 1	YES
53		MECHANICAL	FBR Sections 2	YES
54		MECHANICAL	FBR Details 1	
55		MECHANICAL	FBR Details 2	
56		MECHANICAL	FBR Details 3	
57		MECHANICAL	Plan at NE Pump Station	YES
58		MECHANICAL	Sections at NE Pump Station	YES
59		MECHANICAL	Details 1 at NE Pump Station	
60		MECHANICAL	Details 2 at NE Pump Station	
61		MECHANICAL	Renderings of FBR Facility	YES
62		MECHANICAL	Renderings Cells 1 to 4	YES
63		MECHANICAL	Renderings Cells 5 and 6	YES
64		MECHANICAL	Renderings Misc Facilities	YES
65		ELECTRICAL	Electrical Legend and Symbols	YES
66		ELECTRICAL	Electrical Abbreviations	YES
67		ELECTRICAL	Electrical Site Plan	
68		ELECTRICAL	Power & Control Plan	
69		ELECTRICAL	Panel Elevation	
70		ELECTRICAL	Single Line Diagram	YES
71		ELECTRICAL	Electrical Details 1	
72		ELECTRICAL	Electrical Details 2	
73		INSTRUMENTATION	Instrumentation Symbols and Abbreviations 1	YES
74		INSTRUMENTATION	Instrumentation Symbols and Abbreviations 2	YES
75		INSTRUMENTATION	Instrumentation Symbols and Abbreviations 3	
76		INSTRUMENTATION	Instrumentation Symbols and Abbreviations 4	
77		INSTRUMENTATION	Asset Tag Prefixes Table	
78		INSTRUMENTATION	P&ID NE Pump Station	YES
79		INSTRUMENTATION	P&ID Cells 1 and 2	YES
80		INSTRUMENTATION	P&ID Cells 3 and 4	YES
81		INSTRUMENTATION	P&ID Cells 5 and 6	YES
82		INSTRUMENTATION	P&ID Support Facilities	YES
83		INSTRUMENTATION	Schematic Symbols	YES
84		INSTRUMENTATION	Sample Loop Drawing	
85		INSTRUMENTATION	Communications Block Diagram	
86		INSTRUMENTATION	Control Schematic 1	
87		INSTRUMENTATION	Control Schematic 2	