CITY OF GRAND JUNCTION, COLORADO

****

CONTRACT

This CONTRACT made and entered into this 17th day of May, 2023 by and between the **City of Grand Junction, Colorado,** a government entity in the County of Mesa, State of Colorado, hereinafter in the Contract Documents referred to as the "Owner" and **HDR Engineering, Inc.** hereinafter in the Contract Documents referred to as the "Contractor."

WITNESSETH:

WHEREAS the Owner advertised that sealed Responses would be received for furnishing all labor, tools, supplies, equipment, materials, and everything necessary and required for the Project described by the Contract Documents and known as **Wastewater Treatment Plant SCADA Upgrade Design RFP-5166-23-SDH.**

WHEREAS, the Contract has been awarded to the above-named Contractor by the Owner, and said Contractor is now ready, willing, and able to perform the Work specified in the Notice of Award, in accordance with the Contract Documents.

NOW, THEREFORE, in consideration of the compensation to be paid the Contractor, the mutual covenants hereinafter set forth and subject to the terms hereinafter stated, it is mutually covenanted and agreed as follows:

ARTICLE 1

Contract Documents: It is agreed by the parties hereto that the following list of instruments, drawings, and documents which are attached hereto, bound herewith, or incorporated herein by reference constitute and shall be referred to either as the "Contract Documents" or the "Contract", and all of said instruments, drawings, and documents taken together as a whole constitute the Contract between the parties hereto, and they are fully a part of this agreement as if they were set out verbatim and in full herein:

The order of contract document governance shall be as follows:

a) The body of this contract agreement;
b) Contractor's Defined Scope of Services (Exhibit A) and Pricing Proposal (Exhibit B);
c) Solicitation Documents for the Project (including Addendum 2 and 3, Addendum 1 does not apply as it only pertained to a change in the solicitation opening date); **Wastewater Treatment Plant SCADA Upgrade Design;**
d) Contractor's Proposal Response to the Solicitation;

e) Service(s) Change Requests (Amendment directing that changed Services be performed).
f) Change Orders.

ARTICLE 2

Definitions: The definitions provided in the Solicitation apply to the terms used in the Contract and all the Contract Documents.

ARTICLE 3

Contract Services: The Contractor agrees to furnish all labor, tools, supplies, equipment, materials, and all that is necessary and required to complete the tasks associated with the Work described, set forth, shown, and included in the Contract Documents as set forth in the Scope of Services in Exhibit A.

ARTICLE 4

Contract Price and Payment Procedures: The Contractor shall accept as full and complete compensation for the performance and completion of all the Services specified in the Contract Documents, the hourly rate amounts that are as stated in the Contractor's hourly rates schedule in Exhibit B, up to but not to exceed $189,370 without an adjustment by Change Order ("Contract Price"). If this Contract contains unit price pay items, the Contract Price shall be adjusted in accordance with the actual quantities of items completed and accepted by the Owner at the unit prices quoted. The amount of the Contract Price is and has heretofore been appropriated by the Grand Junction City Council for the use and benefit of this Project. The Contract Price shall not be modified except by Change Order or other written directive of the Owner. The Owner shall not issue a Change Order or other written directive which requires additional work to be performed, which work causes the aggregate amount payable under this Contract to exceed the amount appropriated for this Project, unless and until the Owner provides Contractor written assurance that lawful appropriations to cover the costs of the additional work have been made.

ARTICLE 5

Contract Binding: The Owner and the Contractor each bind itself, its partners, successors, assigns and legal representatives to the other party hereto in respect to all covenants, agreements and obligations contained in the Contract Documents. The Contract Documents constitute the entire agreement between the Owner and Contractor and may only be altered, amended, or repealed by a duly executed written instrument. Neither the Owner nor the Contractor shall, without the prior written consent of the other, assign or sublet in whole or in part its interest under any of the Contract Documents and specifically, the Contractor shall not assign any moneys due or to become due without the prior written consent of the Owner.

ARTICLE 6

Severability: If any part, portion, or provision of the Contract shall be found or declared null, void or unenforceable for any reason whatsoever by any court of competent jurisdiction or any governmental agency having the authority thereover, only such part, portion or provision shall be effected thereby and all other parts, portions and provisions of the Contract shall remain in full force and effect.

ARTICLE 7

Operational Technology Systems: Owner agrees that the effectiveness of operational technology systems and features designed, recommended or assessed by Contractor (collectively "OT Systems") are dependent upon Owner's continued operation and maintenance of the OT Systems in accordance with all standards, best practices, laws, and regulations that govern the operation and maintenance of the OT Systems. Owner shall be solely responsible for operating and maintaining the OT Systems in accordance with applicable laws, regulations, and industry standards (e.g. ISA, NIST, *etc.*) and best practices, which generally include but are not limited to, cyber security policies and procedures, documentation and training requirements, continuous monitoring of assets for tampering and intrusion, periodic evaluation for asset vulnerabilities, implementation and update of appropriate technical, physical, and operational standards, and offline testing of all software/firmware patches/updates prior to placing updates into production. Additionally, Owner recognizes and agrees that OT Systems are subject to internal and external breach, compromise, and similar incidents. Security features designed, recommended, or assessed by Contractor are intended to reduce the likelihood that OT Systems will be compromised by such incidents; however, Contractor does not guarantee that Owner's OT Systems are impenetrable and Owner agrees to waive any claims against Contractor resulting from any such incidents that relate to or affect Owner's OT Systems.

Article 8

Mutual Waiver of Consequential Damages: Both the owner and contractor agree not to hold each other liable for any special, incidental, indirect, or consequential damages. This includes damages such as loss of use, loss of goodwill, cost of substitute facilities or services, financial losses, and penalties. It applies to any causes of damage, including negligence, errors or omissions, strict liability, breach of contract, or breach of warranty, whether expressed or implied, related to the Project or the Agreement.

Article 9

Allocation of Risks: Allocation of risks and limitations of remedies under this Agreement are business understandings between the Parties and shall apply to all theories of recovery, including but not limited to breach of contract or warranty (express or implied), tort (including but not limited to negligence), strict or statutory liability, or any other cause of action. Notwithstanding any other provision of this Agreement, and to the fullest extent permitted by law, the total liability, in the aggregate, of Contractor and Contractor's officers, directors, members, partners, agents, employees, and subcontractors to Owner and anyone claiming by, through, or under Owner for any and all claims, losses, costs, or

damages whatsoever arising out of, resulting from, or in any way related to the Project or the Agreement from any cause or causes, including but not limited to the negligence, professional errors or omissions, strict liability, breach of contract, indemnity obligations, or warranty, express or implied, of Contractor or Contractor's officers, directors, members, partners, agents, employees, or subcontractors, shall not exceed the lesser of Contractor's fee under this Agreement or $1,000,000.

IN WITNESS WHEREOF, City of Grand Junction, Colorado, has caused this Contract to be subscribed and sealed and attested in its behalf; and the Contractor has signed this Contract the day and the year first mentioned herein.

City of Grand Junction, Colorado

DocuSigned by:
By: Duane Hoff Jr. 5/19/2023
0F789E7D58F14BC...
Duane Hoff Jr., Contract Administrator Date

HDR Engineering, Inc.

DocuSigned by:
By: R. Bradly Martin 5/19/2023
A7F68EF26D5B48D...
R. Bradly Martin Senior Vice President Date

Exhibit A

Scope of Services

TASK 1: SCADA SYSTEM FUNCTIONALITY AND CONTROL ROOM REQUIREMENTS

Description

1. Review the existing SCADA control room equipment and PLC/SCADA infrastructure in the Plant and additional functionality needed from the SCADA system.
2. Identify Owner's vision for SCADA system functionality, workstations, and future control room.
3. Document requirements needed to achieve the City's vision for future control room, including quantity and type of workstations and control room audio-visual equipment.

Deliverables

Section in the project technical memorandum describing the existing control room, requirements for a new control room, types and quantities of workstations and audio-visual equipment for the new control room, and narrative description of additional SCADA system functionality desired.

TASK 2: EVALUATE NETWORK INFRASTRUCTURE

Description

1. Identify and document existing SCADA network components (hardware and software) in the plant.
2. Evaluate network structure, effectiveness, and reliability.
3. Update existing plant network diagram to reflect current conditions.
4. Modify the existing plant network diagram to illustrate areas needing improvement.

Deliverables

Section in the project technical memorandum describing the network structure, effectiveness, and reliability, including narrative describing necessary improvements, and existing and future network diagrams.

TASK 3: FIBER OPTIC INFRASTRUCTURE DESIGN

Description

1. Identify process buildings and control system nodes that require fiber optic network connections within the Persigo WWTP site. Identify existing or desired interfaces between the Owner's IT and process control/OT networks, including appropriate firewalls between the separate networks.
2. Identify existing infrastructure such as pull boxes, duct banks, manholes, network racks, and network rooms, that can be used for fiber optic cable routing and installation. "Duraline" or similar microduct system will be used for cross-site fiber optic network routing where existing conduits/duct banks do not exist.
3. Develop fiber optic ring design for the identified locations, including site plans, details, and technical specifications (excluding Division 0 and Division 1 "front end" documents).

Deliverables

1. Section in the project technical memorandum containing a summary of the fiber optic design and salient features.
2. Design Contract Drawings for construction bidding.
3. Design Specifications for construction bidding.

TASK 4: PLC BACKUP/REPLACEMENT PLANNING

Description

1. Identify PLCs and associated hardware (Central Processing Units, network cards, Input/Output cards, etc.) within the plant.
2. Identify hardware end-of-life timeframes based on product lifecycle and hardware exposure to environmental conditions.
3. Establish replacement schedules for hardware components.
4. Recommended data backup schedules for PLC data.
5. Estimate annual costs per year for hardware replacements.
6. Establish spare parts list for critical hardware components.

Deliverables

PLC backup/replacement planning spreadsheet with PLC replacement and data backup schedules, equipment costs, recommended spare parts, and spare parts in current inventory. Spreadsheet will be provided in native (Excel) format and as an Appendix in the project technical memorandum.

TASK 5: CYBERSECURITY AUDIT

Description

A facility-wide cybersecurity audit will be performed. The methodology used for the development of this cyber security assessment will be based on the six steps contained in the ISA-62443 High Level Risk Assessment workflow process for the control system and design for isolation of IT and control system networks. The cyber security audit sequence includes the following:

1. Define the methodology for identifying risks
2. Identify risks
3. Define the methodology for assessing the priority of risks
4. Assess the priority of risks
5. Document the results and rationale
6. Involve stakeholders in steps 2 through 4: develop planning level vulnerability mitigations and incorporate recommendations into network upgrade recommendations (Task 2) and the fiber optic design project (Task 3).

The cybersecurity audit will review and provide recommendations on OT network security improvements including separation of IT and OT network functions, methods for secure remote access to OT systems, network addressing, and device and software updates and patching related to cybersecurity.

Deliverables

See Section___ in the project technical memorandum describing identified/prioritized risks and a narrative description of recommended cybersecurity improvements.

TASK 6: PHYSICAL SECURITY AUDIT

Description

The physical security assessment will:

1. Review existing electronic security monitoring systems (e.g., closed-circuit television (CCTV) and Electronic Security System (ESS))
2. Review existing physical deterrents (e.g., locks, fences, exterior lighting, etc.) for access to site and control system.
3. Review possible integration of Owner's security monitoring services to provide signals to the plant control system.
4. Address physical security measures identified during the Cybersecurity Audit in Task 5.

Deliverables

Section in the project technical memorandum describing security monitoring and physical deterrents, and narrative of recommended physical security improvements.

TASK 7: ASSET MANAGEMENT PLANNING

Description

1. Consult with Owner's asset management staff to identify required Lucidity database inputs/parameters for SCADA assets and spreadsheet format necessary for data input into database.
2. Tabulate PLC/SCADA asset data, including typical equipment and asset lifespans and estimated replacement costs into a spreadsheet for the Owner to input into the asset management software.

Deliverables

Asset management planning spreadsheet with asset information to be entered in Lucidity by the Owner's Utility Asset Management Specialist. Spreadsheet will be provided in native (Excel) format and as an Appendix in the project technical memorandum.

TASK 8: EVALUATE MAINTENANCE CONTRACTS

Description

1. Identify PLC/SCADA hardware and software items used at the plant that are, or could be, maintained through maintenance contracts.
2. Identify and evaluate existing or reasonably available maintenance contracts associated with PLC/SCADA hardware and software.
3. Tabulate the maintenance contracts renewal date, service provider, service cost, and service terms.

Deliverables

Spreadsheet with hardware and software inventories and service contract details for existing or potential maintenance contracts. Spreadsheet will be provided in native (Excel) format and as an Appendix in the project technical memorandum.

TASK 9: EVALUATE THIRD-PARTY SYSTEM SUPPORT

Description

1. Identify equipment with third party-supported OT/control systems used within the plant.
2. Identify and evaluate third party system's age, manufacturer, service contracts in place, remote access/maintenance capabilities, and future service contract needs. Identify and evaluate existing or reasonably available service contracts for third-party OT/control systems.
3. Tabulate data about existing third-part service agreements and recommendations for new or modified third-party service agreements.

Deliverables

Section in the project technical memorandum describing equipment with third party-supported OT/control systems, type/presence of existing third-party maintenance agreements, and recommendations for new or modified third-party service agreements.

TASK 10: PROVIDE UPGRADE IMPLEMENTATION PLAN

This Task compiles information from all other Tasks. The overall intent and objective of the Project are to document the current state of the Persigo WWTP SCADA system, desired future state of the SCADA system, and recommended steps to achieve the desired future state.

Deliverable #1

Design Documents: A design package for the fiber optic infrastructure will include construction drawings and technical specifications. This deliverable includes construction-level detail for the plant fiber optic network.

Deliverable #2

Technical Memorandum: The project technical memorandum will provide evaluations, recommendations, and narrative descriptions as described in each task.

Deliverable #3

Supplementary documentation/spreadsheets as describe under each task (as applicable).

KEY SCOPE ASSUMPTIONS

- Owner will facilitate site visits, distribution of the plant's existing records for Contractor's evaluation and provide feedback throughout the evaluation and design process.
- The fiber ring design will not involve and medium-voltage equipment, systems or provisions.
- The fiber ring design will be solely for process buildings inside the Persigo WWTP.
- The fiber optic ring design will include construction-level information fit for construction. bidding by Owner, including drawings and technical specifications as applicable.
- Control Room A/V recommendations do not include design.
- Other scope items in this project will result in recommendation- or documentation-level information in a technical memorandum but not construction-ready documents.
- The Owner will facilitate staff to open control panels, buildings and other plant equipment during the plant walk through for data collection.
- The Owner will provide as-built AutoCAD files of existing infrastructure to assist in the fiber ring design.
- The Owner will provide existing information and documentation of plant assets and infrastructure as available and requested by Contractor.
- The project execution schedule will be developed in collaboration with the Owner, and the schedule depends in part on Owner staff schedules and availability.
- Three in-person meetings/workshops with Owner staff are assumed. Other meetings will be via telephone or video conference.
- Owner will provide compiled review comments for preliminary drawings/specifications and technical memorandum.
- The following items are not included in this proposal, but can be provided as additional services if desired by the Owner:
    - Construction cost estimating.
    - Bidding-phase and construction-phase services.
    - Preparation of Division 0 or Division 1 construction contract documents. It is assumed that these "front-end" documents will be prepared as required by the City.
    - Detailed design of the scope items in addition to the fiber optic ring design.
    - PLC/HMI implementation, programming, and configuration.

Exhibit B
Hourly Rate Schedule

The project Services under this contract are offered on a Time & Materials basis, with a total Not-To-Exceed amount of $189,370 (Total Fee). Contractor will invoice monthly for work performed in the previous month. The Total Fee will not be exceeded unless agreed to in advance and in writing by ad between the Owner and Contractor through a Change Order. Contractor will manage the project budget on an overall basis and may shift time/effort between tasks as necessary for completion of the project. Billing rates listed are 2023 rates, and it is assumed that the project will be completed in calendar year 2023. Rates for years beyond 2023 will be negotiated with the Owner as needed. Rates for Contractor staff not specifically listed in the table below will be similar to those presented for a particular role and level of expertise.

ROLE	Project Manager	Assistant Project Manager & Fiber Optic Advisor	QA/QC & Technical Advisor	Cyber Security	Western Colorado Liaison	Networking Lead	Networking	PLC/HMI Specialists	PLC/HMI Specialists	CAD	Quality/Records	Accounting	Travel, Vehicle Mileage, and Misc. Direct Expenses	Total Fee
NAME	Travis Moore	Nohemi Almaraz	Bill Cassity	David Brearley	Michael Goolsby	Casey Oppegard	Tanner Smith	Josie Brahler	Andrew Burton	Nicole Lynch	Project Admin	Project Accountant	N/A	**N/A**
BILLING RATE	$275	$150	$275	$300	$225	$200	$135	$135	$135	$133	$85	$120		
PROJECT MANAGEMENT														
Accounting												16		$ 1,920
Quality Records Control											6			$ 510
Project Management	40	40												$ 17,000
TECHNICAL TASKS														
Task 1		8	8	4		16	16							$9,960
Task 2			8	20		40	20							$18,900
Task 3		80	8			20				120				$34,160
Task 4		8	8					20	20					$8,800
Task 5 & 6			8	60			20	40						$28,300
Task 7		16	8			16								$7,800
Task 8		8	8			8		8	8					$7,160
Task 9		10	8	10		10								$8,700
Task 10		8	8			16		40						$12,000
Meetings/Workshops/Site Visits		40	8	24	4	40	12	12	12					$34,160
HOURS SUBTOTAL	40	218	80	118	4	166	68	120	40	120	6	16	N/A	**996**
FEE SUBTOTAL	$11,000	$32,700	$22,000	$35,400	$900	$33,200	$9,180	$16,200	$5,400	$15,960	$510	$1,920	$5,000	**$189,370**

Request for Proposal
RFP-5166-23-SDH

WASTEWATER TREATMENT PLANT SCADA UPGRADE DESIGN

RESPONSES DUE:
February 23, 2023 prior to 2:30 P.M.

Accepting Electronic Responses Only Submitted Through the Rocky Mountain E-Purchasing System (RMEPS)
www.bidnetdirect.com/colorado

(Purchasing Representative does not have access or control of the vendor side of RMEPS. If website or other problems arise during response submission, vendor MUST contact RMEPS to resolve issue prior to the response deadline. 800-835-4603)

PURCHASING REPRESENTATIVE:
Scott Hockins, IT Supervisor

Preproposal Meeting January 12, 2:00 Mountain Time
Join on your computer, mobile app or room device
Click here to join the meeting
Meeting ID: 219 402 986 09
Passcode: xtrRbZ
Download Teams | Join on the web
Learn More | Meeting options

This solicitation has been developed specifically for a Request for Proposal intended to solicit competitive responses for this solicitation and may not be the same as previous City of Grand Junction solicitations. All offerors are urged to thoroughly review this solicitation prior to submitting. Submittal by **FAX, EMAIL or HARD COPY IS NOT ACCEPTABLE** for this solicitation.

REQUEST FOR PROPOSAL

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Section

REQUEST FOR PROPOSAL

SECTION 1.0: ADMINISTRATIVE INFORMATION & CONDITIONS FOR SUBMITTAL

NOTE: It is the Firm's responsibility to read and review all solicitation documentation in its entirety, and to ensure that they have a clear and complete understanding of not only the scope, specifications, project requirements, etc., but also all other requirements, instructions, rules, regulations, laws, conditions, statements, procurement policies, etc. that are associated with the solicitation process and project/services being solicited.

1.1 Issuing Office: This Request for Proposal (RFP) is issued by the City of Grand Junction. All contact regarding this RFP is directed to:

RFP QUESTIONS:
Scott Hockins, IT Supervisor
scotth@gjcity.org

1.2 Purpose: The purpose of this RFP is to obtain proposals from qualified professional consultant firms or individuals for a Wastewater Treatment Plant SCADA Upgrade Design.

1.3 The Owner: The Owner is the City of Grand Junction, Colorado and is referred to throughout this Solicitation. The term Owner means the Owner or his authorized representative.

1.4 Compliance: All participating Offerors, by their signature hereunder, shall agree to comply with all conditions, requirements, and instructions of this RFP as stated or implied herein. Should the Owner omit anything from this packet which is necessary to the clear understanding of the requirements, or should it appear that various instructions are in conflict, the Offeror(s) shall secure instructions from the Purchasing Division prior to the date and time of the submittal deadline shown in this RFP.

1.5 Procurement Process: Procurement processes shall be governed by the most current version of the City of Grand Junction Purchasing Policy and Procedure Manual.

1.6 Submission: **Each proposal shall be submitted in electronic format only, and only through the Rocky Mountain E-Purchasing (BidNet Colorado) website,** www.bidnetdirect.com/colorado. *This site offers both "free" and "paying" registration options that allow for full access of the Owner's documents and for electronic submission of proposals. (Note: "free" registration may take up to 24 hours to process. Please Plan accordingly.)* Please view our **"Electronic Vendor Registration Guide"** at http://www.gjcity.org/501/Purchasing-Bids for details. (Purchasing Representative does not have access or control of the vendor side of RMEPS. If website or other problems arise during response submission, vendor **MUST** contact RMEPS to resolve issue prior to the response deadline. **800-835-4603**).

1.7 Altering Proposals: Any alterations made prior to opening date and time must be initialed by the signer of the proposal, guaranteeing authenticity. Proposals cannot be altered or amended after submission deadline.

1.8 Withdrawal of Proposal: A proposal must be firm and valid for award and may not be withdrawn or canceled by the Offeror for sixty (60) days following the submittal deadline date, and only prior to award. The Offeror so agrees upon submittal of their proposal. After awarding this statement is not applicable.

1.9 Acceptance of Proposal Content: The contents of the proposal of the successful Offeror shall become contractual obligations if acquisition action ensues. Failure of the successful Offeror to accept these obligations in a contract shall result in cancellation of the award and such vendor shall be removed from future solicitations.

1.10 Addenda: All questions shall be submitted in writing to the appropriate person as shown in Section 1.1. Any interpretations, corrections and changes to this RFP or extensions to the opening/receipt date shall be made by a written Addendum to the RFP by the City. Sole authority to authorize addenda shall be vested in the City of Grand Junction Purchasing Representative. Addenda will be issued electronically through the Rocky Mountain E-Purchasing website at www.bidnetdirect.com/colorado and on the City's website at www.gjcity.org/501/Purchasing/Bids . Offerors shall acknowledge receipt of all addenda in their proposal.

1.11 Exceptions and Substitutions: All proposals meeting the intent of this RFP shall be considered for award. Offerors taking exception to the specifications shall do so at their own risk. The Owner reserves the right to accept or reject any or all substitutions or alternatives. When offering substitutions and/or alternatives, Offeror must state these exceptions in the section pertaining to that area. Exception/substitution, if accepted, must meet, or exceed the stated intent and/or specifications. The absence of such a list shall indicate that the Offeror has not taken exceptions, and if awarded a contract, shall hold the Offeror responsible to perform in strict accordance with the specifications or scope of services contained herein.

1.12 Confidential Material: All materials submitted in response to this RFP shall ultimately become public record and shall be subject to inspection after contract award. **"Proprietary or Confidential Information"** is defined as any information that is not generally known to competitors and which provides a competitive advantage. Unrestricted disclosure of proprietary information places it in the public domain. Only submittal information clearly identified with the words "***Confidential Disclosure***" and uploaded as a separate document shall establish a confidential, proprietary relationship. Any material to be treated as confidential or proprietary in nature must include a justification for the request. The request shall be reviewed and either approved or denied by the Owner. If denied, the proposer shall have the opportunity to withdraw its entire proposal, or to remove the confidential or proprietary restrictions. Neither cost nor pricing information nor the total proposal shall be considered confidential or proprietary.

1.13 Response Material Ownership: All proposals become the property of the Owner upon receipt and shall only be returned to the proposer at the Owner's option. Selection or rejection of the proposal shall not affect this right. The Owner shall have the right to use all ideas or adaptations of the ideas contained in any proposal received in response to this RFP, subject to limitations outlined in the entitled "Confidential Material". Disqualification of a proposal does not eliminate this right.

1.14 Minimal Standards for Responsible Prospective Offerors: A prospective Offeror must affirmably demonstrate their responsibility. A prospective Offeror must meet the following requirements.

- Have adequate financial resources, or the ability to obtain such resources as required.
- Be able to comply with the required or proposed completion schedule.
- Have a satisfactory record of performance.
- Have a satisfactory record of integrity and ethics.
- Be otherwise qualified and eligible to receive an award and enter into a contract with the Owner.

1.15 Open Records: Proposals shall be received and publicly acknowledged at the location, date, and time stated herein. Offerors, their representatives and interested persons may be present. Proposals shall be received and acknowledged only so as to avoid disclosure of process. However, all proposals shall be open for public inspection after the contract is awarded. Trade secrets and confidential information contained in the proposal so identified by offer as such shall be treated as confidential by the Owner to the extent allowable in the Open Records Act.

1.16 Sales Tax: The Owner is, by statute, exempt from the State Sales Tax and Federal Excise Tax; therefore, all fees shall not include taxes.

1.17 Public Opening: Proposals shall be opened virtually immediately following the proposal deadline. Offerors, their representatives and interested persons may attend virtually. See Section 1.6 for details. Only the names and locations on the proposing firms will be disclosed.

SECTION 2.0: GENERAL CONTRACT TERMS AND CONDITIONS

2.1. Acceptance of RFP Terms: A proposal submitted in response to this RFP shall constitute a binding offer. Acknowledgment of this condition shall be indicated on the Letter of Interest or Cover Letter by the autographic signature of the Offeror or an officer of the Offeror legally authorized to execute contractual obligations. A submission in response to the RFP acknowledges acceptance by the Offeror of all terms and conditions including compensation, as set forth herein. An Offeror shall identify clearly and thoroughly any variations between its proposal and the Owner's RFP requirements. Failure to do so shall be deemed a waiver of any rights to subsequently modify the terms of performance, except as outlined or specified in the RFP.

2.2. Execution, Correlation, Intent, and Interpretations: The Contract Documents shall be signed by the Owner and Firm. By executing the contract, the Firm represents that they have familiarized themselves with the local conditions under which the Services is to be performed and correlated their observations with the requirements of the Contract Documents. The Contract Documents are complementary, and what is required by anyone, shall be as binding as if required by all. The intention of the documents is to include all labor, materials, equipment, services, and other items necessary for the proper execution and completion of the scope of services as defined in the technical specifications and drawings contained herein. All drawings, specifications and copies furnished by the Owner are, and shall remain, Owner property. They are not to be used on any other project.

2.3. Permits, Fees, & Notices: The Firm shall secure and pay for all permits, governmental fees and licenses necessary for the proper execution and completion of the services. The Firm shall give all notices and comply with all laws, ordinances, rules, regulations and orders of any public authority bearing on the performance of the services. If the Firm observes that any of the Contract Documents are at variance in any respect, he shall promptly notify the Owner in writing, and any necessary changes shall be adjusted by approximate modification. If the Firm performs any services knowing it to be contrary to such laws, ordinances, rules and regulations, and without such notice to the Owner, he shall assume full responsibility and shall bear all costs attributable.

2.4. Responsibility for those Performing the Services: The Firm shall be responsible to the Owner for the acts and omissions of all his employees and all other persons performing any of the services under a contract with the Firm.

2.5. Payment & Completion: The Contract Sum is stated in the Contract and is the total amount payable by the Owner to the Firm for the performance of the services under the Contract Documents. Upon receipt of written notice that the services is ready for final inspection and acceptance and upon receipt of application for payment, the Owner's Project Manager will promptly make such inspection and, when they find the services acceptable under the Contract Documents and the Contract fully performed, the Owner shall make payment in the manner provided in the Contract Documents. Partial payments will be based upon estimates, prepared by the Firm, of the value of services performed and materials placed in accordance with the Contract Documents. The services performed by Firm shall be in accordance with generally accepted professional practices and the level of competency presently maintained by other practicing professional firms in the same or similar type of services in the applicable community. The services and services to be performed by Firm hereunder shall be done in compliance with applicable laws, ordinances, rules and regulations.

2.6. Protection of Persons & Property: The Firm shall comply with all applicable laws, ordinances, rules, regulations, and orders of any public authority having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss. Firm shall erect and maintain, as required by existing safeguards for safety and protection, and all reasonable precautions, including posting danger signs or other warnings against hazards promulgating safety regulations and notifying owners and users of adjacent utilities. When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect, or misconduct by the Firm in the execution of the services, or in consequence of the non-execution thereof by the Firm, they shall restore, at their own expense, such property to a condition similar or equal to that existing before such damage or injury was done, by repairing, rebuilding, or otherwise restoring as may be directed, or it shall make good such damage or injury in an acceptable manner.

2.7. Changes in the Services: The Owner, without invalidating the contract, may order changes in the services within the general scope of the contract consisting of additions, deletions, or other revisions. All such changes in the services shall be authorized by Change Order/Amendment and shall be executed under the applicable conditions of the contract documents. A Change Order/Amendment is a written order to the Firm signed by the Owner issued after the execution of the contract, authorizing a change in the services or an adjustment in the contract sum or the contract time.

2.8. Minor Changes in the Services: The Owner shall have authority to order minor changes in the services not involving an adjustment in the contract sum or an extension of the contract time and not inconsistent with the intent of the contract documents.

2.9. Uncovering & Correction of Services: The Firm shall promptly correct all services found by the Owner as defective or as failing to conform to the contract documents. The Firm shall bear all costs of correcting such rejected services, including the cost of the Owner's additional services thereby made necessary. The Owner shall give such notice promptly after discovering of condition. All such defective or non-conforming services under the above paragraphs shall be removed from the site where necessary and the services shall be corrected to comply with the contract documents without cost to the Owner.

2.10. Acceptance Not Waiver: The Owner's acceptance or approval of any services furnished hereunder shall not in any way relieve the proposer of their present responsibility to maintain the high quality, integrity and timeliness of his services. The Owner's approval or acceptance of, or payment for, any services shall not be construed as a future waiver of any rights under this Contract, or of any cause of action arising out of performance under this Contract.

2.11. Change Order/Amendment: No oral statement of any person shall modify or otherwise change, or affect the terms, conditions or specifications stated in the resulting contract. All amendments to the contract shall be made in writing by the Owner.

2.12. Assignment: The Offeror shall not sell, assign, transfer or convey any contract resulting from this RFP, in whole or in part, without the prior written approval from the Owner.

2.13. Compliance with Laws: Proposals must comply with all Federal, State, County and local laws governing or covering this type of service and the fulfillment of all ADA (Americans with Disabilities Act) requirements. Firm hereby warrants that it is qualified to assume the responsibilities and render the services described herein and has all requisite corporate authority and professional licenses in good standing, required by law.

2.14. Debarment/Suspension: The Firm herby certifies that the Firm is not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Governmental department or agency.

2.15. Confidentiality: All information disclosed by the Owner to the Offeror for the purpose of the services to be done or information that comes to the attention of the Offeror during the course of performing such services is to be kept strictly confidential.

2.16. Conflict of Interest: No public official and/or Owner employee shall have interest in any contract resulting from this RFP.

2.17. Contract: This Request for Proposal, submitted documents, and any negotiations, when properly accepted by the Owner, shall constitute a contract equally binding between the Owner and Offeror. The contract represents the entire and integrated agreement between the parties hereto and supersedes all prior negotiations, representations, or agreements, either written or oral, including the Proposal documents. The contract may be amended or modified with Change Orders, Field Orders, or Amendment.

2.18. Project Manager/Administrator: The Project Manager, on behalf of the Owner, shall render decisions in a timely manner pertaining to the services proposed or performed by the Offeror. The Project Manager shall be responsible for approval and/or acceptance of any related performance of the Scope of Services.

2.19. Contract Termination: This contract shall remain in effect until any of the following occurs: (1) contract expires; (2) completion of services; (3) acceptance of services or, (4) for convenience terminated by either party with a written *Notice of Cancellation* stating therein the reasons for such cancellation and the effective date of cancellation at least thirty days past notification.

2.20. Employment Discrimination: During the performance of any services per agreement with the Owner, the Offeror, by submitting a Proposal, agrees to the following conditions:

2.20.1. The Offeror shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, age, disability, citizenship status, marital status, veteran status, sexual orientation, national origin, or any legally protected status except when such condition is a legitimate occupational qualification reasonably necessary for the normal operations of the Offeror. The Offeror agrees to post in conspicuous places, visible to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause.

2.20.2. The Offeror, in all solicitations or advertisements for employees placed by or on behalf of the Offeror, shall state that such Offeror is an Equal Opportunity Employer.

2.20.3. Notices, advertisements, and solicitations placed in accordance with federal law, rule, or regulation shall be deemed sufficient for the purpose of meeting the requirements of this section.

2.21. Immigration Reform and Control Act of 1986 and Immigration Compliance: The Offeror certifies that it does not and will not during the performance of the contract employ illegal alien services or otherwise violate the provisions of the Federal Immigration Reform and Control Act of 1986 and/or the immigration compliance requirements of State of Colorado C.R.S. § 8-17.5-101, (House Bill 06-1343).

2.22. Ethics: The Offeror shall not accept or offer gifts or anything of value nor enter into any business arrangement with any employee, official, or agent of the Owner.

2.23. Failure to Deliver: In the event of failure of the Offeror to deliver services in accordance with the contract terms and conditions, the Owner, after due oral or written notice, may procure the services from other sources and hold the Offeror responsible for any costs resulting in additional purchase and administrative services. This remedy shall be in addition to any other remedies that the Owner may have.

2.24. Failure to Enforce: Failure by the Owner at any time to enforce the provisions of the contract shall not be construed as a waiver of any such provisions. Such failure to enforce shall not affect the validity of the contract or any part thereof or the right of the Owner to enforce any provision at any time in accordance with its terms.

2.25. Force Majeure: The Offeror shall not be held responsible for failure to perform the duties and responsibilities imposed by the contract due to legal strikes, fires, riots, rebellions, and acts of God beyond the control of the Offeror, unless otherwise specified in the contract.

2.26. Indemnification: Offeror shall defend, indemnify and save harmless the Owner and all its officers, employees, insurers, and self-insurance pool, from and against all liability, suits, actions, or other claims of any character, name and description brought for or on account of any injuries or damages received or sustained by any person, persons, or property on account of any negligent act or fault of the Offeror, or of any Offeror's agent, employee, sub-Firm or supplier in the execution of, or performance under, any contract which may result from proposal award. Offeror shall pay any judgment with cost which may be obtained against the Owner growing out of such injury or damages.

2.27. Independent Firm: The Offeror shall be legally considered an Independent Firm and neither the Firm nor its employees shall, under any circumstances, be considered servants or agents of the Owner. The Owner shall be at no time legally responsible for any negligence or other wrongdoing by the Firm, its servants, or agents. The Owner shall not withhold from the contract payments to the Firm any federal or state unemployment taxes, federal or state income taxes, Social Security Tax or any other amounts for benefits to the Firm. Further, the Owner shall not provide to the Firm any insurance coverage or other benefits, including Workers' Compensation, normally provided by the Owner for its employees.

2.28. Nonconforming Terms and Conditions: A proposal that includes terms and conditions that do not conform to the terms and conditions of this Request for Proposal is subject to rejection as non-responsive. The Owner reserves the right to permit the Offeror to withdraw nonconforming terms and conditions from its proposal prior to a determination by the Owner of non-responsiveness based on the submission of nonconforming terms and conditions.

2.29. Ownership: All plans, prints, designs, concepts, etc., shall become the property of the Owner.

2.30. Oral Statements: No oral statement of any person shall modify or otherwise affect the terms, conditions, or specifications stated in this document and/or resulting agreement. All modifications to this request and any agreement must be made in writing by the Owner.

2.31. Patents/Copyrights: The Offeror agrees to protect the Owner from any claims involving infringements of patents and/or copyrights. In no event shall the Owner be liable to the Offeror for any/all suits arising on the grounds of patent(s)/copyright(s) infringement. Patent/copyright infringement shall null and void any agreement resulting from response to this RFP.

2.32. Venue: Any agreement because of responding to this RFP shall be deemed to have been made in, and shall be construed and interpreted in accordance with, the laws of the City of Grand Junction, Mesa County, Colorado.

2.33. Expenses: Expenses incurred in preparation, submission and presentation of this RFP are the responsibility of the company and cannot be charged to the Owner.

2.34. Sovereign Immunity: The Owner specifically reserves its right to sovereign immunity pursuant to Colorado State Law as a defense to any action arising in conjunction to this agreement.

2.35. Public Funds/Non-Appropriation of Funds: Funds for payment have been provided through the Owner's budget approved by the City Council/Board of County Commissioners for the stated fiscal year only. State of Colorado statutes prohibit the obligation and expenditure of public funds beyond the fiscal year for which a budget has been approved. Therefore, anticipated orders or other obligations that may arise past the end of the stated Owner's fiscal year shall be subject to budget approval. Any contract will be subject to and must contain a governmental non-appropriation of funds clause.

2.36. Collusion Clause: Each Offeror by submitting a proposal certifies that it is not party to any collusive action or any action that may be in violation of the Sherman Antitrust Act. All proposals shall be rejected if there is evidence or reason for believing that collusion exists among the proposers. The Owner may or may not, at the discretion of the Owner Purchasing Representative, accept future proposals for the same service or commodities for participants in such collusion.

2.37. Gratuities: The Firm certifies and agrees that no gratuities or kickbacks were paid in connection with this contract, nor were any fees, commissions, gifts or other considerations made contingent upon the award of this contract. If the Firm breaches or violates this warranty, the Owner may, at their discretion, terminate this contract without liability to the Owner.

2.38. Performance of the Contract: The Owner reserves the right to enforce the performance of the contract in any manner prescribed by law or deemed to be in the best interest of the Owner in the event of breach or default of resulting contract award.

2.39. Benefit Claims: The Owner shall not provide to the Offeror any insurance coverage or other benefits, including Worker's Compensation, normally provided by the Owner for its employees.

2.40. Default: The Owner reserves the right to terminate the contract in the event the Firm fails to meet delivery or completion schedules, or otherwise perform in accordance with the accepted proposal. Breach of contract or default authorizes the Owner to purchase like services elsewhere and charge the full increase in cost to the defaulting Offeror.

2.41. Multiple Offers: If said proposer chooses to submit more than one offer, THE ALTERNATE OFFER must be clearly marked "Alternate Proposal". The Owner reserves the right to make award in the best interest of the Owner.

2.42. Cooperative Purchasing: Purchases as a result of this solicitation are primarily for the Owner. Other governmental entities may be extended the opportunity to utilize the resultant contract award with the agreement of the successful provider and the participating agencies. All participating entities will be required to abide by the specifications, terms, conditions and pricings established in this Proposal. The quantities furnished in this proposal document are for only the Owner. It does not include quantities for any other jurisdiction. The Owner will be responsible only for the award for our jurisdiction. Other participating entities will place their own awards on their respective Purchase Orders through their purchasing office or use their purchasing card for purchase/payment as

authorized or agreed upon between the provider and the individual entity. The Owner accepts no liability for payment of orders placed by other participating jurisdictions that choose to piggy-back on our solicitation. Orders placed by participating jurisdictions under the terms of this solicitation will indicate their specific delivery and invoicing instructions.

2.43. Definitions:

2.43.1. "Offeror" and/or "Proposer" refers to the person or persons legally authorized by the Consultant to make an offer and/or submit a response (fee) proposal in response to the Owner's RFP.

2.43.2. The term "Services" includes all labor, materials, equipment, and/or services necessary to produce the requirements of the Contract Documents.

2.43.3. "Firm" is the person, organization, firm or consultant identified as such in the Agreement and is referred to throughout the Contract Documents. The term Firm means the Firm or his authorized representative. The Firm shall carefully study and compare the Scope of Services, Addenda and Modifications and shall at once report to the Owner any error, inconsistency, or omission he may discover. Firm shall not be liable to the Owner for any damage resulting from such errors, inconsistencies, or omissions. The Firm shall not commence services without clarifying Drawings, Specifications, or Interpretations.

2.43.4. "Sub-Contractor is a person or organization who has a direct contract with the Firm to perform any of the services at the site. The term Sub-Firm is referred to throughout the contract documents and means a Sub-Contractor or his authorized representative.

2.44. Public Disclosure Record: If the Proposer has knowledge of their employee(s) or sub-proposers having an immediate family relationship with an Owner employee or elected official, the proposer must provide the Purchasing Representative with the name(s) of these individuals. These individuals are required to file an acceptable "Public Disclosure Record", a statement of financial interest, before conducting business with the Owner.

SECTION 3.0: INSURANCE REQUIREMENTS

3.1 Insurance Requirements: The selected Firm agrees to procure and maintain, at its own cost, policy(s) of insurance sufficient to insure against all liability, claims, demands, and other obligations assumed by the Firm pursuant to this Section. Such insurance shall be in addition to any other insurance requirements imposed by this Contract or by law. The Firm shall not be relieved of any liability, claims, demands, or other obligations assumed pursuant to this Section by reason of its failure to procure or maintain insurance in sufficient amounts, durations, or types.

Firm shall procure and maintain and, if applicable, shall cause any Sub-Firm of the Firm to procure and maintain insurance coverage listed below. Such coverage shall be procured and maintained with forms and insurers acceptable to The Owner. All coverage shall be continuously maintained to cover all liability, claims, demands, and other obligations assumed by the Firm pursuant to this Section. In the case of any claims-made policy, the necessary retroactive dates and extended reporting periods shall be procured to maintain such continuous coverage. Minimum coverage limits shall be as indicated below unless specified otherwise in the Special Conditions:

(a) Worker Compensation: Firm shall comply with all State of Colorado Regulations concerning Workers' Compensation insurance coverage.

(b) General Liability insurance with minimum combined single limits of:

ONE MILLION DOLLARS ($1,000,000) each occurrence and
ONE MILLION DOLLARS ($1,000,000) per job aggregate.

The policy shall be applicable to all premises, products and completed operations. The policy shall include coverage for bodily injury, broad form property damage (including completed operations), personal injury (including coverage for contractual and employee acts), blanket contractual, products, and completed operations. The policy shall include coverage for explosion, collapse, and underground (XCU) hazards. The policy shall contain a severability of interests provision.

(c) Comprehensive Automobile Liability insurance with minimum combined single limits for bodily injury and property damage of not less than:

ONE MILLION DOLLARS ($1,000,000) each occurrence and
ONE MILLION DOLLARS ($1,000,000) aggregate

(d) Professional Liability & Errors and Omissions Insurance policy with a minimum of:

ONE MILLION DOLLARS ($1,000,000) per claim

This policy shall provide coverage to protect the Firm against liability incurred as a result of the professional services performed as a result of responding to this Solicitation.

With respect to each of Consultant's owned, hired, or non-owned vehicles assigned to be used in performance of the Services. The policy shall contain a severability of interests provision.

3.2 Additional Insured Endorsement: The policies required by paragraphs (b), and (c) above shall be endorsed to include the Owner and the Owner's officers and employees as additional insureds. Every policy required above shall be primary insurance, and any insurance carried by the Owner, its officers, or its employees, or carried by or provided through any insurance pool of the Owner, shall be excess and not contributory insurance to that provided by Firm. The Firm shall be solely responsible for any deductible losses under any policy required above.

SECTION 4.0: SPECIFICATIONS/SCOPE OF SERVICES

Scope of Work: The City of Grand Junction is seeking proposals from qualified vendors to perform a Persigo Wastewater Treatment Plant (WWTP) SCADA Upgrade Design. This Design will document Persigo WWTP SCADA system current state, desired future state and recommended steps to achieve the desired future state. The service area that the Persigo WWTP serves is continuing to experience growth and as a result the Persigo WWTP SCADA system needs to be updated to account for this growth and for upgrading cyber and physical security.

Currently, the Persigo WWTP does not have fiber optics at the plant and Persigo relies on radio based telemetry for access to the City network. By the end of year 2023, the Persigo WWTP plans to have fiber installed to the plant. Getting fiber to Persigo in 2023 is a top priority and will allow Persigo and the City's IT Department to start implementing the results of the SCADA Upgrade Design.

The Persigo WWTP currently utilizes Siemens SCADA systems. The Persigo WWTP has two full-time SCADA Technicians/Programmers. The consultant selected as part of this RFP process shall meet with Persigo's SCADA Technicians to document the current SCADA system and our SCADA Tech's recommendations for improvements.

In 2020/2021 the Persigo WWTP worked with Carollo Engineering on developing the 2020 Wastewater Treatment Facilities Master Plan Study. The City initiated the 2020 Master Plan Study to address service area growth, aging infrastructure, and operational efficiencies at the WWTP and in the collection system. Chapter 7 within the Master Plan Study addresses infrastructure and personnel facilities at the WWTP including electrical distribution, SCADA, Instrumentation and Controls, Site Security, etc. The Master Plan Study will be made available.

The scope of services set forth in this Request for Proposals (RFP) represents an outline of the services which the City of Grand Junction anticipates the successful proposer to perform and is presented for the primary purpose of allowing the City of Grand Junction to compare proposals.

The City of Grand Junction's IT Department will be reviewing SCADA cybersecurity requirements, and the security recommendations presented in this Design should be modeled after industry standards such as America's Water Infrastructure Act (AIWA) or the American Water Works Association (AWWA) cyber security standards.

The Persigo WWTP SCADA Upgrade Design shall include:

1. Identification of the technology, manufacturer, and additional functionality needed from the SCADA system. This shall include recommendations for a new WWTP SCADA system control room and recommendations for the number of workstations needed to meet security and staffing needs and identify the requirements and types of audio-visual equipment needed in the new control room.
2. Determine the effectiveness and reliability of the overall network infrastructure, identify areas that need improvement and documented design for future state SCADA network.
3. Develop a site plan and construction plans of the proposed routing for implementing a facility-wide (loop) upgrade to medium-voltage and installation of an industrial fiber network. An example of the proposed routing for new electrical and fiber is shown in the Master Plan Study in Figure 7.2. The Persigo WWTP intends to use the construction plans developed as part of this Design for future construction.
4. Recommendations and design for replacing control panels and PLCs at the Persigo WWTP and connecting PLCs to the Ethernet network. Provide a recommended PLC replacement program with estimated annual costs per year.
5. Conduct a facility-wide cyber security audit and provide recommendations and design for physical security improvements including access control and video surveillance at the Persigo WWTP.

6. Recommendations and designs for cyber-security improvements that include network segmentation and isolation between Operations Technology (OT) and Information Technology (IT) networks. Secure remote access to OT network for monitoring and controls, proper network address to match City's networking scheme, plans for device and software patching, and integration with City's security monitoring services.
7. Asset inventory into City's asset management system. Including life-cycle management and expected replacement dates of equipment and projected budgetary considerations. The City uses Lucity for asset management.
8. Recommendations for maintenance contracts for software and hardware.
9. Evaluate and document Persigo's current non-standard 3rd party supported equipment in the WWTP process buildings and provide recommendations for 3rd party service level agreements for maintenance.
10. Sufficient SCADA design detail to support the secure implementation of SCADA upgrades.

Attached Documents: 2020 Wastewater Treatment Facilities Master Plan – Chapter 7

- Pre-Proposal Meeting: January 12, 2023
- Inquiry deadline, no questions after this date: February 10, 2023
- Addendum Posted: February 16, 2023
- Submittal deadline for proposals: February 23, 2023

Questions Regarding Scope of Services:
scotth@gjcity.org

SECTION 5.0: PREPARATION AND SUBMITTAL OF PROPOSALS

Submission: **Each proposal shall be submitted in electronic format only through the BidNet website, www.bidnetdirect.com/colorado.** This site offers both "free" and "paying" registration options that allow for full access of the City's documents and for electronic submission of proposals. (Note: "free" registration may take up to 24 hours to process. Please Plan accordingly.) (Purchasing Representative does not have access or control of the vendor side of RMEPS. If website or other problems arise during response submission, vendor **MUST** contact RMEPS to resolve issue prior to the response deadline; **800-835-4603**). For proper comparison and evaluation, the City requests that proposals be formatted as directed. Offerors are required to indicate their interest in this Project, show their specific experience and address their capability to perform the Scope of Services in the Time Schedule as set forth herein. For proper comparison and evaluation, the City requires that proposals be formatted **A** to **F**.

A. **Cover Letter:** Cover letter shall be provided which explains the Firm's interest in the project. The letter shall contain the name/address/phone number/email of the person who will serve as the firm's principal contact person with Owner's Contract Administrator and shall identify individual(s) who will be authorized to make presentations on behalf of the firm. The statement shall bear the signature of the person having proper authority to make formal commitments on behalf of the firm. By submitting a response to this solicitation, the Firm agrees to all requirements herein.

B. **Qualifications/Experience/Credentials:** Provide qualifications for consideration as a professional consultant with experience wastewater treatment plant SCADA system designs. Include prior experience with similar projects.

C. **Strategy and Implementation:** Describe your (the firm's) interpretation of the Owner's objectives regarding this RFP. Describe the proposed strategy and/or plan for achieving the objectives of this RFP. The Firm may utilize a written narrative or any other printed technique to demonstrate their ability to satisfy the Scope of Services. The narrative should describe a logical progression of tasks and efforts starting with the initial steps or tasks to be accomplished and continuing until all proposed tasks are fully described and the RFP objectives are accomplished. Include a **time schedule** for completion of your firm's implementation plan, deliverables, and an estimate of time commitments.

D. **References:** A minimum of three (3) **references** that can attest to your experience in projects of similar scope and size. **Please also summarize the projects completed with these references including** Client Name, Address, Contact Person, Telephone, Email Address, Project Dates, Project Description, Budget, etc.

E. **Design Budget:** The Owner has $200,000 budgeted for the completion of this design.

F. **Additional Data (optional):** Provide any additional information that will aid in evaluation of your qualifications with respect to this project.

SECTION 6.0: EVALUATION CRITERIA AND FACTORS

6.1 **Evaluation:** An evaluation team shall review all responses and select the proposal or proposals that best demonstrate the capability in all aspects to perform the scope of services and possess the integrity and reliability that will ensure good faith performance.

6.2 **Intent:** Only respondents who meet the qualification criteria will be considered. Therefore, it is imperative that the submitted proposal clearly indicate the firm's ability to provide the services described. Submittal evaluations will be done in accordance with the criteria and procedure defined. The Owner reserves the right to reject all portions of proposals and take into consideration past performance.

References of the short-listed firms will be assessed during the final phase of the evaluation process. The Owner will undertake negotiations with the top-rated firm and may choose not to negotiate with lower rated firms unless negotiations with higher rated firms have been unsuccessful and terminated.

6.3 **Oral Interviews:** The Owner reserves the right to invite the most qualified rated proposer(s) to participate in oral interviews, if needed.

6.4 **Award:** The Owner reserves the right to consider all the information submitted and/or oral presentations, if required, in selecting the project Firm.

Chapter 7

SUPPORTING INFRASTRUCTURE AND PERSONNEL FACILITIES

For safe and reliable facility operation, it is critical to maintain the condition of the support utilities, such as electrical systems, control systems, natural gas supply, and potable water systems. Doing so promotes staff health and safety and provides the ability to reliably meet effluent goals and regulatory requirements.

This chapter provides information and recommendations for the support systems, developed from site investigations and discussions with Grand Junction staff.

7.1 Electrical Systems

7.1.1 Main Utility Feeds and Primary Switchgear

The Persigo WWTP has two primary electric utility feeds to a pad mount medium voltage switch maintained by Xcel Energy (Xcel). The pad mount equipment can automatically transfer between sources during power interruptions to either source. From the Xcel-owned pad mount equipment, a single medium voltage feed continues to the City-owned outdoor primary switchgear, which utilize fused switches to power a medium voltage loop.

The medium voltage loop continues through the site duct bank system to distribute power to step down transformers for various facilities. A diagram of the electrical connections and basic routing of the loop is shown in Figure 7.1.

7.1.1.1 Outdoor Primary Switchgear

The outdoor primary switchgear consists of fused switches to provide loop power for the facility. The outdoor gear was replaced in the last 5 years and appears to be in good condition. Because the equipment is new, it is not recommended for replacement. The gear is vulnerable to weather and wildlife and because of the fuses, there is limited coordination with downstream overcurrent devices. In the future, when the gear is considered for replacement, Carollo recommends evaluating an electrical room and switchgear that uses a circuit breaker and relays for overcurrent protection, a remote-control panel so facility staff does not have to be near electrical hazards, remote racking mechanism, and arc flash detection relays.

Primary switchgear.

During the site investigation, it was noted that the electrical staff does not have current training or capabilities to work on the medium voltage equipment. To handle emergencies and general maintenance of the medium voltage electrical system, it is recommended to either:

1. Invest in the training and equipment needed to safely work on the medium voltage system.
2. Develop an on-call contract with a third-party company to maintain and respond to emergencies in the medium voltage system.

Additionally, it is not known what the current fuse sizes are withing the gear. This should be I investigated, and spare fuses of each size be kept and stored for future use.

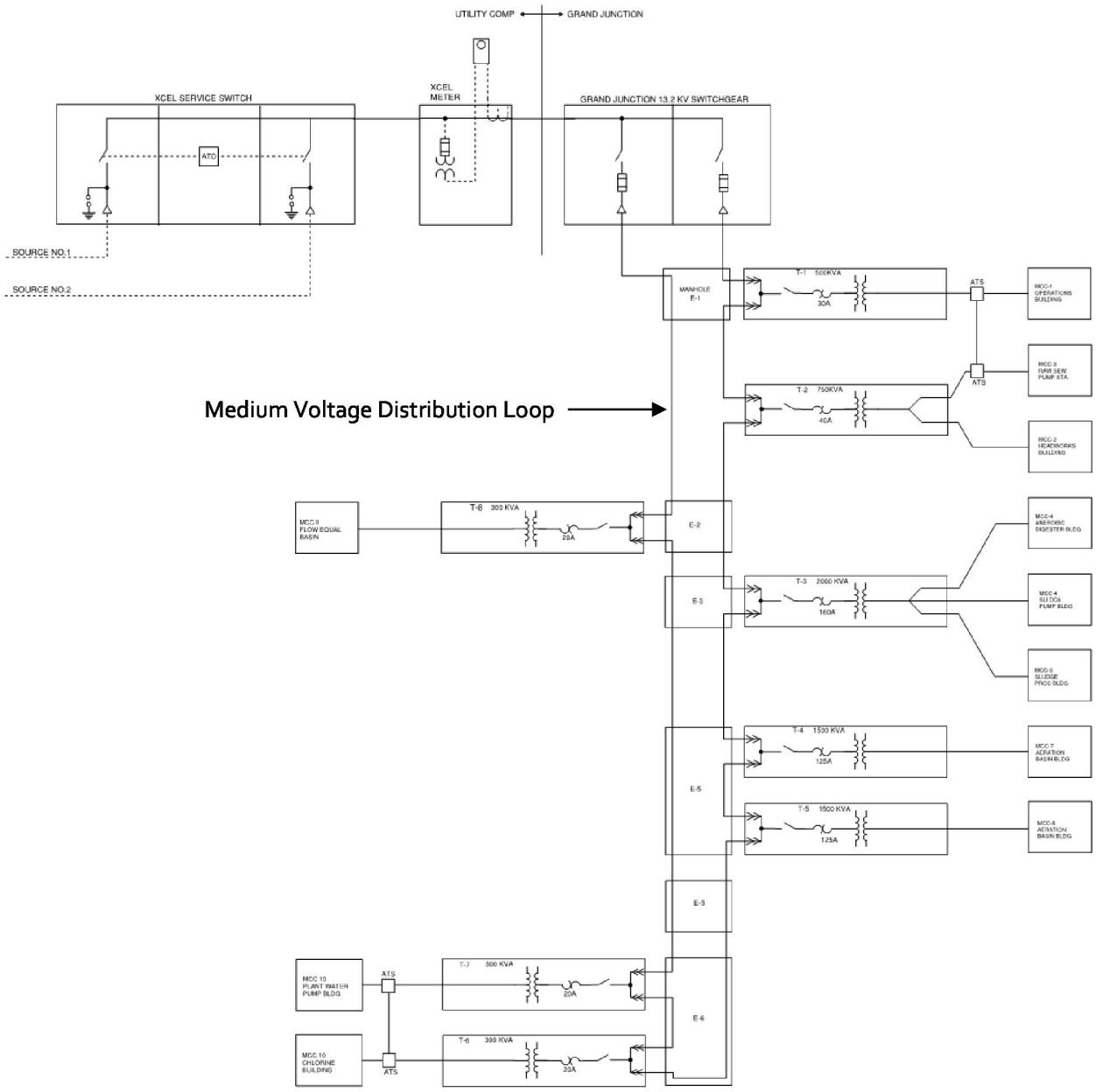

Figure 7.1 Existing Electrical One-Line Diagram

7.1.1.2 Loop Power Distribution

The outdoor primary switchgear provides power to the primary medium voltage loop. The loop routes through the plant's duct bank system to step-down transformers at various points in the facility. A diagram of the routing including the manholes it passes through is shown in Figure 7.1.

The cables for the medium voltage loop were part of the original installation in 1981 and reported to be submerged under groundwater throughout the year. No failures have been reported or recorded to this point. One consideration for the loop conductors is that both ends of the loop route through the same duct bank, and through the same manholes. This is not ideal because a single failure in a manhole or duct bank (fault condition, accidently damaged while digging, etc.) can cause a complete outage of the facility.

Considering the age of the conductors and the reliability concerns of the routing, planning for replacement of the medium voltage loop conductors is recommended. As part of the replacement, the design criteria should include a new path for the conductors that will ensure that the loops are not in a single point of failure (common manhole or common duct bank). Additionally, the loop system would provide an opportunity to have spare conduits to accommodate a fiber backbone ring for the facility's communications system discussed more in Section 7.2.

Installation of the new medium voltage power distribution loop requires coordination between on-going projects and operations to ensure sequencing does not cause service interruptions and ultimately discharge permit violations. Installing the new power distribution loop requires redundant duct banks and assumes the existing electrical distribution system would be maintained. Figure 7.2 illustrates a proposed routing for the new electrical duct bank, which would include both electrical cabling and fiber to provide a networked facility. A capital cost estimate has been provided in Appendix G.

7.1.2 Standby Generation

As described above, the facility has two electric utility sources that power the main facilities on-site through a medium voltage loop. In addition to dual utility sources, there are stationary diesel back-up generators dedicated to Raw Water Pumping and Headworks. In the event that both utility sources are lost, water can still be pumped through the plant. Plant staff noted that the raw water generator can support up to two Raw Water Pumps concurrently (of the five installed).

Staff noted that the generators are in reasonably good condition with no major concerns. Currently, the generators are operated weekly, but there is no regular load testing performed. To bring the generators up to operating temperature, and for the overall health of the machine, the manufacturers and National Fire Protection Association (NFPA) 110 recommend operating the generators under load at least twice a year. This can be done by using plant loads if available, or by load bank testing. It is recommended that the facility develop a regular load testing schedule for the generators.

7.1.2.1 Additional Standby Generator Needs

Facility staff indicated that the current electrical system is adequately reliable with the redundant feeders to the facility site. However, on-site generation would be beneficial at the disinfection building, which supports the UV system. Providing on-site generation will allow the staff to maintain disinfection during extended outages, which is critical to discharge permit compliance and maintaining service.

7.1.3 Medium Voltage Transformers

Throughout the facility, step-down transformers are present to reduce the voltage from 13.2 kilovolts (kV) to 480 V). As the existing electrical one-line diagram in Figure 7.1 shows, each building or process area can be fed from either side of the medium voltage loop. In total, there are eight transformers as shown on Figure 7.1.

Over the years, the staff has proactively replacement and maintained the pad mount transformers on site. As part of the current maintenance procedures, the transformer oil is tested regularly. Carollo recommends that the staff continue to test the transformer oil and trend for transformer replacements, especially on the transformers that have not been replaced.

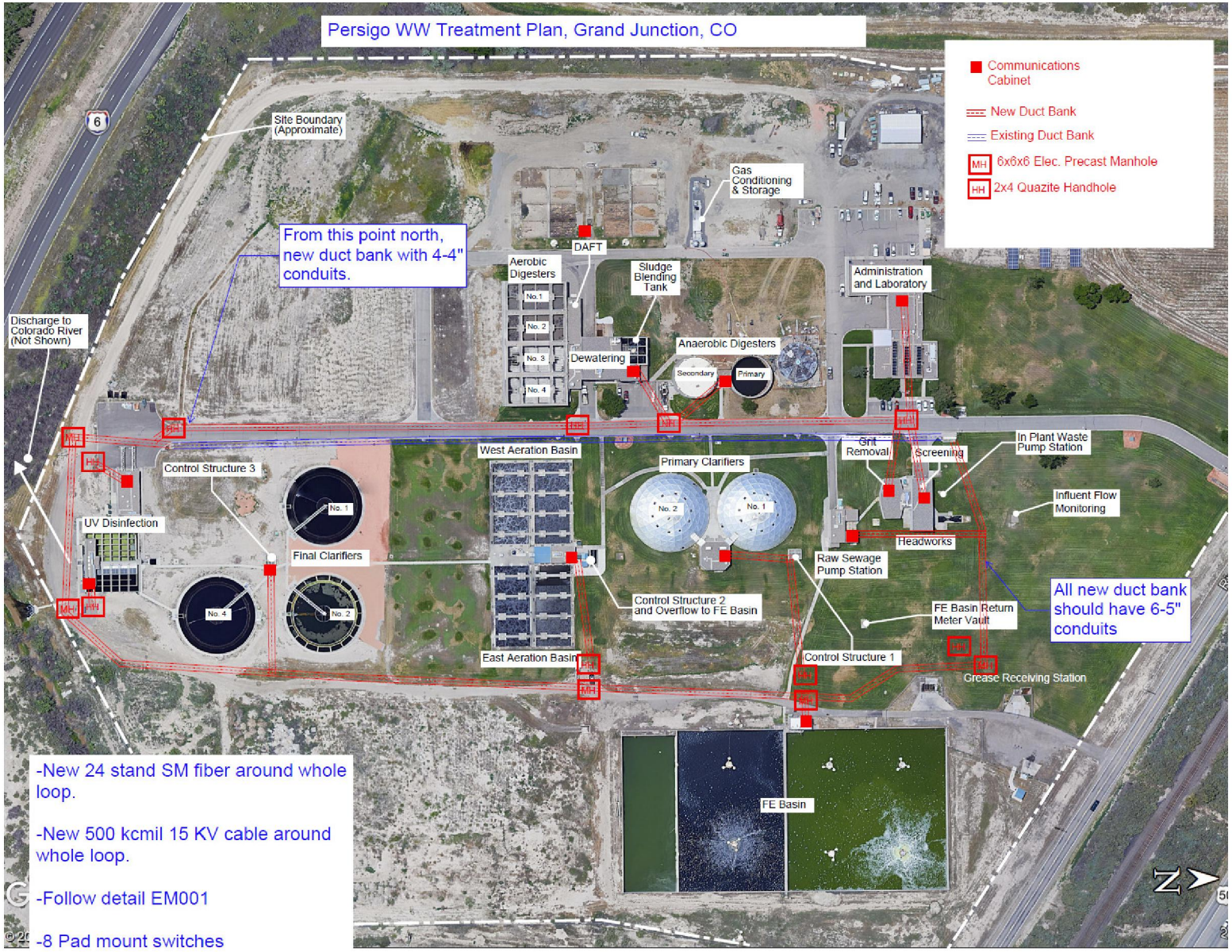

Figure 7.2 Proposed Routing for New Electrical Duct Bank

During the facility site visit, the transformer at the Administration Building was observed to be original equipment and may be leaking oil as shown in Figure 7.3. This transformer should be considered for replacement in the near-term and may be combined with the Administration Building upgrades or Medium Voltage distribution loop Projects.

When asked, the staff confirmed that many of the transformers on site have internal fusing. However, there are no records of which transformers have the internal fusing, nor the replacement fuse sizes. The existing fuse sizes for each transformer should be identified and spare fuses of each size should be kept on site for quick replacement. Additionally, the City should consider an on-call contract with a company that can help replace the fuses or invest in the proper training and equipment for staff to be able to replace fuses.

Figure 7.3 Administration Building Transformer

7.1.4 Low Voltage Distribution and Equipment

7.1.4.1 Motor Control Centers

There have been a number of MCC replacements over the years. However, there are still a few original MCCs on-site that are past their recommended useful life, and other MCCs that are installed in harsh environments and are recommended to be replaced even though they are newer. MCCs that are recommended for replacement include:

- Flow Equalization (EQ) Building.
- Headworks.
- Administration Building.
- Primary Clarifier Building.
- Blower Building.
  Replacement of the existing MCCs in the Blower Building is recommended. However, this 2020 Master Plan also recommends a complete replacement of the Blower Building for equipment and process reasons. As such, the replacement or upgrades to the existing Blower Building MCC needs to be evaluated to maintain secondary sludge (RAS and WAS pumping) operations in the basement of the existing Blower Building. Additionally, the controls upgrades/replacement should be coordinated and sequenced with the replacement of the Blower Building.
- Old Chlorine Building.

In addition to the MCC replacement, it is important to consider environmental improvements as well. If the City is going to invest in the replacement of the MCC, it makes sense to also invest in improvements to the environmental conditions to ensure longevity of the equipment. Some considerations noted from the site investigation include:

1. Headworks Electrical Room:
   a. Ventilation is poor and the room is located adjacent to classified spaces. Conduct NFPA 820 evaluation and modify the electrical room accordingly. Implement heating, ventilation, and air conditioning (HVAC) improvements to increase air flow and consider isolation from classified air spaces to increase MCC life expectancy.

2. Primary Clarifier Electrical Room:
    a. Ventilation is poor and room is located adjacent to classified spaces. Conduct NFPA 820 evaluation and modify the electrical room accordingly. Implement HVAC improvements to increase air flow and consider isolation from classified air spaces to increase MCC life expectancy.
    b. There appear to be potential roof leaks above the MCC as well. The building roof should be inspected and repaired as necessary to improve protection for the MCC.
3. Administration Building:
    a. The MCC is located in the walkway of the Administration Building. Recommend relocating and isolating so that staff are not exposed to the electrical hazards of 480 VAC electrical equipment.
4. Old Chlorine Building:
    a. The building's purpose has changed over the last several years. Consider replacement with equipment that is less expensive and adequate for the new purpose of the building.
5. Flow EQ Building:
    a. The future floating mixer replacement project identified as an asset replacement project in Chapter 4 could have an impact on electrical improvements if alternative technologies are used.
    b. Significant corrosion was also identified on the EQ Return Vault electrical infrastructure. This should also be considered for replacement after the future EQ basin plans have been finalized.

When considering building upgrades and equipment replacement, also consider access and space around the equipment. One concern is that currently, many facilities utilize the space around electrical equipment for storage. This is a violation of National Electric Code requirements and alternate storage methods and locations should be considered for the electrical spaces. In Chapter 8, it is recommended a storage and personnel space allocation and programming evaluation be completed to address these storage concerns.

Another consideration is trying to limit unqualified staff from having to interact or be around the power distribution equipment. There are design concepts such as separating the PLC controls by placing them in a different room from the power distribution equipment that can reduce interactions with unqualified staff to improve safety on site.

In addition to the environmental considerations, it is also important to note that today's MCCs are available with many different features, including but not limited to:

- Power metering.
- Networked or "intelligent" motor starters.
- Arc flash preventative equipment.
- Absence of voltage measurements.
- Remote controls, etc.

The City should review available features and consider defining standards to be implemented at all City facilities when replacing major electrical equipment such as the MCCs. These features are always evolving, and it is ideal to be consistent with replacements to the extent possible.

7.1.4.2 Ancillary Electrical Equipment

Corrosion concerns are common among many wastewater plant processes. The gas vapors associated with wastewater coupled with poor ventilation can create a harsh environment for electrical equipment, conductors, lighting, etc. Several facilities visited are seeing visual corrosion, as well as frequent failures due to the environmental conditions. It is recommended that while conducting the MCC replacements noted

above, the conductors, conduits, lighting, and other miscellaneous boxes and components be evaluated and replaced as well.

While it is ideal to replace all the electrical in a building or process at one time, it can also be costly. To prioritize investments, it is recommended to start with replacing critical equipment, like the MCCs, and main feeders, then budget for other electrical improvements for future CIP projects.

7.1.4.3 Raw Water Pump Station Electrical Room

Currently, the raw water pump station Electrical Room houses the MCC, a switchboard distribution panel, and a control enclosure, which has the PLC as well as the raw water pump VFDs. Failures have occurred within the switchboard, and the VFD cabinet is experiencing issues with overheating.

To address the corrosive atmosphere and failures noted above, the following steps are recommended:

- Remove the switchboard.
- Separate the VFDs from the PLC enclosure.
- Install new PLC cabinet.
- Redesign HVAC system for the Electrical Room.

Completing these equipment replacements and implementing a properly designed HVAC system will increase the reliability and the life expectancy of the equipment in one of the most critical areas of the plant.

Additionally, the power meter installed in the existing MCC appears to be metering negative values. The meter should be investigated and verified that the polarity is correct on the current transformers.

7.1.4.4 Blower Building General Upgrades

The staff have identified several concerns with the aging electrical equipment in the Blower Building. The age coupled with the many modifications to date (see photo of modified control panel in Figure 7.4), equipment overheating, power quality issues below, and performance concerns of the process, replacements to the electrical and control systems are recommended. However, a complete Blower Building replacement is identified in this 2020 Master Plan. As such, replacement of the electrical system should be completed as part of the Blower Building replacement project.

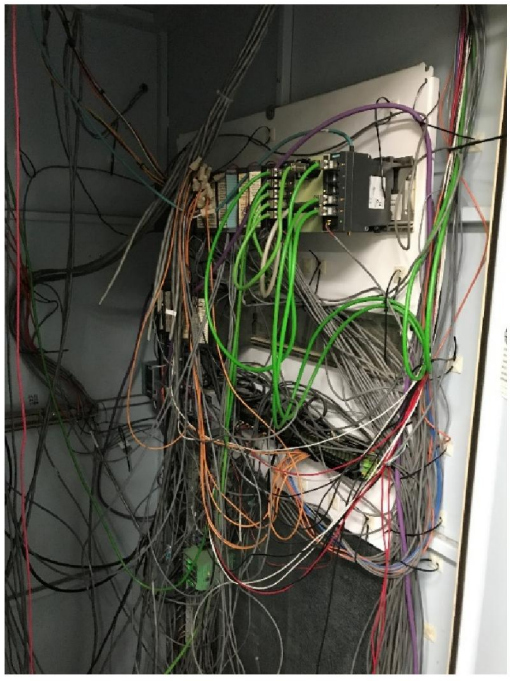

Figure 7.4 Blower Building Control Panel

7.1.4.5 Plant Variable Frequency Drives

Power quality concerns have been identified by the staff during blower operation. It is primarily noticed when the VFD for the 400-hp blower is operational. Upon starting and operating, lights are noted to flicker during VFD operation. Additionally, the large drives for the BFP process are on 6-pulse VFDs without any filtering.

VFDs generate electrical noise on the electrical system called harmonics. When severe enough, they can cause issues with lighting, extra heating in electrical components, and even equipment failures. When there are a large number of VFDs on an electrical system or high hp rated VFDs, harmonic mitigation is needed to maintain the stability of the electrical system. To address the current power quality concerns and future issues in the electrical system, addition of harmonic filtering to the Blower Building replacement project is recommended. A harmonic analysis is also recommended to determine other locations in the plant where harmonic mitigation is warranted.

7.1.5 Lift Stations

The City Owns and operates 26 lift stations throughout the collection system. The lift station design varies between three different layouts:

- Above ground.
- Partially above and partially below ground.
- Below ground.

The City is steadily replacing the below ground lift stations as these are older and have confined space concerns.

The newer lift stations have been installed with electrical labeling and have design drawings available for troubleshooting. However, many of the existing pump stations are missing labeling and have no record documentation. Additionally, many of the lift stations do not appear to properly address NFPA 820 which has specific continuous ventilation requirements to handle classified spaces as well as specific equipment ratings for classified areas. It is recommended that the lift stations be evaluated for conformance to current NFPA 820 requirements and the City maintain or develop record documents for all lift stations.

The lift stations currently communicate over a license-free, spread spectrum, 900 megahertz (MHz) radio system. The existing radio system is obsolete, becoming unsupported, thus it is not reliable and requires constant maintenance/attention. The City started investigating different options for cellular communications. The remote facilities should be connected to a secured cellular network. This cellular approach could be managed by the City or using a third-party provider.

For cellular communication, the City staff has been working with manufacturers to price and determine opportunities to connect the remote assets and provide real-time data and dashboards through a cloud service for City use. This would provide immediate resolution and connection to the remote facilities. Using a third party would also likely result in the lowest near-term costs; however, there are likely to be long-term management and annual fees associated with the third-party approach.

7.1.6 Recommended Capital Improvement Projects

Table 7.1 shows the recommended capital improvement projects to address the electrical infrastructure. Project costs are shown in 2021 dollars. Some of these projects have been captured in Chapter 4 Asset Replacement Projects. As a result, most of these identified projects will not be included as stand-alone projects in the implementation plan.

Table 7.1 Recommended Electrical System Improvements

Implementation Period	Identified Projects	Capital Costs (2021 $)
2021-2025	1. Medium voltage loop and fiber ring installation.	$7.1 million
	2. MCC replacements (for the six identified above) and associated electrical equipment replacement.	$350,000 per MCC $2,100,000 total
	3. Administration Building transformer replacement.	$500,000
	4. Headworks Electrical Room improvements.	Costs included in Chapter 4 Asset Revitalization Projects
	5. Raw Water Pump Station Electrical Room improvements.	
	6. Primary Clarifier Electrical Room improvements.	
	7. Flow EQ basin and return vault electrical replacement.	
	8. Generator addition to UV Building.	
	9. Harmonic study and plant VFD upgrades/replacement.	
2026-2030	1. Electrical system studies.	$100,000
	2. Miscellaneous electrical improvement projects for unit process areas and site electrical.	Included as allowance with identified projects
2031-2040	1. MCC replacements (future – assume 5).	$350,000 per MCC $1,750,000 total
	2. Electrical system studies.	$150,000
	3. Transformer and switchgear replacements (future allowance).	$1,500,000 every 5 years

7.2 Instrumentation and Controls

The Persigo WWTP focuses on providing the appropriate level of instrumentation for the right application. As treatment processes and instrumentation evolve, the organization will confirm that implemented new technologies make sense financially and are appropriate for the facility staffing requirements. To date, the facility's design philosophy has been and should continue to be focused on using the best available technologies to provide more precise, robust, reliable control and require less operator intervention in process control.

The existing Siemens SCADA system is maintained with in-house SCADA technicians. There is local support in the greater Grand Junction area by Siemens and other integrators to support the Persigo WWTP staff with troubleshooting and implementing software upgrades.

7.2.1 Organizational I&C Vision

In order to understand the future direction, a visioning exercise was completed through a series of facilitated discussions with Persigo WWTP and City staff. In developing and understanding the existing SCADA and business networks, a network architectural diagram was created. Figure 7.5 illustrates Carollo's understanding of the current network configurations at the Persigo WWTP.

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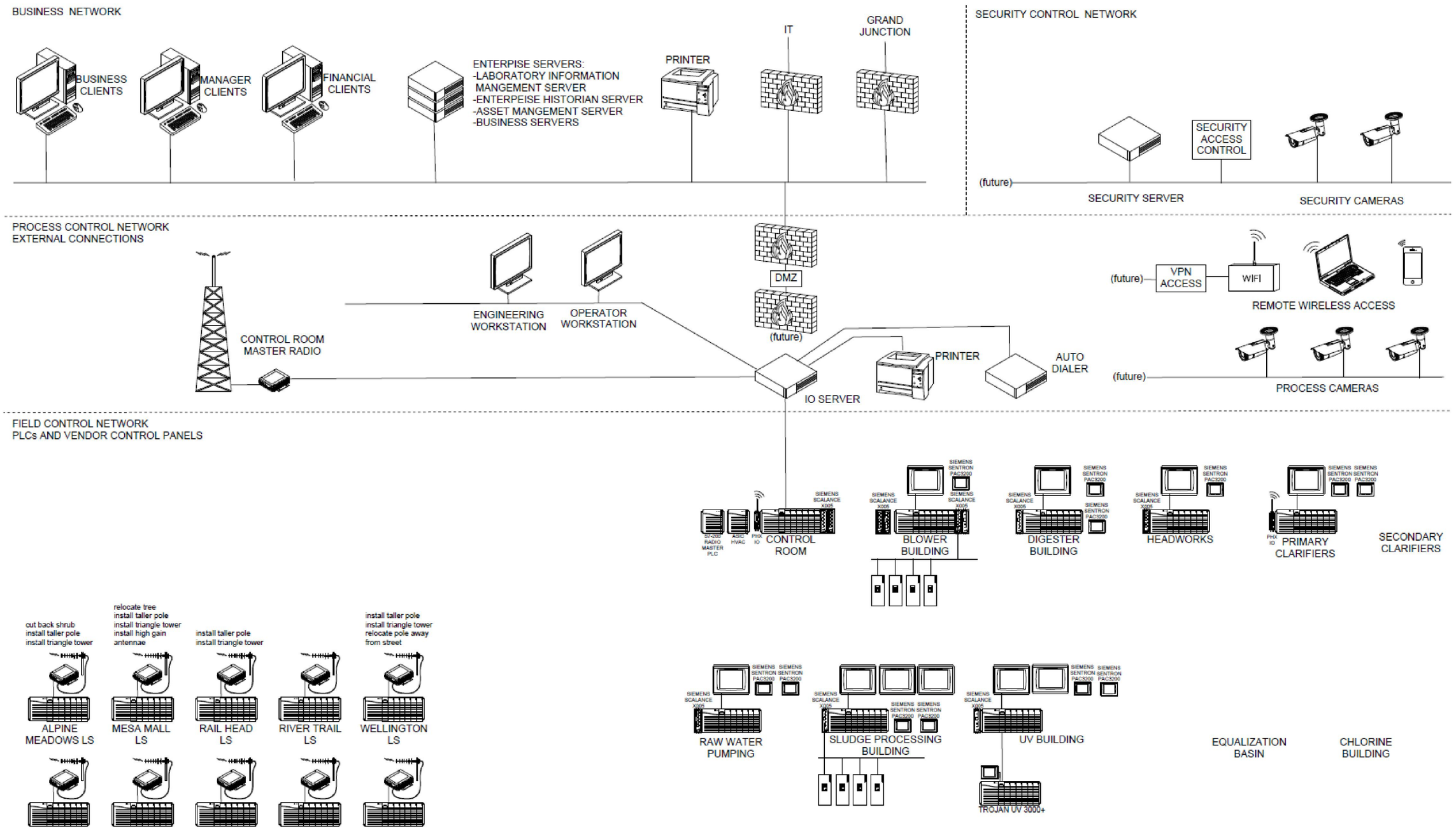

Figure 7.5 Persigo WWTP Current Network Diagram

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Figure 7.6 illustrates the eight different policy areas that were discussed during the I&C visioning exercises. By understanding the current network architecture and the City's vision, the following themes and recommendations were established.

Figure 7.6 I&C Policy Areas Discussed

1. **Operational / Staffing Needs –** The Persigo WWTP staff would like to have the ability to monitor and control operations remotely. As technologies and level of instrumentation increase, the Persigo WWTP staff will need to increase the headcount and number of I&C staff (instrument technicians, SCADA/network managers, etc.).
2. **IT Security –** The City will be managing security requirements and should be modeled after industry standards such as America's Water Infrastructure Act (AIWA) or American Water Works Association (AWWA) cyber security standards. City and Persigo WWTP staff should implement security protocols prior to implementing cellular improvements for the lift stations.
3. **City IT Staff** – The City IT staff will support the Persigo WWTP networks and can be used as a resource. It is assumed the process control and human-machine interface (HMI) networks will remain the responsibility of the Persigo WWTP staff.
4. **Process Monitoring / Controls –** The Siemens PLCs have been used and maintained through the years. Per Persigo WWTP staff, these PLCs have been easy to use and support has been available when needed. Connecting these PLCs to a fiber network will improve the data transfer and use needed.
5. **Alarm Management –** Improvements to the alarm management needs to be evaluated in the future as there are a number of alarms received and staff would like the ability to address remotely.
6. **Data Management –** Improved data management will take a coordinated effort with the City IT to ensure server space is available for the data historian and data analytic platforms desired. The City may evaluate the use of cloud-based servers to minimize capital investments. Data access and management will be greatly enhanced with the installation of a fiber network.
7. **Reporting –** The City should invest in developing dashboard and reporting software to simplify the process for developing, submitting, and analyzing process and financial reports.

7.2.2 Instrumentation

The Persigo WWTP has invested in functional instrumentation appropriate for the level of treatment required. However, as treatment processes change and evolve, the staff will be challenged to continue deploying new instruments and invest in additional instruments and controls that will add to the reliability of the plant's automation strategy and enable Operators to better control the plant 24/7 with enhanced functionality for remote operations. These investments will increase the facilities' efficiency and improve operational performance and controls.

No specific instrumentation deficiencies were identified during the project development. However, each project identified has an allowance for evaluating and implementing instrumentation. A key area to focus on increased IC is the flow management in the flow EQ basins and the aeration basins. In addition, when replacing MCCs and electrical equipment, the City should evaluate the use of smart-MCCs and power measurement throughout the facility.

7.2.3 Control Hardware and Software

The I&C visioning recommended the following instrumentation and control upgrades.

- Evaluate the Persigo WWTP SCADA HMI software and operator interface to ensure it meets the growing needs for remote 24/7 monitoring with base level control. Consider high-performance HMI graphics development for future upgrades.
- Upgrade the process alarm features and notification systems and procedures in the SCADA systems.
- Evaluate the Persigo WWTP facilities, duct banks, and site plan for deployment of a plant-wide, industrial Ethernet network.
- Evaluate and upgrade the Persigo WWTP and lift station PLC control network as infrastructure reaches end of useful life. Recommend completing a SCADA Upgrades Study, which will identify the technology, manufacturer, and additional functionality needed from the SCADA system.
- Retire the radio communications and move towards a cellular network for the Persigo WWTP lift station controls, and remote facilities.

The plant staff indicated the existing Siemens SCADA system functions well and the plant has proactively replaced and maintained the Siemens SCADA system and PLCs. A software upgrade would be recommended to modernize the SCADA system. However, at this point, a complete overhaul or change of SCADA platforms is not recommended. The Siemens SCADA system is one of the top five systems implemented in the United States. The City should develop a technical support or on-call contract with a Siemens certified programmer to support the Persigo WWTP staff with integration of new capital projects into the existing SCADA platform.

A multi-faceted SCADA Upgrades Study is suggested. This study will serve as a long-term implementation approach for evaluating the security, reliability, and responsibilities of the overall network infrastructure and control system. As part of the SCADA Upgrades Study, the Persigo WWTP should consider conducting a facility-wide cyber security audit, implementing a plant-wide industrial Ethernet network, and developing a responsible approach to achieve enhanced remote monitoring and operations. Looking to the future, regular reviews of new technologies are essential to making the Persigo WWTP system more robust and efficient. Adding a recurring SCADA Upgrades Study effort every 5 to 8 years is recommended to maintain perspective on new/evolving technology.

Control panels are one of the more expensive assets to account for in this project. Many of the hardware components in the facility's area process control cabinets are becoming obsolete. Upgrading control panels can be completed on a project-by-project basis or as a separate project. This replacement approach should

be further defined in a future SCADA Upgrade Study. For master planning purposes, a budgetary line item for PLC replacements will be added to the capital schedule.

7.2.4 Data Management

As part of the IC Visioning, it was recommended to complete a data mapping exercise to better understand the functionality of each data system and better streamline the use, management, and presentation of data. This would include analyzing your laboratory information system, the operations data, SCADA network, Lucity database, business network/financial information, and process control data and reports.

7.2.5 Process Control Center

The existing process control center does not meet the security and staffing needs for the Persigo WWTP. As a result, Carollo recommends building a security process control center and increasing the number of workstations for operators to monitor treatment plant activities. This process control center is assumed to be included in the existing administration building improvements. The SCADA Upgrades Study will further identify the requirements and types of audio-visual equipment required for the control room.

Additionally, it is considered best practice to have a redundant location located off-site to operate the treatment facility in the event of an emergency. This facility would have a redundant data center and connection to the process network. Carollo recommends constructing a secondary process control location and backup data center at another City owned facility to provide this service.

7.2.6 Recommended Capital Improvement Projects

Table 7.2 lists the recommended CIPs for the instrumentation and controls systems.

Table 7.2 Recommended Instrumentation and Controls System Improvements

Implementation Period	Identified Projects	Capital Costs (2021 $)
2021-2025	Industrial fiber installation at Persigo WWTP installed with new MV electrical distribution system as discussed in Table 7.1.	Included above
	SCADA Upgrades Study with cyber-security assessment.	$150,000
	Connect lift stations and remote assets to cellular network and retire radio communications.	$200,000
	PLC Replacement Program (annual cost – 1 per year).	$150,000
	Upgrade the Persigo WWTP SCADA HMI, alarming, call-out/paging software and operator hardware.	$125,000
2026-2030	Continuous IT master planning.	$200,000
	Security improvements (access control, video surveillance, etc.).	$250,000
	Redundant Data Center infrastructure.	$125,000
	Upgrade lift station controllers to newer PLC (included as part of lift station upgrades).	NA
	Replacement of PLCs and control panels (annual allowance).	$200,000
2031-2040	Replacement of PLCs and control panels (annual allowance).	$200,000

7.3 Site Security

The site is secured by a perimeter fence and a gate entry access system. Inside the facility, security is limited. After implementation of a fiber loop, a security evaluation is recommended to consider the installation of cameras and an access system for each building.

To improve the access control and visibility, it is recommended that the front gate and the septic receiving station both have surveillance cameras installed.

In October 2018, the United States Congress signed into law the AWIA. The AWIA focuses on drinking water systems and is not explicitly required for WWTP. It is recommended, as good practice, that WWTP facilities conduct a Risk and Resilience Assessment to understand the physical and cyber threats that could impact the safety of the Persigo WWTP staff and the operations of the facility.

7.4 Site Utilities (Natural Gas, Potable, and Plant Water)

The Persigo WWTP site has underground utilities, which include natural gas service provided by Xcel and potable water service provided by the City. In addition, the facility has a distribution network of non-potable water owned and operated by the Persigo WWTP.

7.4.1 Natural Gas

Xcel provides natural gas to the Persigo WWTP and maintains the natural gas piping to each facility. According to Persigo staff, the distribution gas piping on the Persigo WWTP site were recently updated by Xcel and there are no known improvements needed. This 2020 Master Plan assumes since Xcel owns the natural gas piping, future replacement or rehabilitation will be Xcel's responsibility.

7.4.2 Potable Water Systems

Ute Water provides potable water to the Persigo WWTP site. According to staff, the existing potable water system is adequate for all current and anticipated process needs, and no expansions or improvements are necessary.

7.4.3 Non-Potable Water System

The Persigo WWTP has a non-potable water system used for process water and irrigation uses around the facility site. Disinfected secondary effluent is pumped and provides non-potable water to the system at approximately 80 psi. The pump station includes three vertical turbine pumps at 600 gpm and one vertical turbine pump at 320 gpm.

The replacement or rehabilitation needs for the plant water system were identified as part of the Disinfection Building improvements as identified in Chapter 4.

7.4.4 Recommended Capital Improvement Projects

No specific asset revitalization projects were identified for the gas, potable, and non-potable water systems.

7.5 Administration Building

The existing Administration Building is over 40 years old and requires improvements to address the following:

1. Modernize the facility to meet current code requirements, enhance operational safety, and security.
2. Replace aging assets to improve building operations and efficiencies.
3. Increased staffing levels and assumed growth in staffing for the future requires additional workspaces and resources.
4. Provide dedicated area for the plant SCADA control center.

The following near-term projects or improvements to the Administration Building have been identified and included in the implementation plan.

7.5.1 Modernization and Expansion of Administration Building

Improvements to modernize and increase capacity of the existing facilities in order to address staffing and additional maintenance space have been identified as follows.

1. Contract with an Architectural Engineering firm to complete a plant-wide personnel and facilities storage architectural programming study. This will refine and update the long-term plans and budgetary numbers for the laboratory space and storage facilities across the plant. Storage facilities across the plant and inside the Administration Building will become a priority as additional staffing or office remodels occur.
2. Create an updated control room with updated control stations, central monitoring point, and improved security to room. This area should have one central common station along with four additional workstations. Assume workstations would be open concept with potential cubicle walls creating separation, as needed.
3. Modernize the entry way to accommodate larger groups and create shared workstations for floating staff or individuals not requiring office space.
4. Remodel the laboratory office space to create one office and two workstations in the existing footprint. Improve and replace existing HVAC systems in the laboratory area and for the building.
5. Replace and relocate the existing electrical equipment or improve the safety levels associated with the electrical equipment.
6. Provide up to up to seven enclosed offices based on discussions with Persigo WWTP staff for following roles: Plant Manager, Supervisors (three - Collection, Maintenance, Operations), office space for use by City engineers or staff, future biosolids management role or septic elimination program role, and a future office space. Adding these spaces to the Administration Building will require additional planning and determination of space can be configured to accommodate these additional enclosed offices. Potential considerations for providing additional office space:
    a. Relocate items in storage spaces to other buildings on-site.
    b. Re-purpose the kitchen area and relocate kitchen facilities to existing patio/breezeway.
    c. Provide temporary trailer to accommodate the additional spaces needed, or
    d. Expand the storage/maintenance facility to the north of the Administration Building to add personnel offices.
7. Improvements to the maintenance facilities include adding bench space, which could be accommodated by moving storage items or less used equipment to adjacent storage areas on the plant.
8. Additionally, as the City's collection system maintenance requirements increase, an additional jetter truck will be needed. To provide additional space for storage and cleaning of this additional equipment, another truck bay is recommended.

To achieve the goals and improvements listed above and shown in Figure 7.7, additional storage space has been planned to be constructed adjacent to the existing storage building to the north of the Administration Building. Figure 7.8 illustrates the intended expansion to provide additional office spaces, storage area (for supplies, files, and equipment), and includes truck bay for future jetter truck.

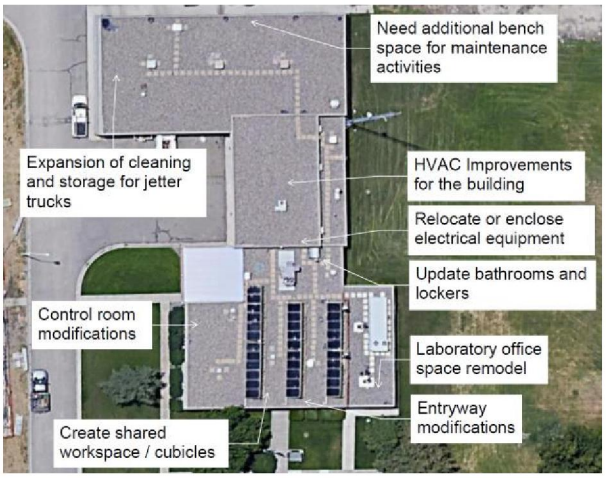

Figure 7.7 Recommended Improvements to Administration Building

Figure 7.8 Additional Storage Facility

7.5.2 Recommended Capital Improvement Projects

Table 7.3 lists the recommended capital improvements for the Support Facility Building improvements carried forward into the CIP.

Table 7.3 Recommended Capital Improvements for Support Facility Building

Implementation Period	Identified Projects	Capital Costs (2021 $)
2021-2025	Personnel and Storage Facilities Master Plan.	$75,000
	Administration Building improvements and storage facility.	$2,500,000
2026-2030	None identified.	
2031-2040	Renovate laboratory space and other facilities or construct new Administration Building.(1)	NA

Notes:
(1) Assumed the long-term vision for the laboratory space and entire Administration Building would be evaluated by the architectural consultant that completes the Administration Building repairs project.

7.6 Yard Piping

A detailed assessment of the yard piping condition was not performed as part of this 2020 Master Plan. A project to complete a condition assessment or survey of the buried yard piping is recommended to develop mitigation strategies for reducing pipeline failure events. The evaluation phase could include closed-circuit television (CCTV), soil corrosivity testing, and electromagnetic testing.

The original pipelines have reached 40 years of life expectancy and may require rehabilitation to preserve the pipeline integrity and to avoid pipeline failures. A pipeline rehabilitation allowance was established to allocate future funding to rehabilitate existing pipelines.

7.7 Site/Civil Improvements

Table 7.4 shows the recommended capital improvement projects to address yard piping and site/civil improvements. Project costs are shown in 2021 dollars. Annual budget allocation should be made to repair and replace aging asphalt, concrete sidewalk, curb and gutters, and general landscaping improvements. It is assumed these re-occurring budgeting items would be categorized as part of the Annual Operations Budget and not included in the capital improvement plan.

Table 7.4 Summary of Yard Piping and Site/Civil Improvements

Implementation Period	Identified Projects	Capital Costs (2021 $)
2021-2025	Civil improvements (annually).	$50,000
	Pipeline inspection program.	$200,000
2026-2030	Civil improvements (annually).	$75,000
2031-2040	Civil improvements (annually)..	$100,000
	Pipeline rehabilitation allowance	$5,000,000

7.8 Energy Baseline

The Persigo WWTP receives electrical power from Xcel Energy under the Commercial and Industrial Primary Service – Primary General tariff. After reviewing 2 years of Xcel electrical bills from January 2018 through December 2019, the following observations were developed.

1. The peak electrical demand expressed as highest kilowatt (kW) use over a 15-minute period was less than 950 kW. The variation of these demands month to month was less than 8 percent.
2. The electrical energy used, expressed as kWh, was less than 7,000,000 kWh for the year. Electrical use during the winter months were 15 to 20 percent higher than the summer months, which is likely a result of the facility heating demands.

Benchmarking energy use against other utilities can be challenging due to the differences in electrical tariffs, discharge permits, treatment processes, and operational goals. However, NACWA publishes benchmarking data for over 130 wastewater utilities. Based on the data from 2018, the following statistics provide a comparison to the Persigo WWTP facility.

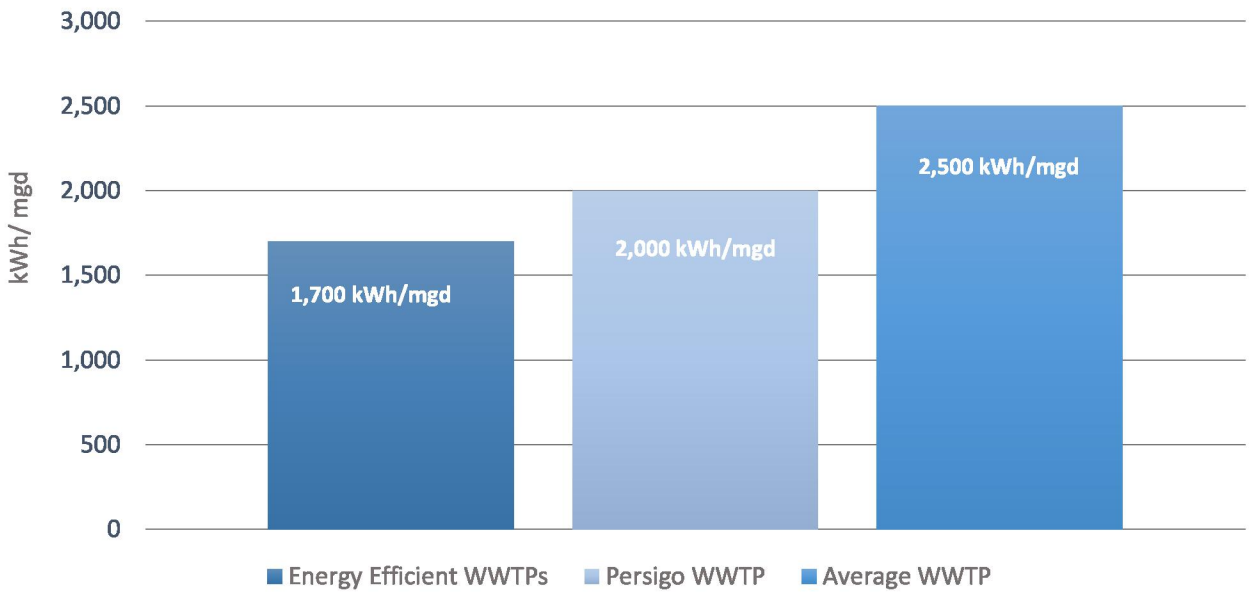

Figure 7.9 Comparison of Persigo WWTP Energy Use to Average and Energy Efficient Utilities (NACWA, 2018)

The Persigo WWTP is more efficient than the average wastewater utility. Further reductions in energy use will occur based on the recommendations provided in Chapter 5. The recommended improvements in Chapter 5 which will have the biggest impact in reducing the electrical use include:

- Replacing the existing blowers used in the activated sludge process with higher efficiency technologies will reduce the aeration electrical use significantly.
- Converting to an anaerobic digestion process will eliminate the aeration requirements for aerobic digestion.
- Upgrading existing heating and ventilation equipment using more efficient equipment and controls.

7.8.1.1 Electrical Submetering

Measuring the electrical use by each facility at the MCCs can be incorporated when replacing and upgrading the existing MCCs. Submetering is recommended in the following areas to better optimize electrical use and eventually provide the data for real-time operational control based on energy use and costs.

1. Raw sewage pumping.
2. Aeration basins.
3. Disinfection Facility/Plant Water Station.
4. Sludge Processing Building.
5. Administration Building.

7.9 Renewable Energy – Photovoltaic Systems

Solar energy is a viable, available, and affordable resource in Colorado, with more than 300 days of sunshine a year. Photovoltaic (PV) systems require very little maintenance, are reliable, and produce energy during all daylight hours. PV systems are clean, providing renewable energy with no harmful greenhouse gas emissions and no noise, which make them good neighbors.

The Persigo WWTP currently has a 100-kW PV system that provides power to the Administration Building behind the meter. This PV system supplies less than 5-percent of the average energy consumption at the Persigo WWTP. Carollo evaluated locations to increase the amount of renewable energy produced through a PV system at the Persigo WWTP site. The Figure 7.9 illustrates five areas that addition PV systems could be added. For this analysis, it was assumed a ground mounted PV system would be the most economical approach due to the availability of space. Table 7.5 provides the size and financial information for each of these sites.

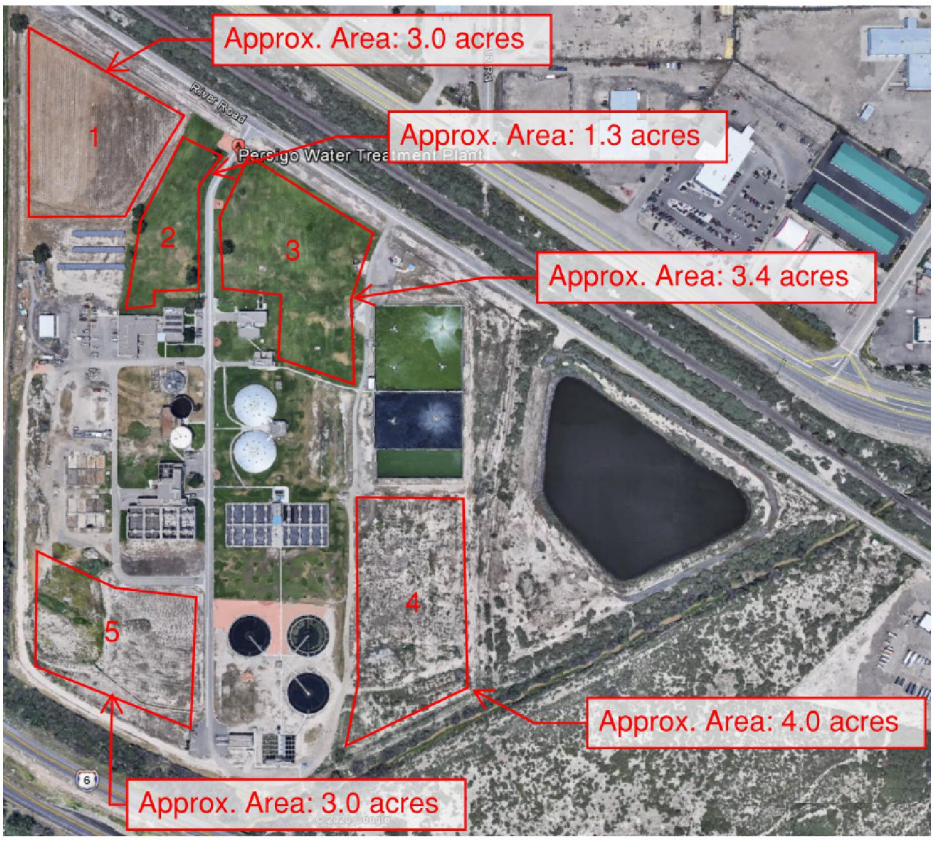

Figure 7.10 Locations for Future PV System

Table 7.5 PV Sizing and Financial Details

Site	Available Land (acres)	Size of PV System (kW)[1]	Energy Produced (kWh/year)[2]	Capital Costs ($)[3]	Annual Electrical Savings ($)[4]
1	3.0	900	1,685,000	$1,890,000	$101,000
2	1.3	390	730,000	$819,000	$44,000
3	3.4	1,020	1,910,000	$2,142,000	$115,000
4	4.0	1,200	2,247,000	$2,520,000	$135,000
5	3.0	900	1,685,000	$1,890,000	$101,000
Total	**14.7**	**4,410**	**8,257,000**	**$9,261,000**	**$495,000**

Notes:
(1) Size of the PV system assumes 300 kW/acre, which includes space for access.
(2) Amount of energy produced calculated using National Renewal Energy Laboratories (NREL) PV watts model for ground mounted single axis tracking system.
(3) Capital costs assume design, construction, and installation of PV system at $2.1/watt.
(4) Electrical savings calculated using $0.06/kWh.

Based on the financial analysis for installing a PV system only using City financing the estimated simple pay back is between 18 and 20 years. Depending on the City's energy management goals, there is adequate space available for the Persigo WWTP to produce excess energy and provide back to the electrical grid.

7.9.1.1 Battery Energy Storage System

The commercial availability and cost for energy storage systems has decreased dramatically in the past 5 years and will continue to decrease in the future. In water and wastewater applications, the most commonly used battery energy storage system (BESS) is a lithium ion battery. The BESS provides the system reliability, improves power quality, provides immediate response to instantaneous peak demands, and can reduce energy used for a longer period.

Most PV systems today will include a BESS to provide storage during periods of excess power generation. For the size and demands from the Persigo WWTP, the estimated BESS sizing would be between likely between a 250 kW/1 megawatt-hour (MWh) to 500 kW/2 MWh lithium ion battery system. The estimated installed capital costs for this system would be between $1,000,000 and 1,500,000. When combined with the PV analysis above, the simple payback period would be 15 to 18 years.

7.9.1.2 Equipment Replacement and Annual Maintenance Costs

PV panels typically have a 20- to 25-year manufacturer's warranty. Per manufacturer's published data, a typical panel will lose about 0.2 percent of its energy production output per year. PV systems are typically estimated to have a useful life of 25 years; however, there are installations installed greater than 25 years ago that operate at the reduced efficiency. The PV inverters and BESS systems have a lifespan of 10 to 15 years.

7.9.1.3 Solar Rewards / Incentive Options

Net metering is a utility billing mechanism that credits solar energy system owners for the electricity they over produce and sell back to the electrical grid. The utility customer is only billed for their "net" energy used. Net metering allows net excess generation (NEG) in a given month to be applied as a credit to the client's bill the following month. Every kWh of NEG shall produce a 1 kWh credit back to the customer on the future bill. At the end of the calendar year, if the customer's generation exceeds consumption, or if the customer terminates service, the utility must reimburse the customer for the NEG at the utility's average incremental cost over the most recent calendar year. The customer has a one-time option to request in writing that the NEG at the end of the calendar year be carried over from month to month indefinitely.

If using the Solar Rewards Standard offer, the NEG is sold back to the electrical utility at a rate dependent on the size of the system and type of customer. The maximum annual kWh of renewable energy that will be credited per Xcel Energy is a 2-MWh PV system. This needs to be confirmed with Xcel Energy. This incentive has not been included in the financial analysis to this point as it is undetermined how much renewable energy will be required to meet the electrical demands of the NTP.

7.9.1.4 Interconnection Costs

The interconnection costs depend on the PV system size, the incentive program enrolled in, and the required utility infrastructure improvements. Xcel Energy offers an evaluation study for a fee of $2,000 and will provide within 10 business days a rough order of magnitude pricing for interconnect.

7.9.1.5 Ownership Options

The current understanding and analysis provided assumes Persigo WWTP will own and operate the PV system. Other ownership options are dependent on the overall organizational energy management goals, site security and access, and if federal tax credits are available. Other ownership options include:

- Power purchase agreement with a third-party provider, or energy as a service, to construction and operate the PV system.
- Leasing agreement where Persigo WWTP could own the PV system in the future.
- Own the PV system and operate system as a community solar garden.

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CITY OF Grand Junction COLORADO

Purchasing Division

ADDENDUM NO. 2

DATE: **January 24, 2023**
FROM: **City of Grand Junction Purchasing Division**
TO: **All Offerors**
RE: **Persigo Wastewater Treatment Plant SCADA Upgrade Design**
RFP-5166-23-SDH

Offerors responding to the above referenced solicitation are hereby instructed that the requirements have been clarified, modified, superseded and supplemented as to this date as hereinafter described.

Please make note of the following clarifications:

1. Q. Provide clarification on how the consultant is to work with the City's Asset Management Specialist on incorporating process control devices, SCADA equipment, fiber and ethernet equipment into the City's Lucity program?

   A. *Persigo is looking for a detailed spreadsheet that provides asset management information on anticipated/estimated replacement schedules for the various components associated with the Persigo local network and PLC's with estimates on replacement costs. This spreadsheet should also list any recommended spare parts Persigo staff should keep in-stock. Please keep in mind that PLC's that are in environments with higher H_2S concentrations typically have a shorter lifespan.*

   For this RFP, at least two meetings with the City's Utilities Asset Management Specialist shall be required. The first meeting with the Utilities Asset Management Specialist can take place at the project kick-off meeting, and the second meeting can take place around the 60% complete stage.

2. Q. Provide clarification on how many PLC's and subpanels are expected to be replaced at Persigo, or still need to be replaced? Provide description of what PLC's Persigo has already replaced/updated with the most current Siemens technology and where they are located at?

   A. *See updated Section 4.0 – Scope of Services, included with this Addendum #1, for information of what PLC's have been replaced and which PLC's still need to be replaced. Persigo has been replacing old PLC's with new Siemens S7-1500 and Siemens S7-1200 PLC's.*

3. Clarification: In 2023, the Persigo WWTP plans to have fiber cabling installed to the Persigo Operations Building (Admin. Building). At this time, the fiber cabling project will only supply the

Operations Building with fiber service to get the City's IT network off of the current radio-based telemetry. The City plans to install 144 strand fiber cabling along River Road. The fiber cabling taken to the Operations Building from River Road will be 24 strand fiber cabling. The consultant shall design a proposed internal fiber cabling loop (24 strand minimum) that will serve each individual process building and proposed future process buildings. This internal fiber loop design shall include pull-box locations, conduit size, utility trench details (if necessary), connection details, and transition details to ethernet at each process building.

4. Clarification: The scope of this RFP will not include providing design recommendations for communication upgrades to Persigo's existing wastewater lift stations and remote facilities. Persigo's SCADA staff is currently developing cellular communication upgrades with the lift stations and remote facilities.

5. Clarification: The scope of this RFP will not include the medium-voltage component. This RFP is to focus on improvements/upgrades to the Persigo local network and SCADA system.

The original solicitation for the project noted above is amended as noted.

All other conditions of subject remain the same.

Respectfully,

Scott Hockins, IT Supervisor
City of Grand Junction, Colorado

SECTION 4.0: SPECIFICATIONS/SCOPE OF SERVICES

Scope of Work: The City of Grand Junction is seeking proposals from qualified vendors to perform a Persigo Wastewater Treatment Plant (WWTP) SCADA Upgrade Design. This Design will document the Persigo WWTP SCADA systems current state, desired future state and recommended steps to achieve the desired future state. The service area that the Persigo WWTP serves is continuing to experience growth and as a result the Persigo WWTP SCADA system needs to be updated to account for this growth and for upgrading cyber and physical security.

The Persigo WWTP does not have fiber optics at the plant and Persigo relies on radio-based telemetry for access to the City's IT network. Currently, there are two networks here at Persigo. There is the Persigo local network that operates the SCADA system and other internal devices, and then there's the City's IT network which uses the radio-based telemetry. By the end of year 2023, the Persigo WWTP plans to have fiber installed to the plant Operations Building (Admin. Building). Getting fiber to Persigo in 2023 is a top priority and will allow Persigo staff and the City's IT Department to start implementing the results of the SCADA Upgrade Design.

The Persigo WWTP currently utilizes Siemens SCADA systems. The Persigo WWTP has two full-time SCADA Technicians/Programmers. The consultant selected as part of this RFP process shall meet with Persigo's SCADA Technicians to document the current SCADA system and our SCADA Tech's recommendations for improvements.

In 2020/2021 the Persigo WWTP worked with Carollo Engineering on developing the 2020 Wastewater Treatment Facilities Master Plan Study. The City initiated the 2020 Master Plan Study to address service area growth, aging infrastructure, and operational efficiencies at the WWTP and in the collection system. Chapter 7 within the Master Plan Study addresses infrastructure and personnel facilities at the WWTP including electrical distribution, SCADA, Instrumentation and Controls, Site Security, etc. The Master Plan Study will be made available.

The scope of services set forth in this Request for Proposals (RFP) represents an outline of the services which the City of Grand Junction anticipates the successful proposer to perform and is presented for the primary purpose of allowing the City of Grand Junction to compare proposals.

The City of Grand Junction's IT Department will be reviewing SCADA cybersecurity requirements, and the security recommendations presented in this Design should be modeled after industry standards such as America's Water Infrastructure Act (AWIA) or the American Water Works Association (AWWA) cyber security standards.

The Persigo WWTP SCADA Upgrade Design shall include:

1. Identification of the technology, manufacturer, and additional functionality needed from the SCADA system. This shall include recommendations for a new WWTP SCADA system control room and recommendations for the number of workstations needed to meet security and staffing needs and identify the requirements and types of audio-visual equipment needed for a new control room.

2. Determine the effectiveness and reliability of Persigo's overall network infrastructure. Identify areas that need improvement and documented design for a future state SCADA network.
3. Develop a site plan and construction plans of the proposed routing for implementing a facility-wide fiber loop for the Persigo WWTP network. This proposed fiber loop would be used as the Persigo "network" between all the different process buildings and would be separate from the City's IT network for security reasons. This RFP needs to develop a separate fiber system at Persigo. For cyber security, there needs to be protections (firewalls) provided between the Persigo network and the City's IT network. However, the Persigo network shall have the ability to have offsite backup of historical data on the City's IT network server. An example of a possible fiber loop is shown in the Master Plan Study in Figure 7.2. The Persigo WWTP intends to use the construction plans developed as part of this Design for future construction of the fiber loop.
4. Provide a recommended PLC backup and replacement program including best practices for City SCADA Techs to perform regular back-ups of PLC's, estimation of annual costs per year and, identification of critical spare parts Persigo should keep in-stock regarding PLC's. Within the last three years, the majority of PLC's at Persigo have been replaced with modern Siemen's PLC's. The following process buildings have had their PLC's replaced:

    a. Headworks Building: Siemens S7-1500 PLC
    b. Raw Sewage Pump Station: Siemens S7-1500 PLC
    c. Aeration Building: Siemens S7-1500 PLC
    d. Anaerobic Digester Building: Siemens S7-1500 PLC
    e. Operations Building: Siemens S7-1500 PLC
    f. Primary Clarification Building: Siemens S7-1200 PLC

    The following process buildings have not had their PLC's upgraded yet:

    a. Plant Water/UV Disinfection Building: New PLC ordered in June 2022. Waiting on delivery.
    b. Grease Processing: New PLC ordered in June 2022. Waiting on delivery.
    c. No plans to upgrade current Sludge Dewatering Building because it's getting replaced with a new Dewatering Building within the next three years.

5. Conduct a facility-wide cyber security audit and provide detailed recommendations and design for cyber security and physical security improvements including access control and video surveillance at the Persigo WWTP.
6. Recommendations and designs for cyber-security improvements that include network segmentation and isolation between Operations Technology (OT) and Information Technology (IT) networks. Secure remote access to OT network for monitoring and controls, proper network address to match City's networking scheme, plans for device and software patching, and integration with City's security monitoring services.
7. Provide recommendations and a spreadsheet with average SCADA and PLC equipment lifespans and estimated replacements costs that can be used for asset inventory into City's asset management system. Including life-cycle management and expected replacement dates of equipment and projected budgetary considerations. The selected Consultant shall meet with the City's Utilities Asset Management Specialist to discuss the current state of

the City's asset inventory and learn how the City's asset management system works for determining recommendations. The City uses Lucity software for asset management.

8. Recommendations for maintenance contracts for software and hardware.
9. Evaluate and document Persigo's current non-standard 3rd party supported equipment in the WWTP process buildings and provide recommendations for 3rd party service level agreements for maintenance.
10. Provide sufficient SCADA design detail to support the secure implementation of SCADA upgrades.

Attached Documents: 2020 Wastewater Treatment Facilities Master Plan – Chapter 7

- Pre-Proposal Meeting: January 12, 2023
- Inquiry deadline, no questions after this date: February 10, 2023
- Addendum Posted: February 16, 2023
- Submittal deadline for proposals: February 23, 2023

Questions Regarding Scope of Services:
scotth@gjcity.org

CITY OF Grand Junction COLORADO

Purchasing Division

ADDENDUM NO. 3

DATE: **February 16, 2023**
FROM: **City of Grand Junction Purchasing Division**
TO: **All Offerors**
RE: **Persigo Wastewater Treatment Plant SCADA Upgrade Design**
RFP-5166-23-SDH

Offerors responding to the above referenced solicitation are hereby instructed that the requirements have been clarified, modified, superseded and supplemented as to this date as hereinafter described.

Please make note of the following clarifications:

1. Q. Can you elaborate on the proposal requirements listed in Section 5.0, E – Design Budget? What do you prefer we include in our proposal for this item?

   A. *The City would prefer for the Proposers to provide a "total cost not to exceed" amount to complete the Persigo WWTP SCADA Upgrade Design based on the scope presented in the updated version of Section 4.0 – Scope of Services in Addendum #1.*

2. Q. What expectations does the City have regarding a fee sheet included with the proposal?

   A. The City would like the Proposers to provide a spreadsheet that provides a list of tasks/activities required to complete this SCADA Upgrade Design as presented in Section 4.0 – Scope of Work in Addendum #1. Provide the estimated hours employee(s) are projected to work on each task/activity with the employee's current hourly rate and a summation of the costs to provide a project total cost.

3. Q. What HMI package does your SCADA system use, in conjunction with your Siemens S7 PLC's?

   A. The Persigo WWTP uses Siemens TIA (Totally Integrated Automation) with Siemens SIMATIC WinCC for the HMI package.

The original solicitation for the project noted above is amended as noted.

All other conditions of subject remain the same.

Proposal for

Wastewater Treatment Plant SCADA Upgrade Design

City of Grand Junction

RFP-5166-23-SDH

February 23, 2023

TABLE OF CONTENTS

COVER LETTER

A. Cover Letter

Scott Hockins, IT Supervisor
City of Grand Junction
Submitted via the Rocky Mountain E-Purchasing System

RE: RFP-5166-23-SDH Wastewater Treatment Plant SCADA Upgrade Design

Dear Scott Hockins:

The City of Grand Junction (City) is embarking on an important Wastewater Treatment Plant (WWTP or plant) SCADA Upgrade Design Project and our team at HDR is very interested and excited to partner with you on this undertaking that will benefit the WWTP far into the future.

Our team is balanced in professional tenure and has the breadth and depth of skills and knowledge necessary to accomplish this project efficiently and effectively.

- Our team includes design engineers, Programmable Logic Controlller (PLC)/Human-Machine Interface (HMI) specialists, a former IT/network administration professional, and an attentive project manager.
- Team members pride themselves on practical field experience, including working as system integrators; PLC/HMI and network system startup and commissioning; and on-site troubleshooting and debugging. This valuable experience provides a real-world "nuts-and-bolts" insight into how modern process control systems need to function in a wastewater plant.
- Project Manager Travis Moore is a life-long Coloradan and Western Slope native and recognizes and understands the unique challenges faced by cities in the western half of our state. Travis' western Colorado historical knowledge and cultural understanding will be reinforced by Michael Goolsby, another Western Slope native who is based in Grand Junction.

We acknowledge receipt of the addenda posted on BidNet: Addendum No. 1 (blank), Addendum No. 2 (two documents), and Addendum No. 3 (one document). Proposed modifications to the contract language are presented in Section F of our proposal.

Our team welcomes the possibility of an in-person interview to further discuss your project and our team's capabilities. We're confident that our skills and passion in this field will be clearly evident; this is truly what we love to do. Please contact our project manager, Travis Moore, at Travis.Moore@HDRinc.com or 303.746.2967 with questions or for more information about this proposal.

Sincerely,
HDR Engineering, Inc.

Travis Moore, PE (CO 38135)
Project Manager

R. Bradley Martin, PE (CO 53191)
Area Manager/Senior Vice President

B

QUALIFICATIONS/EXPERIENCE/ CREDENTIALS

B. Qualifications/Experience/Credentials

ABOUT HDR

HDR is a full-service, employee-owned engineering consulting firm. HDR has partnered with our clients to shape communities since 1917. HDR has provided our Colorado clients with local services since our first Colorado office opened in Colorado Springs in 1957. Since then, HDR has opened additional offices in Denver, Durango, Englewood, and Fort Collins, and has a growing number of personnel across Colorado's Western Slope. Our dynamic, integrated team lives and works in Colorado. We recognize the importance of adding value to the local community by solving tough challenges and inspiring positive change. This project will primarily be led from our Denver office with support from HDR's Western Slope liaison and Grand Junction resident, Mike Goolsby, and national resources as needed.

As HDR implements water and wastewater treatment projects, our teams plan and design modern SCADA and process control systems, leveraging current and emerging technology to enhance operations, support proactive maintenance, and promote secure data sharing and management. With a diverse background in SCADA, master planning, design, construction, and system integration, our team brings a unique perspective to each phase of the project life cycle that promotes proactive challenge recognition and solution identification to mitigate risks that threaten SCADA project success.

CITY OF grand junction COLORADO

Scott Hockins

PROJECT MANAGER
Travis Moore, PE

QA/QC AND TECHNICAL ADVISOR
Bill Cassity, PE

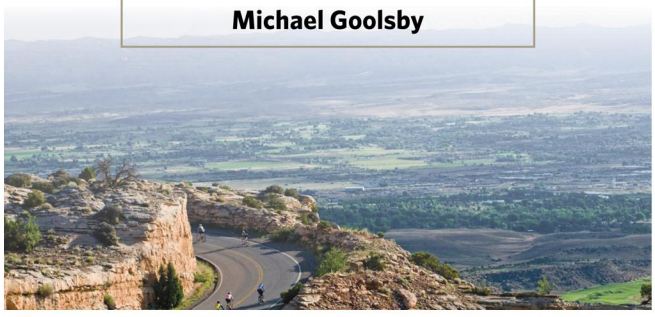
ASSISTANT PROJECT MANAGER AND FIBER OPTIC ADVISOR
Nohemi Almaraz

CYBER SECURITY LEAD
David Brearley, GICSP, PMP, CISM

NETWORKING
Casey Oppegard, PE
Tanner Smith

PLC & HMI SPECIALISTS
Andrew Burton
Josie Brahler

WESTERN SLOPE LIAISON
Michael Goolsby



Travis Moore, PE (CO 38135)

Project Manager

Travis is a senior electrical engineer and project manager, and routinely leads electrical and control system teams on complex projects. Travis is known for reliable and uncomplicated designs, and clients often appreciate his ability to explain electrical and control systems in simple and easy-to-understand terms. A significant amount of Travis' experience is in municipal, governmental, and industrial water and wastewater systems. Travis is a Western Slope native and lifetime Colorado resident.

OFFICE LOCATION

Denver, CO

EDUCATION

MS/BS, Electrical Engineering, Colorado School of Mines

PROJECT EXPERIENCE

- City of Boulder, 63rd Street Water Treatment Facility Campus Electrical and High Service Pump Station Improvements
- National Park Service, Grand Canyon SCADA Communication Replacement Design
- City of Boulder, Process Automation System Improvements
- Hot Springs National Park, SCADA and Thermal Reservoir Condition Assessment
- City of La Junta, Critical Infrastructure Distributed Generation
- Copper Mountain Metropolitan District, AWIA Risk and Resilience Assessment

The following section provides overviews of the experience and expertise that our key team members bring to the City.

Bill Cassity, PE (CO 50957)

QA/QC and Technical Advisor

Bill leads HDR's Colorado-based instrumentation, controls, and process automation team. His broad background in design engineering, system integration, and commissioning and startup has given him expert-level knowledge in industrial and process automation, networks, and data systems. Many clients seek Bill's advice on future-oriented modernization of their process control systems.

PROJECT EXPERIENCE

- City of Boulder, 63rd Street Water Treatment Facility Campus Electrical and High Service Pump Station Improvements
- National Park Service, Grand Canyon SCADA Communication Replacement Design
- City of Boulder, Process Automation System Improvements
- Town of Erie, North Water Reclamation Facility Design

OFFICE LOCATION

Denver, CO

EDUCATION

BS, Electrical Engineering, California State University, Sacramento

Nohemi Almaraz

Assistant Project Manager and Fiber Optic Advisor

Nohemi is a proactive control system designer who has played key roles in design and on-site control system implementation and commissioning projects. She uses her environmental background and experience with wastewater control systems in project leadership roles.

PROJECT EXPERIENCE

- City of Boulder, 63rd Street Water Treatment Facility Campus Electrical and High Service Pump Station Improvements
- National Park Service, Grand Canyon SCADA Communication Replacement Design
- City of Boulder, Process Automation System Improvements

OFFICE LOCATION

Denver, CO

EDUCATION

BS/MS Civil Engineering, MS Environmental Engineering, Colorado School of Mines

David Brearley, GICSP, CISM, PMP

Cyber Security Lead

David has 20 years of experience in providing IT & OT solutions, services, and consulting. David applies his experience to assist clients in scaling cyber security solutions which balance risk, operability, maintainability and costs.

PROJECT EXPERIENCE

- City of Boulder, 63rd Street Water Treatment Facility Campus Electrical and High Service Pump Station Improvements
- National Park Service, Grand Canyon SCADA Communication Replacement Design
- City of Boulder, Process Automation System Improvements
- Copper Mountain Metropolitanization District, AWIA Risk and Resilience Assessment

OFFICE LOCATION

Charlotte, NC

EDUCATION

BS, Computer Engineering, University of South Carolina

Casey Oppegard, PE (CO 60188)

Networking Lead

Casey's past experience as both a system integrator and a design engineer gives him a unique perspective on real-world control system implementations. Recently, Casey has been managing on-site control system implementation at City of Boulder's wastewater treatment facility.

PROJECT EXPERIENCE

- City of Boulder, Process Automation System Improvements
- National Park Service, Grand Canyon SCADA Communication Replacement Design
- Town of Erie, North Water Reclamation Facility Design

OFFICE LOCATION

Denver, CO

EDUCATION

BS, Electrical Engineering, University of Nebraska-Lincoln

Tanner Smith

Networking Designer

Tanner is a highly skilled technology problem solver who leverages his unique background in computer information systems and criminal justice to help investigate and solve technology issues. Tanner recently joined HDR's building engineering services team as a network designer after four years of working with HDR's Mountain West Information Technology Group. His background includes installment of network infrastructure with fiber connections. While working with HDR's Information Technology Group, Tanner supported daily on-site IT operations for over 400 users including maintaining computer networks and related computing environments, as well as improvement rollouts, on-site technology support for large-scale meetings and events, and equipment refreshes throughout HDR's Colorado and Wyoming offices.

OFFICE LOCATION

Denver, CO

EDUCATION

BS, Computer Information Systems and Criminal Justice, Jacksonville State University

Josie Brahler

PLC & HMI Specialist

Josie has diverse PLC and HMI programming, on-site commissioning, and radio-path study experience in water and wastewater treatment facilities. Recently, she has been assisting clients implement high-performance SCADA graphics.

PROJECT EXPERIENCE

- City of Boulder, Process Automation System Improvements
- National Park Service, Grand Canyon SCADA Communication Replacement Design
- Town of Erie, North Water Reclamation Facility Design

OFFICE LOCATION

Denver, CO

EDUCATION

BS, Electrical Engineering, Colorado School of Mines

Andrew Burton

PLC & HMI Specialist

Andrew programs and configures PLC and HMI systems for wastewater clients. He listens to clients' needs and feedback to help customize the control system for the specific application. Much of Andrew's experience is in on-site implementation and troubleshooting.

PROJECT EXPERIENCE

- City of Boulder, Process Automation System Improvements
- National Park Service, Grand Canyon SCADA Communication Replacement Design
- Town of Erie, North Water Reclamation Facility Design

OFFICE LOCATION

Denver, CO

EDUCATION

BS, Electrical Engineering, Colorado School of Mines

Michael Goolsby

Western Colorado Liaison

Mike has implemented control room projects while working with CDOT at Hanging Lake Tunnels. Mike is also a Western Slope native and has lived in Grand Junction for the past 16 years. Mike will lean on his regional knowledge to support the City while working with the Front Range team to deliver the project's goals.

PROJECT EXPERIENCE

- CDOT Region 3 Roadway Design Guide
- Mesa County 32 1/2 Road and Clifton Campus Improvements
- CDOT Region 3 Hanging Lake Tunnel Control Room Upgrade and Traffic Communications Upgrades
- Prior to joining HDR: CDOT Region 3, Regional Transportation director

OFFICE LOCATION

Grand Junction, CO

EDUCATION

Highway Maintenance Management, Front Range Community College

C STRATEGY AND IMPLEMENTATION

C. Strategy and Implementation

PROJECT UNDERSTANDING

The City of Grand Junction is a vibrant growing community. To accommodate this and future growth, the Persigo WWTP SCADA system upgrades are required to add resiliency to the existing Siemens-based SCADA system. Part of this SCADA Project involves documenting the SCADA system's current state and identifying the necessary steps to reach the desired future state.

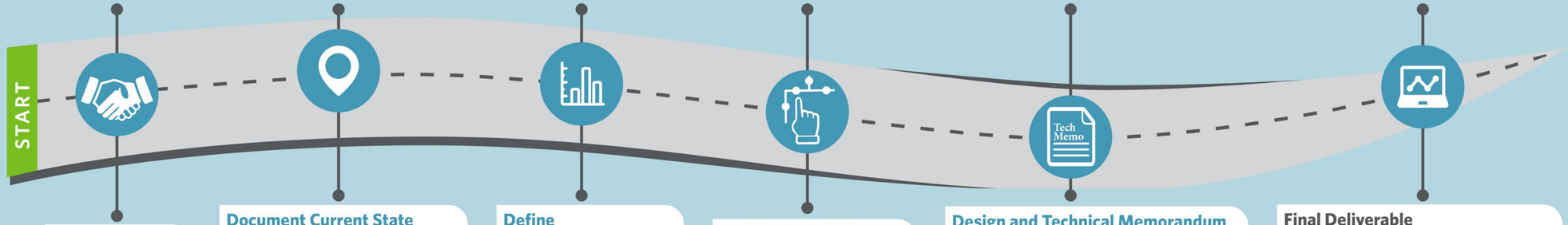
PROJECT MANAGEMENT APPROACH

The HDR project manager, Travis Moore, will conduct conference calls or in-person meetings with City staff upon request, to review project progress, schedule, budget, discuss needs for additional information, and changes in scope or services. HDR will conduct virtual meetings in the City's preferred communication platform or Webex as agreed by parties.

ROADMAP TO PROJECT DELIVERY

Figure 1 outlines our team's roadmap to delivering the project while aligning with the City's goals and overall project deliverables. We believe the project can be completed in three to five months, with several upgrade tasks being completed independently and concurrently by our proposed team. This timeline allows our team to facilitate workshops and meetings with the City, evaluate and establish the City's needs, and deliver final documents for the City to move forward with their plan. The roadmap depicted to the right, identifies critical steps our team will take to carry the project to completion that will satisfy the City's project objectives. Further, we have associated tasks 1-10 with those steps to project completion. Each task is detailed in the following pages and will aid to our team's deliverables.

Figure 1. Road Map to the SCADA Upgrade Design and Anticipated Schedule



Project Kickoff
- Kickoff meeting
- HDR team meets with Plant staff (virtual)
- Request and review existing documentation

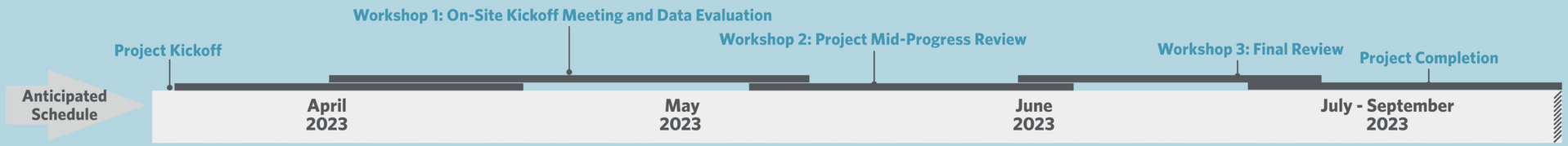
Document Current State
- Evaluation of control room A/V and staff requirements identification
- Interview City staff
- Plant walk through
- Meet with the City's utilities asset management specialist
- Data evaluation

Define Requirements
- Establish vision for future state
- Evaluate City requirements in RFP

Gap Analysis
- Compare current state vs vision of future state
- Determine upgrades requirements to reach the future state
- Meet with the City's utilities asset management specialist

Design and Technical Memorandum
- Develop recommendations for SCADA upgrades
- Prepare technical memorandum and design documents
- Review recommendations
- Plant fiber optic system

Final Deliverable
- Design docs: plant fiber optic system
- Memorandum: SCADA upgrade recommendations
- Asset management spreadsheets



TASKS OUTLINE
- Task 1. Evaluation of Control Room A/V and Staff Requirements Identification
- Task 2. Evaluate SCADA Network
- Task 3. Design Plant Fiber Optic Infrastructure
- Task 4. PLC Backup/Replacement Planning
- Task 5. Cyber audit
- Task 6. Physical Security
- Task 7. Asset Management Planning
- Task 8. Evaluate Maintenance and Service Contracts
- Task 9. Evaluate Third Party Systems
- Task 10. Provide Upgrade Implementation Plan

Document Current State

HDR will begin the design and evaluation process by collecting documentation and information on the plant's SCADA system and network architecture. Our team will conduct an initial site visit with the intent of kicking off the project and collecting information from the City staff and throughout the plant. We will coordinate with the City to have a two-day visit where two-to-three HDR team members from the Denver office will meet with City staff including the instrumentation and controls (I&C) technicians, plant operators, IT staff, and other stakeholders to review the current state of the network, SCADA assets, cyber security in place, and discuss the City's vision for the system's future state.

The team will meet with the City staff where the City will provide detailed information on their system, our team will then ask questions and clarify information, as needed. Following this meeting, the team will walk through the plant's buildings with the City's SCADA and IT professionals to document SCADA and IT assets throughout the plant. Pictures, part numbers, equipment condition, and locations will be noted and specifics of a system discussed while on site. The Data Collection section in the following pages provides an overview of the data that will be collected as part of our effort in documenting the current state.

Workshop #1 On-Site Kickoff Meeting and Data Collection (In-Person)

Day 1: We plan to conduct a meeting with the City to discuss current state of the SCADA system, the vision for the future state of the system, and general SCADA and IT information relevant to the tasks outlined in the scope of services. Following our initial meeting with the City, our team will facilitate a walkthrough of the plant with the City staff to collect data on control panels, third party systems, SCADA and IT equipment (radios, switches, etc.), and existing control stations/room.

Day 2: Following the initial walkthrough, we will continue our plant walkthrough as needed. Our team will also meet with the City's Utilities Asset Management Specialist to define Lucidity's required inputs and formulate a plan for how to provide and arrange information for their use.

DATA COLLECTION: REVIEW EXISTING DOCUMENTATION

- As-built drawings including process and instrumentation diagrams (P&IDs), panel drawings, input/output lists, loop drawings, network diagrams, and process control descriptions
- AutoCAD files of plant infrastructure (e.g.,electrical ductbanks, pullboxes, and building floorplans)
- PLC and control panels
- Telemetry/network equipment, including switches, routers, and radios
- Installed software, including HMIs, historians, databases, alarm notification platforms, asset inventory, antivirus, and operating systems
- Data use and sharing mechanisms
- Data on third party systems and obtain contracts
- System architecture documentation
- Information required for Lucidity

DATA COLLECTION: CONDUCT SITE INVESTIGATIONS

- Cyber audit and physical security
- Infrastructure available for fiber ring and routing/location observations
- Available space for future SCADA equipment, including new control room
- Collect site notes, photos, and locations of each asset that team members can access and use for future reference
- Collect available information including installation/manufacturer date, part numbers, and lifecycle stage
- Determine condition of assets and the systems in which they operate
- Meet with the City staff to discuss how City team members interact with the SCADA system, which includes how data is used by staff and what current issues different users are having or would like to see addressed to help them perform their duties more efficiently

DATA EVALUATION

Following data collection, our team will gather the information to review, research, and evaluate the current SCADA system as outlined below:

- Evaluate City needs, space, and infrastructure available for a SCADA control room
- Network effectiveness
- Utilize ISA-62443 high level assessment methodology and thread mapping exercise to finalize cyber security analysis of network architecture for vulnerabilities
- Document the baseline system architecture
- Evaluate existing infrastructure for fiber ring design
- Compare asset inventory records versus actual assets
- Evaluate compliance with NIST 800-82, AWWA cyber security best practices and CISA cross sector performance goals
- Identify vulnerabilities in the overall system architecture that present security or reliability risk
- Determine what information needs to be added to Lucidity
- Determine hardware and software position in the product lifecycle to plan replacement needs and timeframe

After the data evaluation, the team will identify additional information that needs to be collected to develop the SCADA upgrades recommendation. Information will be collected via email, by coordinating intermediate site visits or by leveraging our local HDR liaison, Mike Goolsby, on an as-need basis. Data collection that requires an intermediate site visit from our Denver-based staff will be coordinated with the City to have one-to-two HDR team members on site.

Define Requirements

After data collection and evaluation, HDR will collaborate with various City stakeholders to define the requirements for each task identified in the RFP.

TASK 1: EVALUATION OF CONTROL ROOM A/V AND STAFF REQUIREMENTS IDENTIFICATION

The evaluation of the control room will involve defining requirements of the space and infrastructure available for the new control room and the equipment necessary to meet operation staff and security needs.

Figure 2. Control Room Mock-Up

TASK 2: EVALUATE SCADA NETWORK

Evaluation of the SCADA network will be conducted in parallel with the cyber security audit and fiber optic design. Understanding the existing network infrastructure will be a starting point for understanding where fiber optic is required to create a resilient fiber network within the plant. Additionally, the cyber security audit will include components of how the network is segmented and data is managed within the plant's network.

TASK 3: DESIGN FIBER OPTIC INFRASTRUCTURE

A key item for the fiber optic design is defining the available infrastructure within the plant to route the fiber. This would involve finding existing ducts running to the desired locations for the fiber network. As-built drawings of the plant will provide a better understanding of the infrastructure in place and the feasible routing options for new infrastructure. As-built drawings in parallel with site observations will be used to provide a detailed fiber network design to existing and future process buildings.

TASK 4: PLC BACKUP/REPLACEMENT PLANNING

HDR will work with City staff to identify the PLCs and associated hardware (e.g., Central Processing Unit (CPUs), Input/Output (IO) cards, network cards, etc.) within the plant to generate a replacement and backup strategy that suits the plant's needs and SCADA maintenance schedules. Part of the replacement planning strategy will require understanding and setting end-of-life requirements (e.g., PLCs exposed to Hydrogen Sulfide (H2S)) to establish replacement schedules. The replacement schedules and asset inventory will further assist with establishing spare part requirements for different SCADA assets.

Secure Remote Access

Secure remote access will be based upon an industry standard approach similar to Figure 3. This Purdue Diagram method is to show how information for an enterprise and process control are segregated. This methodology allows for levels where signals within that level can pass with less filtering or scrutiny but other areas that are public or potentially more exposed to public access are more controlled.

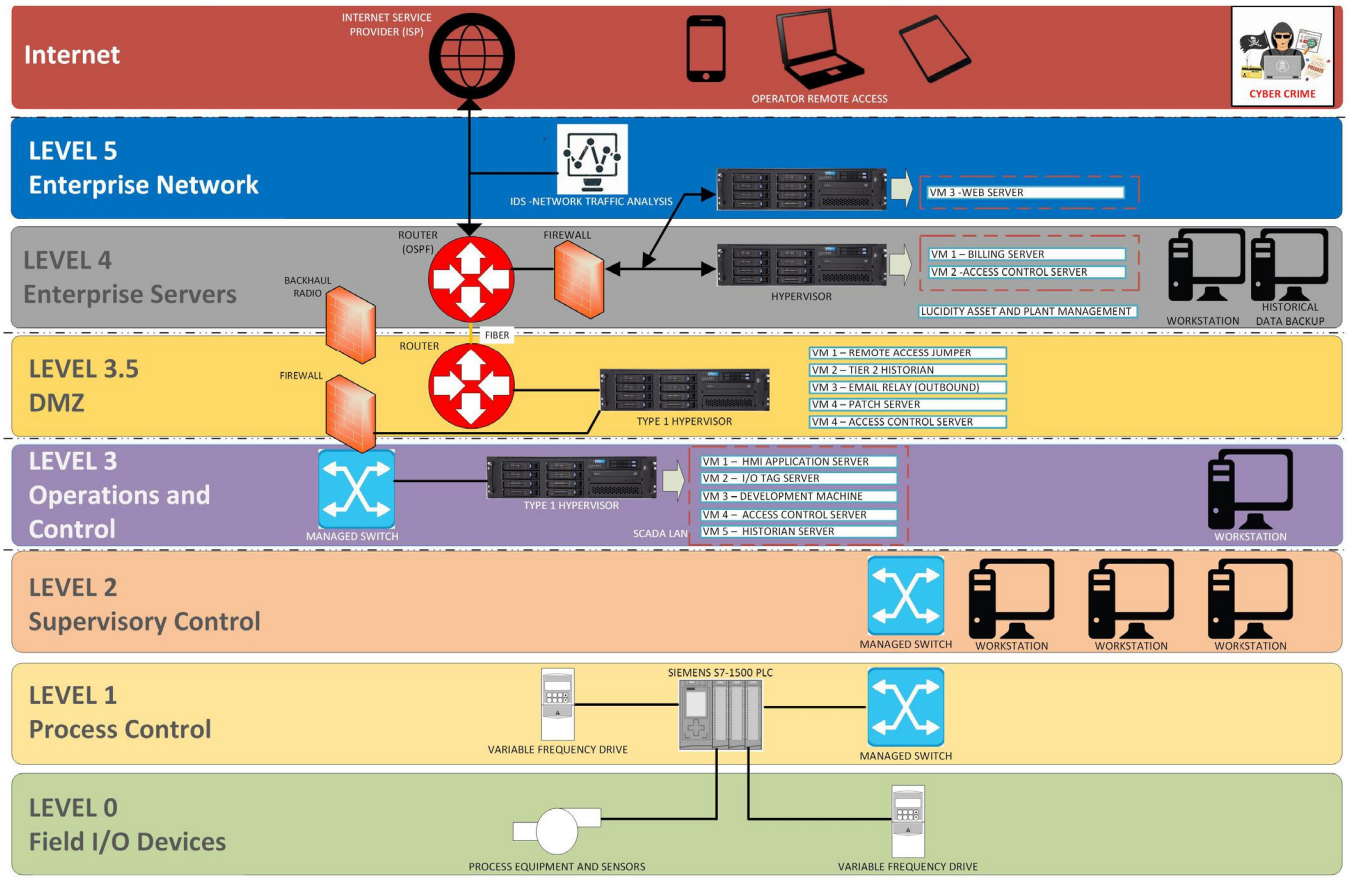


Figure 3. Purdue Diagram Example

TASK 5: CYBER AUDIT

The methodology used for the development of this cyber security assessment is based on the six steps contained in the ISA-62443 High Level Risk Assessment work flow process for the control system and design for isolation of IT and control system networks. This cyber security work plan includes the following:

1. Define the methodology for identifying risks
2. Identify risks
3. Define the methodology for assessing the priority of risks
4. Assess the priority of risks
5. Document the results and rationale
6. Involve stakeholders in steps 2 through 4: develop planning level vulnerability mitigations, full-time staff estimates, and incorporate recommendations into fiber optic design project

TASK 6: PHYSICAL SECURITY

Physical security is a foundational requirement in a cyber security program. A physical security assessment will be accomplished during the site visits and will focus on gaps in security monitoring (e.g., closed-curit television (CCTV) and Electronic Security System (ESS)) and deterrents (e.g., locks, fence, etc.) for access to site and control system.

TASK 7: ASSET MANAGEMENT PLANNING

The HDR team will schedule meetings with the City's Utilities Asset Management Specialist to develop a comprehensive spreadsheet of SCADA assets that can be entered into the City's Lucidity Asset Management Software. HDR will coordinate the required Lucidity inputs and spreadsheet layout for City staff use. Meetings throughout the projects will help define additional information necessary to update the Lucidity Database with SCADA asset inventory.

TASK 8: EVALUATE MAINTENANCE AND SERVICE CONTRACTS

HDR will create an inventory of the different hardware and software used in the plant and that are fit for maintenance. After an inventory is generated, service contracts that are currently in place will be evaluated for information including the service terms (e.g., length, provider responsiveness, etc.) the number of contracts the City currently has, and the different service/ maintenance providers that are used. This information will provide a foundation for understanding how future upgrades in the plant can eliminate the need for service contracts or to standardize plant equipment that would require fewer service contracts.

TASK 9: EVALUATE THIRD PARTY SYSTEMS

Third party systems add an extra level of planning for WWTP staff as additional coordination for service and maintenance is required. Key items in evaluating third party systems involve defining the current remote capabilities (if any), the types of support contracts in place, and the age of the system. Defining those parameters can help identify how service contracts are used and how beneficial they are. These parameters can be used as defining factors for third party system requirements in future projects.

Analyze Gaps

A gap analysis identifies the gaps and defines the work required to leverage or improve the current state to meet the requirements of the future state. Furthermore, a gap analysis can be used to identify how intensive the upgrades required to reach the future state will be. The fiber optic design, for example, will be evaluated for whether the plant's current ductbank system can support new fiber runs or if new conduits/ductbank will be required in the plant. Similarly, the control room evaluation will follow a similar approach where the new control room requirements for workstations, security equipment, and other new equipment, which will be compared against the existing infrastructure.

Workshop #2 Project Mid-Progress Review (In-Person)

The second workshop will be a 60% review. We will discuss progress to date, review the trajectory of the various tasks, and collect additional information as needed. We will also meet with the City's Utilities Asset Management Specialist again to review the data collected and progress on the development of the asset management spreadsheet.

Design and Technical Memorandum

A SCADA upgrades plan for the Persigo WWTP evaluation will involve recommendations detailing the current system's cyber security, control room, network architecture and infrastructure, and the steps required to achieve the City's vision for how those are to be structured in the future. The plan will include a detailed design of the fiber optic infrastructure to create a new fiber ring network within the plant.

The design will include detailed drawings suitable for construction and bidding and technical specifications, as applicable. Additionally, supplementary information for asset management will be provided in excel form, which will include a spreadsheet tailored for Lucidity Asset Management recordkeeping, PLC backup and replacement strategy, and a detailed hardware and software inventory spreadsheet with maintenance and service contract details.

Workshop #3 Final Review Workshop (In-Person)
The third workshop our team will facilitate will serve as deliverable, milestone for a 90% review of our plan, spreadsheets for PLC replacement, and Lucidity Asset Management inventory.

TASK 10: PROVIDE UPGRADE IMPLEMENTATION PLAN

- Deliverable #1 Design Documents: A design package for the fiber optic infrastructure will include construction drawings and technical specification. With information pertaining to the use of new infrastructure and con structure of new infrastructure within the plant
- Deliverable #2 Technical Memorandum: A technical memorandum will provide detailed recommendations on the tasks outlined below:
  - » Task 1 – Control room A/V recommendations on necessary upgrades for new control room
  - » Task 2 – Evaluation of SCADA network structure and efficiency
  - » Task 4 – PLC backup/replacement strategy including recommended schedules and spare parts
  - » Task 5/6 – Evaluation of cyber audit and physical security
  - » Task 8 – Maintenance and service contracts renewal date, service provider, service cost, and service terms
  - » Task 9 – Evaluation of third party systems including age, manufacturer, service contracts in place, remote capabilities, and future service contract needs
- Deliverable #3 Supplementary documentation/ spreadsheets
  - » Assess management planning spreadsheet with asset information to be e antered in Lucidity
  - » PLC backup/replacement planning spreadsheet with PLC replacement and backup schedules, equipment costs, recommended spare parts, and spare parts in current inventory.
  - » Hardware and software inventories with service contract details spreadsheet.

WHY HDR?

1. **New perspective from experienced professionals.** Our team of experienced professionals provides fresh perspectives and will be engaged and responsive throughout the Project.
2. **Dedicated and collaborative team of professionals.** The HDR team has a dedicated cyber security practice of professionals who work side-by-side with our automation and networking engineers and designers.
3. **In-depth knowledge in control systems and cyber security.** Our team has a deep understanding of the application of automation solutions with cyber security in multiple industries including water/ wastewater.
4. **Unwavering commitment to quality products.** We believe in delivering high quality deliverables that are easy to understand and review. HDR leverages resources to execute a project efficiently and effectively.

D

REFERENCES

D. References

CLIENT CONTACT

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Ted Morrison, IT Services Manager
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CLIENT ADDRESS

4049 N 75th St., Boulder, Colorado 80301

PROJECT DATES

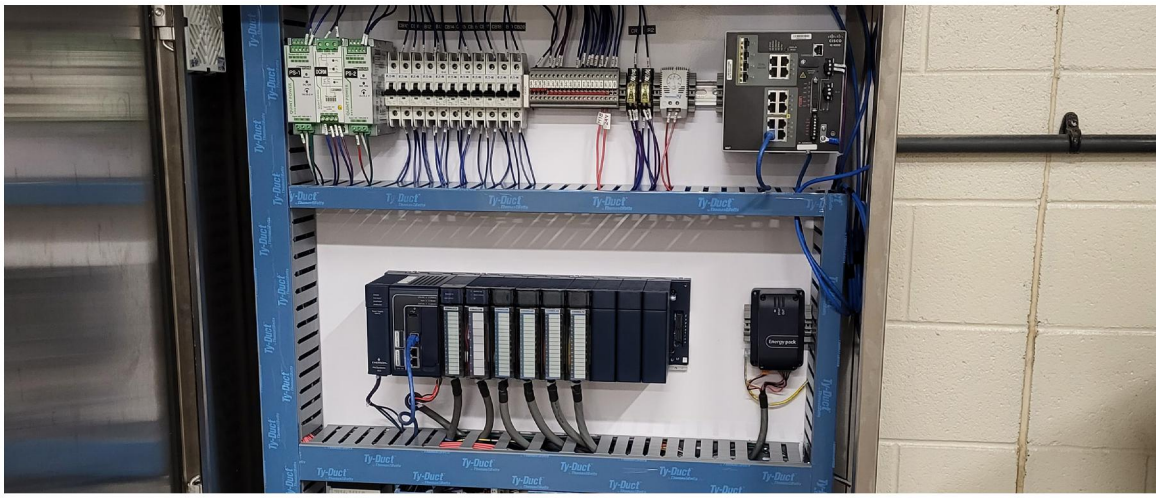
Start: November 2019
Estimated Completion: May 2023

PROJECT BUDGET

$236,510 (Design Fee)

KEY TEAM MEMBERS

Travis Moore: Design Manager
Bill Cassity: I&C Engineer
Nohemi Almaraz: HMI Programming and Commissioning
Casey Oppegard: PLC Programming, Project Coordination, Server Visualization, On-Site Start-up/Commissioning
Andrew Burton: Software Developer and Testing Team
Josie Brahler: PLC and HMI Programming



Process Automation System (PAS) Improvements and Construction Management

City of Boulder | *Boulder, CO*

The City of Boulder owns and operates the Boulder Water Resource Recovery Facility (WRRF) which treats an average of 12 million gallons per day (MGD) of wastewater. The facility, originally placed online in 1968, has expanded through regular upgrades. The PAS project will address the remainder of the improvements identified in the City's strategic plan. HDR was selected to design the physical improvements to the PAS and complete the systems integration and programming throughout the WRRF, including:

- Separation of 480V and controls wiring to improve operator safety
- Extending fiber optic communication to new areas of the facility
- Replacement of aging local control panels and replacing old SLC 505 PLCs with new GE Rx3i PLCs for their polymer and truck loading systems to meet the facility's current standards
- Replacement of old DeviceNet communication for motor control centers were upgraded to new ProfiNet communication structure

A major focus of this project was to minimize disruption of the day-to-day operations. New SCADA servers were provided and setup to replace aging servers and add reliability to operations. HDR worked closely with Boulder staff and developed detailed construction sequencing plans to help lessen construction impacts throughout project implementation. The SCADA servers were also upgraded to a virtualized environment. HDR performed programming of the PLCs, HMIs, virtualization, and other system integration tasks.

The I&C scope of work on the project included:

- A variety of automation upgrades including polymer conversions for Dissolved Air Flotation Thickening (DAFT) and dewatering
- The polymer conversion phase including rewriting the polymers programs in GE PLC language to optimize polymer operations
- Truck unloading design and programming, motor control center (MCC) conversions and virtualization of SCADA servers and machines using Type1 hypervisors.

CLIENT CONTACT

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Ted Morrison,
IT Services Manager
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morrisont@
bouldercolorado.gov

CLIENT ADDRESS

1739 Broadway, Floor 2,
Boulder, Colorado 80302

PROJECT DATES

Start: March 2019
Estimated Completion:
2025 (construction)

PROJECT BUDGET

$3.1M (Design Fee)

KEY TEAM MEMBERS

Travis Moore: Electrical Design Manager
Bill Cassity: I&C Engineer
Nohemi Almaraz: I&C Designer
David Brearley: Cyrbersecurity Subject Matter Expert
Casey Oppegard: QA/QC

63rd Street Water Treatment Facility Campus Electrical and High Service Pump Station (HSPS) Improvements

City of Boulder | *Boulder, CO*

The 63rd Water Treatment Facility (WTF) was constructed in 1969, and much of its existing infrastructure is nearing, or beyond, its anticipated useful life. In particular, the HSPS, major electrical equipment, raw water pump station, and a number of PLC-based control systems throughout the facility are obsolete and difficult to find replacement parts for routine maintenance and repair. This project provides a unique opportunity for the City to address other safety and reliability issues at the 63rd WTF.

As part of the project, HDR addressed the following issues:

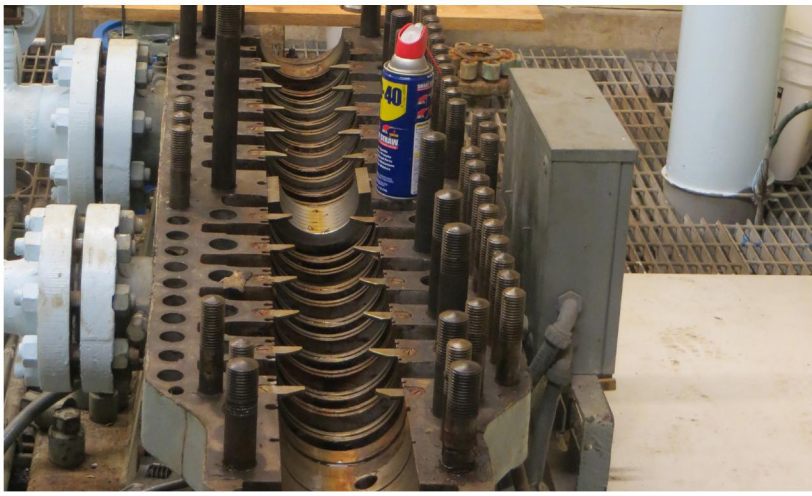
- Cyber-attack response plan
- Evaluation of alternatives for replacement of the HSPS, including:
  - Developing a plan to replace the pump station while allowing half the existing HSPS to remain in service throughout construction
  - Providing a backup washwater supply for additional process reliability
  - Improving isolation and draining of suction and discharge headers to facilitate long-term maintenance
  - Adding surge control to protect the HSPS from transient events
- Rehabilitation of the Raw Water Strainer and Raw Water Pump Station, including:
  - Replacement of aging valves and flexible connections
  - Refurbishment of raw water pumps
  - Replacement of the RWPS electrical equipment

In addition, the 63rd WTF does not have full backup power, making the water supply vulnerable to extended power outages. Electrical services provided included:

- Replacement of the electrical equipment
- Primary power improvements
- Refurbishment of the medium-voltage primary switchgear and reconfiguration to a main-tie-main configuration for improved reliability and redundancy while maximizing use of existing infrastructure
- New backup generator
- Looping the site-wide electrical system for additional reliability and redundancy
- Instrumentation and controls improvements

The HDR team also provided a number of control system improvements, including:

- Provided existing fiber infrastructure to be a fiber ring (loop)
- Active control of third party solar array to prevent the array from operating when utility power is lost and emergency generator is operating



CLIENT CONTACT
Chris Carpenter, PE, PMP,
Portfolio Manager,
Civil Engineer
720.429.6190
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CLIENT ADDRESS
12795 W Alameda
Pkwy, Lakewood,
Colorado 80228

PROJECT DATES
Start: June 2021
Completion: July 2022

PROJECT BUDGET
$423,638 (Design Fee)

KEY TEAM MEMBERS
Travis Moore:
Senior Electrical Engineer
Bill Cassity:
Lead I&C Engineer
Nohemi Almaraz:
I&C Designer
David Brearley: Cyber Security Subject Matter Expert
Casey Oppegard:
QA/QC
Josie Brahler: SCADA Systems Deployment

Grand Canyon SCADA Communication Replacement Design

National Park Service | *Grand Canyon, AZ*

HDR has performed predesign and schematic design services to upgrade and replace the existing SCADA system and initiate park-wide communications systems improvements.

The current SCADA system for the Grand Canyon National Park is a custom design that employs Think & Do software with Koyo PLCs to govern the water and wastewater systems, but uses various media to communicate due to the remoteness and varied geography of the Park's location. The Think & Do system has many disadvantages. If communication failure occurs the system will not function. Trouble-shooting is difficult to perform and it is challenging to correct system failures. The current 5.5 version of Think & Do is obsolete and no longer supported by Microsoft. Version 8.0 is available but the graphics would have to be recreated and reanimated. The current system is not well supported by system integrators that are local to the Grand Canyon.

HDR has performed desktop radio path studies, evaluated SCADA software platforms through the NPS value-based decision-making processes, and has implemented the Department of Interior's software and IT security requirements.

HDR has also performed integration services that design and implement a fully functional system for the Indian Garden pumping system and the various South Rim water storage components related to the operation of the water storage and distribution system. Specific tasks have included:

- The procurement of the InduSoft Web Studio 8.1+SP3 software
- Programming and setup of PLC & HMI for IG and S Rim water systems
- Performing in-house bench testing and factory acceptance testing
- Deployment of SCADA software and hardware

CLIENT CONTACT
Jon Coyle
303.815.2957
jcoyle@erieco.gov

CLIENT ADDRESS
501 State Highway 52,
Erie, CO 80516

PROJECT DATES
Design: March 2018 - June 2020
Estimated Construction Completion: June 2023

PROJECT BUDGET
$256,000 (Master Plan Fee)
$2.2M (Design Fee)

KEY TEAM MEMBERS
Travis Moore: Planning and Project Strategy
Bill Cassity: I&C Engineer
Casey Oppegard: Server Virtulalization
Andrew Burton: PLC Programming
Josie Brahler: PLC & HMI Programming and Commissioning

North Water Reclamation Facility Expansion Plan and Design

Town of Erie | *Erie, CO*

In 2018, the Town of Erie retained HDR to produce a master plan that resulted in an upgrade and expansion design to increase the rated treatment capacity and meet more stringent biosolids quality limits. The project includes expanding the existing treatment capacity at the NWRF as well as incorporating a new biosolids stabilization system.

Town of Erie's North Water Reclamation Facility (NWRF) is currently a 1.95 MGD biological nutrient removal plant which uses lime/pasteurization stabilization for a biosolids stabilization system. The Town of Erie has seen tremendous population growth over the past several years, placing a strain on the existing treatment capacity of NWRF.

HDR's planning efforts for this project included capacity evaluation of the facility's infrastructure for both liquid treatment and solids handling including a long-term biosolids stabilization study to determine the most viable and sustainable solution for solids stabilization at the NWRF. The design includes an increase of the rated treatment capacity by adding a third IFAS liquid treatment train and expansions of the two existing treatment trains. The long-term biosolids stabilization study resulted the design of a new Autothermal Thermophilic Aerobic Digestion facility, with new thickening, dewatering, and solids storage.

HDR also performed the PLC and HMI programming and wrote the process control programming for the entire plant with high performance HMI screens to allow for operator information and control to be implemented into plant operations. The system is virtualized for the HMI servers with a redundant HMI server architecture. The programming for this project were unique in that the facility required multiple temporary phases while construction was ongoing. Various sections of the original plant needed to remain running as they were previously but now in conjunction with new sections of the plant. The PLC and HMI were adjusted constantly to incorporate this need and the requests of the operators.

The improvements design concluded the fall of 2020. Construction is scheduled to be complete by June 2023. A Construction Manager At-Risk project delivery is being used to build the design. This infrastructure investment utilizes the latest proven technologies and protects the environment by meeting anticipated future permit limits.

SCADA Master Plan and Program Implementation

Union County Water | *Union County, NC*

CLIENT CONTACT
John Shutak, Director of Engineering,
704.993.0465
john.shutak@
unioncountync.gov

CLIENT ADDRESS
500 North Main St.,
Monroe, NC 28112

PROJECT DATES
Start: June 2016
Estimated Completion: 2026

PROJECT BUDGET
$3.4M with an additional $1.8M pending (fee for all professional service provided, planning through construction administration)

KEY TEAM MEMBERS
David Brearley:
I&C Engineer

Union County partnered with HDR to develop a master plan to address the modernization of their current SCADA system with the goal of building a scalable SCADA system that could be leveraged to increase operational awareness and improve service to the County's customers. Objectives included: build a self-supporting operational technology group, correct instability issues, replace obsolete equipment and reduce dependency on proprietary equipment, optimize operations and maintenance, and improve security and data management.

The planning process started with a detailed inventory and current state assessment to baseline the County's existing SCADA system. Through a series of workshops, HDR worked with multiple stakeholders including members of executive management, information technology, operations, and maintenance to define the system requirements for the future state of their SCADA system.

The gap analysis focused on defining where the existing system can meet the defined requirements, either through minor configuration changes or more substantial project work. Where the systems did not meet the defined requirements, the gap was used to define improvements to the current system.

HDR developed a master plan to be executed in two phases with higher priority improvements scheduled for completion in five years and lower priority improvements scheduled for completion in 7 - 10 years. The plan included 32 projects essential to modernizing the County's SCADA system in 10 categories of related work:

1. Operational Technology Organization
2. SCADA System Network Improvements
3. Control System Policies and Standards
4. Collection and Distribution System Improvements
5. WWTP SCADA System Improvements
6. Network Access Improvements
7. Disaster Recovery
8. Control System Maintenance
9. Enterprise Integration
10. SCADA System Operational Enhancements

HDR helped the County implement high priority improvements, including development of standards, SCADA network architecture improvements, telemetry system improvements, RTU replacement, alarm management, obsolete equipment replacement, and disaster recovery. To date, HDR has developed a comprehensive set of master specifications as well as standards and conventions to promote the consistent delivery of process control and SCADA system projects. HDR has also completed the design of a county-wide SCADA system network to allow for secure monitoring and control from central and backup locations including the build-out of a training, testing, and validation center.

CLIENT CONTACT
Bob Reiss, Project Manager
605.939.5503,
robert_reiss@nps.gov

CLIENT ADDRESS
601 Riverfront Dr.,
Omaha, NE 68102

PROJECT DATES
Start: July 2020
Completion:
October 2021

PROJECT BUDGET
$361,000 (Design Fee)

KEY TEAM MEMBERS

Travis Moore: QA/QC
Bill Cassity: I&C Engineer
Nohemi Almaraz: I&C Designer

Hot Springs National Park SCADA Design

National Park Service | *Hot Springs, AR*

HDR provided the National Park Service with their goal of preservation and protection of critical and historical assets at the Hot Springs National Park in Hot Springs, Arkansas. This project included SCADA Design and other project work elements.

Hot Springs National Park is a 5,500-acre area that preserves geothermal spring water and resources and includes historic structures, cultural landscapes, and natural settings. The water system encompasses six different sites including thermal water, spring water, and potable water systems.

The first work element was to replace antiquated control equipment with new SCADA equipment designed to monitor and control the functions and operations of the Park's water systems. The new SCADA system design allows the National Park Service to monitor and control all water system functions and operations. The new SCADA system that was designed is in compliance with the EPA and the State of Arkansas' design standards. SCADA efforts included:

- Development of a demolition plan for existing antiquated remote monitoring equipment within the Park water systems and replacement of that equipment.
- Design of a new SCADA system to provide operational control over the entire water system including cooling system operations, storage reservoir level control, pump/ controls, monitoring of conditions and providing control over water treatment systems (ozone disinfection) and the distribution system.
- Submission of a permit package for the State of Arkansas to construct the SCADA project.
- Communication upgrades including wireless telemetry and single mode fiber optic system.

This project also included construction management work to support the project during construction.

DESIGN BUDGET

E. Design Budget

HDR is pleased to present the estimated project budget below. The project Services are offered on a Time & Materials basis, with a total Not-To-Exceed amount of $189,370. HDR will invoice monthly for work performed in the previous month. The total fee listed below will not be exceeded unless agreed between the City and HDR through a change order. HDR will manage the project budget on an overall basis, and may shift time/effort between tasks as necessary for completion of the project. Billing rates listed are 2023 rates, and it is assumed that the project will be completed in calendar year 2023. Rates for years beyond 2023 will be negotiated with the City as needed.

ROLE	Project Manager	Assistant Project Manager & Fiber Optic Advisor	QA/QC & Technical Advisor	Cyber Security	Western Colorado Liaison	Networking Lead	Networking	PLC/HMI Specialists	PLC/HMI Specialists	CAD	Quality/Records	Accounting	Travel, Vehicle Mileage, and Misc. Direct Expenses	Total Fee
NAME	Travis Moore	Nohemi Almaraz	Bill Cassity	David Brearley	Michael Goolsby	Casey Oppegard	Tanner Smith	Josie Brahler	Andrew Burton	Nicole Lynch	Project Admin	Project Accountant	N/A	**N/A**
BILLING RATE	$275	$150	$275	$300	$225	$200	$135	$135	$135	$133	$85	$120		
PROJECT MANAGEMENT														
Accounting												16		$ 1,920
Quality Records Control											6			$ 510
Project Management	40	40												$ 17,000
TECHNICAL TASKS														
Task 1		8	8	4		16	16							$9,960
Task 2			8	20		40	20							$18,900
Task 3		80	8			20				120				$34,160
Task 4		8	8					20	20					$8,800
Task 5 & 6			8	60			20	40						$28,300
Task 7		16	8			16								$7,800
Task 8		8	8			8		8	8					$7,160
Task 9		10	8	10		10								$8,700
Task 10		8	8			16		40						$12,000
Meetings/Workshops/Site Visits		40	8	24	4	40	12	12	12					$34,160
HOURS SUBTOTAL	40	218	80	118	4	166	68	120	40	120	6	16	N/A	**996**
FEE SUBTOTAL	$11,000	$32,700	$22,000	$35,400	$900	$33,200	$9,180	$16,200	$5,400	$15,960	$510	$1,920	$5,000	**$189,370**

ADDITIONAL DATA

F. Additional Data

PROJECT ASSUMPTIONS

- The fiber ring design will not involve the medium-voltage equipment.
- The fiber ring design will be solely of process buildings inside the Persigo WWTP and future locations.
- The fiber optic ring design will include construction-level information fit for construction bidding by the City, including drawings and technical specifications as applicable.
- Control Room A/V recommendations do not include design.
- Other scope items in this project will result in recommendation- or documentation-level information in a technical memorandum but not construction-ready documents.
- The City will facilitate staff to open control panels, buildings and other plant equipment during the plant walk through for data collection.
- The City will provide as-built AutoCAD files of existing infrastructure to assist in the fiber ring design.
- The project execution schedule will be developed in collaboration with the City, and the schedule depends in part on City staff schedules and availability.
- Three in-person workshops with City staff are assumed. Other meetings will be via telephone or video conference.
- The following items are not included in this proposal, but can be provided as additional services if desired by the City:
  - » Construction cost estimating.
  - » Bidding-phase and construction-phase services.
  - » Preparation of Division 0 or Division 1 construction contract documents. It is assumed that these “front-end” documents will be prepared as required by the City.
  - » Detailed design of the scope items in addition to the fiber optic ring design.
  - » PLC/HMI implementation, programming, and configuration.

PROPOSED MODIFICATIONS TO CONTRACT LANGUAGE

HDR and the City of Grand Junction have entered into similar contract agreements in the past. We look forward to discussing our contractual exceptions and suggestions during negotiations. Additional suggested language to the agreement or scope of work is outlined below.

- **Operational Technology Systems.** Owner agrees that the effectiveness of operational technology systems ("OT Systems") and features designed, recommended or assessed by Firm are dependent upon Owner's continued operation and maintenance of the OT Systems in accordance with all standards, best practices, laws, and regulations that govern the operation and maintenance of the OT Systems. Owner shall be solely responsible for operating and maintaining the OT System in accordance with applicable industry standards (i.e. ISA, NIST, etc.) and best practices, which generally include but are not limited to, cyber security policies and procedures, documentation and training requirements, continuous monitoring of assets for tampering and intrusion, periodic evaluation for asset vulnerabilities, implementation and update of appropriate technical, physical, and operational standards, and offline testing of all software/firmware patches/updates prior to placing updates into production. Additionally, Owner recognizes and agrees that OT Systems are subject to internal and external breach, compromise, and similar incidents. Security features designed, recommended or assessed by Firm are intended to reduce the likelihood that OT Systems will be compromised by such incidents. However, Firm does not guarantee that Owner's OT Systems are or will be impenetrable and Owner agrees to waive any claims against Firmresulting from any such incidents that relate to or affect Owner's OT Systems.

- **Mutual Waiver of Consequential Damages.** Neither Party to this Agreement shall be liable to the other Party or any entity claiming by or through the other Party for any special, incidental, indirect, or consequential damages (including but not limited to loss of use or opportunity; loss of good will; cost of substitute facilities, goods, or services; cost of capital; and/or fines or penalties), loss of profits or revenue arising out of, resulting from, or in any way related to the Project or the Agreement from any cause or causes, including but not limited to any such damages caused by the negligence, errors or omissions, strict liability or breach of contract, or warranty -- express or implied.

- **Allocation of Risk.** Allocation of risks and limitations of remedies under this Agreement are business understandings between the parties and shall apply to all theories of recovery, including but not limited to breach of contract or warranty (express or implied), tort (including but not limited to negligence), strict or statutory liability, or any other cause of action. Notwithstanding any other provision of this Agreement, and to the fullest extent permitted by law, the total liability, in the aggregate, of Firm and Firm's officers, directors, members, partners, agents, employees, and subconsultants to Owner and anyone claiming by, through, or under Owner for any and all claims, losses, costs, or damages whatsoever arising out of, resulting from, or in any way related to the Project or the Agreement from any cause or causes, including but not limited to the negligence, professional errors or omissions, strict liability, breach of contract, indemnity obligations, or warranty, express or implied, of Firm or Firm's officers, directors, members, partners, agents, employees, or subconsultants, shall not exceed the lesser of Firm's fee under this Agreement or $1,000,000.

APPENDIX A: RESUMES

Travis Moore, PE

Project Manager

Industry Tenure: 23 Years

Travis is a senior electrical engineer and project manager, and routinely leads electrical and control system design teams on complex projects. A significant amount of his project experience is in municipal, governmental, and private industrial water and wastewater systems. Travis is known for reliable and uncomplicated designs and clients often appreciate his ability to explain electrical and control systems in simple and easy-to-understand terms.

RELEVANT PROJECT EXPERIENCE

City of Boulder, 63rd Street Water Treatment Facility Campus Electrical and High Service Pump Station Improvements, *Boulder, CO*

Role: Electrical Design Manager. HDR is assisting the City of Boulder in the 63rd Street Water Treatment Facility (WTF) Campus Electrical & High Service Pump Station (HSPS) Project. We are addressing aging infrastructure in the electrical and control systems, in parallel with the process and pumping systems. The project includes cyber security assessments, integration of solar power with standby power systems, and planning for future enhanced plant automation. Travis led the full electrical design, working in close coordination with HDR's control system and automation team.

City of Boulder, Process Automation System Improvements and Construction Management, *Boulder, CO*

Role: Design Manager. The City of Boulder owns and operates the Boulder Water Resource Recovery Facility which treats an average of 12 MGD of wastewater. The facility, originally placed online in 1968, has expanded through regular upgrades. The Process Automation System (PAS) Phase II Upgrades Project addresses improvements identified in the City's control system strategic plan. HDR was selected to design the physical improvements to the PAS and complete the system's PLC and SCADA integration and programming. Travis led the design phase of the project and is the engineer of record.

National Park Service, Grand Canyon SCADA Communication Replacement Design and Infrastructure Engineering, *Grand Canyon, AZ*

Role: Electrical Design Manager. Travis led the overall electrical designs and is the electrical engineer of record for the helibase and South Rim and Phantom Ranch water treatment plants in the Transcanyon Waterline project. The electrical design team closely coordinated with the instrumentation and controls team on this complex project.

City of La Junta, Critical Infrastructure Distributed Generation, *La Junta, CO*

Role: Project Manager. HDR designed standby generator systems for seven water system sites including well fields, the reverse osmosis water treatment plant, and a series of pressure booster stations. The designs include engine-generators, automatic transfer switches, outdoor equipment foundations, interface with utility systems and La Junta systems, and additional electrical upgrades for long-term reliability at selected sites. The generators range from 45kW to 900kW. Travis managed the project and is the engineer of record.

EDUCATION

Bachelor of Science, Electrical Engineering, Colorado School of Mines

Masters of Science, Electrical Engineering, Colorado School of Mines

REGISTRATIONS

Professional Engineer, Colorado, No. 38135

OFFICE

Denver, CO

Bill Cassity, PE

QC/QC and Technical Advisor

Industry Tenure: 30 Years

Bill is a knowledgeable, energetic, and focused Professional Electrical Engineer with experience in control systems integration, electrical engineering, and project management. Major strengths include project design planning, initiation, and management. Skilled in budgeting, team building, programming, and assessing and managing risk, Bill has extensive experience in PLC-based SCADA control systems. Bill is recognized for an excellent record of accomplishments delivering projects on time and on budget - a record supported by his many satisfied customers.

EDUCATION

Bachelor of Science, Electrical Engineering, California State University, Sacramento

REGISTRATIONS

Professional Engineer, Colorado, No. 50957

OFFICE

Denver, CO

RELEVANT PROJECT EXPERIENCE

City of Boulder, 63rd Street Water Treatment Facility Campus Electrical and High Service Pump Station Improvements, *Boulder, CO*

Role: I&C Engineer. HDR is assisting the City of Boulder, Colorado (City) in the 63rd Street Water Treatment Facility (WTF) Campus Electrical & High Service Pump Station (HSPS) Project. By addressing aging infrastructure for the main electrical system, HSPS, raw water pump station, and other facilities at the 63rd WTF, we are working to eliminate single points of failure in the water supply and restore a 30-year service life to the facility. HDR developed a plan to replace the pump station while allowing half the existing HSPS to remain in service throughout construction.

City of Boulder, Process Automation System Improvements and Construction Management, *Boulder, CO*

Role: I&C Engineer, Lead Programmer. The City of Boulder owns and operates the Boulder Water Resource Recovery Facility which treats an average of 12 MGD of wastewater. The facility, originally placed online in 1968, has expanded through regular upgrades. The Process Automation System (PAS) Phase II Upgrades Project will address the remainder of the improvements identified in the City's strategic plan. HDR was selected to design the physical improvements to your PAS and complete the systems integration and programming. A major focus of this project will be to minimize disruption of the day-to-day operations. HDR worked closely with Boulder staff to develop detailed construction sequencing plans to help lessen construction impacts as the project is implemented.

National Park Service, Grand Canyon SCADA Communication Replacement Design, *Grand Canyon, AZ*

Role: I&C Engineer, Electrical Engineer, Lead Programmer. The Indian Gardens Pump Station consists of three pumps housed within two historically significant structures. This pump station is a part of the larger Trans-Canyon Waterline system and lifts water 3,300-feet from within the canyon to the South Rim where it supplies potable water to Grand Canyon National Park's 5 million annual visitors and 3,000 permanent residents on the South Rim. The scope of the project was to replace the existing pumps No.1 and No. 2 in the north pump house as these pumps are beyond their service life and have had long periods of being inoperable. The project scope also included upgrades to the SCADA and radio communications systems. Construction logistics and the unique constructability requirements of delivering two 10,000 lb pumps to a site within the Grand Canyon played a significant role in the design approach. Equipment selection required assessment of helicopter load capacities and flight coordination to address environmental compliance requirements associated with the California Condor and maintaining visitor safety. Design activities included SDs, DDs, CDs, and Title III (construction) services.

Nohemi Almaraz, EIT

Assistant Project Manager and Fiber Optic Advisor

Industry Tenure: 4 Years

Nohemi is an engineering in tranining (EIT) with experience in I&C design, SCADA programing, and commissioning. Nohemi strives to include project stakeholders including information technology, operation technology, operations, and I&C engineers, of who are involved in project design and construction to provide optimal project execution and communication. Nohemi has worked very closely with the City of Boulder in the control panel improvements at the Water Resource Recovery Facility and adding network resiliency (Fiber loops) to one of the two Water Treatment Facilities in the City for future implementation of remote operations.

EDUCATION

Bachelor of Science, Civil Engineering, Colorado School of Mines

Masters of Science, Civil and Environmental Engineering, Colorado School of Mines

OFFICE

Denver, CO

RELEVANT PROJECT EXPERIENCE

City of Boulder, Process Automation System Improvements and Construction, *Boulder, CO*

Role: HMI Programming and Commissioning Lead. HDR was selected to design the physical improvements to the PAS and complete the systems integration and programming throughout the WRRF, including separation of 480V and controls wiring to improve operator safety, extending fiber optic communication to new areas of the facility, replacement of aging local control panels, and replacing old Allen Bradley PLCs with new GE PLCs to meet the facility's current standards. A major focus of this project is to minimize disruption of the day-to-day operations. New SCADA servers were provided and setup to replace aging servers and add reliability to operations. HDR is worked closely with City staff to develop a detailed construction sequencing plan to help lessen construction impacts as the project is implemented. The SCADA servers were upgraded to virtualized in environment. HDR performed all programming of the PLCs, HMIs, virtualization, and other system integration tasks.

National Park Service, Grand Canyon SCADA Communication Replacement Design, *Grand Canyon, AZ*

Role: I&C Designer and SCADA Commissioning Support. HDR has performed predesign and supplemental services to upgrade and replace the existing SCADA system and initiate park-wide communications systems improvements. Through that process, HDR has performed desktop radio path studies, evaluated SCADA software platformed through the NPS value-based decision-making processes, and has implemented the Department of Interior's software and IT security requirements. HDR has performed integration services that design and implement a fully functional system for Indian Garden pumping system and the various South Rim water storage components related to the operation of the water storage and distribution system.

City of Boulder, 63rd Street Water Treatment Facility Campus Electrical and High Service Pump Station Improvements, *Boulder, CO*

Role: I&C Designer. HDR is assisting the City of Boulder in the 63rd Street Water Treatment Facility (WTF) Campus Electrical & High Service Pump Station (HSPS) Project. By addressing aging infrastructure for the main electrical system, HSPS, raw water pump station, and other facilities at the 63rd WTF, we are working to eliminate single points of failure in the water supply and restore a 30-year service life to the facility. HDR developed a plan to replace the pump station while allowing half the existing HSPS to remain in service throughout construction.

David Brearley, GICSP, PMP

Cyber Security Lead

Industry Tenure: 20 Years

David is a senior professional associate and the operational technology cyber security director at HDR in Charlotte, North Carolina. David has nearly 20 years of international experience in providing IT and OT (operational technologies/industrial controls) solutions, services, and consulting. In providing hands-on configuration, assessment, design, and consulting services, his experience covers the comprehensive control system life cycle. David has experience in all 16-critical infrastructure sectors including extensive implementation experience in water/wastewater and power sectors (hydro, solar, wind, natural gas, fossil fuels, and BES systems). David is motivated by helping improve the security awareness and risk posture for HDR's cross-sector clients.

RELEVANT PROJECT EXPERIENCE

National Park Service, Grand Canyon SCADA Communications Replacement Design and Improvements, *Grand Canyon, AZ*

Role: Cyber Security Subject Matter Expert. HDR has performed predesign and supplemental services to upgrade and replace the existing SCADA system and initiate park-wide communications systems improvements. Through that process, HDR has evaluated SCADA software platformed through the NPS value-based decision-making processes, and has implemented Department of Interior's software and IT security requirements. HDR has performed integration services that design and implement a fully functional system for the various water components related to the operation of the water storage and distribution system. The design of the communication systems that allow data interchange between the new SCADA system and related equipment (cameras). The design is a multiple Ethernet path system with fiber link from the South Rim WWTP to the Hopi Point Communications site. Additionally, there will be a 450 MHZ backup radio communication system for critical water stations.

City of Boulder, 63rd Street Water Treatment Facility Campus Electrical and High Service Pump Station Improvements, *Boulder, CO*

Role: Cyber Security Subject Matter Expert. The 63rd WTF was constructed in 1969, and much of its existing infrastructure is nearing, or beyond, its anticipated useful life. HDR provided analysis of the existing pumps and developed a new operating curve based on system-wide hydraulic modeling, which included a transient analysis. The new pumping station will have a capacity of 20 MGD and will be installed in phased approve leaving the original pumps in operation during construction and start-up of the new system.

Copper Mountain Metropolitan District, AWIA Risk and Resilience Assessment, *Frisco, CO*

Role: Cyber Security Subject Matter Expert. Conducted an risk and resilience assessment for the Copper Mountain Metropolitan District water and wastewater systems, including treatment facilities, storage tanks, pump stations and pipelines. The primary objective of this project was to identify and prioritize risks and provide guidance to support decisions by the utility in allocating resources to risk-reduction initiatives.

EDUCATION

Bachelor of Science, Computer Engineering, University of South Carolina

REGISTRATIONS

Project Management Professional, US, #1327838

OSHA 30 Hour Construction Safety, US

Global Industrial Cyber Security Professional (GICSP), US, #3034

ISACA Certified Information Systems Manager (CISM) #221919132

OFFICE

Columbia, SC

Casey Oppegard, PE

Networking Lead

Industry Tenure: 11 Years

Casey has experience in the field of instrumentation and control systems along with system integration in the water/wastewater, pharmaceutical, and oil and gas industries. He has designed and commissioned PLC and HMI programming as well as plant-wide SCADA systems, virtualization servers, and automation networks.

EDUCATION

Bachelor of Science, Electrical Engineering, University of Nebraska-Lincoln

REGISTRATIONS

Professional Engineer, Colorado, No. 60188

OFFICE

Denver, CO

RELEVANT PROJECT EXPERIENCE

City of Boulder, 63rd Street Water Treatment Facility Campus Electrical and High Service Pump Station Improvements, *Boulder, CO*

Role: QA/QC. The 63rd WTF was constructed in 1969, and much of its existing infrastructure is nearing, or beyond, its anticipated useful life. In particular, the high service pump station (HSPS), major electrical equipment, raw water pump station, and several PLCs throughout the facility are obsolete and difficult to find replacement parts for routine maintenance and repair. The 63rd WTF is fed from a single substation, and does not have full backup power, making the water supply vulnerable to extended power outages. HDR provided analysis of the existing pumps and developed a new operating curve based on system-wide hydraulic modeling, which included a transient analysis. The redesign includes new suction and discharge header pipe, pump control valves, and surge tanks. The system is being physically tested in a lab before completing the design to make sure all elements of flow meet Hydraulic Institute requirements. The new pumping station will have a capacity of 20 MGD and will be installed in phases, leaving the original pumps in operation during construction and start-up of the new system.

City of Boulder, Process Automation System Improvements and Construction Management, *Boulder, CO*

Role: PLC Programming, Project Coordination, Server Virtualization, On-Site Start-up/ Commissioning. Assisting in questions and problems arising from PLC development. The Process Automation System (PAS) Phase II Upgrades Project will address the remainder of the improvements identified in Boulder's strategic plan. HDR was selected to design the physical improvements to the PAS and complete the systems integration and programming throughout the WRRF, including separation of 480V and controls wiring to improve operator safety, extending fiber optic communication to new areas of the facility, replacement of aging local control panels, and replacing old SLC 505 PLCs with new GE Rx3i PLCs to meet the facility's current standards. A major focus of this project is to minimize disruption of the day-to-day operations.

Town of Erie, North Water Reclamation Facility Expansion Plan and Design, *Erie, CO*

Role: Server Virtualization. Due to rapid growth in the Town of Erie, the North Water Reclamation Facility (NWRF), constructed in 2011, experienced significant capacity constraints. After our responsive, quality work on the Town NWRF Expansion Master Plan, HDR led the design that will increase the liquid treatment capacity and added a new solids treatment process to accommodate growth for the next 20 years. The long-term biosolids stabilization study resulted in the design of a new Autothermal Thermophilic Aerobic Digestion (ATAD) facility, with new thickening, dewatering, and solids storage (including expansion of the IFAS system, surface wasting, EBPR, headworks improvements, new screw press dewatering, and ferric addition for phosphorus sequestration in the solids).

Tanner Smith

Networking

Industry Tenure: 9 Years

Tanner has experience as an IT professional supporting, maintaining, building, and upgrading a wide range of computer systems and networks. Tanner is a high skilled technology problem solver who leverages his unique background in both CIS and Criminal Justice to help investigate and solve technology issues. Tanner's first 4 years at HDR was with the Mountain West team of HDR's Information Technology Group. Tanner helped with a HDR project collaboration site to install HDR's network infrastructure equipment, and worked with the local ISP on a new fiber line install.

RELEVANT PROJECT EXPERIENCE

National Park Service, Grand Canyon Communications Replacement Design, *Grand Canyon, AZ*

Role: Network Design. The design of the communication systems that allow data interchange between the new SCADA system and related equipment. The design shall be a multiple ethernet path system with fiber link from the South Rim WWTP to the Hopi Point communications site. Additionally, there will be a 450 MHZ backup radio communication system for critical water stations.

HDR, IT Support Specialist, *Denver, CO, 2018-2022*

Role: Support daily on-site IT operations for over 400 users. Additional projects included multiple office relocations in Colorado, multiple network equipment refreshes in Colorado & Wyoming, multiple project site IT setups, and on-site support for an industry convention with over 1,000 attendees in Omaha, NE.

MergerTree Solutions, IT Support Specialist, *Houston, TX, 2013-2018*

Role: Support daily on-site IT operations for over 100 users (prior to joining HDR). Developed an autonomous system for OS deployment of new laptops. Maintained and administered computer networks and related computing environments, including workstations, servers, and software systems.

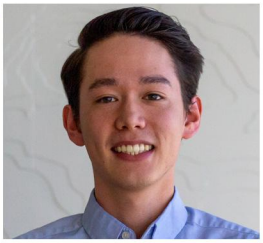
EDUCATION

Bachelor of Science, Computer Information Systems, Jacksonville State University

Bachelor of Science, Criminal Justice, Jacksonville State University

OFFICE

Denver, CO



Andrew Burton, EIT

PLC & HMI Specialist

Industry Tenure: 1 Year

Andrew is an instrumentation and controls engineer in training with experience in the wastewater industry. He has helped design PLC programming and HMIs. Andrew works with operators to fully understand their needs and how to implement them in the project. He also has experience in helping design and implement OT networks.

EDUCATION

Bachelor of Science, Electrical Engineering, Colorado School of Mines

OFFICE

Denver, CO

RELEVANT PROJECT EXPERIENCE

National Park Service, Phantom Ranch Wastewater Treatment Plant, *Grand Canyon, AZ*

Role: Software Developer and Testing Team Member. The existing Phantom Ranch WWTP was constructed in 1980 and supports all the visitor and support services for Phantom Ranch and Bright Angel Campground at the bottom of the Grand Canyon. The Phantom Ranch WWTP supports 30 permanent residents and 70,000 annual visitors. The WWTP can no longer meet its treatment requirements for water quality. This project will develop the schematic and preliminary design for the new WWTP.

Town of Erie, North Water Reclamation Facility Expansion Plan and Design, *Erie, CO*

Role: PLC Programmer. Due to rapid growth in the Town of Erie, the North Water Reclamation Facility (NWRF), constructed in 2011, experienced significant capacity constraints. After our responsive, quality work on the Town NWRF Expansion Master Plan, HDR led the design that will increase the liquid treatment capacity and added a new solids treatment process to accommodate growth for the next 20 years. The long-term biosolids stabilization study resulted the design of a new Autothermal Thermophilic Aerobic Digestion (ATAD) facility, with new thickening, dewatering, and solids storage (including expansion of the IFAS system, surface wasting, EBPR, headworks improvements, new screw press dewatering, and ferric addition for phosphorus sequestration in the solids). A Construction Manager At-Risk (CMAR) project delivery is being used to build the design.

City of Boulder, Process Automation System Improvements and Construction Management, *Boulder, CO*

Role: Software Developer and Testing. The Process Automation System (PAS) Phase II Upgrades Project will address the remainder of the improvements identified in Boulder's strategic plan. HDR was selected to design the physical improvements to the PAS and complete the systems integration and programming throughout the WRRF, including separation of 480V and controls wiring to improve operator safety, extending fiber optic communication to new areas of the facility, replacement of aging local control panels, and replacing old SLC 505 PLCs with new GE Rx3i PLCs to meet the facility's current standards. A major focus of this project is to minimize disruption of the day-to-day operations. HDR worked closely with Boulder staff to develop detailed construction sequencing plans to help lessen construction impacts as the project is implemented.

Josie Brahler, EIT

PLC & HMI Specialist

Industry Tenure: 4 Years

Josie is an instrumentation and controls EIT with experience in PLC and HMI programming, SCADA network design, and radio path studies. Her PLC programming experience includes RS Logix 5000, RS Logix 500, and Do-More; and her HMI programming experience includes Allen Bradley FactoryTalk, Wonderware InTouch, and InduSoft. She has led the HMI programming for several projects; assisted the designing and implementation of SCADA networks; and supported the programming, testing, and onsite start-up and commissioning of various SCADA systems.

EDUCATION

Bachelor of Science, Electrical Engineering, Colorado School of Mines

OFFICE

Denver, CO

RELEVANT PROJECT EXPERIENCE

National Park Service, Grand Canyon SCADA Replacement Plant Component System, *Grand Canyon, AZ*

Role: System Development and Deployment Assistance. HDR has performed predesign and supplemental services to upgrade and replace the existing SCADA system and initiate park-wide communications systems improvements. Through that process, HDR has evaluated SCADA software platformed through the NPS value-based decision-making processes, and has implemented Department of Interior's software and IT security requirements. HDR has performed integration services that design and implement a fully functional system for the various water components related to the operation of the water storage and distribution system.

National Park Service, Grand Canyon Communications Replacement Design, *Grand Canyon, AZ*

Role: Design and Proof of Concept Testing Assistance. The design of the communication systems that allow data interchange between the new SCADA system and related equipment. The design shall be a multiple ethernet path system with fiber link from the South Rim WWTP to the Hopi Point communications site. Additionally, there will be a 450 MHZ backup radio communication system for critical water stations.

Town of Erie, North Water Reclamation Facility Expansion Plan and Design, *Erie, CO*

Role: Lead HMI Programmer and Commissioning Lead. Due to rapid growth in the Town of Erie, the North Water Reclamation Facility (NWRF), constructed in 2011, experienced significant capacity constraints. After our responsive, quality work on the Town NWRF Expansion Master Plan, HDR led the design that will increase the liquid treatment capacity and added a new solids treatment process to accommodate growth for the next 20 years. The long-term biosolids stabilization study resulted the design of a new Autothermal Thermophilic Aerobic Digestion (ATAD) facility, with new thickening, dewatering, and solids storage (including expansion of the IFAS system, surface wasting, EBPR, headworks improvements, new screw press dewatering, and ferric addition for phosphorus sequestration in the solids). A Construction Manager At-Risk (CMAR) project delivery is being used to build the design.

Michael Goolsby

Western Colorado Liaison

Industry Tenure: 27 Years

Mike brings 27 years of transportation experience including leading CDOT's Region 3 counties in their transportation, maintenance, and engineering programs. His experience working in Region 3 consists of projects located throughout the Western Slope, including Grand Junction, Mesa, Gunnison, Eagle, and Delta counties. During his tenure at CDOT, Mike was the lead for building the architecture and implementation plan for the Enterprise Resource Program plant maintenance module. Mike resides in Grand Junction and will serve as our team's local liaison for the project. He will lean on his regional knowledge to support the City while working with the Front Range team to deliver the project's goals.

EDUCATION

Highway Maintenance Management, Front Range Community College

OFFICE

Grand Junction, CO

RELEVANT PROJECT EXPERIENCE

CDOT Region 3, Hanging Lake Tunnel Control Room Upgrade and Traffic Communications Upgrade, *Glenwood Springs, CO*

Role: Asset Manager (CDOT experience, prior to joining HDR). Provided central monitoring system replacement that included video wall, operator stations, HVAC, server room and components and integration with standalone SCADA tunnel operation system. Additionally, upgraded electrical traffic control cabinets and PLCs for entire tunnel traffic management system for integration with standalone SCADA tunnel operation system.

CDOT Headquarters, Roadway Guide Task Order 3, *Varies Counties, CO*

Role: Contributor. This task order is a continuation of work for the CDOT Roadway Design Guide which will develop the final deliverable of the Guide. HDR is currently "rewriting the book." The design manual has traditionally provided strict guidance related to fundamental roadway guidance and criteria. The rewrite will begin a new era of innovation and sophistication to inform and direct professionals in the art of context sensitive design solutions. This will include descriptive tools and examples utilizing performance-based practical design for modes across transportation sectors.

Mesa County, 32 1/2 Road and Clifton Campus Improvements, *Mesa County, CO*

Role: Project Manager. HDR is currently providing design services for Mesa County to complete road construction in three locations: the connection of 32 ½ Road from the existing dead end north of D ¾ Road north to the intersection with East Road. The second location is 32 ½ Road from East Road north to the north side of the Grand Valley Mainline Cana. The third location is the widening of D ¾ Road to a full roadway section from W. Chukar Way to the existing completed section of East Chukar Way.

CDOT Region 3, Regional Transportation Director, *Grand Junction, CO*

Role: Director (CDOT experience, prior to joining HDR). Mike oversaw the annual region program budget, which totaled approximately $200M. He was responsible for approximately 520 full time employees and 15 counties in Northwest Colorado. He developed long and short-range plans by engaging and developing relationships with stakeholders.

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