CITY OF Grand Junction COLORADO

LETTER OF INTENT

Date: April 26, 2018

Company: J-U-B Engineers, Inc.

Project: Design Services for Purdy Mesa Flowline – Sullivan Draw Plan Development (RFP-4511-18-DH)

Based upon review of the proposals received for Design Services for Purdy Mesa Flowline – Sullivan Draw Plan Development (RFP-4511-18-DH), your company has been selected as preferred proposer of this solicitation process. It is the intent of the City of Grand Junction to award the aforementioned contract to your company as is listed in the RFP documents and your proposal response.

This contract must be approved by the City Manager prior to award and a contract being issued.

Please feel free to contact me with any questions at 970-244-1545.

Thank you and Best Regards

Duane Hoff Jr., Senior Buyer

CITY OF GRAND JUNCTION, COLORADO

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CONTRACT

This CONTRACT made and entered into this 1st day of May, 2018 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 **J-U-B Engineers, 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 **Design Services for Purdy Mesa Flowline – Sullivan Draw Plan Development RFP-4511-18-DH**.

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. Solicitation Documents for the Project; **Design Services for Purdy Mesa Flowline – Sullivan Draw Plan Development;**
c. Contractors Response to the Solicitation
d. Work Change Requests (directing that changed work be performed);

e. Change Orders.

ARTICLE 2

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

ARTICLE 3

Contract Work: 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 indicated in the Solicitation Document.

ARTICLE 4

Contract Time: Time is of the essence with respect to this Contract. The Contractor hereby agrees to commence Work under the Contract on or before the date specified in the Solicitation from the Owner, and to achieve Substantial Completion and Final Completion of the Work within the time or times specified in the Solicitation

ARTICLE 5

Contract Price and Payment Procedures: The Contractor shall accept as full and complete compensation for the performance and completion of all of the Work specified in the Contract Documents, the sum of **Forty Six Thousand One Hundred Thirty and 00/100 Dollars ($46,130.00).** 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 in the Solicitation Response. 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.

Unless otherwise provided in the Solicitation, monthly partial payments shall be made as the Work progresses. Applications for partial and Final Payment shall be prepared by the Contractor and approved by the Owner in accordance with the Solicitation.

ARTICLE 6

Contract Binding: The Owner and the Contractor each binds 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 7

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.

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.

The Contract is executed in two counterparts.

CITY OF GRAND JUNCTION, COLORADO

DocuSigned by:
By: Duane Hoff Jr., Senior Buyer – City of Grand Junction 5/2018 | 17:00 MDT
9F789E7D50F14BC...
Duane Hoff Jr., Senior Buyer Date

J-U-B Engineers, Inc.

DocuSigned by:
By: Lee Cammack, PE, President, J-U-B Engineers, Inc. 5/1/2018 | 13:37 MDT
27BF1B497DB4493...
Lee Cammack, PE, President, J-U-B Engineers, Inc. President Date

Request for Proposal
RFP-4511-18-DH

Design Services for Purdy Mesa Flowline – Sullivan Draw Plan Development

RESPONSES DUE:
April 17, 2018 prior to 3:30 PM MST
Accepting Electronic Responses Only
Responses Only Submitted Through the Rocky Mountain E-Purchasing System (RMEPS)
https://www.rockymountainbidsystem.com/default.asp
(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:
Duane Hoff Jr., Senior Buyer
duaneh@gjcity.org
970-244-1545

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

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:
Duane Hoff Jr., Senior Buyer
duaneh@gjcity.org

1.2 Purpose: The purpose of this RFP is to obtain proposals from qualified professional engineering firms to provide design services for the Purdy Mesa Flowline – Sullivan Draw Plan Development Project.

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 Pre-Proposal Meeting: A pre-proposal meeting is recommended for all prospective offerors. The purpose will be to inspect and to clarify the contents of this Request for Proposal (RFP). Meeting location shall begin at City Hall Auditorium, 250 N. 5th Street, Grand Junction, CO on March 30, 2018 at 10:30am.

1.5 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.

1.6 Submission: Please refer to section 5.0 for what is to be included. ***Each proposal shall be submitted in electronic format only, and only through the Rocky Mountain E-Purchasing website (https://www.rockymountainbidsystem.com/default.asp).*** *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/business-and-economic-development/bids/ for details. For proper comparison and evaluation, the City requests that proposals be formatted as directed in Section 5.0 "Preparation and Submittal of Proposals." Submittals received that fail to follow this format may be ruled non-responsive. (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 award 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 Purchasing Division. 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.rockymountainbidsystem.com. 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 in the City Hall Auditorium, 250 North 5th Street, Grand Junction, CO, 81501, immediately following the proposal deadline. Offerors, their representatives and interested persons may be present. 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 Contractor. By executing the contract, the Contractor 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 any one, 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 Contractor shall secure and pay for all permits, governmental fees and licenses necessary for the proper execution and completion of the services. The Contractor 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 Contractor 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 Contractor 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 Contractor 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 Contractor.

2.5. Payment & Completion: The Contract Sum is stated in the Contract and is the total amount payable by the Owner to the Contractor 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 Contractor, of the value of services performed and materials placed in accordance with the Contract Documents. The services performed by Contractor 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 Contractor hereunder shall be done in compliance with applicable laws, ordinances, rules and regulations.

2.6. Protection of Persons & Property: The Contractor 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. Contractor 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 Contractor in the execution of the services, or in consequence of the non-execution thereof by the Contractor, 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 Contractor

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 Contractor shall promptly correct all services found by the Owner as defective or as failing to conform to the contract documents. The Contractor 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 discover 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. Contractor 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 Contractor herby certifies that the Contractor 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 servicesers 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, *et.seq.* (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, subcontractor 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 Servicesers' 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 as a result 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 can not 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. Any and 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 Contractor 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 Contractor 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 Serviceser'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 Contractor 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. "Contractor" is the person, organization, firm or consultant identified as such in the Agreement and is referred to throughout the Contract Documents. The term Contractor means the Contractor or his authorized representative. The Contractor shall carefully study and compare the General Contract Conditions of the Contract, Specification and Drawings, Scope of Services, Addenda and Modifications and shall at once report to the Owner any error, inconsistency or omission he may discover. Contractor shall not be liable to the Owner for any damage resulting from such errors, inconsistencies or omissions. The Contractor 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 Contractor to perform any of the services at the site. The term sub-contractor 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 Subcontractor 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: Contractor 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 contractor 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 Contractor. The Contractor shall be solely responsible for any deductible losses under any policy required above.

SECTION 4.0: SPECIFICATIONS/SCOPE OF SERVICES

4.1. General/Background: The Purdy Mesa Flowline carries raw water approximately 16.5 miles from the City's main storage reservoir, Juniata Reservoir, to the water treatment plant in Orchard Mesa. Originally built in the 1940's the line is mostly 18" CIP with some portions having been replaced in more recent decades. A segment of the flowline that crosses a wash called Sullivan Draw has been identified as a priority for replacement. This segment of the flowline crosses two steep draws through rough terrain. The reach has been determined to be pose hydraulic limitations on the capacity of the entire transmission line. The existing pipeline is past its design life and while no significant leaks or problems have been identified in this reach, the topography and access challenges would make emergency repairs very difficult.

The 1.25-mile replacement project on two BLM Parcels and two private parcels. It also crosses Reeder Mesa Road in three locations. The downstream limit of the replacement project will be at an existing Pressure Control Valve (PCV). The upstream limit of the project reach is the Pressure Control Tower (PCT) located just east of Sullivan Draw. A thorough hydraulic study of the Purdy Mesa flowline has been completed including design recommendations.

Therefore, the City of Grand Junction is requesting qualifications accompanied by sealed cost proposals, from Consulting Civil Engineers to provide design services, prepare construction drawings, assist in the development of bid documents and provide design information to consultants working to receive BLM approval for this project. The project calls for the following

1. Design replacement pipeline between upstream PCT and downstream existing PCV following the recommendations within the hydraulic technical memorandum and including
    a. replacement Pressure Control Tower,
    b. replacement of two Pressure Control Valves, air valves, cleanouts (up to two),
    c. connections to existing pipeline,
    d. pipe restraint and erosions control measure on hill slopes,
    e. control of PCV's and PCT, including power connection,
2. Coordinate with consultant working for City of Grand Junction who is preparing the NEPA study for BLM
3. Provide bidding and construction support

The Consultant shall be responsible for evaluation the proposed alternative, evaluating foundation and slope stability at and around the replacement PCT, final CAD drawing, standard and project specifications, and other related services which are included in the scope of work.

Additional Project Information:

- Existing easement is 40' wide; 20' to either side of existing pipeline. The intent is to keep new pipe and construction disturbance within this easement wherever possible.
- Construction staging areas are tentatively identified at three locations; the upstream and downstream project limits and at the southeast most crossing of Reeder Mesa Road.
- Permitting is required with BLM and possibly CDPHE. The City is working with a consultant on the NEPA report required by the BLM.
- Geotechnical investigation services will be provided by the City, but slope and foundation stability analysis will be part of this scope of work.
- The existing pipe is 18" and 20" steel. No active cathodic system exists on the Purdy Mesa flowline.
- Electrical power for equipment control must be considered as part of this project. The options are to bring power from one the local provider (Grand Valley Power), or to investigate the use of a micro-turbine in the pipe line.
- Ground survey has been completed within the project reach and will be made available to the selected Consultant. Potholing on the pipeline has not been conducted. The depth of pipe is generally less than the 4' depth per City of Grand Junction Standards.
- The where available, City of Grand Junction Design Standards should prevail. For components not addressed by the City Standards, the Consultant shall provide standards, details, and specifications. These included, but are not limited to the PCT, valves, electrical and data acquisition control, and pipe restraint.
- Sullivan draw sees perennial flows. It is believed that these are irrigation return and not associated with leakage from the Purdy Mesa Flowline. There are wetlands in the draw, but the flows are not identified as Waters of the U.S. Wetland plants have been noted in the 2 other locations along the project reach.
- Overflow design is part of the PCT design. This includes mitigating potential scour on the steep slope of Sullivan Draw.
- Access is a bit of a challenge in this site. There is direct access from Reeder Mesa Road to both PCV's. An access to the PCT exists from Lands End Road. The City has a good working relationship with the private landowners along the pipeline, but works to give notice prior to entering their properties.
- The BLM prefers that the existing line be abandoned in place.
- The pipeline should be constructed with the existing line still in service. A short shutdown time will be required for connection of the new line to the old.
- Flow Demand begins to rise for the summer season in March and April.

4.2. Special Conditions/Provisions:

4.2.1 Price/Fees: Project pricing shall be all inclusive, to include, but not be limited to: labor, materials, equipment, travel, design, drawings, engineering work, shipping/freight, licenses, permits, fees, etc.

Provide a not to exceed cost using Solicitation Response Form found in Section 7, accompanied by a complete list of costs breakdown.

All fees will be considered by the Owner to be negotiable.

4.2.2 Codes: Contractor shall ensure that project design, scope, and specifications meets all Federal, State, County, and City Codes.

4.3. Specifications/Scope of Services:

Consultant Responsibilities: The scope of work shall include the following

Task One: Project Management and Coordination

Project Initiation: Develop and prepare a project schedule to meet the proposed construction time frame and assign tasks. The schedule shall show individual tasks described in the scope of work for the project and identify key milestone dates. The Consultant Project Manager (Consultant PM) shall maintain and update the project schedule as the work proceeds. Consultants PM will be assigned to this project for the duration of the work.

Work Task Coordination: The Consultant PM shall assign and coordinate all work tasks being accomplished, including those to be performed by sub-consultants, to ensure project work is completed on schedule.

Project Team Coordination: The City PM and the Consultant PM shall maintain ongoing communication about the project on a frequent and regular basis. Each PM shall provide the other with

- Written synopsis of their respective contracts (both telephone or in person) with others
- Copies of pertinent written communications, including electronic (email) correspondence
- Early identification of potential problems

Progress Meetings: The City and Consultant shall meet, either in person or by telephone conference calls, at regularly scheduled Project Working Group Meetings held at approximate two-week intervals throughout the project. Meetings shall include consultant PM, City PM, and Water Resources Manager. The Project Working Group Meetings shall be used to coordinate the work effort and resolve any outstanding issues or problems. The meetings shall focus on the following topics:

- Activities completed since last meeting
- Problems encountered or anticipated
- Late activities/activities slipping behind schedule
- Solutions for unresolved or newly identified problems
- Schedule of upcoming activities
- Information on items required, or comments from Federal agencies.

The Consultant PM shall prepare a written summary report of the general discussions held including all action items assigned. This scope assumes six (6) Project Working Group Meetings via conference call.

Reporting Requirements: The Consultant PM shall provide the following on a routine basis:

- Bi-weekly status reports (percent of design components complete) and monthly billings.

Task Two: Design Plans and Design Report

The consultant will prepare final design plans, final design report and final design report. Prior to final design, Consultant shall provide 60% design review plans to the City for comment. Final design plans and report shall be submitted for review and approval by City and federal agencies involved. Review of documents and plans will be completed by City Project Engineer and City Water Resources Manager. The final plans and report shall be stamped by a professional engineer registered in the State of Colorado. All submittals shall be in a PDF format, with final electronic files provided at close of design task. This task will also include responding to any comments from review by BLM, USACE or other agency for approval by July 31, 2018. Any fees paid to federal agencies will be paid by the City of Grand Junction.

60% design submittal and Final Design Submittal shall include Engineers Opinion of Probable Cost for construction of the design.

Advertisement for Construction should be published on or about July 1, 2018 to allow for construction to occur during the months of October 2018 through January 2019.

City Provided Materials: The City will provide the following:

- As-constructed drawings of existing facilities as available
- GIS data
- Survey, base mapping and existing plan files

Task Three: Final Bid Documents

The Consultant will prepare final bid documents including Plans and Project Technical Specifications in accordance with the City of Grand Junction Standard Contract Documents for Capital Improvement Construction, Revised July 2010. The final bid documents shall be complete and adequate to obtain competitive construction bids for the Intake Rehabilitation Project. The consultant will also provide the City with an engineering estimate of cost to construct the project that will be used to evaluate adequacy of currently budgeted funds. Final bid documents shall include: Stamped engineering drawings, and technical specifications as well as an itemized line item bid schedule and engineers estimate for the project.

Reproduction: The Consultant will provide electronic copies of the final construction drawings and contract documents (.pdf format).

Authentication: The Consultant's Professional Engineer responsible for the project shall affix his stamp and signature to two (2) original copies of the final drawings, bid documents and design report.

Permitting: The Consultant shall assist in coordination with BLM and other required agencies regarding plan approval and site application amendment. Any costs associated with this amendment or other permitting fees will be the responsibility of the owner.

Task Four: Construction Phase Services

Bidding Phase: After Completion of the plans, the City will bid the project out, however the consultant shall be available for technical questions and provide to the City appropriate addenda. Consultant shall participate in the pre-bid meeting, however presence at the bid opening is not required.

Construction Phase: The City will provide onsite, full time inspection for the project. Resident engineering shall be provided by the Consultant on an as-needed basis, but no less than once every month (4 visits). Consultant resident engineer shall also assist in reviewing and approving all shop drawings.

4.4. Pre-Proposal Meeting: A pre-proposal meeting is recommended for all prospective offerors. The purpose will be to inspect and to clarify the contents of this Request for Proposal (RFP). Meeting location shall begin at City Hall Auditorium, 250 N. 5th Street, Grand Junction, CO on March 30, 2018 at 10:30am.

4.5. RFP Tentative Time Schedule:

• Request for Proposal available	March 23, 2018
• Pre-Proposal Meeting	March 30, 2018
• Inquiry deadline, no questions after this date	April 5, 2018
• Post Addendum	April 11, 2018
• Submittal deadline for proposals	April 17, 2018
• Owner evaluation of proposals	April 18-25, 2018
• Final selection	April 27, 2018
• Contract execution	April 30, 2018
• Final Design, Drawings, Scope, Specs	July 1, 2018

4.6. Questions Regarding Scope of Services:

Duane Hoff Jr., Senior Buyer
duaneh@gjcity.org

SECTION 5.0: PREPARATION AND SUBMITTAL OF PROPOSALS

Submission: ***Each proposal shall be submitted in electronic format only, and only through the Rocky Mountain E-Purchasing website (https://www.rockymountainbidsystem.com/default.asp).*** *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/BidOpenings.aspx 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**). For proper comparison and evaluation, the City requests that proposals be formatted as directed in Section 5.0 "Preparation and Submittal of Proposals." 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 Owner 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 Contractor agrees to all requirements herein.

B. **Qualifications/Experience/Credentials:** Proposers shall provide their qualifications for consideration as a contract provider to the City of Grand Junction and include prior experience in similar projects.

C. **Strategy and Implementation Plan:** Describe your (the firm's) interpretation of the Owner's objectives with regard to 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 and an estimate of time commitments from Owner staff.

D. **References:** A minimum of three (3) **references** with name, address, telephone number, and email address that can attest to your experience in projects of similar scope and size.

E. **Fee Proposal:** Provide a not to exceed cost using Solicitation Response Form found in Section 7, accompanied by a complete list of costs breakdown.

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 herein.

Submittal evaluations will be done in accordance with the criteria and procedure defined herein. The Owner reserves the right to reject any and all portions of proposals and take into consideration past performance. The following parameters will be used to evaluate the submittals (in no particular order of priority):

- Responsiveness of submittal to the RFP
- Understanding of the project and the objectives
- Experience/Demonstrated capability
- Necessary resources
- Strategy & Implementation Plan
- References
- Fees

Owner also reserves the right to take into consideration past performance of previous awards/contracts with the Owner of any vendor, contractor, supplier, or service provider in determining final award(s).

The Owner will undertake negotiations with the top rated firm and will not negotiate with lower rated firms unless negotiations with higher rated firms have been unsuccessful and terminated.

6.3 **Oral Interviews:** Interviews are not anticipated for this solicitation process. However, the Owner reserves the right to invite the most qualified rated proposer(s) to participate in oral interviews, if needed.

6.4 **Award:** Firms shall be ranked or disqualified based on the criteria listed in Section 6.2. The Owner reserves the right to consider all of the information submitted and/or oral presentations, if required, in selecting the project Contractor.

SECTION 7.0: SOLICITATION RESPONSE FORM

RFP-4451-18-DH Design Services for Purdy Mesa Flowline – Sullivan Draw Plan Development

Offeror must submit entire Form completed, dated and signed.

1) **Not to exceed cost to provide design services for the Design Services for Purdy Mesa Flowline – Sullivan Draw Plan Development for labor, materials, equipment, travel, design, drawings, engineering work, shipping/freight, licenses, permits, fees, etc. per specifications:**

NOT TO EXCEED COST $_____

WRITTEN:_____dollars.

The Owner reserves the right to accept any portion of the services to be performed at its discretion

---

The undersigned has thoroughly examined the entire Request for Proposals and therefore submits the proposal and schedule of fees and services attached hereto.

This offer is firm and irrevocable for sixty (60) days after the time and date set for receipt of proposals.

The undersigned Offeror agrees to provide services and products in accordance with the terms and conditions contained in this Request for Proposal and as described in the Offeror's proposal attached hereto; as accepted by the Owner.

Prices in the proposal have not knowingly been disclosed with another provider and will not be prior to award.

- Prices in this proposal have been arrived at independently, without consultation, communication or agreement for the purpose of restricting competition.
- No attempt has been made nor will be to induce any other person or firm to submit a proposal for the purpose of restricting competition.
- The individual signing this proposal certifies they are a legal agent of the offeror, authorized to represent the offeror and is legally responsible for the offer with regard to supporting documentation and prices provided.
- Direct purchases by the City of Grand Junction are tax exempt from Colorado Sales or Use Tax. Tax exempt No. 98-903544. The undersigned certifies that no Federal, State, County or Municipal tax will be added to the above quoted prices.
- City of Grand Junction payment terms shall be Net 30 days.
- Prompt payment discount of _____ percent of the net dollar will be offered to the Owner if the invoice is paid within _____ days after the receipt of the invoice.

RECEIPT OF ADDENDA: the undersigned Contractor acknowledges receipt of Addenda to the Solicitation, Specifications, and other Contract Documents. State number of Addenda received: _____

It is the responsibility of the Proposer to ensure all Addenda have been received and acknowledged.

_____	_____
Company Name – (Typed or Printed)	Authorized Agent – (Typed or Printed)
_____	_____
Authorized Agent Signature	Phone Number
_____	_____
Address of Offeror	E-mail Address of Agent
_____	_____
City, State, and Zip Code	Date

CITY OF Grand Junction COLORADO

Purchasing Division

ADDENDUM NO. 1

DATE: April 11, 2018
FROM: City of Grand Junction Purchasing Division
TO: All Offerors
RE: Design Services for Purdy Mesa Flowline – Sullivan Draw Plan Development
RFP-4511-18-DH

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. What type of Tank is preferred by the City? Welded steel, etc.?

   A. Steel or concrete are the most logical options, but the city will entertain any realistic recommendation made by the Consultant.

2. Q. What firm is conducting the NEPA study?

   A. WestWater Engineering - http://westwaterco.com/

3. Q. Is there a recent survey (ROW, utilities, easements etc.) of the entire alignment?

   A. No, gound survey is the only recent survey in the project reach. The City does have 40'-wide easement along the length of the flowline.

4. See attached Purdy Mesa Flow Line Hydraulic Evaluation.

5. Awarded firm shall submit review sets of 30% and 90%, and a completed bid set. Engineers estimates of probable costs to be included with all submittals, and project specifications to be included with the 90% review set and completed bid set.

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

All other conditions of subject remain the same.

Respectfully,

Duane Hoff Jr., Senior Buyer
City of Grand Junction, Colorado

FINAL

PURDY MESA FLOW LINE HYDRAULIC EVALUATION

Grand Junction, Colorado

B&V PROJECT NO. 197600

PREPARED FOR

City of Grand Junction

6 APRIL 2018

BLACK & VEATCH

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LIST OF FIGURES

1 Introduction

The Purdy Mesa Flow Line (PMFL) is a gravity transmission main of approximately 17.5 miles which currently conveys up to 7.6 mgd of raw water from the Juniata Reservoir to the Grand Junction Water Treatment Plant (WTP) in the City of Grand Junction, Colorado (City) as shown in Figure 1. The PMFL runs through the Sullivan Draw, which is an area of extreme elevation relief with grades of up to 40%. Approximately 1.25 miles of 18-inch and 20-inch steel pipe (shown in red in Figure 1) is approaching the end of its useful life and is in need of replacement. Due to the challenging site conditions associated with the steep terrain, the City would like the new Sullivan Draw pipeline to be installed with a diameter large enough that the segment does not create a hydraulic restriction (which the Sullivan draw currently does) or limit the ultimate desired flow rates of the PMFL in the future. The City has already replaced approximately 6.1 miles of the PMFL with 24-inch PVC and 3.7 miles with 20-inch PVC. An additional 6.5 miles of the PMFL are also planned to be replaced in the future.

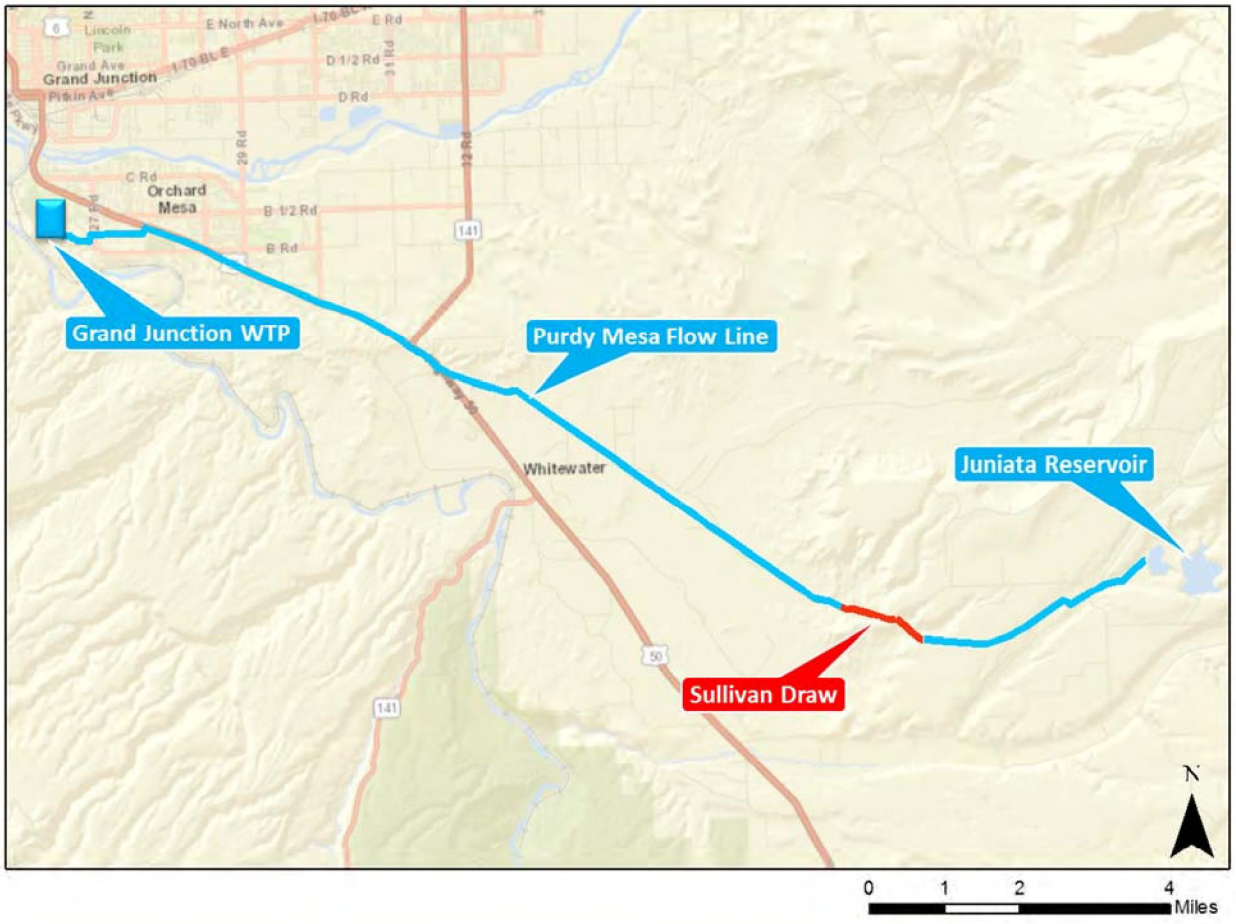


Figure 1 Purdy Mesa Flow Line Overview

In addition to the replacement of the pipeline which runs through the Sullivan Draw, the City also recognizes that the PMFL is operationally challenging due to the existing flow control infrastructure and hydraulics under varying flow rates, which can cause air entrainment (manifested as milky

water at the Grand Junction WTP) because of a variety of factors including partially full pipe flow and cavitation.

The primary objectives of the analyses described in this Technical Memorandum were to:

- Construct and validate a WaterGEMS hydraulic model of the PMFL to enable detailed analysis of the pipeline hydraulics under a variety of flow rates and system conditions
- Use the hydraulic model to confirm the existing hydraulic capacity of the 0.8 mile 18-inch segment of the Sullivan Draw portion of the PMFL
- Use the hydraulic model to evaluate the hydraulic benefits (and associated increases in maximum potential PMFL flow rates) of upsizing the 18-inch Sullivan Draw pipeline to 20-inch or 24-inch
- Use the hydraulic model to investigate potential causes for air entrainment in the PMFL and develop potential hydraulic improvement recommendations to both improve pipeline operation and reduce air entrainment in the future

2 Hydraulic Model Development and Validation

A hydraulic model of the PMFL was constructed in Bentley WaterGEMS as described in the following section.

2.1 DATA SOURCES

The City provided the following data sources to Black & Veatch which were used to build and calibrate the hydraulic model. In addition to the data listed below, a workshop was held with The City on 11/29/17 to confirm understanding of the current operation of the PMFL.

- 05019800-CleaningLiningHallenbeckWaterline-1968.pdf
- 05020200-HWY50_RawWaterlineRelocation-1998.pdf
- 05100600-PurdyMesaFlowlineReplacement-2008.pdf
- WaterLines.shp
- Purdy Mesa Flowline Hydraulic calcs.xlsx
- Roll Seal info to Cla-Val.doc
- Roll_Seal_Catalog.pdf

2.2 PURDY MESA FLOW LINE FACILITIES AND OPERATIONAL DESCRIPTION

Figure 2 displays a detailed overview of the PMFL from the Juniata Reservoir to the Grand Junction WTP and Figure 3 displays the pipeline profile, which was developed based on the data received as well as conversations with the City. The PMFL is currently operated as described below:

1. Raw water from the Juniata Reservoir (nominal water surface elevations of 5,741 ft to 5,754 ft) is released into the PMFL by an automatic Flow Control Valve (FCV) which can be set remotely to deliver a desired flow rate. The FCV automatically modulates to maintain the desired flow rate.

2. Raw water flows through approximately 3.4 miles of 20-inch steel pipe and discharges to atmosphere at the Pressure Control Tower (PCT). Because flow is controlled by the FCV at the upstream side of the PMFL, this section of pipe is not under constant positive pressure. Instead, it flows under a combination of partially full and full pipe flow between the FCV and the PCT. Based on conversations with the City, this section of pipe is currently in poor condition.

3. The PCT is a cylindrical tank 12 ft in height with a diameter of 5 ft and a total volume of 235 ft^3 (1,760 gallons). Raw water flows into the PCT from the 20-inch steel pipe and flows out of the PCT through the 18-inch steel Sullivan Draw pipe.

4. Flow continues from the PCT through 0.8 miles of 18-inch steel pipe to the Upper Roll Seal PSV, which is a 12-inch Cla-Val Roll Seal. The Upper Roll Seal is bypassed at flow rates of less than approximately 6.1 mgd and is used to control flow downstream of the PCT at flows greater than 6.1 mgd by manually adjusting the upstream pressure setting between approximately 63 psi to 68 psi.

5. Flow continues from the Upper Roll Seal PSV through 0.4 miles of 20-inch steel pipe to the Lower Roll Seal PSV, which is also a 12-inch Cla-Val Roll Seal. The Lower Roll Seal is bypassed at flows of less than approximately 6.1 mgd and is used to reduce pressures in the 20-inch steel pipeline between the Upper and Lower Roll Seals at flows of greater than 6.1 mgd by using an upstream pressure setting of approximately 101 psi.

6. Flow continues from the Lower Roll Seal PSV through 3.1 miles of 20-inch steel pipe, 3.7 miles of 20-inch PVC pipe and finally 6.1 miles of 24-inch PVC pipe before discharging to atmosphere at the raw water vault at the Grand Junction WTP at a water surface elevation of approximately 4,831 ft.

It is noted that the WaterGEMS hydraulic modeling software cannot accurately simulate hydraulics under partially full pipe flow conditions due to the unpredictable formation and movement of air pockets (which can cause hydraulic restrictions, air entrainment and flow anomalies). For this reason, the hydraulic model was developed for the PMFL from the PCT to the Grand Junction WTP only (as shown in Figure 3), excluding the 3.4 miles of 20-inch steel pipe from the FCV to the PCT.

It is also noted that there are five raw water taps along the PMFL between the PCT and the Grand Junction WTP which had a total combined 2017 average day usage of approximately 0.04 mgd. Because this usage is negligible (less than 1% of the total PMFL flow), these raw water taps were not included in the hydraulic model.

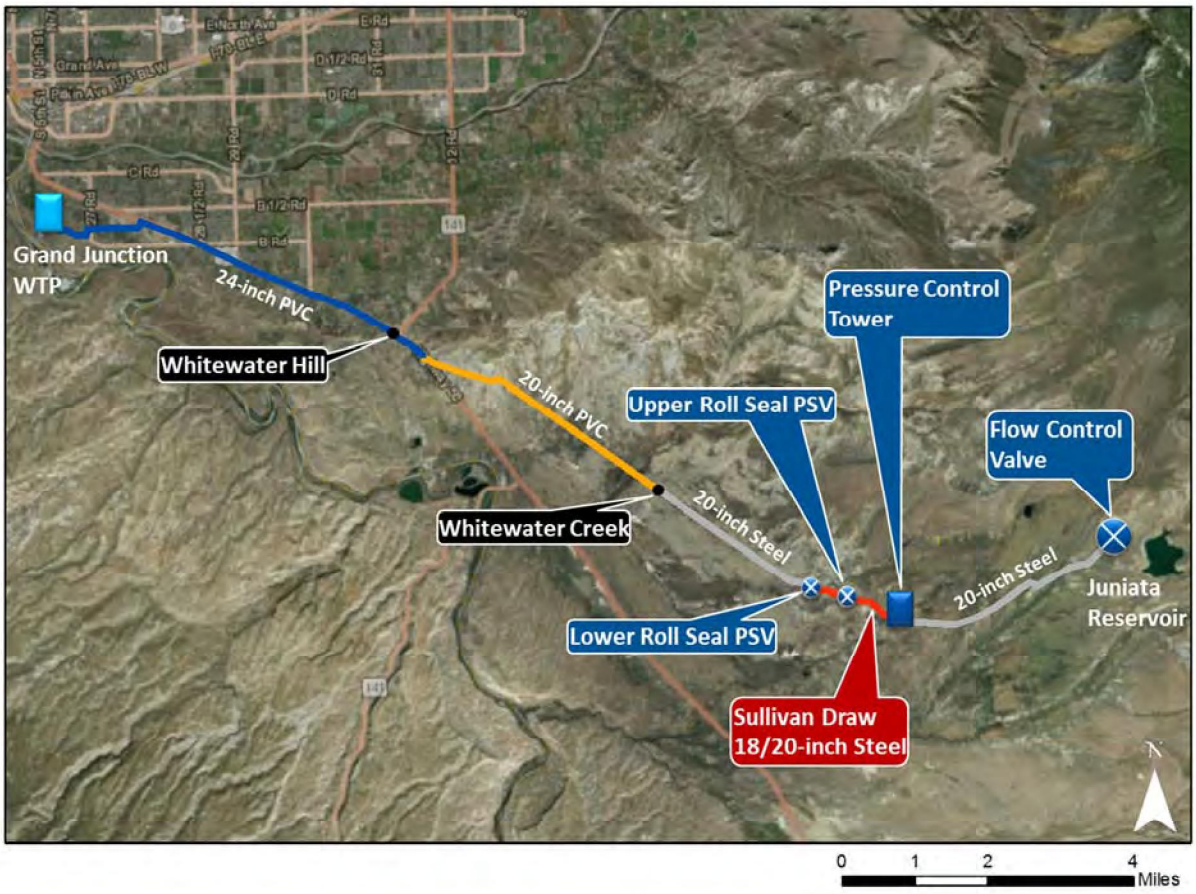


Figure 2 Purdy Mesa Flow Line and Facilities

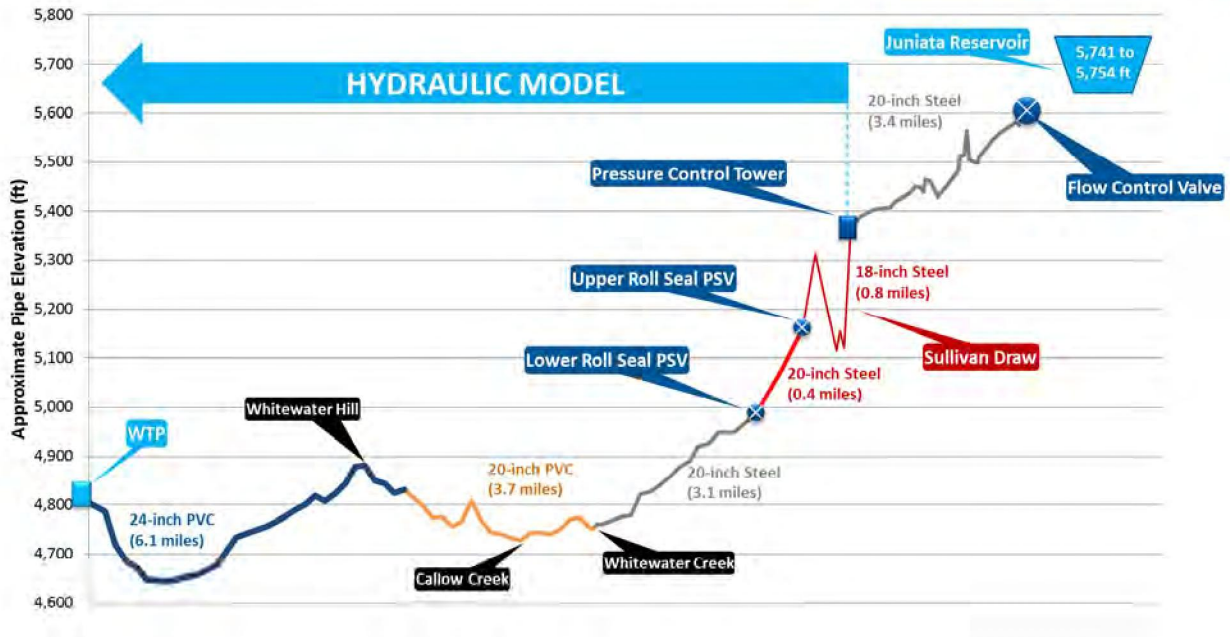


Figure 3 Purdy Mesa Flow Line – Profile

Table 1 displays a detailed summary of the PMFL pipelines based on information provided by the City. This information was used to build and validate the hydraulic model.

Table 1 Purdy Mesa Flow Line Pipe Summary

PIPE SIZE	MATERIAL	INTERNAL DIAMETER[1]	C-FACTOR[1]	LENGTH	INSTALLATION OR REHAB YEAR	DESCRIPTION
20-inch	Steel	19-inch	124	3.4 miles	Cleaned and cement mortar lined in 1968	Juniata Reservoir to PCT
18-inch	Steel	17-inch	112[2]	0.8 miles	Cleaned and cement mortar lined in 1968	PCT to Upper Roll Seal PSV
20-inch	Steel	19-inch	124	0.4 miles	Cleaned and cement mortar lined in 1968	Upper Roll Seal PSV to Lower Roll Seal PSV
20-inch	Steel	19-inch	124	3.1 miles	Cleaned and cement mortar lined in 1968	Lower Roll Seal PSV to Whitewater Creek
20-inch	PVC	19.75-inch	130	3.7 miles	Installed in 2009	Whitewater Creek to approximately the Orchard Mesa Park and Ride on US-50
24-inch	PVC	23.59-inch	130	6.1 miles	Installed circa 2001	Approximately Orchard Mesa Park and Ride on US-50 to Grand Junction WTP
Total				**17.5 miles**		

[1]Based on Purdy Mesa Flowline Hydraulic calcs.xlsx
[2]Based on model validation

2.3 HYDRAULIC MODEL CONSTRUCTION

Based on the information detailed in Section 2.2, a hydraulic model of the PMFL was constructed in Bentley WaterGEMS. The pipeline alignment and critical pipeline elevations were based on spatial, as-built and GPS information provided by the City. Pipe lengths, materials, internal diameters and C-Factors were based on the information summarized in Table 1.

As described previously, the hydraulic model was built to represent the existing PMFL from the PCT to the Grand Junction WTP, excluding the 20-inch steel pipe from the Juniata Reservoir to the PCT, which flows under partially full pipe conditions (and cannot be simulated with the hydraulic model) under all existing PMFL flow rates. Figure 4 displays a screenshot of the PMFL Bentley WaterGEMS hydraulic model.

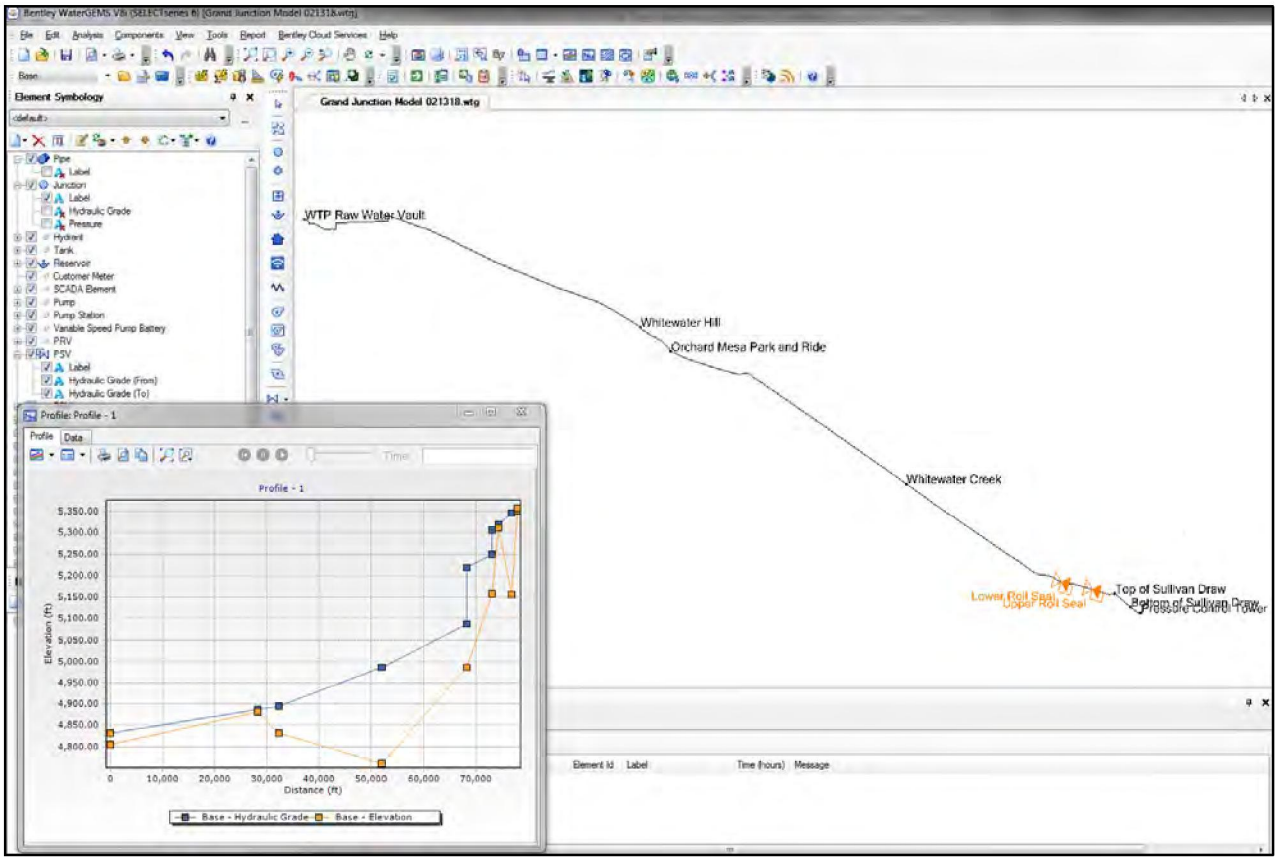


Figure 4 Purdy Mesa Flow Line Bentley WaterGEMS Hydraulic Model Screenshot

3 Hydraulic Model Validation

Validation of a hydraulic model is generally completed using recent field data (e.g. pressures and flow) to ensure that the model accurately simulates reality. Recent field data (specifically pressures along the PMFL) was not available, so model validation was completed using the hydraulic spreadsheet provided by the City (Purdy Mesa Flowline Hydraulic calcs.xlsx) which was developed based on field data collected in 2010.

It is noted that length discrepancies were noted between the hydraulic spreadsheet and the as-built drawings, survey and GIS records for the Sullivan Draw pipeline between the PCT and the Lower Roll Seal PSV. The C-Factor of the 18-inch steel pipe was reduced from 124 to 112 in order to maintain the calculated hydraulics of the spreadsheet with the reduced pipe lengths. A C-Factor of 112 was also used for the 18-inch steel pipeline in the WaterGEMS hydraulic model.

Model validation was completed by comparing pressures / hydraulic grade line (HGL) simulated by the Bentley WaterGEMS hydraulic model to the hydraulic spreadsheet under a high flow condition, which produced the high dynamic head losses required to validate the model with a high degree of confidence.

Key model validation assumptions:

- PMFL Flow Rate: 7.45 mgd
- PCT Water Surface Elevation: 5,358 ft
- Upper Roll Seal PSV Setting: 64 psi (5,305 ft)
- Lower Roll Seal PSV Setting: 101 psi (5,220 ft)
- Grand Junction WTP Water Surface Elevation: 4,831 ft (12 psi in raw water vault)

Figure 5 displays the results of the model validation simulation (shown as the simulated blue HGL line) compared at key locations to the hydraulic spreadsheet. Table 2 displays the model validation results in tabular form. As shown, the Bentley WaterGEMS hydraulic model was shown to simulate HGLs within 1 ft of the HGLs in the hydraulic spreadsheet, indicating a high degree of agreement. Based on this validation, the PMFL Bentley WaterGEMS hydraulic model could be used with confidence as an analysis tool to analyze existing hydraulics and evaluate potential improvement alternatives for the PMFL.

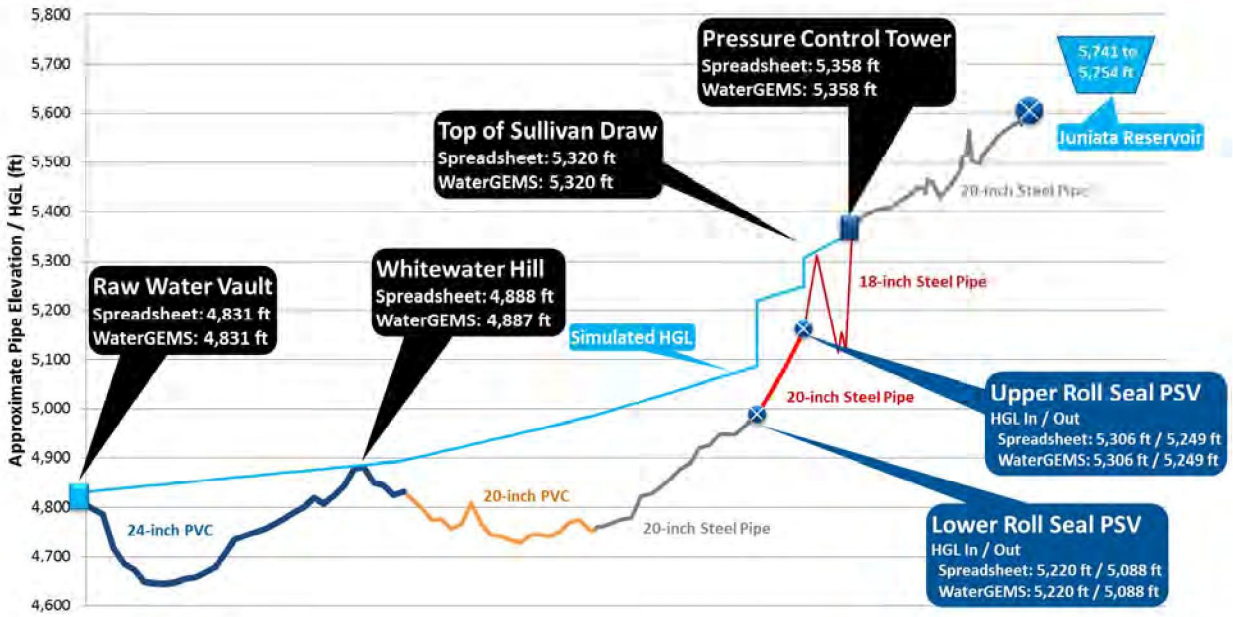


Figure 5 Model Validation Results Figure

Table 2 Model Validation Results Table

LOCATION	GRAND JUNCTION HYDRAULIC SPREADHEET HGL	BENTLEY WATERGEMS HYDRAULIC MODEL SIMULATED HGL	DIFFERENCE[1]
Pressure Control Tower	5,358 ft	5,358 ft	0 ft
Top of Sullivan Draw	5,320 ft	5,320 ft	0 ft
Upper Roll Seal PSV (Upstream)	5,306 ft	5,306 ft	0 ft
Upper Roll Seal PSV (Downstream)	5,249 ft	5,249 ft	0 ft
Lower Roll Seal PSV (Upstream)	5,220 ft	5,220 ft	0 ft
Lower Roll Seal PSV (Downstream)	5,088 ft	5,088 ft	0 ft
Whitewater Hill	4,888 ft	4,887 ft	1 ft
Raw Water Vault	4,831 ft	4,831 ft	0 ft

[1]Grand Junction Hydraulic Spreadsheet HGL – Bentley WaterGEMS Hydraulic Model Simulated HGL

4 Hydraulic Analyses

The validated Bentley WaterGEMS hydraulic model of the PMFL was used to analyze the pipeline hydraulics under six scenarios as described in the following section.

- Sullivan Draw Pipeline Analyses
  - Scenario 1: Existing 18-inch Sullivan Draw Pipeline
  - Scenario 2: New 20-inch Sullivan Draw Pipeline
- Existing Purdy Mesa Flow Line Analyses
  - Scenario 3: Existing Purdy Mesa Flow Line, 3.0 mgd
  - Scenario 4: Existing Purdy Mesa Flow Line, 6.7 mgd
  - Scenario 5: Existing Purdy Mesa Flow Line, 7.6 mgd
- Future Purdy Mesa Flow Line Analysis

  Scenario 6: Purdy Mesa Flow Line Upsized to 24-inch

4.1 SULLIVAN DRAW PIPELINE ANALYSES

4.1.1 Scenario 1: Existing 18-inch Sullivan Draw Pipeline

4.1.1.1 Objective

The existing 0.8 miles of 18-inch steel pipe which runs from the PCT through the Sullivan Draw to the Upper Roll Seal PSV is the smallest diameter pipe in the PMFL. Additionally, the pipeline experiences significant elevation relief which includes a low point of approximately 5,114 ft and a high point of approximately 5,312 ft, before terminating at the Upper Roll Seal at an elevation of approximately 5,158 ft.

Due to the 18-inch diameter as well as the 5,312 ft high point, the 18-inch Sullivan Draw steel pipe is currently the hydraulic bottleneck of PMFL, limiting the total flow rate which can be delivered from the Juniata Reservoir to the Grand Junction WTP.

The objective of this analysis was to evaluate the hydraulic performance of the existing 18-inch Sullivan draw pipeline under two flow conditions:

- 6.7 mgd: Normal “high flow” rate for PMFL
- Maximum Flow: Maximum flow rate which can be conveyed through the existing 18-inch Sullivan Draw pipeline

4.1.1.2 Assumptions

- PCT water surface elevation: 5,358 ft (approximately half full)
- Upper Roll Seal PSV Setting: modulated to produce desired flow rate through Sullivan Draw pipeline

4.1.1.3 Results

The hydraulic model was used to evaluate the existing 18-inch Sullivan Draw pipeline under a 6.7 mgd flow rate as shown in Figure 6. A flow rate of 6.7 mgd was simulated by adjusting the setting of the Upper Roll Seal PSV to 68 psi (5,315 ft). HGLs between the Upper Roll Seal PSV and the PCT were predicted by the model based on dynamic head loss due to the flow rate, the pipe diameter, pipe length and pipe C-Factor. At a flow rate of 6.7 mgd the model predicted an HGL of 5,327 ft at the Sullivan Draw high point, which exceeds the pipe elevation at a positive pressure of approximately 6 psi.

The maximum flow rate which can be conveyed from the PCT through the Sullivan Draw is the flow rate which results in dynamic head losses between the PCT and the Sullivan Draw high point such that the HGL at the high point is just above the pipe elevation of 5,312 ft. In practicality, 1-2 psi of positive pressure (HGL of 5,316 ft) should be maintained at the Sullivan Draw high point. The maximum flow rate of the existing 18-inch Sullivan Draw pipeline was determined using the hydraulic model by iteratively adjusting the upstream setting of the Upper Roll Seal PSV until the HGL at the Sullivan Draw high point was approximately 1 psi above the pipe elevation. As shown in Figure 6, the maximum flow rate through the Sullivan Draw was predicted to be approximately 8.0 mgd, corresponding to an upstream pressure setting of the Upper Roll Seal PSV of approximately 61 psi (5,298 ft).

Based on this analysis, the existing 18-inch Sullivan Draw pipeline limits the overall maximum flow rate of the PMFL to 8.0 mgd.

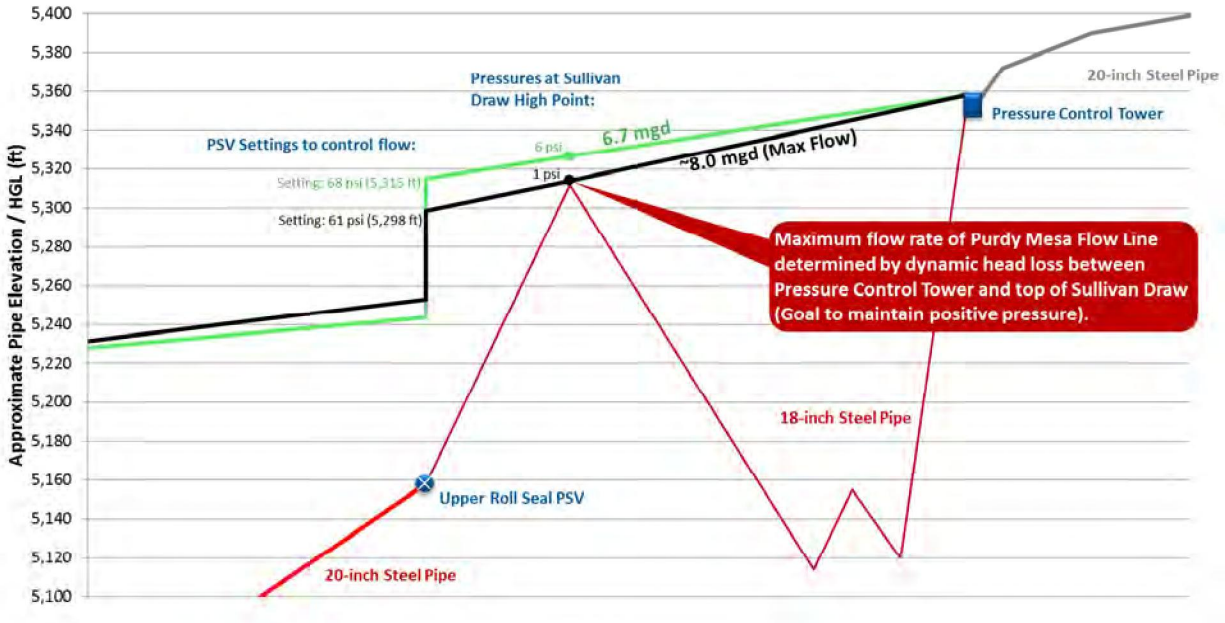


Figure 6 Existing 18-inch Sullivan Draw Hydraulic Analysis

4.1.2 Scenario 2: New 20-inch Sullivan Draw Pipeline

4.1.2.1 Objective

Replacement of the existing 0.8 miles of 18-inch steel pipe which runs from the PCT to the Upper Roll Seal PSV as well as the 0.4 miles of 20-inch steel pipe from the Upper Roll Seal PSV to the Lower Roll Seal PSV is currently part of the City's 10 Year CIP. Currently, the City Plans to replace (abandon in place) the existing 18-inch and 20-inch steel pipe and replace them with a new 20-inch PVC pipe.

The objective of this analysis was to evaluate the hydraulic performance of the proposed new 20-inch Sullivan draw pipeline under two flow conditions:

- 6.7 mgd: Normal "high flow" rate for PMFL
- Maximum Flow: Maximum flow rate which can be conveyed through the proposed new 20-inch Sullivan Draw pipeline to the Grand Junction WTP

4.1.2.2 Assumptions

- 1.25 miles of PMFL from PCT to Lower Roll Seal PSV replaced with 20-inch pipe (internal diameter: 19-inch, C-Factor: 130)
- PCT water surface elevation: 5,358 ft (approximately half full)
- Upper Roll Seal PSV Setting: modulated to produce desired flow rate through Sullivan Draw pipeline
- Grand Junction WTP Water Surface Elevation: 4,831 ft

4.1.2.3 Results

The hydraulic model was used to evaluate the proposed 20-inch Sullivan Draw pipeline under a 6.7 mgd flow rate as shown in Figure 7. A flow rate of 6.7 mgd was simulated by adjusting the upstream setting of the Upper Roll Seal PSV to 77.7 psi (5,337 ft). HGLs between the Upper Roll Seal PSV and the PCT were predicted by the model based on dynamic head loss due to the flow rate, the pipe diameter, pipe length and pipe C-Factor. At a flow rate of 6.7 mgd the model predicted an HGL of 5,344 ft at the Sullivan Draw high point, which exceeds the pipe elevation at a positive pressure of approximately 14 psi.

The maximum flow rate of the PMFL with the proposed 20-inch Sullivan Draw pipeline was estimated by bypassing the Upper Roll Seal PSV and allowing water to flow unrestricted from the PCT to the Grand Junction WTP. As shown in Figure 7, the maximum flow rate with the Upper Roll Seal PSV bypassed was predicted to be 10.1 mgd. At this flow rate, the HGL at the Sullivan Draw high point was predicted to be approximately 5,329 ft (7 psi of positive pressure), which confirms that the proposed 20-inch Sullivan Draw would no longer be the bottleneck restricting flow through the PMFL.

Figure 8 displays the PMFL hydraulic profile from the PCT to the Grand Junction WTP with the proposed 20-inch Sullivan Draw pipeline and both the Upper and Lower Roll Seal PSVs bypassed. As shown, the maximum flow rate of 10.1 mgd is limited by dynamic head losses through the existing PMFL pipelines downstream of the Lower Roll Seal PSV. The maximum pressure along the

PMFL was predicted to be 159 psi in the vicinity of Whitewater Creek, which is below the 160 psi pressure rating of the 20-inch steel pipe. If flow rates of more than 10.1 mgd are desired in the future, upsizing of other segments of the PMFL must be completed.

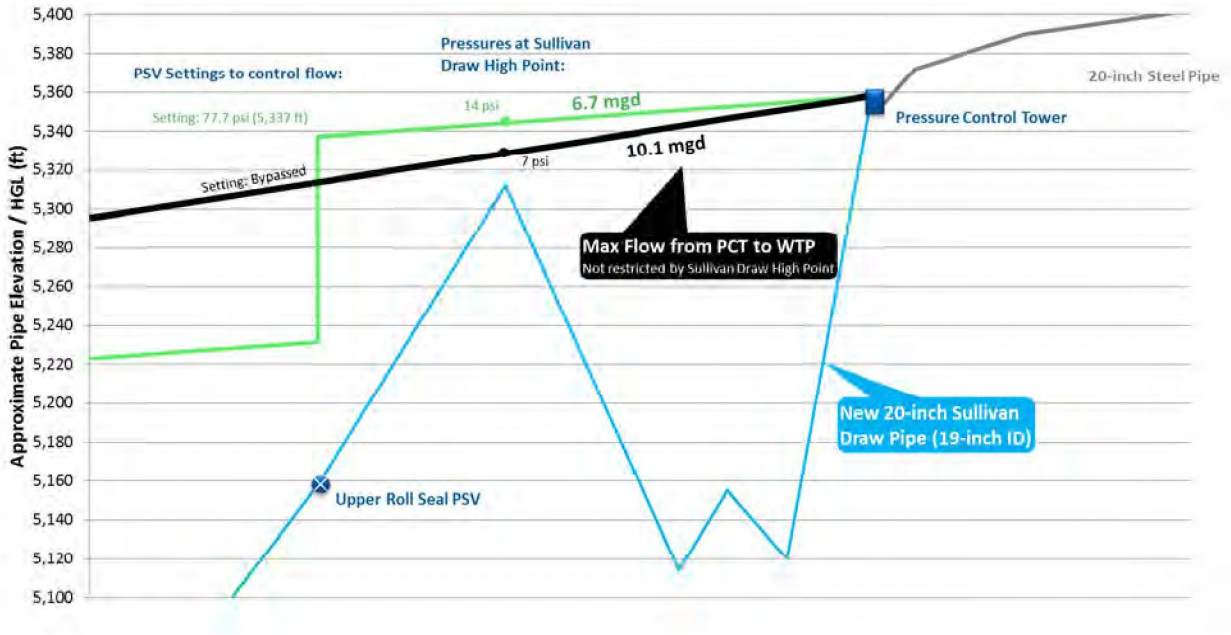


Figure 7 Proposed 20-inch Sullivan Draw Hydraulic Analysis

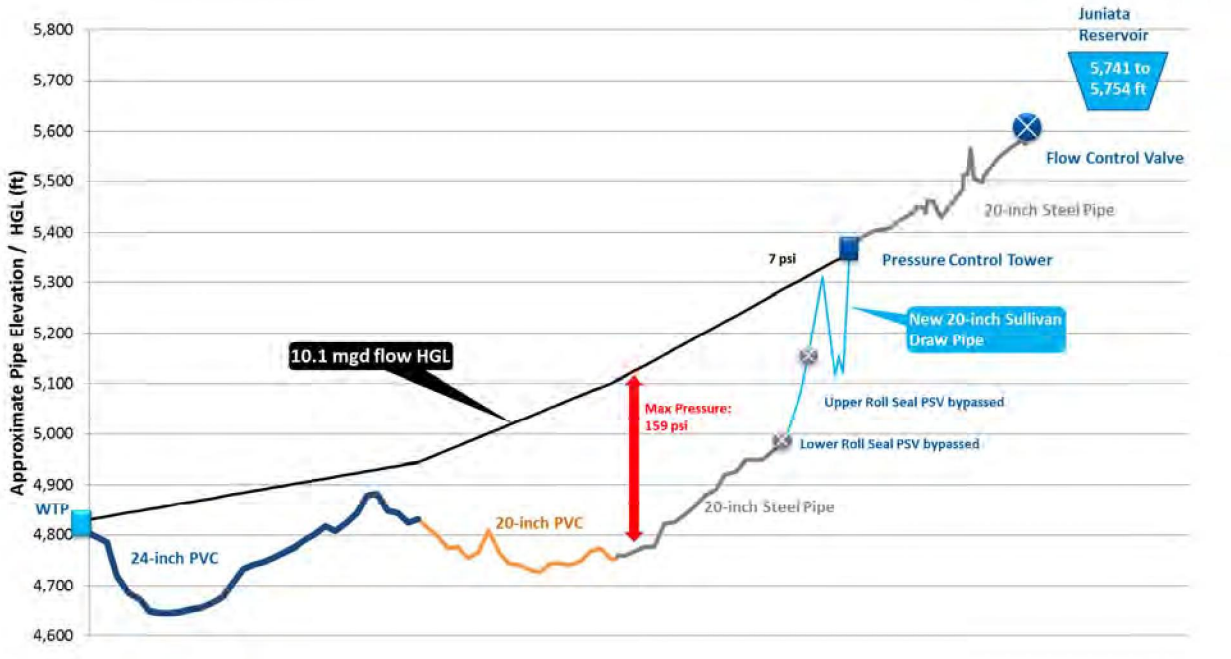


Figure 8 Purdy Mesa Flow Hydraulic Profile - Maximum Flow Rate with 20-inch Sullivan Draw Pipe

4.2 EXISTING PURDY MESA FLOW LINE ANALYSES

The PMFL is operationally challenging due to the existing flow control infrastructure and hydraulics under varying flow rates, which can cause air entrainment (manifested as milky water at the Grand Junction WTP) due to a variety of factors including partially full pipe flow and cavitation. The existing PMFL was analyzed under three flow rates to facilitate understanding of existing hydraulics and enable identification of operational issues and the development of potential hydraulic solutions. The following scenarios were evaluated and are detailed in the following section:

- Scenario 3: Existing Purdy Mesa Flow Line, 3.0 mgd
  - PMFL under a normal "low flow" condition
- Scenario 4: Existing Purdy Mesa Flow Line, 6.7 mgd
  - PMFL under a normal "high flow" condition
- Scenario 5: Existing Purdy Mesa Flow Line, 7.6 mgd
  - PMFL under a near maximum flow condition

4.2.1 Scenario 3: Existing Purdy Mesa Flow Line, 3.0 mgd

4.2.1.1 Objective

Based on conversations with the City, during low flow rates (e.g. 3.0 mgd), the FCV at the Juniata Reservoir is set to the desired flow rate and Upper and Lower Roll Seal PSVs are bypassed. The objective of this scenario was to evaluate the PMFL hydraulics at a flow rate of 3.0 mgd.

4.2.1.2 Assumptions

- Flow rate of 3.0 mgd delivered to the PCT from the Juniata Reservoir FCV (modeled as a 3.0 mgd inflow at the PCT)
- Upper and Lower Roll Seal PSVs bypassed
- Grand Junction WTP Water Surface Elevation: 4,831 ft

4.2.1.3 Results

The hydraulic model was used to evaluate the existing PMFL under a 3.0 mgd flow rate as shown in Figure 9. A flow rate of 3.0 mgd was simulated using an inflow of 3.0 mgd at the PCT, mimicking the actual system conditions of 3.0 mgd being delivered to the PCT by the Juniata Reservoir FCV.

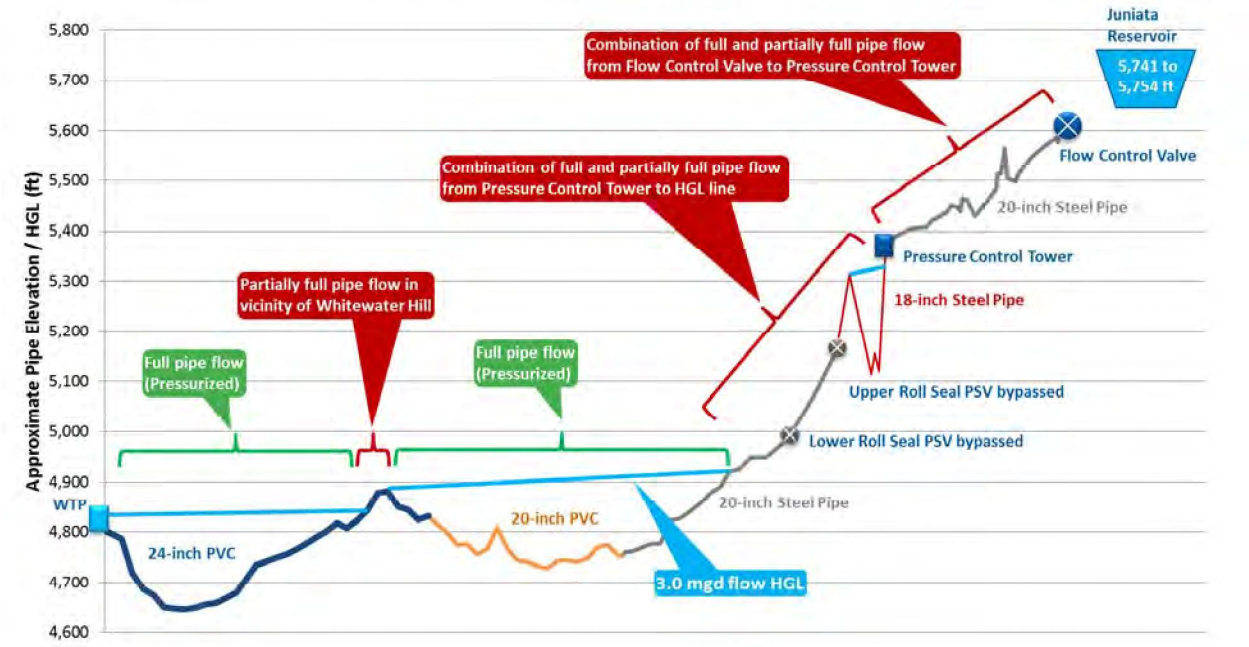


Figure 9 - Existing Purdy Mesa Flow Line, 3.0 mgd- Hydraulic Profile

The following is a description of the predicted PMFL hydraulics from the Juniata Reservoir to the Grand Junction WTP under a flow rate of 3.0 mgd:

- Water from the Juniata Reservoir is released into the 20-inch steel PMFL by the FCV at a flow rate of 3.0 mgd
- A combination of full and partially full pipe flow occurs in the 20-inch steel pipe from the FCV to the PCT. The pipe will be full upstream of high points (where water will "back up" in the pipeline until a sufficient HGL is established to flow over the high point. On the downstream side of high points, the pipe will flow partially full (with the rest of the pipe filled with air)
- Water will flow into the PCT, however, without a sufficient downstream HGL to maintain water level in the PCT, the PCT will drain into the 18-inch Sullivan Draw pipe
- An HGL will be established through the Sullivan Draw which is defined by the high point of the Sullivan Draw and the dynamic head losses associated with the 18-inch Sullivan Draw pipe at a flow rate of 3.0 mgd
- Downstream of the Sullivan Draw high point, partially full pipe flow will occur as water falls from the high point. Significant air accumulation is likely to occur in this portion of the PMFL. Partially full pipe flow was predicted to continue until reaching the HGL established by the Whitewater Hill high point and the dynamic head loss in the PMFL at a flow rate of 3.0 mgd, at which point flow will continue full pipe (under pressure) to the White Water Hill high point
- Downstream of the Whitewater Hill high point, partially full pipe flow was predicted to occur as water falls from the high point. Significant air accumulation is likely to occur in this portion of the PMFL. Partially full pipe flow was predicted to continue until reaching the HGL established by the water surface elevation at the Grand Junction WTP and the dynamic head loss in the

pipeline at 3.0 mgd, at which point flow was predicted to continue full pipe (under pressure) to the Grand Junction WTP

As described and detailed above, significant air accumulation was predicted to be likely to occur in the existing PMFL under flow rates of 3.0 mgd. Accumulated air (air pockets) are unpredictable and can become lodged in various locations, causing hydraulic restrictions (by artificially reducing the flowable cross-sectional area of the pipe) when flow rates in the PMFL are increased.

4.2.2 Scenario 4: Existing Purdy Mesa Flow Line, 6.7 mgd

4.2.2.1 Objective

Based on conversations with the City, during high flow rates (e.g. 6.7 mgd), the FCV at the Juniata Reservoir is set to the desired flow rate and the upstream setting of the Upper Roll Seal PSV is manually set to establish a constant water surface elevation in the PCT. In practice, the City manually adjusts the setting of the Upper Roll Seal PSV by having one staff member at the Upper Roll Seal PSV and one staff member at the PCT, communicating by radio. The staff member at the Upper Roll Seal PSV adjusts the upstream setting until the staff member at the PCT can visually see that the level has stabilized in the middle of the PCT head range. Under ideal circumstances, the Juniata Reservoir FCV will control flow into the PCT and the Upper Roll Seal PSV will control flow out of the PCT at an identical rate, allowing the PCT water surface elevation to remain constant. Based on conversations with the City, however, it was noted that following manual adjustment of the Upper Roll Seal PSV, flow in and out of the PCT generally becomes unbalanced quickly, leading to the PCT either draining or overflowing.

The objective of this scenario was to evaluate the PMFL hydraulics at a flow rate of 6.7 mgd under an ideal case where the flow into and out of the PCT are matched, enabling the PCT to float at a consistent water surface elevation in the middle of its head range of approximately 5,358 ft.

4.2.2.2 Assumptions

- PCT water surface elevation: 5,358 ft (middle of PCT head range, assumes flow into the PCT controlled by the Juniata Reservoir FCV is equal to the flow out of the PCT controlled by the upstream setting of the Upper Roll Seal PSV)
- Upper Roll Seal PSV upstream setting: 68 psi, 5,315 ft (set to control 6.7 mgd of flow downstream of the PCT)
- Lower Roll Seal PSV upstream setting: 101 psi, 5,220 ft (set to maintain positive pressure between the Lower Roll Seal PSV and Upper Roll Seal PSV and eliminate the partially pipe flow which would be otherwise predicted to occur downstream of the Upper Roll Seal PSV. It is noted that the Lower Roll Seal PSV does not impact the flow rate of the PMFL downstream of the PCT)
- Grand Junction WTP Water Surface Elevation: 4,831 ft

4.2.2.3 Results

The hydraulic model was used to evaluate the existing PMFL under a 6.7 mgd flow rate as shown in Figure 10. A flow rate of 6.7 mgd was simulated by setting the water surface elevation of the PCT to 5,358 ft and adjusting the upstream setting of the Upper Roll Seal PSV to 68 psi (5,315 ft).

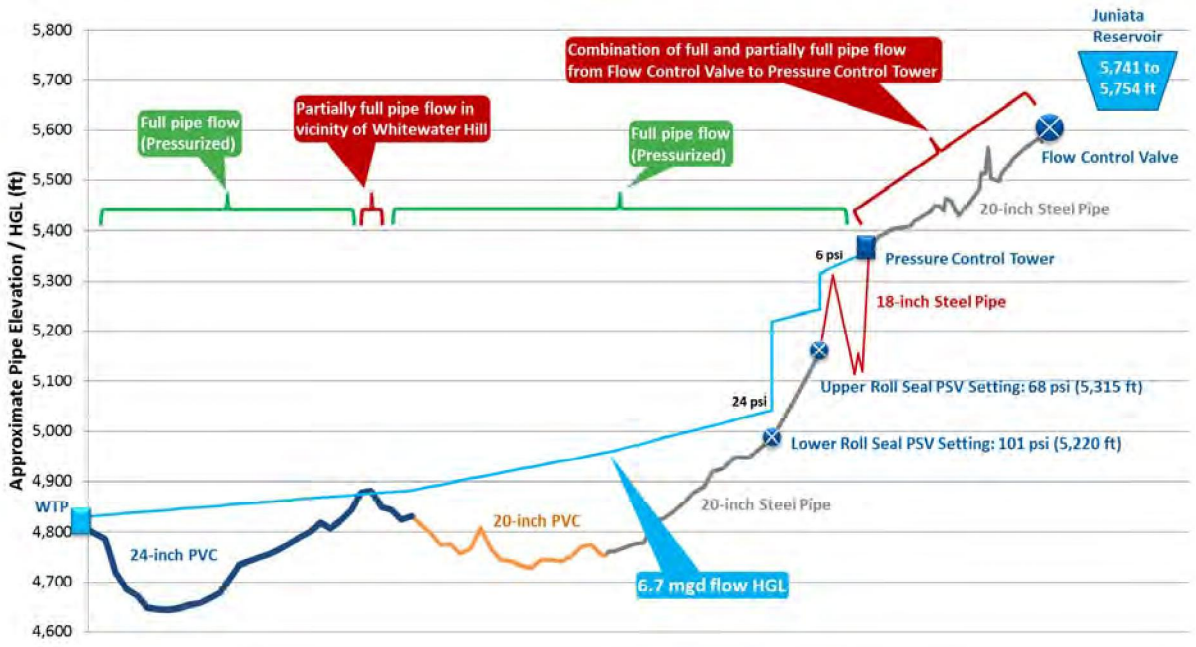


Figure 10 - Existing Purdy Mesa Flow Line, 6.7 mgd - Hydraulic Profile

The following is a description of the predicted PMFL hydraulics from the Juniata Reservoir to the Grand Junction WTP under a flow rate of 6.7 mgd:

- Water from the Juniata Reservoir is released into the 20-inch steel PMFL by the FCV at a flow rate of 6.7 mgd
- A combination of full and partially full pipe flow occurs in the 20-inch steel pipe from the FCV to the PCT. The pipe will be full upstream of high points (where water will "back up" in the pipeline until a sufficient HGL is established to flow over the high point. On the downstream side of high points, the pipe will flow partially full (with the rest of the pipe filled with air).
- Water will flow into the PCT, and, assuming that flow out of the PCT is effectively controlled by the Upper Roll Seal PSV to match the flow into the PCT, the water surface elevation will remain constant at 5,358 ft.
- Full pipe flow is predicted through the Sullivan Draw, including a positive pressure of approximately 6 psi at the Sullivan Draw high point.
- The Upper Roll Seal PSV was predicted to maintain an upstream pressure of 68 psi (5,315 ft).
- The Lower Roll Seal was predicted to maintain an upstream pressure of 101 psi (5,220 ft). Under this flow scenario, the Lower Roll Seal serves the critical function of creating back pressure which enables positive pressure to be maintained on the downstream side of the Upper Roll Seal PSV. Without the Lower Roll Seal PSV, the HGL downstream of the Upper Roll Seal PSV would be

controlled by the water surface elevation at the Grand Junction WTP as well as head loss in the PMFL.

- As shown in Figure 10, if the 6.7 mgd HGL line were to continue past the Lower Roll Seal PSV (without the HGL being raised by the automatic throttling of the PSV to maintain the upstream pressure setting), it would hit the pipe at an elevation of approximately 5,050 ft, which is more than 100 ft below the elevation of the Upper Roll Seal PSV. Without the Lower Roll Seal PSV creating back pressure, the Upper Roll Seal PSV would be likely to cavitate (due to low/negative pressures on the downstream side) and the PMFL would be predicted to experience partially full pipe flow, between the Upper Roll Seal PSV and the HGL line, which could lead to significant air accumulation.
- Following the Lower Roll Seal PSV, an HGL was predicted to be established based on the Whitewater Hill high point and the head loss through the PMFL at a flow rate of 6.7 mgd.
- Downstream of the Whitewater Hill high point, partially full pipe flow was predicted to occur as water falls from the high point. Some air accumulation is likely to occur in this portion of the PMFL. Partially full pipe flow was predicted to continue until reaching the HGL established by the water surface elevation at the Grand Junction WTP and the dynamic head loss in the pipeline at 6.7 mgd, at which point flow was predicted to continue full pipe (under pressure) to the Grand Junction WTP.

As described and detailed above, some air accumulation was predicted to be likely to occur in the existing PMFL under flow rates of 6.7 mgd in the vicinity of Whitewater Hill. Accumulated air (air pockets) are unpredictable and can become lodged in various locations, causing hydraulic restrictions (by artificially reducing the flowable cross-sectional area of the pipe) when flow rates in the PMFL are increased.

4.2.3 Scenario 5: Existing Purdy Mesa Flow Line, 7.6 mgd

4.2.3.1 Objective

Based on conversations with the City, during maximum flow rates (e.g. 7.6 mgd), the FCV at the Juniata Reservoir is set to the desired flow rate and the upstream setting of the Upper Roll Seal PSV is manually set to establish a constant water surface elevation in the PCT. In practice, the City manually adjusts the setting of the Upper Roll Seal PSV by having one staff member at the Upper Roll Seal PSV and one staff member at the PCT, communicating by radio. The staff member at the Upper Roll Seal PSV adjusts the upstream setting until the staff member at the PCT can visually see that the level has stabilized in the middle of the PCT head range. Under ideal circumstances, the Juniata Reservoir FCV will control flow into the PCT and the Upper Roll Seal PSV will control flow out of the PCT at an identical rate, allowing the PCT water surface elevation to remain constant. Based on conversations with the City, however, it was noted that following manual adjustment of the Upper Roll Seal PSV, flow in and out of the PCT generally becomes unbalanced quickly, leading to the PCT either draining or overflowing.

The objective of this scenario was to evaluate the PMFL hydraulics at a flow rate of 7.6 mgd under an ideal case where the flow into and out of the PCT are matched, enabling the PCT to float at a consistent water surface elevation in the middle of its head range of approximately 5,358 ft.

4.2.3.2 Assumptions

- PCT water surface elevation: 5,358 ft (middle of PCT head range, assumes flow into the PCT controlled by the Juniata Reservoir FCV is equal to the flow out of the PCT controlled by the upstream setting of the Upper Roll Seal PSV)
- Upper Roll Seal PSV upstream setting: 63 psi, 5,304 ft (set to control 7.6 mgd of flow downstream of the PCT)
- Lower Roll Seal PSV upstream setting: 101 psi, 5,220 ft (set to maintain positive pressure between the Lower Roll Seal PSV and Upper Roll Seal PSV and eliminate the partially pipe flow which would be otherwise predicted to occur downstream of the Upper Roll Seal PSV. The Lower Roll Seal PSV does not impact the flow rate of the PMFL downstream of the PCT)
- Grand Junction WTP Water Surface Elevation: 4,831 ft

4.2.3.3 Results

The hydraulic model was used to evaluate the existing PMFL under a 7.6 mgd flow rate as shown in Figure 11. A flow rate of 7.6 mgd was simulated by setting the water surface elevation of the PCT to 5,358 ft and adjusting the upstream setting of the Upper Roll Seal PSV to 63 psi (5,304 ft).

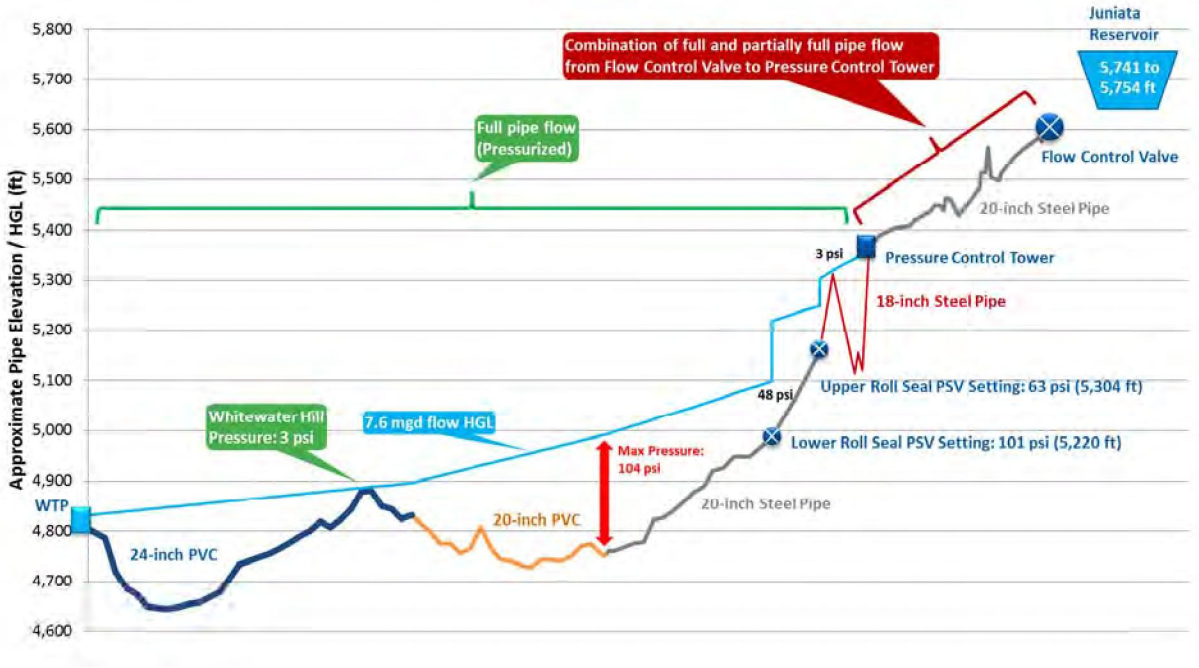


Figure 11 - Existing Purdy Mesa Flow Line, 7.6 mgd - Hydraulic Profile

The following is a description of the predicted PMFL hydraulics from the Juniata Reservoir to the Grand Junction WTP under a flow rate of 7.6 mgd:

- Water from the Juniata Reservoir is released into the 20-inch steel PMFL by the FCV at a flow rate of 7.6 mgd
- A combination of full and partially full pipe flow occurs in the 20-inch steel pipe from the FCV to the PCT. The pipe will be full upstream of high points (where water will "back up" in the pipeline

until a sufficient HGL is established to flow over the high point. On the downstream side of high points, the pipe will flow partially full (with the rest of the pipe filled with air)

- Water will flow into the PCT, and, assuming that flow out of the PCT is effectively controlled by the Upper Roll Seal PSV to match the flow into the PCT, the water surface elevation will remain constant at 5,358 ft
- Full pipe flow is predicted through the Sullivan Draw, including a positive pressure of approximately 3 psi at the Sullivan Draw high point
- The Upper Roll Seal PSV was predicted to maintain an upstream pressure of 63 psi (5,304 ft)
- The Lower Roll Seal was predicted to maintain an upstream pressure of 101 psi (5,220 ft). Under this flow scenario, the Lower Roll Seal serves the critical function of creating back pressure which enables positive pressure to be maintained on the downstream side of the Upper Roll Seal PSV. Without the Lower Roll Seal PSV, the HGL downstream of the Upper Roll Seal PSV would be controlled by the water surface elevation at the Grand Junction WTP as well as head loss in the PMFL. As shown in Figure 11, if the 7.6 mgd HGL line were to continue to the past the Lower Roll Seal PSV (without the HGL being raised by the automatic throttling of the PSV to maintain the upstream pressure setting), it would hit the pipe at an elevation of approximately 5,130 ft, which is below the elevation of the Upper Roll Seal PSV. Without the Lower Roll Seal PSV creating back pressure, the Upper Roll Seal PSV would be likely to cavitate (due to low/negative pressures on the downstream side) and the PMFL would be predicted to experience partially full pipe flow, between the Upper Roll Seal PSV and the HGL line, which could lead to significant air accumulation.
- Following the Lower Roll Seal PSV, an HGL was predicted to be established based on the water surface elevation at the Grand Junction WTP and the dynamic head loss in the PMFL at 7.6 mgd. It is noted that under this high flow rate, dynamic head losses were predicted to be sufficient maintain full pipe (pressurized) flow from the PCT to the Grand Junction WTP, including a positive pressure of approximately 3 psi at Whitewater Hill.

At a PMFL flow rate of 7.6 mgd, full pipe flow was predicted to occur in the PMFL from the PCT to the Grand Junction WTP. With the PMFL fully pressurized, no air accumulation was predicted.

4.3 FUTURE PURDY MESA FLOW LINE ANALYSIS

4.3.1 Scenario 6: Purdy Mesa Flow Line Upsized to 24-inch

4.3.1.1 Objective

Based on conversations with the City, it may be desirable to increase the flow capacity of the PMFL in the future both to be capable of meeting the required capacity of future growth and to enable the delivery of sufficient raw water capacity to the Grand Junction WTP with the Kannah Creek Flow Line out of service.

If flow capacities of more than approximately 9.8 mgd (maximum flow capacity with new 20-inch Sullivan Draw pipeline) are desired in the future, it may be beneficial to upsize the Sullivan Draw pipe now so it supports the future desired PMFL flow rate without causing a hydraulic bottleneck.

The objective of this analysis was to analyze and determine the maximum hypothetical flow rate of the PMFL (from the PCT to the Grand Junction WTP) it were upsized to 24-inch.

4.3.1.2 Assumptions

- PMFL upsized to 24-inch from the PCT to the existing 24-inch PVC pipe in the vicinity of the Orchard Mesa Park and Ride
- New 24-inch assumed to have an internal diameter of 23.6-inch, C-Factor of 130
- This analysis was focused on the flow capacity of a future 24-inch PMFL from the PCT to the Grand Junction WTP only, and did not consider the flow capacity of 20-inch steel pipe between the Juniata Reservoir and the PCT.
- PCT water surface elevation: 5,358 ft (middle of PCT head range, assumes flow into the PCT controlled by the Juniata Reservoir FCV is equal to the flow out of the PCT)
- Upper and Lower Roll Seal PSVs bypassed
- Grand Junction WTP Water Surface Elevation: 4,831 ft

4.3.1.3 Results

The hydraulic model was used to evaluate the flow capacity of a future 24-inch PMFL from the PCT to the Grand Junction WTP. With the Upper and Lower Roll Seal PSVs bypassed, the model predicted a maximum flow rate of approximately 14.8 mgd as shown in Figure 12.

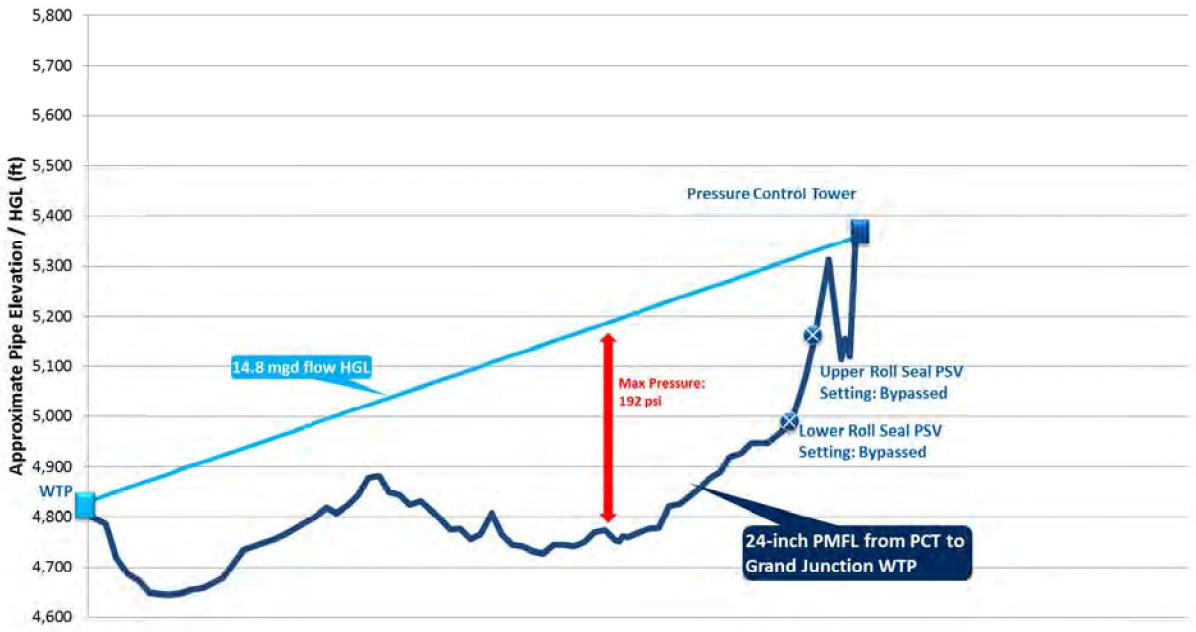


Figure 12 - Purdy Mesa Flow Line Upsized to 24-inch - Hydraulic Profile

The following is a description of the predicted PMFL hydraulics from the PCT to the Grand Junction WTP with the entire pipeline 24-inch and a flow rate of 14.8 mgd:

- It is noted that this analysis did not consider the capacity of the existing 20-inch steel pipe

between the Juniata Reservoir and the PCT. While this existing 20-inch steel pipe could be sufficient to support a flow rate of 14.8 mgd depending on the prevailing C-Factor, it is likely undersized as the velocity under full pipe flow would exceed 10 ft/sec. If the City desires to upsize the PMFL to 24-inch (from the PCT to the Grand Junction WTP) in the future, the existing 20-inch between the Juniata Reservoir and the PCT should be evaluated and likely upsized in kind.

- The maximum flow rate of 14.8 mgd was determined using the hydraulic model such that the dynamic head loss in the 24-inch PMFL was equal to the static head difference between the PCT water surface elevation of 5,358 ft and the Grand Junction WTP water surface elevation of 4,831 ft. At this flow rate, a straight HGL line was established between the Grand Junction WTP and the PCT as shown in Figure 12.
- At a flow rate of 14.8 mgd, velocities of approximately 7.5 ft/sec were predicted in the future 24-inch PMFL.
- Based on the HGL line and the ground elevations of the 24-inch pipe, pressures of up to 192 psi were predicted in the vicinity of Whitewater Creek under a flow rate of 14.8 mgd.

With a future 24-inch PMFL from the PCT to the Grand Junction WTP, the maximum flow capacity was predicted to be approximately 14.8 mgd. It is noted that due to high dynamic head losses at the high flow rate, pressures along the PMFL at low points were predicted to be as high as 192 psi. Any new pipeline should be designed with a sufficient pressure class to sustain the highest predicted dynamic pressures.

5 Hydraulic Issues

Based on the hydraulic analyses conducted and described previously, four primary hydraulic issues were identified as likely causes for the air entrainment observed by the City at the Grand Junction WTP as well as the operational challenges with the PMFL. The following four hydraulic issues are described in this section:

- Roll Seal PSV Cavitation
- Pipeline Air Accumulation
- Pressure Control Tower Volume
- Flow Control Upstream and Downstream of the Pressure Control Tower

5.1 ROLL SEAL PSV CAVITATION

A Roll Seal PSV modulates to maintain an upstream pressure setting. Pressures on the downstream side are determined by system hydraulics independent of the PSV. In the case of the PMFL, the HGL downstream of the Lower Roll Seal PSV is determined by two factors: the water surface elevation at the Grand Junction WTP and the dynamic head loss (determined by pipe diameter, length, C-Factor and flow rate) between the Lower Roll Seal PSV and the Grand Junction WTP.

Cavitation can occur downstream of a Roll Seal PSV if the relationship between the inlet pressure and outlet pressure is within the Cavitation Zone shown in Figure 13 (from the Roll_Seal_Catalog.pdf). The City currently operates the Lower Roll Seal PSV at an upstream pressure setting (inlet pressure) of approximately 101 psi. As shown, this corresponds to a minimum downstream pressure (outlet pressure) of approximately 10 psi to avoid cavitation.

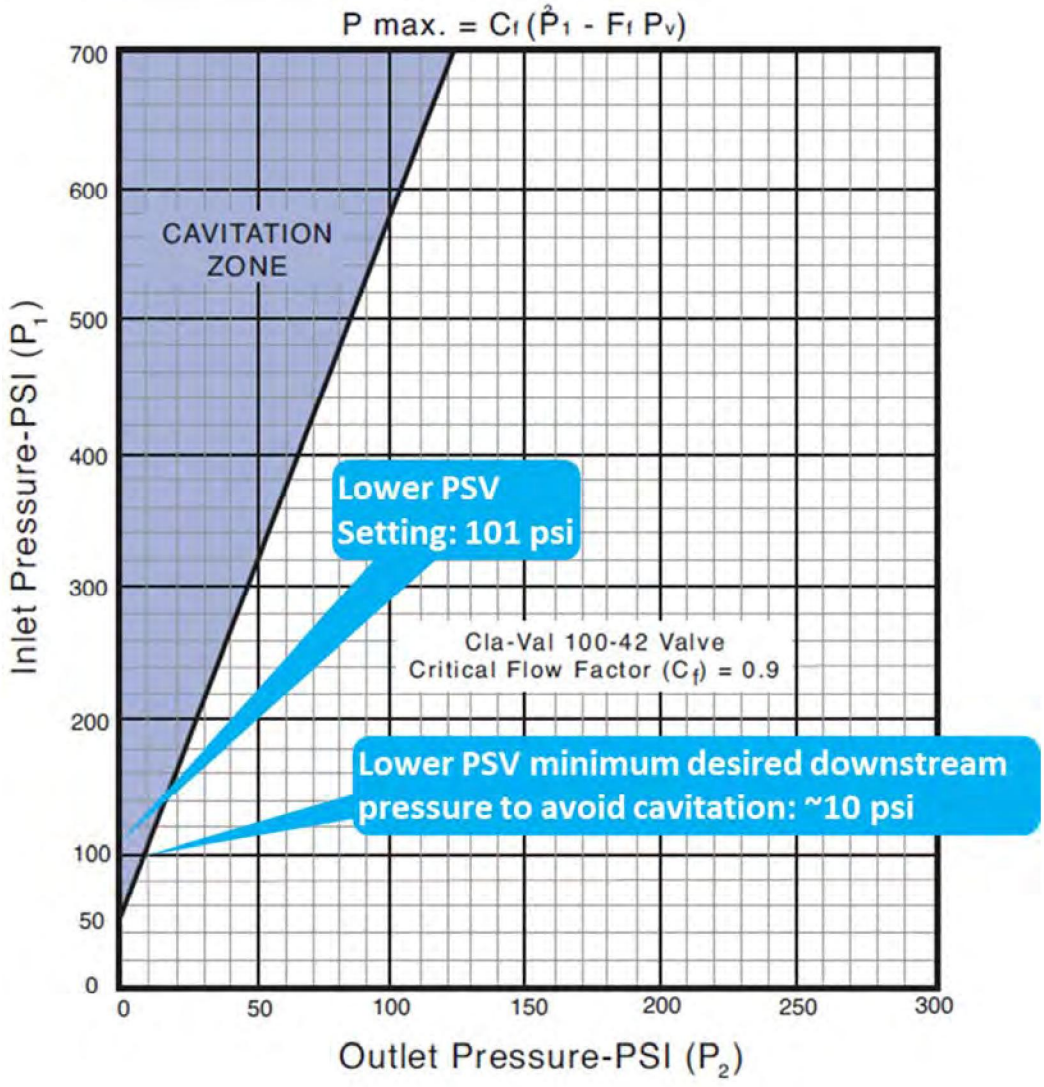


Figure 13 Cla-Val 100-42 Valve Cavitation Chart

Because the outlet pressure of Lower Roll Seal PSV is controlled by the water surface elevation at the Grand Junction WTP (which was assumed to be constant at approximately 4,831 ft) and the dynamic head loss in the PMFL (which varies based on flow rate), it was possible to calculate the minimum required PMFL rate to avoid cavitation of the Lower Roll Seal PSV. Figure 14 displays the relationship between flow rate in the PMFL and outlet pressure of the Lower Roll Seal PSV. As shown, at flow rates of approximately 6.1 mgd and below, the Lower Roll Seal PSV will be predicted to operate within the cavitation zone, which could lead to cavitation and subsequent air entrainment in the PMFL. At PMFL flow rates of greater than 6.1 mgd, the Lower Roll Seal PSV will not be predicted to cavitate.

Based on the analysis detailed above, to avoid cavitation the Lower Roll Seal PSV should be used under PMFL flow rates of approximately 6.1 mgd or greater. Under flow rates of less than 6.1 mgd, the Lower Roll Seal PSV should be bypassed to avoid cavitation. Additionally, the Upper Roll Seal PSV should also be bypassed any time that the Lower Roll Seal PSV is bypassed to avoid cavitation at the Upper Roll Seal PSV.

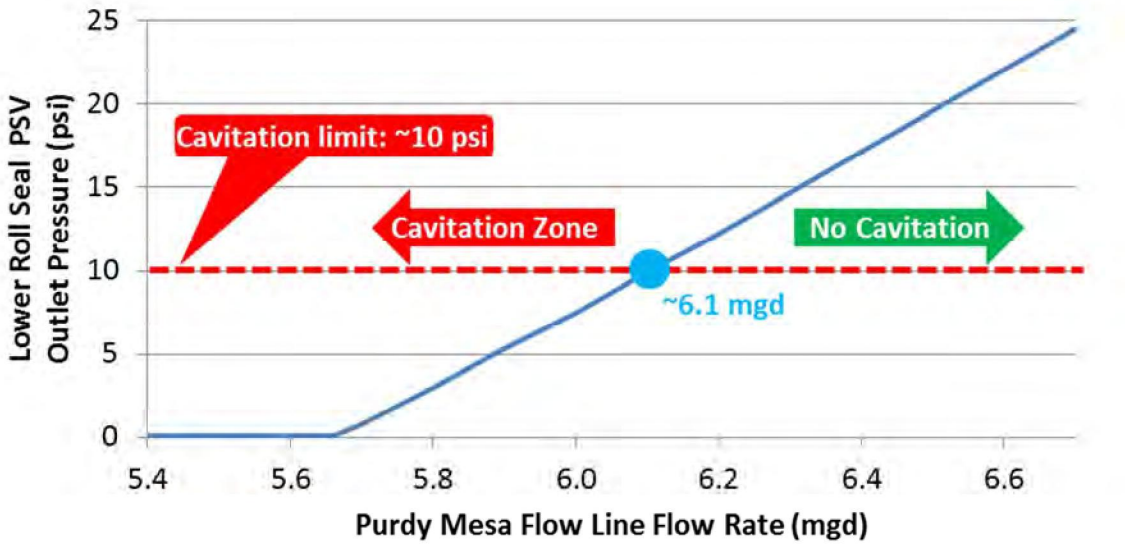


Figure 14 Lower Roll Seal PSV – Required Flow Rate to Avoid Cavitation

5.2 PIPELINE AIR ACCUMULATION

When pipelines flow under positive pressure, they flow full and minimize the accumulation of air within the pipeline. When the HGL of water within a pipeline drops below the elevation of the pipeline, partially full pipe flow can occur, which can lead to the accumulation of air. Accumulated air in the pipeline can lead to a variety of negative consequences including the unpredictable formation and movement of air pockets, temporary hydraulic restrictions due to air pockets (which effectively reduce the flowable cross-sectional area of a pipe until the air is expelled through an air valve), uncertain time durations to fully expel air from the pipeline as well as air entrainment and other flow anomalies.

Based on the hydraulic analyses described in the previous section, there is potential for air accumulation due to partially full pipe flow between the PCT and the Grand Junction WTP under the following flow conditions:

- PMFL flow rates of less than 6.1 mgd with the Upper and Lower Roll Seal PSVs bypassed
  - Significant potential for air accumulation between the PCT (which was predicted to operate fully drained with the outflow pipe flowing partially full) and the dynamic HGL determined by the flow rate (illustrated in Figure 9).
  - Additional potential for air accumulation on the downstream side of the Whitewater Hill high point. Utilizing the Roll Seal PSVs under PMFL flow rates of less than 6.1 mgd are not recommended due to the cavitation potential of the Lower Roll Seal PSV (as described in Section 5.1)
- PMFL flow rates between 6.1 mgd and 7.1 mgd with the Upper Roll Seal PSV upstream setting set to match the flow rate of the Juniata Reservoir PSV and the Lower Roll Seal PSV upstream setting of 101 psi

- Potential for air accumulation on the downstream side of the Whitewater Hill point, which was predicted to flow partially full at PMFL flow rates of less than approximately 7.1 mgd and flow full at PMFL flow rates in excess of approximately 7.1 mgd

5.3 PRESSURE CONTROL TOWER VOLUME

Under flow rates in excess of approximately 6.1 mgd, the City currently attempts to maintain the water surface elevation of the PCT by manually adjusting the Upper Roll Seal PSV such that the outflow of the PCT is equal to the inflow to the PCT from the Juniata Reservoir FCV. Based on discussions with the City, maintaining a consistent water surface elevation in the PCT is challenging, with the City generally observing either the overflowing of the PCT (inflow greater than outflow) or draining of the PCT (outflow greater than inflow) shortly after adjusting the water surface elevation by manually adjusting the upstream setting of the Upper Roll Seal PSV.

An overview of the PCT is shown in Figure 15. The cylindrical PCT is 12 ft in height (approximately 5,252 ft to 5,364 ft) with a diameter of 5 ft and a nominal total volume of approximately 235 ft^3 (1,760 gallons). Water flows into the PCT from the 20-inch steel pipe which conveys water from the Juniata Reservoir and flows out through the existing 18-inch steel Sullivan Draw pipe. As shown, the outflow pipe is located approximately 4 ft above the bottom of the PCT and the overflow pipe (which discharges water out of the PCT if inflow is greater than outflow) is located approximately 2 ft below the top. In practice, this leaves a 6 ft desired level range (between 5,256 ft and 5,362 ft) in the PCT. When operating the PCT within this desired level range, the outflow pipe flows full (no air accumulation) and the PCT does not overflow.

The volume corresponding to the desired PCT level range of 6 ft is approximately 118 ft^3 (881 gallons), which is a small volume relative to the normal flow rates of the PMLF. For example, under a flow rate of 6.7 mgd, a 1% discrepancy in flow in versus flow out of PCT would be predicted to result in the PCT either overflowing or draining within 10 to 15 minutes. Increasing the volume of the PCT would result in an increased ability to maintain the water surface elevation of the PCT without overflowing or draining.

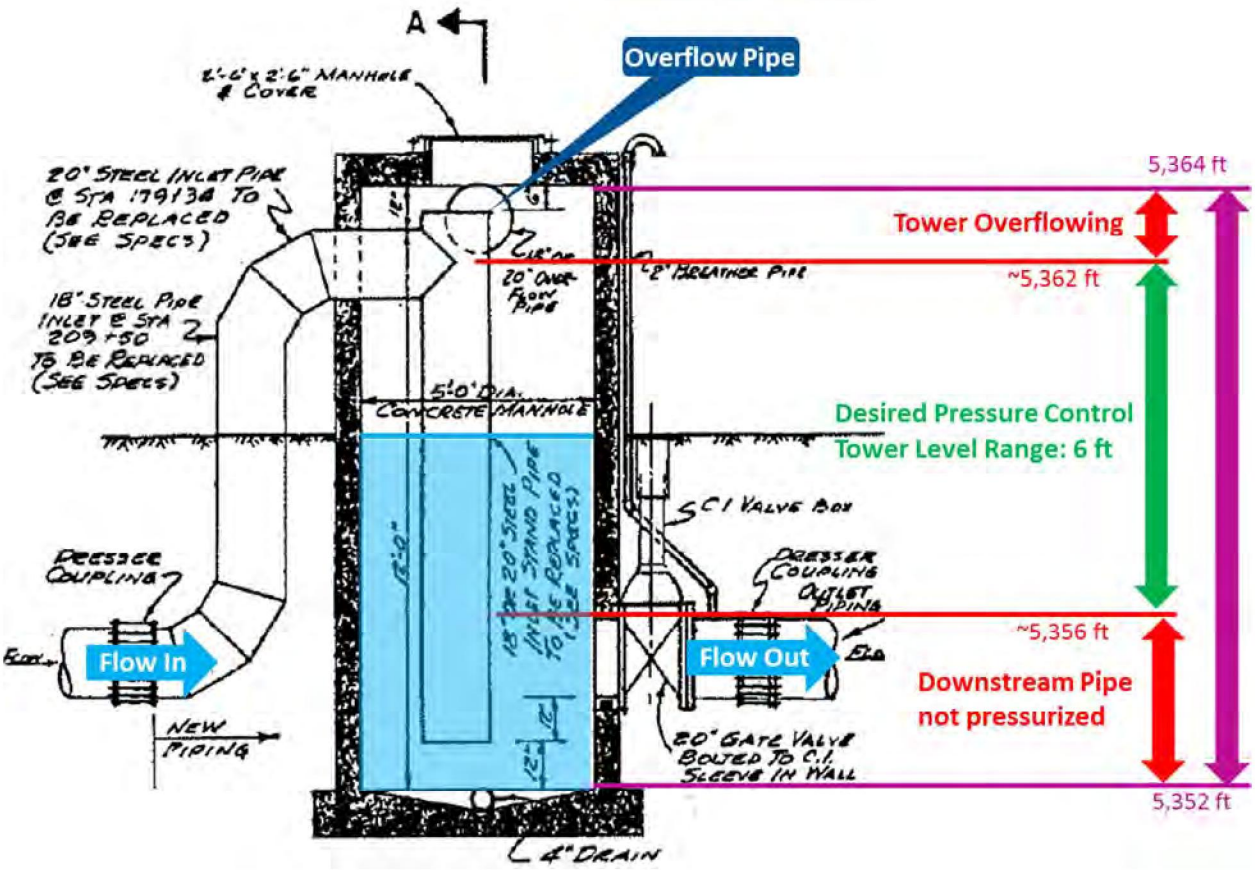


Figure 15 Pressure Control Tower Overview

5.4 FLOW CONTROL UPSTREAM AND DOWNSTREAM OF THE PRESSURE CONTROL TOWER

Based on conversations with the City, maintaining a consistent, stable water level in the PCT is a challenge. This challenge is primarily due to the small volume of the PCT as described in Section 5.3 as well as the difficulty of matching flow into the PCT with flow out of the PCV, which is necessary to maintain a stable water level. Existing flow control into and out of the PCT is described below:

- Flow into PCT
  - At all PMFL flow rates, flow into the PCT is controlled by the FCV at the Juniata Reservoir as shown in Figure 16
  - The flow rate delivered to the PMFL (and subsequently delivered to the PCT) is set by the City and the FCV automatically modulates to maintain the flow setpoint.
- Flow out of PCT
  - At PMFL flow rates of approximately 6.1 mgd or greater, flow out of the PCT is controlled by manually adjusting the upstream pressure setting of Upper Roll Seal PSV until the flow out of the PCT is equal to the flow into the PCT and City staff can visually confirm that the PCT water level has stabilized within its desired head range.

- At PMFL flow rates of less than 6.1 mgd, cavitation of the Lower Roll Seal PSV is likely (Section 5.1) and both the Upper and Roll Seal PSVs should be bypassed, leaving no ability to control flow out of the PCT. Without the Upper Roll Seal PSV controlling flow (and creating back pressure to full pipe flow through the Sullivan Draw), the PCT was predicted to drain completely (as shown in Figure 9).

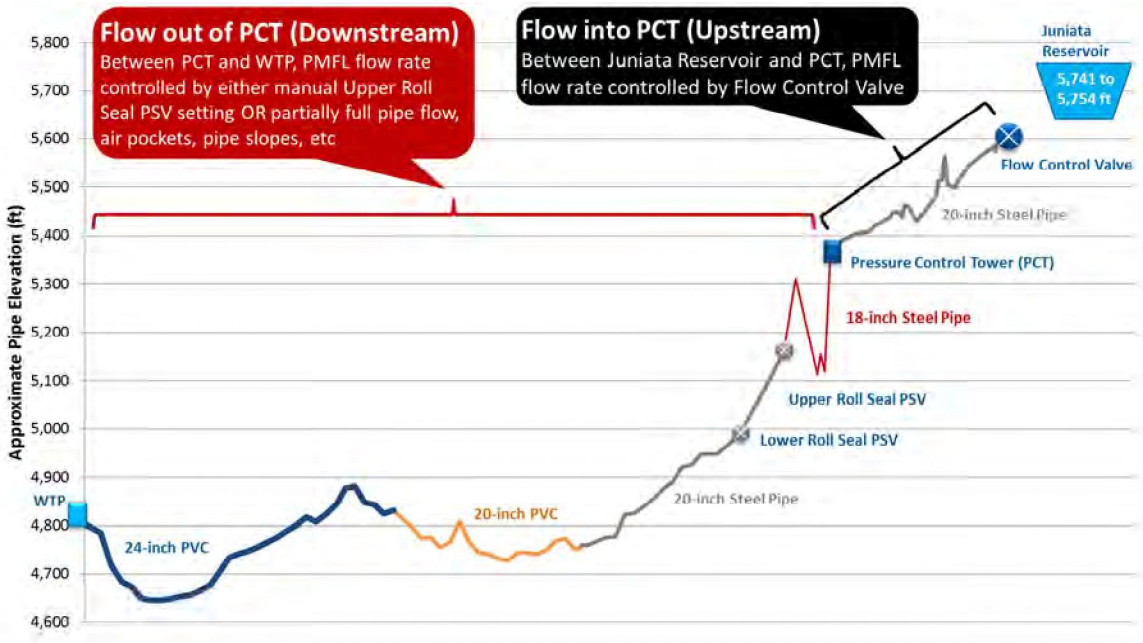


Figure 16 Flow Control Upstream and Downstream of the Pressure Control Tower

6 Potential Hydraulic Improvements

Based on the hydraulic analyses detailed in Section 4 and the hydraulic issues described in Section 5, potential hydraulic improvements were developed for the PMFL to accomplish two primary objectives:

1. Enable the PMFL to flow fully pressurized between the PCT and the Grand Junction WTP under all desired flow rates. This will significantly reduce the potential for air accumulation in the pipeline and cavitation of the Roll Seal PSVs, which are currently believed to be the primary causes of air entrainment seen by City staff at the Grand Junction WTP.

2. Simplify operation of the PMFL for the City by enabling automatic flow control on both the upstream and downstream side of the PCT.

The potential hydraulic improvement projects identified as part of this analysis are shown in Figure 17 and detailed in the following section.

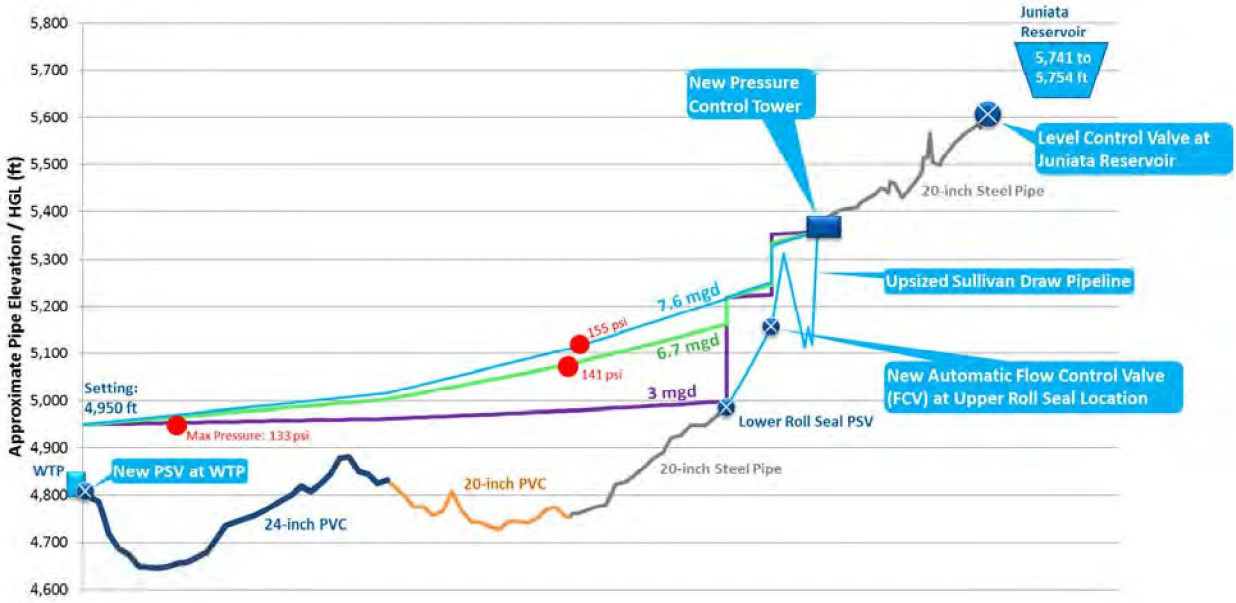


Figure 17 Purdy Mesa Flow Line - Potential Hydraulic Improvements

6.1 UPSIZED SULLIVAN DRAW PIPELINE

Upsizing of the Sullivan Drive pipeline from the PCT to the Lower Roll Seal PSV to 20-inch to facilitate future PMFL flow rates of up to 9.8 mgd as described in Section 4.1.1. If PMFL flow rates in excess of 9.8 mgd are desired in the future (which will requiring upsizing additional portions of the PMFL), the Sullivan Drive pipeline should be upsized to support that desired future flow rate. As described in Section 4.3, a 24-inch PMFL from the PCT to the Grand Junction WTP was predicted to be capable of delivering flows of up to 14.4 mgd.

6.2 NEW AUTOMATIC FLOW CONTROL VALVE AT UPPER ROLL SEAL LOCATION

Installation of a new automatic flow control valve at the current Upper Roll Seal PSV location would enable the City to send a desired PMFL flow setpoint to the new FCV, which would modulate to deliver that flow rate from the PCT to the Grand Junction WTP. The key benefit of locating the new FCV at this location is that this valve will naturally create back pressure while modulating to control flow. This back pressure will ensure that the PMFL is fully pressurized (full pipe flow) from the PCT to the new automatic FCV at the Upper Roll Seal PSV location under all potential PMFL flow rates.

The Upper Roll Seal PSV location is a desirable location for the new automatic flow control valve as it allows the City to maintain the Lower Roll Seal PSV at its current location while maintaining PMFL pressures of less than approximately 100 psi between the new automatic flow control valve and the Lower Roll Seal PSV. If the new automatic flow valve is desired to be installed at an alternate location (with easier access, better site conditions, available power), between the Sullivan Draw High point and the Lower Roll Seal PSV, the setting of the Lower Roll Seal PSV would need to be modified and the City could expect to see PMFL pressures as high as 150 psi, depending on the selected location of the new automatic flow control valve. If an alternate location is selected, the new Sullivan Draw pipeline should be designed with pressure class which exceeds the predicted pressures.

The automatic FCV will require reliable power to modulate continuously. Options for electrification of the Upper Roll Seal site location could include working with the Grand Valley Rural Power Authority, installation of a hydropower turbine, or a combination.

6.3 AUTOMATIC LEVEL CONTROL VALVE AT JUNIATA RESERVOIR

With the PMFL flow rate controlled by the new automatic FCV at the Upper Roll Seal location, the existing FCV at the Juniata Reservoir would be proposed to be modified to an automatic level control valve, which would modulate to maintain a desired water surface elevation in the PCT under all potential PMFL flow rates.

6.4 NEW PRESSURE CONTROL TOWER

As described in Section 5.3, the existing PCT volume is small, leading to significant operational challenges when attempting to maintain a consistent water level, which is required to achieve fully pressurized full pipe flow from the PCT to the Grand Junction WTP. With the proposed new automatic flow control valve at the Upper Roll Seal PSV location and the automatic level control valve at the Juniata Reservoir, a consistent water level in the PCT could theoretically be maintained under ideal hydraulic conditions. However, in reality, changes in flow rate (due to transient events, etc.) would be likely to cause rapid level change in the existing PCT due to its small volume, causing the level control valve at the Juniata Reservoir to constantly "hunt" for the correct level and leading to system instability.

Installation of a new, larger PCT at or near the existing PCT site would give the automatic level control valve at the Juniata time to modulate while maintaining the PCT within a desired head range and enable full automatic control of the PMFL from the Juniata Reservoir to the Grand Junction WTP.

The exact size of the larger PCT should be confirmed with detailed design, but is preliminarily anticipated to be approximately 430,000 gallons (maximum PMFL flow rate of 10.1 mgd) to 610,000 gallons (maximum PMFL flow rate of 14.8 mgd), depending on the desired maximum flow rate of the PMF, as detailed in the following section.

6.4.1 Preliminary New Pressure Control Tower Sizing Calculations

A preliminary PCT sizing tool was developed as shown in Figure 18. This tool is based on a given maximum PMFL (assumed to be 14.8 mgd in the example shown) as well as a cylindrical PCT geometry. If the City determines the maximum future flow rate of the PMFL to be less than 14.8 mgd, the new PCT volume could be reduced accordingly.

The new PCT was sized based on three primary components: Operating Range, Deadband and Freeboard:

6.4.1.1 Operating Range

The volume required for the operating range of the PCT was assumed to be 30 minutes at the maximum anticipated flow rate of the PMFL. At a maximum potential future flow rate of 14.8 mgd, this corresponds to a volume of 308,000 gallons as shown in Figure 18. An operating range of 8 ft (corresponding to 38,500 gal/ft) was selected to give the automatic level control valve at the Juniata Reservoir sufficient buffer time to modulate and maintain the level near the desired level setpoint, even if the PMFL flow rate is modified significantly at the new automatic flow control valve located at the Upper Roll Seal PSV.

6.4.1.2 Deadband

Deadband is the volume of water required below the operating range to ensure that vortexing does not occur. The deadband calculations are shown in Figure 18 and were predicted to require approximately 5.3 ft of height, corresponding to a volume of approximately 203,000 gallons.

6.4.1.3 Freeboard

Freeboard is the additional head in the tank above the operating range which is available to prevent overfilling/overflowing under certain conditions. For the PCT, this volume was assumed to be approximately 50% of the 20-inch steel pipe upstream of the PCT to the intermediate high point, which could potentially flow into the tank by gravity following the shutdown of flow through the PMFL at the new automatic flow control valve at the Upper Roll Seal location. The approximate required freeboard was calculated to be 2.5 ft of height, corresponding to a volume of 97,000 gallons.

6.4.1.4 Total Required PCT Volume and Dimensions

The total required volume of the PCT (assuming a maximum PMFL flow rate of 14.4 mgd) was calculated to be approximately 608,000 gallons as shown in Figure 18. With a cylindrical geometry, the required volume and total head range corresponds to approximate tank dimensions of 16 ft in height with a diameter 81 ft. If a cylindrical geometry does not fit the available site or right of way, the shape of the PCT could be modified while maintaining the same volume per ft of head range (gal/ft) and height. Potential alternate dimensions would be a square tank 16 ft in height with sides of 71 ft or a rectangular tank 16 ft in height with dimensions of 60 ft by 85 ft.

Operating Range Calcs	PMFL Max Flow Rate	14.8	mgd	*Entered Value*
	Desired Duration of Max Flow Rate	30	min	*Entered Value*
	Required Working Volume of PCT	**308,000**	**gal**	*Purdy Mesa Max Flow Rate * Duration*
	Desired Working Head Operating Range	8.0	ft	*Entered Value*
	Operating Range gal/ft	38,500	gal/ft	*Gallons per ft of Operating Range*
	Required Balance Tank Diameter	81	ft	
Deadband Calcs	Assumed Balance Tank Outlet Pipe Diameter	36	in	*Entered Value*
	Outlet Velocity at Purdy Mesa Max Flow Rate	3.2	ft/s	*Purdy Mesa Max Flow Rate / Outlet Pipe Area*
	Froude Number	0.33		*Fd = V / sqrt(g*D)*
	Required Deadband to Prevent Vortexing	5.3	ft	*S = Outlet Pipe Diameter * (1 + 2.3*Fd)*
	Required Deadband Volume	**203,000**	**gal**	*Assuming cylindrical tank*
Freeboard Calcs	Pipe Distance From High Point Upstream of PCT	11,943	ft	*Entered Value*
	Pipe Diameter Upstream of PCT	20	in	*Entered Value*
	Total Potential Volume in Pipeline Upstream of PCT to High Point	194,896	gal	*Pipe Area x Length*
	Assume % Pipe Volume Potential to Flow into PCT on Shutdown	50%		*Entered Value*
	Required Freeboard Volume	**97,000**	**gal**	
	Required Freeboard	2.5	ft	
	Total Required PCT Volume	**608,000**	**gal**	Working + Deadband + Freeboard Volume
	Tank Diameter	81	ft	
	Tank Height	16	ft	

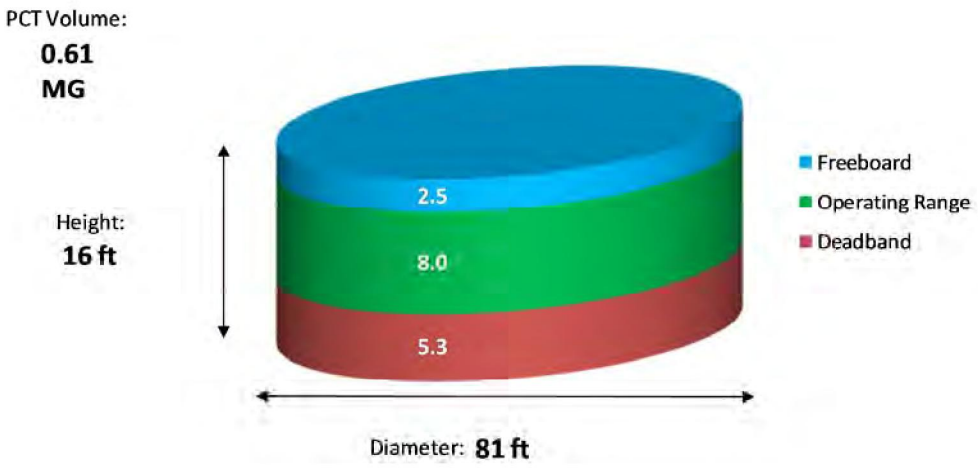


Figure 18 Preliminary Pressure Control Tower Sizing Tool – 14.8 mgd Maximum PMFL Flow Rate

6.5 NEW PRESSURE SUSTAINING VALVE AT GRAND JUNCTION WTP

As described in Section 5.1, the Lower Roll Seal PSV is predicted to cavitate due to low downstream pressures at PMFL flow rates of less than approximately 6.1 mgd. This is because the HGL on the downstream side of the Lower Roll Seal PSV is determined by the water surface elevation of the Grand Junction WTP and the dynamic head loss in the PMFL – and the dynamic losses are only sufficient to create sufficient downstream pressure at flow rates greater than 6.1 mgd. In order to prevent cavitation of the Lower Roll Seal PSV under all potential PMFL flow rates (including flow

rates below 6.1 mgd), a new pressure sustaining valve is proposed to be installed at the Grand Junction WTP, which will enable the HGL to be raised to any desired level between the Grand Junction WTP and the Lower Roll Seal PSV.

Figure 17 displays an example hydraulic profile with all potential hydraulic improvements described above in place under PMFL flow rates of 3.0, 6.7 and 7.6 mgd. As shown in this example, the new PSV at the Grand Junction WTP was set to maintain an upstream setting of 4,950 ft, which enables the HGL at 3.0 mgd to exceed the elevation of the Lower Roll Seal PSV (creating positive downstream pressure and preventing cavitation). Without this PSV operational, the HGL line at 3.0 mgd would be predicted to be below the elevation of the Lower Roll Seal PSV as shown in Figure 9 in Section 4.2.1.

With the new PSV at the Grand Junction WTP, the upstream setting could be modified to enable pressurized (full pipe) flow from the PCT to the Grand Junction WTP under all potential desired PMFL flow rates. It is noted that at higher flow rates the City would be required to lower the upstream setting of the new PSV at the Grand Junction WTP to maintain maximum pressures along the PMFL to within the 160 psi pressure rating of the existing pipe.

7 Summary

A Bentley WaterGEMS hydraulic model was built and validated to facilitate analysis of the PMFL under a variety of conditions. A summary of the key findings and conclusions detailed in this technical memorandum is included below:

7.1 SULLIVAN DRAW PIPELINE

The existing 18-inch Sullivan Draw pipeline was predicted to be an existing hydraulic bottleneck, limiting the maximum flow rate of the PMFL to approximately 8.0 mgd. If the Sullivan Draw pipeline is upsized to 20-inch (as currently planned), the maximum flow rate of the PMFL was predicted to be increased to approximately 9.8 mgd.

7.2 EXISTING PURDY MESA FLOW LINE

Accumulation of air – which could lead to hydraulic issues, including air entrainment – was predicted to occur within the PMFL at all flow rates up to approximately 7.1 mgd, with more significant potential for air accumulation at lower flow rates.

7.3 FUTURE PURDY MESA FLOW LINE

If the PMFL from the PCT to the Grand Junction WTP (including the Sullivan Draw pipeline) was upsized to 24-inch in the future, the maximum flow capacity was predicted to be approximately 14.4 mgd. It was noted that if the PMFL downstream of the of the PCT were upsized to 24-inch, it is likely that the existing 20-inch steel pipe upstream of the PCT (from the Juniata Reservoir to the PCT) would also likely be required to be upsized in kind.

7.4 HYDRAULIC ISSUES

7.4.1 Roll Seal PSV Cavitation

To avoid cavitation (and potential air entrainment) of the Roll Seal PSVs, the PSVs should be bypassed if the PMFL flow rate is 6.1 mgd or lower. The PSVs should be utilized under all PMFL flow rates greater than 6.1 mgd. The Upper Roll Seal PSV should not be utilized if the Lower Roll Seal is bypassed.

7.4.2 Pipeline Air Accumulation

Potential for pipeline air accumulation – which can lead to a variety of negative consequences including the unpredictable formation and movement of air pockets, temporary hydraulic restrictions due to air pockets uncertain time durations to fully expel air from the pipeline as well as air entrainment and other flow anomalies – was predicted under all PMFL flow rates of less than 7.1 mgd.

7.4.3 Pressure Control Tower Volume

In order for the level in the PCT to remain constant, flow into the PCT must equal flow out of the PCT. Due to the small volume of the existing PCT, small discrepancies in flow in versus flow out lead to rapid changes in the water level in the PCT, leading to the tank either overflowing or draining.

7.4.4 Flow Control Upstream and Downstream of the Pressure Control Tower

Flow into the PCT is controlled by the Juniata Reservoir FCV at all flow rates, which is modulated to maintain the given flow setpoint. Flow out of the PCT is controlled by manual adjustment of the upstream setting of the Upper Roll Seal PSV (at flow rates greater than 6.1 mgd) or uncontrolled (dictated solely by open channel pipe hydraulics) when the PSVs are bypassed at flow rates of less than 6.1 mgd. The lack of precise control of flow going both into and out of the PCT at all flow rates leads to operational challenges for the City.

7.5 POTENTIAL HYDRAULIC IMPROVEMENTS

Hydraulic improvements were identified which were predicted to enable the PMFL to be operated automatically (no manual adjustments required) while flowing fully pressurized (no air accumulation, no Roll Seal cavitation) from the PCT to Grand Junction WTP. The potential improvements are listed below and detailed in Section 6.

- Upsize Sullivan Draw pipeline to 20-inch
- New automatic flow control valve at the Upper Roll Seal PSV location which modulates to maintain a PMFL flow setpoint given by the City
- Automatic level control valve at the Juniata Reservoir which modulates to maintain a water level within a desired range at the PCT
- A new PCT with a volume of approximately 430,000 to 610,000 gals (depending on maximum future PMFL flow rate) to enable stable automatic level control
- A new pressure sustaining valve at the Grand Junction WTP to prevent partially full pipe flow and/or cavitation of the Lower Roll Seal PSV under all PMFL flow rates

7.6 OPINION OF PROBABLE CONSTRUCTION COSTS FOR POTENTIAL HYDRAULIC IMPROVEMENTS

Estimated construction costs were developed for the improvements identified as well as two other segments of the pipeline: Reservoir to the PCT and from the Lower Roll Seal to the Whitewater Creek. The cost estimates included in this TM are considered to be Class 5, as outlined by the Association for the Advancement of Cost Engineering (AACE) Cost Estimate Classification System. Costs are based on the current design information from April 2018 with a scope development at approximately a 10% stage of design. The opinion of construction costs includes factors for construction general conditions, contingencies, engineering, and construction management. No allowance was made for irregular construction or environmental difficulties.

The estimate was based on PVC pipe, a prestressed concrete balance tank, and 1.5 miles of electrical power distribution lines. Table 3 summarizes the construction costs for the various segments.

Table 3 Opinion of Probable Construction Costs

DESCRIPTION	LENGTH/ VOLUME	CONSTRUCTION COST
Sullivan Draw		
Pipeline	1.25 miles	2,247,000
Electrical Power to Site	1.5 miles	892,000
Valve Vaults	2	234,000
Balance Tank	0.5 MG	1,208,000
Existing Flow Control Vault SCADA Upgrades	N/A	97,000
SubTotal		4,678,000
Pipeline – Reservoir to PCT	3.4 miles	5,251,000
Pipeline – Lower Roll Seal to Whitewater Creek	3.1 miles	4,644,000
Total		**14,574,000**

J-U-B ENGINEERS, INC.

THE LANGDON GROUP | GATEWAY MAPPING INC.

OTHER J-U-B COMPANIES

ADDENDA ACKNOWLEDGMENT

CITY OF Grand Junction COLORADO

Purchasing Division

ADDENDUM NO. 1

DATE: April 11, 2018
FROM: City of Grand Junction Purchasing Division
TO: All Offerors
RE: Design Services for Purdy Mesa Flowline – Sullivan Draw Plan Development
RFP-4511-18-DH

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. What type of Tank is preferred by the City? Welded steel, etc.?

   A. Steel or concrete are the most logical options, but the city will entertain any realistic recommendation made by the Consultant.

2. Q. What firm is conducting the NEPA study?

   A. WestWater Engineering - http://westwaterco.com/

3. Q. Is there a recent survey (ROW, utilities, easements etc.) of the entire alignment?

   A. No, gound survey is the only recent survey in the project reach. The City does have 40'-wide easement along the length of the flowline.

4. See attached Purdy Mesa Flow Line Hydraulic Evaluation.

5. Awarded firm shall submit review sets of 30% and 90%, and a completed bid set. Engineers estimates of probable costs to be included with all submittals, and project specifications to be included with the 90% review set and completed bid set.

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

All other conditions of subject remain the same.

Respectfully,

Duane Hoff Jr., Senior Buyer
City of Grand Junction, Colorado

The Western Colorado office of J-U-B ENGINEERS, Inc. (J-U-B) hereby acknowledges Addendum No. 1 for RFP-4511-18-DH, Design Services for the Purdy Mesa Flowline – Sullivan Draw Plan Development project from the City of Grand Junction, Colorado.

S. Bret Guillory, PE
Senior Project Manager

City of Grand Junction, Colorado

RFP-4511-18-DH
DESIGN SERVICES FOR PURDY MESA FLOWLINE – SULLIVAN DRAW PLAN DEVELOPMENT

J-U-B ENGINEERS, INC.

OTHER J-U-B COMPANIES: THE LANGDON GROUP; GATEWAY MAPPING INC.

305 S. Main, Suite 6; Palisade, CO | 970-208-8508

April 17, 2018

J-U-B ENGINEERS, INC.

THE LANGDON GROUP | GATEWAY MAPPING INC.

OTHER J-U-B COMPANIES

A > COVER LETTER

April 17, 2018

City of Grand Junction Purchasing Department
Attn: Duane Hoff Jr., Senior Buyer
duaneh@gjcity.org

RE: Request for Proposal RFP-4511-18-DH
Design Services for Purdy Mesa Flowline – Sullivan Draw Plan Development

Mr. Hoff and Selection Committee;

J-U-B ENGINEERS, Inc. (J-U-B) is pleased to submit our proposal for the design of the Purdy Mesa Flowline – Sullivan Draw Plan Development project. J-U-B prides itself on providing exceptional client service by meeting our clients' needs. Our goal is to develop a long-standing relationship with the City based on trust in J-U-B and our ability to provide sound engineering advise.

J-U-B is proposing a design team that is based in two of our Utah offices (Kaysville and Orem), with the Project Manager based in our Western Colorado office (Palisade).

The J-U-B Team is uniquely positioned to help make the Purdy Mesa Flowline – Sullivan Draw Plan Development project a success. Some of the advantages that our team will bring to the City of Grand Junction include:

- **Recent & Relevant Experience** – J-U-B has designed numerous projects that are comparable to the Purdy Mesa Flowline – Sullivan Draw project. Within this proposal, we highlight recent municipal work completed by various team members for Coalville, Herriman, and Vineyard, Utah. Our experience and expertise gained on these projects makes our team a great fit for the Purdy Mesa Flowline project.
- **Familiarity with Area** – Our project manager is very familiar with all local agencies we anticipate will be involved in the project. He has established a good relationship with local US Army Corps of Engineers staff and the City staff that he will be working with.
- **Local Presence** – Our team is made up of local experts. We have established a local office in Palisade with support from 15 other offices in five western states. Our team has worked extensively with Counties, Cities, and Towns in Colorado.

Upon reading our proposal, we are confident that you will gain a sense of our team's expertise and motivation to work on this project. I will be the primary contact and can be reached at (970) 208-8508 or bguillory@jub.com.

We value our relationship with the City of Grand Junction and look forward to continuing to build upon it. The City can be assured that our team will give this project top priority.

Sincerely,

J-U-B ENGINEERS, Inc.

S. Bret Guillory, PE
Senior Project Manager

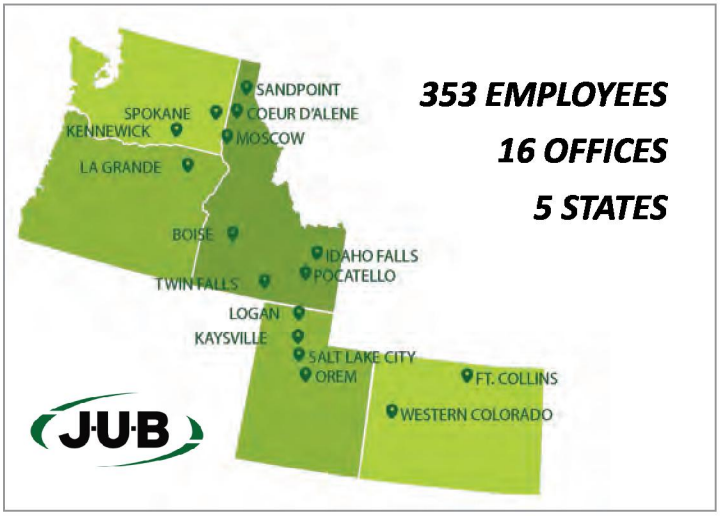
Lee E. Cammack, PE/LS
President and Chief Executive Officer

B > QUALIFICATIONS/EXPERIENCE/CREDENTIALS

QUALIFICATIONS

OVER 60 YEARS OF SERVICE

J-U-B ENGINEERS, Inc. (J-U-B) is a company of more than 350 employees located across five states. We have been providing civil engineering services to municipalities, government agencies, special districts, and individuals since 1954. Our employees have diverse skillsets that encompass all aspects of civil engineering. We have been responsible for a wide range of design efforts, from $82M highway projects, to minor site grading.



Our Kaysville, Utah and Palisade, Colorado offices have been actively involved in the design of water resource projects for water and irrigation districts and municipalities for the last 30 years.

KNOWLEDGEABLE TEAM

The team we have assembled for this project has direct experience in design and construction of multiple stream diversion structures, transmission lines, and monitoring instrumentation. Our project manager and QA/QC engineer have 63 years combined experience in design and construction of water delivery systems, including diversion and piping projects in active rivers and streams.

We have put together a team that has the experience needed to accomplish design for the Purdy Mesa Flowline project. We will engage outside agencies early in the design process to insure critical path scheduling is maintained. We will coordinate with the US Army Corps of Engineers (USACE), Grand Junction office, and WestWater engineering regarding design of the Purdy Mesa Flowline replacement piping and appurtenances. We will provide a design that addresses considerations identified in the hydraulic study to mitigate air entrainment in the raw water delivery system, while successfully accomplishing the City Water Department's goals for SCADA implementation for the Purdy Mesa Flowline.

Our team includes a structural engineer—Erick Christiansen, PE—who has 13 years of experience. Recently, Erick has been directly involved with the design of several water storage and transmission line projects in Utah and Idaho very similar in nature to the Purdy Mesa Flowline design effort.

Our project manager, Bret Guillory, has 24 years' experience in design, management, and construction oversight for municipal water projects. Bret will provide an active management role with oversight and review for this design project.

We have also chosen two preferred subconsultants to complement our internal competencies:

- Brian Mitchem, Mountain Peak Controls (MPC) head of western slope operations, who has over 30 years experience providing design and installation in the automation controls industry.
- Mike Berry, Huddleston-Berry Engineering & Testing (HBET) to provide geotechnical engineering expertise. HBET is based in the State of Colorado to provide geotechnical engineering, construction materials testing, and consulting services to developers, municipalities, contractors and individuals.

DEDICATION

J-U-B's team of professionals is dedicated to planning, design, and construction projects. This depth allows us to adjust to the increased demands necessary to meet accelerated schedules.

We pride ourselves on staying within your budget for both engineering and construction. At the outset of each project, we develop a scope of services and consulting services budget, along with a corresponding schedule that accurately reflects the individual tasks and time commitment needed to accomplish the overall project. These provide the foundation necessary to monitor the progress on a regular basis to ensure that critical milestones are met within budget parameters. We will communicate our progress on a regular basis and discuss any adjustments that may be necessary to keep the project on track.

CLEAR OBJECTIVES

Clear objectives are established by each project team member, including the City at project kickoff. All team members have their task responsibilities clearly defined so the required work efforts are performed efficiently and effectively. Our experience has shown that frequent communication between team members and the client is essential for successful project completion. Key personnel are required to make schedule and budget commitments; thereby, accepting ownership of the timeline and cost constraints associated with their tasks.

TOOLS AND RESOURCES

J-U-B has state-of-the-art experience with hydraulic modeling, including over 20 years with Infowater/ Infoswmm, as well as other software. Our knowledgeable staff has been at the forefront of hydraulic modeling with multiple software programs. Our staff are used as core experts within J-U-B, across several states, and for multiple clients and communities. We continue to maintain ongoing support to many communities with Innovyze's software. Innovyze's software has some built-in advantages over other modeling software platforms. As an example, Innovyze's platform integrate seamlessly with GIS, bringing with it all the advantages of data management and mapping capabilities that the City may be interested in at a future date. Another Innovyze product that will be used is called H20CALC. This software tool can be used to run hydraulic calculations for sizing pipes, calculating pressure losses, weirs, orifices, culverts, and drainage structures. We will use our expertise to evaluate design and confirm performance of the proposed pressure reduction and flow control equipment.

EXPERIENCE > PROJECTS

Municipal engineering is at the core of J-U-B's expertise. We have completed water distribution and transmission projects for municipalities throughout the western United States.

The following pages highlight a small sampling of our relevant project experience.

SEPTIC SYSTEM ELIMINATION PROGRAM (SSEP) > CITY OF GRAND JUNCTION, CO

Bret Guillory provided engineering support and management oversight for this program during his career with the City of Grand Junction. Bret provided design, design oversight, and construction management for the projects as a Project Engineer, and managed the program and design engineers as the Utility Engineer. Bret was involved with the program from its beginning that resulted in design and installation of more than 22.8 miles of sewer main line, providing gravity sewer service to 1,180 residential lots, totaling $11M in capital investment. Design and construction presented numerous challenges, that included negotiating steep hillside installations at numerous locations in the Redlands.

Completed
2001 to 2016 (Program is Ongoing)

Overall Project Costs
Capital Investment > $11M

Project Team Member Roles
- Bret Guillory, PE > Project Engineer/Utility Engineer

Reference
Trent Prall
Public Works Director
333 West Avenue
Grand Junction, CO 81501
970.256.4047 > trentonp@gjcity.org

Project Highlights
- Installation of more than 22.8 miles of sewer main line
- Provision of gravity sewer service to 1,180 residential lots

RDA PHASE 8, WESTSIDE WATERLINE > VINEYARD CITY, UT

J-U-B has been assisting Vineyard City every step of the way in building an entire city almost from scratch. In the past five years, we have designed 14 phases of infrastructure improvements including nine miles of water trunklines. This phase involves the construction of 13,187 lineal feet of 12-inch C900 DR-18 culinary water pipe, one dry jack, bores under the Union Pacific Railroad right-of-way, and one connection to the existing culinary water pipe master meter on 1600 North. This project follows the outside edge of the Vineyard Connector from 800 North around to 1600 North and then extends east under the railroad to the culinary water pipe master meter on 1600 North. Colton Smith provided design/CAD support during design and construction of the project.

Completed
2013

Overall Project Costs
Total Construction > $600K

Project Team Member Roles
- Colton Smith, PE, CFM > Design Engineer
- Erick Christiansen, PE > Project Engineer
- Jubal Meyers > CAD Designer

Reference
Don E. Overson, PE
Public Works Director/City Engineer
125 South Main Street
Vineyard CITY, UT 84058
801.226.1929 > dono@vineyardutah.org

SIX MILLION GALLON TANK DESIGN AND TRANSMISSION PIPING > HERRIMAN, UT

This project included the structural and civil design of a 205'ø concrete, completely buried, culinary water reservoir, a 32-foot x 30-foot buried valve vault, 2,700 linear feet of associated transmission piping to connect to the city's existing water system, a 205-foot x 140-foot retention basin, and associated access roads to connect each component on the project complex. The tank site is on steep terrain requiring an innovative approach to the site grading to fit all buildings on the project site. Other innovative measures included the incorporation of earthquake fittings on the tank piping, as well as skylights for deep bury installation for the valve vault to have natural light.

Completed
Design > 2012-2013

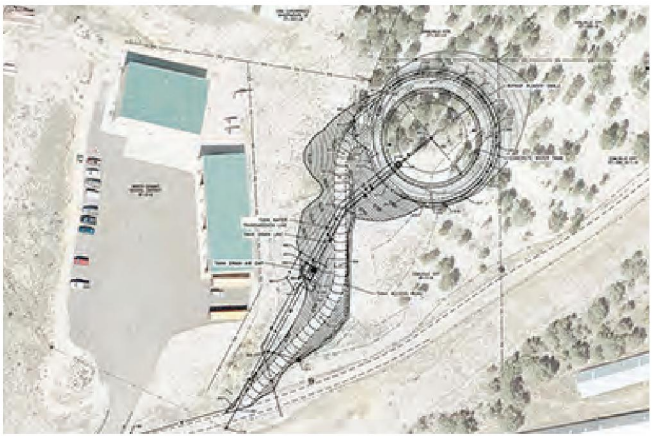
Overall Project Costs
Total Compensation $102K

Project Team Member Roles
- Erick Christiansen, PE > Project Engineer

Reference
City Engineer
5355 West Herriman Main Street
Herriman, UT 84096
801-446-5323 > engineering@herriman.org

600,000 GALLON WATER TANK > COALVILLE, UT

J-U-B has been involved with Coalville City to design and construct a new 600,000 gallon concrete water tank. The overall dimensions of the tank are 96 feet in diameter by 16 feet deep. The tank is located on the northeast section of the City. The existing site consisted of steep slopes and relatively limited access. The project is currently in progress. The tank is part of a large-scale city-wide distribution system upgrade. Included also is the replacement of 30,000 feet of culinary pipe, source development, and well rehabilitation.



Completed
Design > 2017-2018

Overall Project Costs
Total Compensation > $1.3M

Project Team Member Roles
- Erick Christiansen, PE > Project Engineer

Reference
Zane DeWeese
Public Works Director
10 North Main Street
Coalville, UT 84017
435.336.5980 > zane.deweese@coalvillecity.org

WATER TANK AND TRANSMISSION LINE > CLUFF WARD PIPELINE COMPANY > COALVILLE, UT

This project included the structural and civil design of a 72-foot x 24-foot rectangular concrete water tank and 1,100 linear feet of associated transmission piping to connect to the existing company water system. The tank site is on steep terrain above existing residential homes, requiring design measures to assure stability of the slope and also reduce visibility of the tank from adjacent property owners. The tank site also sits over expansive bedrock, requiring installation of an underdrain system to prevent any possible leaks causing moisture to enter the subgrade material.

Completed
October 2017

Overall Project Costs
Total Construction > $436K
Water Tank Construction Cost > $217K

Project Team Member Roles
- Tracy Allen, PE > Project Manager
- Erick Christiansen, PE > Design Engineer

Reference
Douglas V. Moore
President
Cluff Ward Pipeline Company
501 East Chalk Creek Road
Coalville, UT 84017
435.901.2264 > dvmoore2264@gmail.com

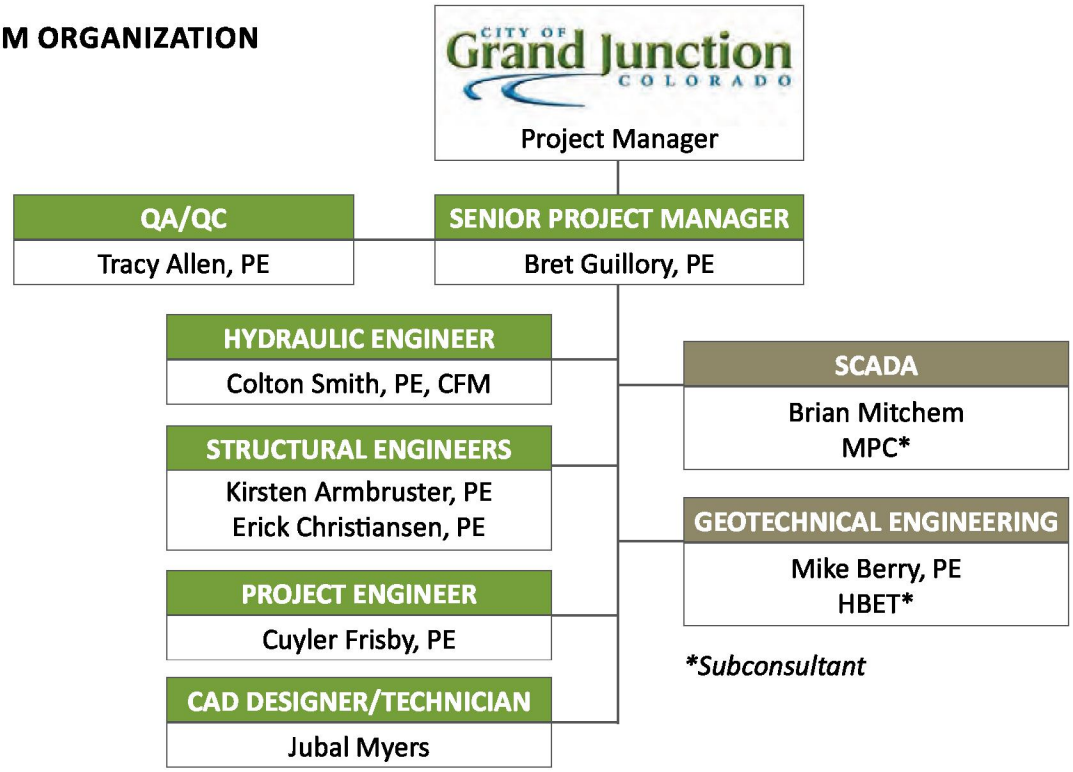
Project Features
- 72-foot x 24-foot rectangular one-cell concrete tank
- EPDM liner and perforated pipe underdrain system
- C-900 PVC transmission line
- Corrugated HDPE drainage line
- Concrete slope anchors for securing pipe on slopes

OTHER SELECT J-U-B EXPERIENCE

PROJECT	CLIENT	DESCRIPTION
100 East Waterline, Cedar Fort, UT (2018)	Town of Cedar Fort, UT	The project consisted of installation of approximately 1,200 feet of 8-inch C-900 pipe, including valves, fittings, connection, and hydrants. Colton Smith provided design, design oversight, and construction management for the project as a Project Engineer.
Waterline Replacement, Charleston, UT (2017)	Charleston Water Conservancy District	The project consisted of installation of approximately 1,300 feet of 8-inch C-900 pipe, including valves, fittings, connections, and hydrants. Jubal Myers provided CAD design support as a CAD designer. Colton Smith provided design, design oversight, CAD support and construction management for the project as a Project Engineer.
Leroux Creek Diversion Overflow Structure, Hotchkiss, CO (2015–2016)	Fire Mountain Canal & Reservoir Company	Structural design, detailing, and specifications for a 16-foot long by 5-foot wide reinforced concrete structure on the bank of the Fire Mountain Canal that diverts overflow water to Leroux Creek in a 36-inch diameter pipeline. The structure also includes a flume gate and control gate.
Forked Tongue Ditch Piping Project, Eckert, Orchard City, CO (2015–2016)	Forked Tongue/ Holman Ditch Company	Structural design, detailing, and specifications for a 44-foot long by 6-foot wide by 10-foot tall reinforced concrete screening structure in a creek. The structure supports a coanda screen that diverts water into a 24-inch diameter pipeline. The structure also includes stop log channels, control gates, grating, energy dissipation plate, an overflow to the creek, and a drain line.
Patterson Lateral Piping Project, Hotchkiss, CO (2015–2016)	Rogers Mesa Water Distribution Association	Structural design, detailing, and specifications for a 30-foot long by 25-foot wide by 12-foot tall reinforced concrete screening structure in the Patterson Lateral. The structure supports a coanda screen that diverts water into a 36-inch diameter pipeline. The structure also includes concrete canal liner transition, trash rack bar screen, grating, handrail, trench drain, and control gates.
Slack Lateral Piping Project, Hotchkiss, CO (2015–2016)	Rogers Mesa Water Distribution Association, Colorado	Structural design, detailing, and specifications or a 38-foot long by 10-foot wide by 5-foot tall reinforced concrete screening structure in the Fire Mountain Canal. The structure supports 8 punch plate screens that divert water into a 30-inch diameter pipeline. The structure also includes grating, handrail, and a control gate.
Huntsville Irrigation Piping Project – Phase 1, Huntsville, UT (2012–2013)	Huntsville Irrigation District	Structural design, detailing, and specifications for a 47 foot long by 30 foot wide by 6 foot tall concrete screening structure in a Bureau of Reclamation canal off of the South Fork of the Ogden River. The structure supports a traveling screen, which diverts water to a 32-inch pipeline for Huntsville Irrigation District and a 20-inch pipeline for Huntsville Waterworks Corp, as well as a diversion to the Emerson ditch and an overflow back to the South Fork of the Ogden River. The structure also includes stop log gates, control gates, and a parshall flume.
Westside Lateral, Farson, WY (2011–2012)	Eden Valley Irrigation and Drainage District	Structural design, detailing, specifications, and construction observation for a 58-foot long by 8-foot wide by 14-foot tall reinforced concrete screening structure on the side of the Means Canal. The structure supports six rotating drum screens that divert approximately 82 cfs into a 60-inch diameter pipeline. The structure also includes grating, handrail, and a control gate.

EXPERIENCE/CREDENTIALS > KEY PERSONNEL

TEAM ORGANIZATION



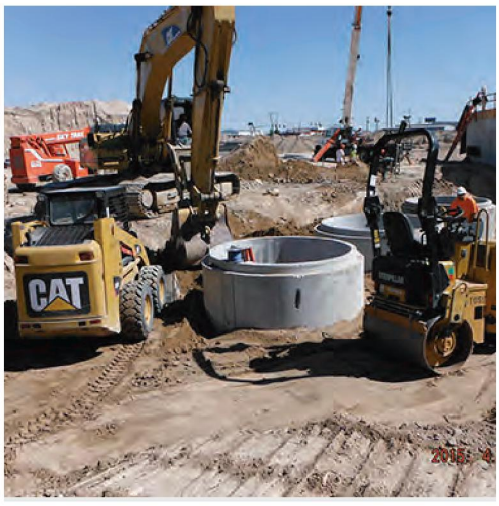
Approximately 85% of J-U-B's current business is dedicated to public municipalities. A large portion of that work is comprised of utility engineering projects with issues similar to those associated with the City's project. Our key team members proposed for this project are depicted in the project organization chart above. The following biographies and resumes describe each individual's extensive experience in completing successful utility projects for municipalities. The City of Grand Junction can be assured that the J-U-B team will use this knowledge to successfully complete the design of this project.

TEAM OVERVIEW

KEY PERSONNEL	QUALIFICATIONS OVERVIEW
TRACY ALLEN, PE *QA/QC* • J-U-B • Utah PE #173069 • BS, Civil Engineering	Tracy has been managing engineering and construction projects, large and small, for over 36 years, including current water resource projects in your area. As a young engineer, Tracy was heavily involved in the design and construction of several challenging projects including hydroelectric, geothermal, and engine-generator power generation facilities. This early construction background and many complex projects since has given him an understanding of constructability issues that should be identified during the design review process. His career then circled back around to water resource projects, specifically irrigation planning and design. He has managed projects that have included large and small river diversion and canal structures, one of the most significant recent project being a large diversion structure across the entire Weber River in Northern Utah. Tracy has been called upon to provide quality assurance/quality control on numerous engineering design projects, in addition to managing project teams, managing budgets and schedules, providing clear communication with clients, and establishing lasting relationships throughout the western United States.

KEY PERSONNEL	QUALIFICATIONS OVERVIEW
BRET GUILLORY, PE *Senior Project Manager* • J-U-B • Colorado PE #31675 • BS, Civil Engineering	Bret has been involved with municipal water, wastewater, and storm water projects in the Grand Valley for over 26 years. He was the Utility Engineer for the City of Grand Junction for 13 years from 2003 through 2016. In that role, he was responsible for management of the engineering staff, and development of the City's capital program for the water, wastewater, and storm water utilities. Bret has worked closely with the outside agencies involved with the Purdy Mesa Flowline – Sullivan Draw Plan Development project. He has developed a good working relationship with staff from the US Army Corps of Engineers office in Grand Junction, Grand Valley Power, and Mesa County. Bret has managed, designed, and overseen construction of water and wastewater utilities in challenging conditions such as steep hillside alignments and proximity to active utilities here in the Grand Valley. Bret has designed and overseen design of literally hundreds of miles of water, sanitary sewer, and storm sewer infrastructure; raw water collection/intake structures, and rehabilitation of earthen dams across western Colorado.
COLTON SMITH, PE, CFM *Hydraulic Engineer* • J-U-B • Utah PE #10393120-2202 • Certified Facility Manager #US-17-10027 • MS, Civil Engineering • BS, Civil Engineering	Colton has five years of experience providing both hydraulic modeling analysis and design of water and sewer systems. He has completed many design projects throughout Utah and Texas, which included design coordination with clients and preparation of plans, specifications, and contract documents. On these projects, Colton served as the main point of contact between the contractor and the client during bidding and construction of the projects.
KIRSTEN ARMBRUSTER, PE *Structural Engineer* • J-U-B • Colorado PE #35215 • Wyoming PE #14536 • MA, Architecture • BS, Civil Engineering	Kirsten is a senior structural engineer for J-U-B and has over 20 years of experience in structural and bridge design projects. She has designed various types of structures including structural repairs, renovations, additions and new buildings and bridges for various clients throughout the Front Range of Colorado. Kirsten's design experience includes structures such as concrete box culverts, wood-framed buildings, steel-framed structures, aluminum-framed greenhouses, aluminum, glass and stone curtain walls, caisson, steel-pile and spread-footing foundations, and various retaining wall types. Her duties range from preliminary analysis to determine structure type, sizes and location, to preparing detailed final design and stress analysis of reinforced concrete, steel and composite structures.
Erick Christiansen, PE *Structural Engineer* • J-U-B • Utah PE #9824596-2202 • ME, Structural Engineering • BS, Mechanical Engineering • AAT, Computer-aided Drafting and Design	Erick is a licensed professional engineer with 13 years of project experience in municipal design engineering. As a design engineer, Erick has gained experience in areas of both civil and structural design, and he is experienced in all project phases from concept and design to construction. This background includes a variety of project types, such as water tanks, pump stations, box culverts, piping, site grading, and roadway design. Erick's experience includes both new construction, as well as rehabilitation projects. He has done work for various public and private clients in the states of Utah, Colorado, Wyoming, Washington, and Idaho.
CUYLER FRISBY, PE *Project Engineer* • J-U-B • California PE #86179 • Nevada PE #024021 • MS, Civil Engineering • BS, Civil Engineering	Cuyler is a civil engineer with four years of experience providing civil and environmental engineering services to clients throughout Nevada, California, and Utah. Cuyler has experience in sewer and storm drain design, water distribution system design, roadway rehabilitation, grading and drainage design, project/construction management, master planning, geographic information systems (GIS), and modeling of water distribution, storm drain, and sewer systems.

KEY PERSONNEL	QUALIFICATIONS OVERVIEW
JUBAL MYERS *CAD Designer/Technician* • J-U-B • AAS, Drafting and Design	Jubal has more than 34 years of work experience in drafting, design, and surveying. His experience has included culinary storage tanks, wells and water systems, sanitary sewer systems and treatment plant design, municipal infrastructure, land and commercial development, roadway design, land and construction surveying, earth dam and reservoir designs, and construction inspection. He is proficient working with AutoDesk Civil 3D, MicroStation, and Power InRoads.
BRIAN MITCHEM *SCADA* • MPC • AAS, Instrumentation Technology	Brian heads Mountain Creek Controls' western slope operations. He has the experience of 30+ years in the automation controls industry providing solutions for all phases of controls design, integration, and project management in various environments such as water/wastewater treatment, irrigation, and manufacturing.
MIKE BERRY, PE *Geotechnical Engineering* • HBET • Colorado PE #39010 • Utah PE #5911977-2202 • MS, Civil Engineering • MS, Engineering Management • BS, Geological Engineering	With over 20 years as a geotechnical engineer, Mike has performed various calculations and computerized analyses for shallow and deep foundations, retaining walls, bridge substructures, slopes, landfills, infiltration structures, and water supply facilities. His responsibilities include scoping, contracting, coordinating, and directing subsurface investigations, geotechnical instrument installation, and geophysical investigations. Mike has completed geophysical investigations for geotechnical and environmental purposes including data collection, data processing, and interpreting results. He has been responsible for conducting Phase I, Phase II, and Phase III environmental site assessments, waste characterization, and remedial design. His other responsibilities include conducting groundwater studies for geotechnical and environmental purposes. Mike has managed subsurface investigations, instrument installation, and geophysical investigations and has supervised and directed operations of geophysical, drilling, excavating, and grouting contractors. Mike has written many detailed geotechnical, geological, hydrologic, and environmental reports and specifications.



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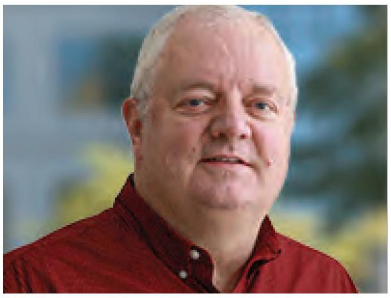
OTHER J-U-B COMPANIES

TRACY L. ALLEN, PE > QA/QC



Tracy has more than 32 years of experience in public works projects for numerous communities in Utah, Idaho, Washington, and Wyoming. Most recently, Tracy has been the Project Manager for the $7M Hancock Cove and State Road Canal Piping Project for Dry Gulch Irrigation Company in the Roosevelt area of northeastern Utah. He has been responsible for all phases of the project including planning, funding, environmental, design, bidding, and construction administration. Just prior to that project, Tracy managed the design and construction of the $3M Davis and Weber Counties Canal Company Forebay and River Diversion Structures across the Weber River near Ogden, Utah.

Currently, Tracy is the City Engineer for Hooper, a rapidly-growing rural community of 7,500 people in northern Utah. He served as Project Manager for all phases of the award-winning $17M Hooper City Vacuum Sewer Project—the first vacuum sewer system in the State of Utah.

SELECT PROJECT EXPERIENCE

- Hancock Cove and State Road Canal Piping Project; Dry Gulch Irrigation Company; Roosevelt, UT
- Forebay and River Diversion Structure; Davis and Weber Counties Canal Company; Sunset, UT
- Bostwick Park Siphon Lateral Piping Project; Montrose, CO
- Montezuma Valley Lone Pine Piping Project; Cortez, CO
- Huntington-Cleveland Irrigation Piping Projects; Huntington, UT
- Hooper Pressure Irrigation System; Hooper, UT
- System Optimization Plan; Bostwick Park Water Conservancy District
- Government Highline Canal Water Management Plan, Master Plan, and Funding Plan Update; Grand Valley Water Users Association
- System Optimization Review; Davis and Weber Counties Canal Company
- Secondary Water System Study; Coalville, UT

PROFESSIONAL REGISTRATIONS

Utah PE #173069

EDUCATION

BS, Civil Engineering, Brigham Young University, 1981

EMPLOYMENT HISTORY

Senior Project Manager, J-U-B, Kaysville, UT, 2004–Present

Area Manager, J-U-B, Kaysville, UT, 1998–2004

Project Manager, J-U-B, Kaysville, UT, 1997–1998

Project Manager/Engineer, Thomas Engineering, Inc., Bountiful, UT, 1991–1997

Project Manager/Engineer, Forsgren Associates, Salt Lake City, UT, 1985–1991

Resident Engineer, Townsend and Bottum, Inc., Healdsburg, CA, 1981–1985

Cost/Scheduling Engineer, Fluor Corporation, Irvine, CA, 1981–1983

J-U-B ENGINEERS, INC.

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OTHER J-U-B COMPANIES

S. BRET GUILLORY, PE > PROJECT MANAGER

PROFESSIONAL REGISTRATIONS
Colorado PE #31675

EDUCATION
BS, Civil Engineering, Colorado State University, 1991

PROFESSIONAL AFFILIATIONS
American Public Works Association

EMPLOYMENT HISTORY
Project Manager, J-U-B, Palisades, CO, 2017–Present

Assistant Manager Distribution & Transmission, Clifton Water District, 2016–2017

Utility Engineer, City of Grand Junction, CO, 2003–2016

Project Engineer, City of Grand Junction, CO, 1998–2003

Design Engineer, WestWater Engineering, 1994–1998

Bret is a senior project manager for J-U-B and has over 27 years of experience in municipal engineering that includes: water and wastewater treatment projects, pump station design, wastewater basin studies, flood hazard mitigation projects; earthen dam inspection, mitigation and construction projects; design of water, wastewater, and storm water conveyance systems, formation of sewer improvement districts, urban transportation projects, hydrologic evaluation for storm water design, site grading, trail design, and BioCNG collection and fueling projects. His experience in all aspects of municipal projects allow him to appropriately scope projects and provide a competitive fee. He also mentors project engineers and field staff in design, management, and maintenance of municipal infrastructure.

Bret has 13 years of experience in managing multi-million dollar budgets, design engineering staff, survey and CAD design staff. This experience and knowledge of municipal infrastructure allow for a deep understanding of what our municipal clients need and expect. His experience allows him to manage and complete projects on time and within scope and budget. He approaches projects knowing that communication is the key to successful projects and maintaining strong relationships with clients. Bret's attention to detail and recognition of stake holders concerns allows him to accurately identify potential conflicts prior to construction.

During his tenure at the City of Grand Junction, Bret was the acting flood plain manager for the City. In this capacity, he was able to assist many residents in mitigation of flood hazard to their property and homes. He managed the $17M Ranchmen's Ditch Flood Hazard Mitigation project for the City of Grand Junction, securing a $3M Pre-Disaster Mitigation Grant for the project that resulted in mitigating flood hazard for 385 properties.

CITY OF GRAND JUNCTION AND/OR MESA COUNTY PROJECT/PROGRAM MANAGEMENT EXPERIENCE

- Colorado River Crossing Waterline Replacement
- Leach Creek Flood Mitigation Dam
- Ranchmen's Ditch Flood Mitigation Project
- Septic System Elimination Project
- 27½ Road Reconstruction F Road to G Road
- Persigo Wastewater Treatment Plant Final Clarifier Addition
- Duck Pond Park Lift Station Elimination Project
- Horizon Drive Reconstruction and Bike/Pedestrian Trail
- Persigo Wastewater Treatment Plant Head Works Modification
- CNG Fueling Station and Maintenance Building
- Grand Mesa Reservoir No. 1 Dam Rehabilitation
- CNG Fueling Station and Maintenance Building
- Septic System Elimination Program
- Persigo Wastewater Treatment Plant BioCNG Project

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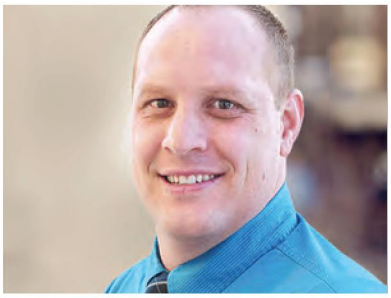
OTHER J-U-B COMPANIES

COLTON F. SMITH, PE, CFM > HYDRAULIC ENGINEER

Colton has five years of experience providing both hydraulic modeling analysis and design of water and sewer systems. He has completed many design projects throughout Utah and Texas, which included design coordination with clients and preparation of plans, specification, and contract documents. On these projects, Colton served as the main point of contact between the contractor and the client during bidding and construction of the projects.



SELECT PROJECT EXPERIENCE

- RDA Phase 8, Westside Waterline; Vineyard, UT
- 100 East Waterline Design; Cedar Fort, UT
- Waterline Replacement; Charleston Water Conservancy District, UT
- SR-23 Drainage Study and Culvert Sizing; Mendon, UT
- EWP Drainage Study and Culvert Sizing; Cache County, UT
- FEMA Drainage Study and Culvert Sizing; Cache County, UT
- Dutch Hollow Pump Station; Midway, UT
- Storm Drain Master Plan; Clinton, UT
- Water Master Plan; Farmington, UT
- Main Street Extension Utility Design; Vineyard, UT

PROFESSIONAL REGISTRATIONS

Utah PE #10393120

Certified Facility Manager #US-17-10027

EDUCATION

MS, Civil Engineering, Utah State University, 2013

BS, Civil Engineering, Utah State University, 2012

EMPLOYMENT HISTORY

Project Engineer, J-U-B, Orem, UT, 01/2017-Present

Design Engineer, Halff Associates, Inc., Fort Worth , TX, 2014-2016

Design Engineer, J-U-B, Orem, UT, 2013-2014

Research Assistant, Water Research Laboratory, Logan, UT, 2007-2013

J-U-B ENGINEERS, INC.

THE LANGDON GROUP | GATEWAY MAPPING INC.

OTHER J-U-B COMPANIES

KIRSTEN ARMBRUSTER, PE > STRUCTURAL ENGINEER

Kirsten is a senior structural engineer for J-U-B and has over 20 years of experience in structural and bridge design projects. She has designed various types of structures including structural repairs, renovations, additions and new buildings and bridges for various clients throughout the Front Range of Colorado. Kirsten's design experience includes structures such as concrete box culverts, wood-framed buildings, steel-framed structures, aluminum-framed greenhouses, aluminum, glass and stone curtain walls, caisson, steel-pile and spread-footing foundations, and various retaining wall types. Her duties range from preliminary analysis to determine structure type, sizes and location, to preparing detailed final design and stress analysis of reinforced concrete, steel and composite structures.

SELECT PROJECT EXPERIENCE

- Boxelder Creek Trail Conceptual and Preliminary Design; Town of Wellington, CO
- Trail 10b Pedestrian Bridge over Big Barnes Ditch Reuse; City of Loveland, CO
- Baseline Safe Routes to School Concrete Retaining Wall; Boulder County, CO
- 20th St. Roadway Improvements Phase 4 from 83rd Ave to 86th Avenue; City of Greeley, CO
- Riverwalk Pedestrian Improvements with Paley Sculpture; Town of Breckenridge, CO
- East County Line Road Bridge Repair over Boulder Creek; Boulder County, CO
- Old St. Vrain Road Bridge over South St. Vrain Creek Replacement; Boulder County, CO
- 71st Avenue Bridge over Sheep Draw Replacement; City of Greeley, CO
- Taft Avenue over Big Barnes Ditch Bridge Replacement; City of Loveland, CO
- Sunset Street Bridge over St Vrain Creek Bridge replacement; City of Longmont, CO
- Bryan Avenue over Larimer #2 Canal Bridge Replacement; City of Fort Collins, CO
- Prospect Road over New Mercer Ditch Bridge Replacement; City of Fort Collins, CO
- Mulberry Street over New Mercer Ditch Bridge Replacement; City of Fort Collins, CO
- FCI Englewood Concrete Slab Replacement; Littleton, CO
- 1324 15th Avenue Custom Detached Garage; Longmont, CO
- 503 S Oneida Way Addition; Denver, CO
- US-34 Highway over Big Thompson River Bridge Replacements; Colorado Department of Transportation

PROFESSIONAL REGISTRATIONS

Colorado PE #35214
Wyoming PE #14536

EDUCATION

MA, Architecture, University of Colorado, 2010

BS, Civil Engineering, Washington University, 1995

EMPLOYMENT HISTORY

Senior Structural Engineer, J-U-B, Fort Collins, CO, 2015-Present

Senior Structural Engineer, Square-K Consulting, 2011-2015

Project Manager, Studio Gunn Architecture, 2007-2011

Bridge Engineer, DMJM Harris (AECOM), 2001-2007

Structural Engineer, Wilson & Company, 1998-2001

Structural Engineer, Wedgcor, Inc., 1997-1998

Engineering Consultant, Heitmann & Associates, 1995-1997

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OTHER J-U-B COMPANIES

ERICK L. CHRISTIANSEN, PE > STRUCTURAL ENGINEER

Erick is a licensed professional engineer with 13 years of project experience in municipal design engineering. As a design engineer, Erick has gained experience in areas of both civil and structural design, and he is experienced in all project phases from concept and design to construction. This background includes a variety of project types, such as water tanks, pump stations, box culverts, piping, site grading, and roadway design. Erick's experience includes both new construction, as well as rehabilitation projects. He has done work for various public and private clients in the states of Utah, Colorado, Wyoming, Washington, and Idaho.

PROFESSIONAL REGISTRATIONS
Utah PE #9824596-2202

EDUCATION
ME, Structural Engineering, Utah State University, 2015

BS, Mechanical Engineering, University of Utah, 2011

AAT, Computer-aided Drafting and Design, Davis Applied Technology College, 2005

EMPLOYMENT HISTORY
Design Engineer, J-U-B, Logan, UT, 2013-Present

Design Engineer, J-U-B, Kaysville, UT, 2011-2013

CADD Technician, J-U-B, Kaysville, UT, 2005-2011

SELECT PROJECT EXPERIENCE

WATER STORAGE TANKS

- Three Million Gallon Water Tank; North Ogden UT - Responsible for structural and civil design of 188'ø concrete water tank and associated piping to connect to existing system.
- 600,000 Gallon Water Tank; Coalville, UT - Responsible for structural and civil design of 96'ø concrete water tank and 400 linear feet of associated transmission piping to connect to existing system.
- 100,000 Gallon Water Tank Project; Cluff Ward, UT - Responsible for structural and civil design and construction management of 72-foot x 24-foot rectangular concrete water tank and 1,100 linear feet of associated transmission piping to connect to existing system.
- Six Million Gallon Reservoir; Herriman, UT - Responsible for CAD design and development of construction documents of 205'ø concrete water tank and 30-foot x 32-foot valve vault and 2,700 linear feet of associated transmission piping to connect to existing system.

WATER TRANSMISSION AND DISTRIBUTION PROJECTS

- Wellsville-Mendon Canal Piping; Hyrum/Wellsville, UT
- 200 South and 1600 South Water Line; Lewiston, UT
- South Valley Lateral Piping; Daggett County, UT
- Cedar Hollow Lateral Piping; Daggett County, UT
- 1700 North Water Main Upgrade; North Ogden, UT
- Drinking Water Treatment Facility; Woods Cross, UT
- Canal Piping and Lining; Davis and Weber Counties, UT
- Eden Valley Canal Piping; Farson, WY
- 200 North Overpass Utility Relocation; Kaysville, UT

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OTHER J-U-B COMPANIES

CUYLER S. FRISBY, PE > PROJECT ENGINEER

Cuyler is a civil engineer with four years of experience providing civil and environmental engineering services to clients throughout Nevada, California, and Utah. He has experience in sewer and storm drain design, water distribution system design, roadway rehabilitation, grading and drainage design, project/construction management, master planning, geographic information systems (GIS), and modeling of water distribution, storm drain, and sewer systems.

PROFESSIONAL REGISTRATIONS
California PE #86179
Nevada PE #024021

EDUCATION
MS, Civil Engineering, Brigham Young University, 2014

BS, Civil Engineering, Brigham Young University, 2013

EMPLOYMENT HISTORY
Project Engineer, J-U-B, Orem, UT, 03/26/2018-Present

SELECT PROJECT EXPERIENCE *(PRIOR TO J-U-B)*

- Hydraulic Modeling Support; Sewer System Hydraulic Model; South Tahoe Public Utilities District, CA
- Integrated Master Plan; City of Porterville, CA
- Pleasant Valley Interceptor Reach 3 and 4 Alternatives Study; Washoe County, NV
- Hydraulic Study; East Bay Dischargers Authority (EBDA), CA
- Cherry Street Pump Station Capacity Study; Union Sanitary District, CA
- Valley Edge Sewer Capacity Analysis, Phase II; Chico Land Investment, LLC
- Sunset Hills Water System Expansion; City of Yerington, NV
- Diablo Drive Water and Sewer Project; Gerlach General Improvement District; NV
- Sierra Colina Subdivision; Kingsbury General Improvement District, NV
- Keller-Heavenly Water System Alternatives Evaluation; South Tahoe Public Utility District, CA
- Unidirectional Flushing Plan; Canyon General Improvement District; NV
- Tahoe Beach Club Development, Phase 1; Kingsbury General Improvement District, NV
- Utility Master Plan Update; City of Yerington, NV
- TRI LLC Re-Use Model; Tahoe-Reno Industrial Center LLC, NV
- Six Mile Canyon Drainage Improvements Project; Storey County, NV
- 2015 and 2016 Cape Seal Projects; Storey County, NV
- 2014 Waterline and Paving Project; Beverly and Virginia for Kingsbury General Improvement District, NV

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OTHER J-U-B COMPANIES

JUBAL M. MYERS > CAD DESIGNER/ TECHNICIAN

Jubal has more than 34 years of work experience in drafting, design, and surveying. His experience has included culinary storage tanks, wells and water systems, sanitary sewer systems and treatment plant design, municipal infrastructure, land and commercial development, roadway design, land and construction surveying, earth dam and reservoir designs, and construction inspection. He is proficient working with AutoDesk Civil 3D, MicroStation, and Power InRoads.

SELECT PROJECT EXPERIENCE

- West Lateral Piping Project and Billy Creek SWA; Bostwich Park Water Conservancy District, CO
- Dutch Hollow Pump Station, Midway Irrigation Company; Midway, UT
- Provo-Orem Transportation Improvement Project, Utility Coordination and Design; Provo City and Orem City, UT
- Building 1781 Water Supply Line Replacement; Hill Air Force Base, UT
- Pressure Irrigation Storage Reservoir; Pleasant Grove City, UT
- Vineyard Redevelopment Agency Projects; Vineyard City, UT
- Sewer, Water and Storm Drain System Improvements; Blanding City, UT
- Culinary Water Wells Design and Improvements; Lehi City and Orem City, UT

EDUCATION

AAS, Drafting and Design Technology, Utah Technical College, 1984

EMPLOYMENT HISTORY

CAD Designer/Technician, J-U-B, Orem, UT, 2014-Present

Senior Civil Designer/ CAD Manager, MW Brown Engineering, Inc., Orem, UT, 2004-2014

Adjunct Instructor, Utah Valley State College, Orem, UT, 1999-2001

CAD Design Manager, RB&G Engineering, Inc., Provo, UT, 1984-2004

C > STRATEGY AND IMPLEMENTATION PLAN

We understand that the City would like to replace a portion of the Purdy Mesa raw water flowline from the pressure control tower above Sullivan Draw downstream to an existing pressure control vault. The total length of the project is approximately 1.25 miles and includes replacement of the pressure control tower with a 0.5 million gallon (minimum) pressure control tank, a flow control valve, a pressure control valve, combination air-vac/relief valves, and two clean out locations. The City has completed a hydraulic study for the Purdy Mesa flowline that includes design recommendations for this project. The bid documents (plans and specifications) will be developed based on findings and recommendations of the study. We also understand that the City is interested in controlling the new flow/pressure control devises remotely from the Orchard Mesa water treatment plant.

The City has secured the services of WestWater Engineering to provide a NEPA report for this project and would like the design consultant to provide engineering support as needed through the NEPA process with the BLM.

PROJECT APPROACH

We see a critical path component of this project being coordination with WestWater Engineering, the City's consultant providing the NEPA report to the BLM. We will work diligently to provide preliminary plans (a foot print of the project) to WestWater Engineering for the NEPA effort. The preliminary plan will also include infrastructure to accommodate electric supply to the site as needed. There is no requirement for CDPHE to be involved with review or site approval of raw water delivery systems associated with this design. CDPHE does not play a critical path role in this project.

The City desires to construct the new flow line within the existing forty-foot-wide easement for the current flowline. Upon award of this project, we will review the location of the existing flowline within the current easement. There may be areas where the easement is not centered longitudinally along the existing line, that may affect the horizontal location of the new line within the existing easement. Consideration will also be made to limit the use of wheeled equipment over the existing flow line during construction to mitigate potential damage to the working line during construction.

We will evaluate provision of power supply to support operation of a new flow control valve to be located at the current upper pressure control valve. We have discussed this with Grand Valley Power (GVP) representatives. Based on these discussions, it appears that a reliable GVP source can be provided to the site for considerably less than the opinion of probable cost identified in the hydraulic evaluation provided by Black and Veatch.

We will also identify improvements and provide design of new SCADA equipment to allow flow control and pressure control of the Purdy Mesa Flowline from the City's water treatment plant on Orchard Mesa.

We have evaluated possible equipment alternatives to accomplish the City's desire to provide flow control and control line pressure below the proposed pressure control tank. Equipment is available that can perform flow control and reduce pressure with one valve. This more elegant solution would include SCADA control of the equipment.

We will evaluate capital cost and maintenance cost for the PCT, and mitigation alternatives for the PCT overflow water. Bret has been involved with design and maintenance of concrete, steel, and fiberglass water storage tanks, both above ground and buried. He has a good understanding of cost and maintenance associated with these structures.

We will look at costs to pipe the PCT overflow water, or convey the water on the surface, down the steep slope. Our goal is to provide a onetime solution to mitigate erosion of the adjacent slope. We will consider present value costs and long-term maintenance for both PCT and erosion mitigation, basing our recommendation on initial cost and maintenance cost for design life of the improvements.

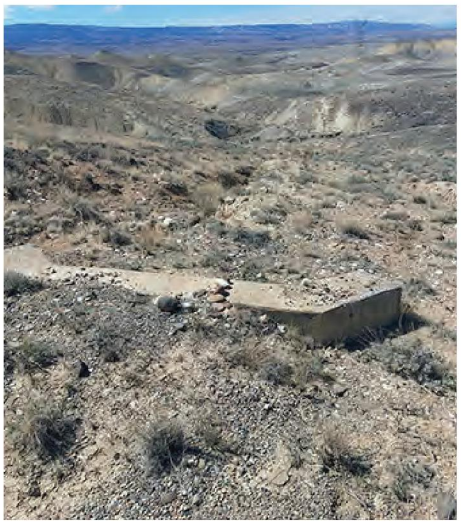
Access for maintenance along this section of the flowline is, and will continue to be, challenging. We will talk with City crews to confirm what type of equipment access they need, and will work to develop improved access along the pipe alignment as part of this design effort.

TASK 1 > PROJECT MANAGEMENT AND COORDINATION

J-U-B understands that communication needs to happen early and often during planning and design effort for the Purdy Mesa Flowline – Sullivan Draw project. We propose the same approach with this project and will develop and discuss a risk analysis during the project kick-off meeting. The risk analysis will identify variables that may affect project schedule, cost, or approach. We will present a plan to mitigate known risks, as well as any perceived or anticipated risks. These may include delay of schedule due to response from outside agencies, unknown geotechnical discoveries, or unanticipated outside agency requirements.

We have developed a project schedule that meets the City's requirements for this project. We have accounted for bi-weekly conference calls with the project working group. Documentation of these meetings will be provided by our Project Manager. We will provide written or email documentation of all communication between the City project manager and the J-U-B project manager through the course of this project. Our bi-weekly progress meetings will include:

- Activities completed since the last meeting.
- Problems encountered or anticipated.
- Early completion of activities.
- Late activities or activities behind schedule.
- Solutions for unresolved or newly identified problems.
- Schedule of upcoming activities.
- Status of schedule for Federal agency submittals, information on items required, or comments from Federal agencies.



Bi-weekly status reports will be provided within 24 hours of our project group meetings that will include percent of design components complete. We will invoice monthly during this design project.

A ***key critical path component*** is provision of preliminary plans to support WestWater Engineering's NEPA work required by the BLM. We would anticipate that full use of the existing 40-foot-wide easement will made during construction. The footprint of the new pressure control tower/tank, and possible power supply to new equipment will need to be identified early. We will work with WestWater Engineering to provide the information they need to meet submittal requirements for the NEPA process. We will also coordinate with the USACE Grand Junction office. We have a good working relationship with the local USACE staff. Bret has worked with Travis Morse on City projects, and on a current project with J-U-B Engineers. Based on scope and nature of the project construction of the new pipe line will likely be permitted under a USACE Nation Wide 12 permit for construction of underground utility lines crossing waters of the United States.

There is a short time allotted to accomplish design and meet the schedule for solicitation, award of a construction contract, and completion of the project later this year. Again, constant communication and coordination between our project manager and the City project manager will be needed to maintain the proposed schedule. We have included a project kickoff meeting and six progress meetings with City Staff in our scope.

We anticipate that our project manager will be in contact with the City project manager more frequently than the formal meetings. We also anticipate two site visits to get more detailed information or physically evaluate existing conditions during design.

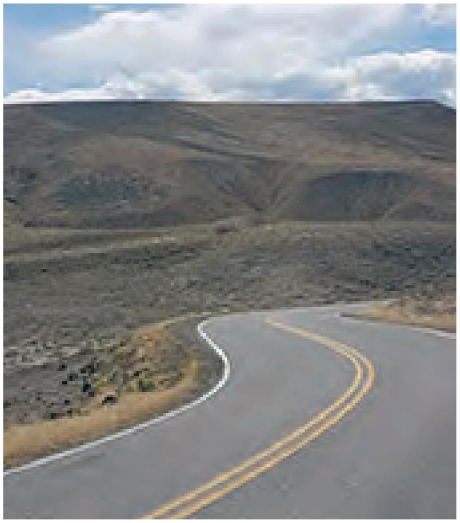
TASK 2 > DESIGN PLANS AND DESIGN REPORT

This flowline and appurtenances are critical components in the City's raw water conveyance system. We will design these improvements to insure longevity of the new portions of the system with an ability to easily access vital components for maintenance. We will provide a coordinated design taking into consideration staff's concerns for reliability and maintenance of the new infrastructure. Design will be based on our proven experience, and input from the staff who are responsible for upkeep and operation of the flowline, appurtenances, and SCADA equipment. The ability to control pressure in the flowline, mitigating a condition of excessive entrained air in the raw water is the goal of this design effort.

We will coordinate with the City project manager and staff maintaining clear communication throughout the design. We feel this will be vital for a quick review with minimal comments. Review submittals will be made at 30% design, 90% design, and Final design. An engineering design report will accompany the final design submittal to the City and federal agencies involved. We will coordinate with the USACE office to ensure that information they require is included on the plans and in the specifications. We will also be sure to include approval from Mesa County Road and Bridge Department for construction activities crossing Reeder Mesa Road.

Our local SCADA sub-consultant, Brain Mitchem with MPC, has extensive project experience along the West Slope and in the Grand Junction area. We will coordinate design with City staff that will be responsible for use and maintenance of the equipment. Provision of like equipment is essential to operation of the system. Our design will be well coordinated with the City water plant staff to be sure the new SCADA equipment communicates properly with the City's existing and planned future equipment.

We have considerable experience with construction of pipe lines in challenging conditions. Our design and construction management of past projects allows us to provide reliable Opinion of Probable Cost for Construction (OPCC) at 90% and Final design.



TASK 3 > FINAL BID DOCUMENTS

Bret is very familiar with the City of Grand Junction's Standard Contract Documents for Capital Improvements Construction and format the City uses to prepare Special Conditions, Special Provisions, and Technical Specifications. We will base our construction documents around the City of Grand Junction Standard Contract Documents. Our goal is to provide a document that is familiar to City staff providing project management and construction inspection.

Both final plans and specifications, and final design report, will be wet stamped by a professional engineer licensed in Colorado. An OPCC based on final design documents will be provided with the final bid documents.

We will coordinate with USACE, WestWater Engineering, and Mesa County to insure we receive approval of the final construction documents, plans and specifications, prior to July 31, 2018 as stated in the Request for Proposal. We feel that we can attain approval from the USACE and Mesa County by June 30, 2018.

TASK 4 > CONSTRUCTION PHASE SERVICES

Bidding Phase

We will be available during the bidding phase to provide technical support and answer any questions regarding design and construction approach. We will also coordinate with the City project manager to provide support as needed in preparation of the pre-bid meeting, and we will be present at the pre-bid meeting to answer questions and provide clarification if needed. We will also provide back up support as needed for addendums.

Construction Phase

Our project manager in Palisade is very familiar with construction of this type and will provide resident engineering support for the project. We have included a minimum of four site visits during construction, and can be available on an as-needed basis beyond monthly visits. We will also assist as needed in review and approval of shop drawings and RFI's that may be submitted.

PROJECT SCHEDULE

DATE		MILESTONE
May	3	Kick-off Meeting
	9	USACE PCN Development
	11	Working Group Meeting #1
	18	USACE NW 12 Submittal
	25	30% Comments / Working Group Meeting #2
	29	Site Visit
June	1	Working Group Meeting #3
	8	90% Plan Submittal / 90% OPCC and Working Group Meeting #4
	15	90% Comments / Working Group Meeting #5
	20	Working Group Meeting #6
	22	USACE NW 12 Permit Issued
	29	Final Plans / Specifications / OPCC

D > REFERENCES

SEPTIC SYSTEM ELIMINATION PROGRAM > GRAND JUNCTION, CO

TRENT PRALL
Public Works Director
333 West Avenue
Grand Junction, CO 81501
970.256.4047 > trentonp@gjcity.org

RDA PHASE 8, WESTSIDE WATERLINE > VINEYARD CITY, UT

DON E. OVERSON, PE
Public Works Director/City Engineer
125 South Main Street
Vineyard CITY, UT 84058
801.226.1929 > dono@vineyardutah.org > vineyard.utah.gov

WATER TANK AND TRANSMISSION LINE > CLUFF WARD PIPELINE COMPANY > COALVILLE, UT

DOUGLAS V. MOORE
President
501 East Chalk Creek Road
Coalville, UT 84017
435.901.2264 > dvmoore2264@gmail.com

Over the past five years, J-U-B's Executive Committee has conducted 368 in-person client feedback interviews throughout our services area—an average of 74 clients per year. As a testament to our success, clients are happy with our services 96% of the time and 99.5% state that they will use J-U-B again for future services.

E > FEE PROPOSAL

J-U-B's fee proposal, including the Section 7 Solicitation Response Form accompanied by a complete list of costs breakdown, has been provided separately in accordance with the RFP.

Also included is a fee proposal for the Project Design and Construction Alternative that we have presented for your consideration under the Additional Data section.

F > ADDITIONAL DATA

PROJECT DESIGN AND CONSTRUCTION ALTERNATIVE

We would like to propose a different approach to design and construction of this project that we feel would reduce costs to the City for both design and construction.

We propose to combine the Purdy Mesa Flow Line project with the Kannah Creek Intake project to gain economies of scale. During design we will combine design update meetings, and project coordination meetings for both projects, providing a cost savings for the City. We will also be able to reduce our fees for development of design plans and specifications by combining the projects.

USACE permitting for both projects can be included in one Pre-Construction Notification (PCN) and one Nationwide 12 permit application.

Bret Guillory has worked in the Grand Valley for the last 24 years designing and overseeing construction of municipal infrastructure. Based on this experience, we anticipate it is very likely that the same contractors will be bidding both these projects. Combining the two projects into one construction contract, with design and bid documents provided by the same engineering firm, the City stands to benefit from economies of scale for construction of the project(s). A larger project will also make the project more appealing to regional contractors, providing for a more competitive bidding environment.

Development of construction phasing for both projects, coordination with outside agencies, scheduling of transmission line tie-ins, and one less mobilization cost, will help to streamline the effort, and based on our experience, provide the City a substantial cost savings.

The City's project manager will be overseeing one contract instead of two, for both project design and construction. This approach will save time for the City's project manager, in addition to being more cost efficient for the City Water Department.

We have included a revised fee schedule (Section F > Additional Data) for this Design and Construction Alternative that reflects cost savings because of this proposed approach.

City of Grand Junction, Colorado

RFP-4511-18-DH | DESIGN SERVICES FOR PURDY MESA FLOWLINE – SULLIVAN DRAW PLAN DEVELOPMENT

J-U-B ENGINEERS, INC.

OTHER J-U-B COMPANIES: THE LANGDON GROUP; GATEWAY MAPPING INC.

305 S. Main, Suite 6; Palisade, CO | 970-208-8508

City of Grand Junction, Colorado

RFP-4511-18-DH
DESIGN SERVICES FOR PURDY MESA FLOWLINE – SULLIVAN DRAW PLAN DEVELOPMENT

E > FEE PROPOSAL

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THE LANGDON GROUP
GATEWAY MAPPING INC.
OTHER J-U-B COMPANIES
305 S. Main, Suite 6; Palisade, CO | 970-208-8508

April 17, 2018

City of Grand Junction, Colorado

RFP-4511-18-DH | DESIGN SERVICES FOR PURDY MESA FLOWLINE – SULLIVAN DRAW PLAN DEVELOPMENT

J-U-B ENGINEERS, INC.

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